LVD TEST REPORT

Report No.:	**STE05232515S**
Product:	Smart Metering Breaker
Model No.:	MT61GR, MT61GP
Prepared for:	**SHANGHAI MATIS ELECTRIC CO., LTD.**
Address:	Room 320, No. 83, Huanhu West Third Road, Pudong, Shanghai, China
Prepared by:	**Shenzhen STE Testing Laboratory Co., Ltd.**
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TEST REPORT

EN 61010-1

Safety requirements for electrical equipment for measurement, control, and laboratory use
Part 1: General requirements

Report Number.....:	STE05232515S
Tested by (name + signature).....:	Plum Xiao / Test engineer
Approved by (name + signature).....:	Allen Huang / Project manager
Date of issue.....:	June 03, 2025
Total number of pages.....:	45
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Applicant's name.....:	**SHANGHAI MATIS ELECTRIC CO., LTD.**
Address.....:	Room 320, No. 83, Huanhu West Third Road, Pudong, Shanghai, China
Manufacturer's name.....:	**SHANGHAI MATIS ELECTRIC CO., LTD.**
Address.....:	Room 320, No. 83, Huanhu West Third Road, Pudong, Shanghai, China
Test specification:	
Standard.....:	EN 61010-1: 2010+ A1: 2019
Test procedure.....:	Type test
Non-standard test method.....:	N/A
Test Report Form No.....:	IEC61010_1P
Test Report Form(s) Originator.....:	VDE Prüf- und Zertifizierungsinstitut GmbH
Master TRF.....:	Dated: 2021-04-12

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Test item description.....:	Smart Metering Breaker
Model/Type reference.....:	MT61GR, MT61GP
Trade Mark.....:	matis
Ratings.....:	Input: 230V~ / 400V 3~, 50Hz, Max. 80A

Summary of testing:

Testing location:

Shenzhen STE Testing Laboratory Co., Ltd.

3/F, Building 9, Hongde Factory, No. 63 Yuchang Road, Niuhu Community, Guanlan Street, Longhua District, Shenzhen, China

Tests performed (name of test and test clause):

- EN 61010-1: 2010+ A1: 2019

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

matis

Smart Metering Breaker

Model: MT61GR

Input: 230V~ / 400V 3~, 50Hz, Max. 80A



SHANGHAI MATIS ELECTRIC CO., LTD.

Room 320, No. 83, Huanhu West Third Road, Pudong, Shanghai, China

Importer: xxxx

Address: xxxx

Made in China

Remarks:

1. Height of CE mark is 5mm or more, height of WEEE symbol is 7mm or more, height of other marks is 5mm or more, height of letters and numerals is 2mm or more.

TEST ITEM PARTICULARS:	
Type of item ..... :	~~Measurement~~ / Control / ~~Laboratory~~
Description of equipment function..... :	Circuit on-off control
Connection to MAINS supply..... :	~~Permanent~~ / ~~Detachable cord set~~ / Terminals ~~Non detachable cord set~~ / ~~None~~ / ~~Battery operated~~
Overvoltage category..... :	II / ~~III~~ / ~~IV~~
POLLUTION DEGREE..... :	IIIb
Means of protection..... :	Class I
Environmental conditions..... :	Normal / ~~Extended (Specify):~~
For use in wet locations..... :	~~Yes~~ / No
Equipment mobility..... :	~~Portable~~ / ~~Hand-held~~ / ~~Floor standing~~ / ~~Fixed~~ / Built-in
Operating conditions..... :	Continuous / ~~Short-time~~ / ~~Intermittent~~
Marked degree of protection to IEC 60529..... :	IPX0

Possible test case verdicts:	
- test case does not apply to the test object..... :	N/A (or N)
- test object does meet the requirement..... :	P (Pass)
- test object does not meet the requirement..... :	F (Fail)

Testing..... :	
Date of receipt of test item..... :	December 23, 2024
Date(s) of performance of tests..... :	December 23, 2024 to June 03, 2025

General remarks:

The test results presented in this report relate only to the object tested.
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"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided..... :	☐ **Yes** ☒ **Not applicable**

General product information

1, The product is a circuit breaker.

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
1	**Scope and object**		**P**
1.3	Verification	Type tests	P
1.4	Environmental conditions	See below	P
1.4.1	Normal environmental conditions		P
a)	indoor use		P
b)	altitude up to 2 000 m		P
c)	temperature 5 ℃ to 40℃		P
d)	maximum relative humidity		--
e)	mains supply voltage fluctuations	±10 % of the nominal voltage	P
f)	transient overvoltages	Overvoltage category II	P
g)	temporary overvoltages occurring on the mains supply		P
h)	Applicable pollution degree of the intended environment	Pollution degree 2	--
1.4.2	Extended environmental conditions		N
a)	outdoor use		N
b)	altitude above 2 000 m		N
c)	temperature below 5 ℃or above 40℃		N
d)	maximum relative humidity		--
e)	mains supply voltage fluctuations	Exceeding ±10 % of the nominal voltage	N
f)	Wet Location		N
g)	transient overvoltages	Overvoltage category II	P
4	**Tests**		**--**
4.1	General	Type tests	P
4.2	Sequence of tests	inspected after each test	P
4.3	Reference test conditions	15-20℃, 75-106kPa	P
4.4	**Testing in SINGLE FAULT CONDITION**	**(see Form A.1)**	**P**
4.4.1	General		P
4.4.2	Application of fault conditions		--
4.4.2.1	Fault conditions shall include those specified in 4.4.2.2 to 4.4.2.14	(see Form A.1)	--
	After each application of a fault condition, the equipment or part shall pass the applicable tests of 4.4.4.	See below	P

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.4.2.2	Protective impedance		N
4.4.2.3	Protective conductor	(see Form A.1 & Form A.6)	P
4.4.2.4	Equipment or parts for short-term or intermittent operations	Continuous operation	N
4.4.2.5	Motors		P
	– stopped while fully energized	See appened table	P
	– prevented from starting	See appened table	P
	– one phase interrupted (multi-phase)		N
4.4.2.6	Capacitors		N
4.4.2.7	Mains transformers		P
4.4.2.7.1	Short circuit	(See Form A.1)	P
4.4.2.7.2	Overload	(See Form A.1)	P
4.4.2.8	Outputs	No hazards	P
4.4.2.9	Equipment for more than one supply		N
4.4.2.10	Cooling		P
a)	air-holes with filters shall be closed;	See appended table	P
b)	forced cooling by motor-driven fans shall be stopped		N
c)	cooling by circulation of water or other coolant shall be stopped		N
d)	loss of cooling liquid shall be simulated		N
4.4.2.11	Heating devices	No such heating devices	N
a)	Overridden timers for limit the heating period		N
b)	Overridden temperature controllers		N
4.4.2.12	Insulation between circuits and parts		P
4.4.2.13	Interlocks	No such interlocks	N
4.4.2.14	Voltage selectors		N
4.4.3	Duration of tests		--
4.4.3.1	The equipment shall be operated unit further change as a result of the applied fault is unlikely	Comply with requirement	P
4.4.3.2	A device interrupted or limited the current shall limit the temperature of parts easily touched		N
4.4.3.3	Fuse opened and not operate within approximately 1 s, and the current through the fuse shall be measured		N
4.4.4	Conformity after application of fault conditions		--

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Clause	Requirement + Test	Result - Remark	Verdict
4.4.4.1	Protection against electric shock is checked after the application of single fault as follows:		P
	a), no accessible conductive parts become hazardous live	Not become hazardous live parts	P
	b), performing a voltage test on double insulation or reinforced insulation	See clause 6.8	P
	c), measuring the temperature of transformer winding		P
4.4.4.2	Temperature of outer surface of enclosure and of parts that can be touched is checked	See appended table	P
4.4.4.3	Protection against the spread of fire is checked	See appended table	P
4.4.4.4	Protection against other hazard is checked	See clause 7 and 8 and 11 to 16	P
5	**MARKING AND DOCUMENTATION**		--
5.1	**Marking**		--
5.1.1	General	See below	P
	Required equipment markings are:		--
	visible:	See page 3	P
	From the exterior; or	See page 3	P
	After removing a cover; or	No removing cover	N
	Opening a door	No opening door	N
	After removal from a rack or panel		N
	Not put on parts which can be removed by an OPERATOR	No such parts	N
	Letter symbols (IEC 60027) used		P
	Graphic symbols (IEC 61010-1: Table 1) used		P
	Graphic symbols shall be explained in the documentation	See user manual or specification	P
5.1.2	Identification		--
	a) Manufacturer’s or supplier’s name or trademark	See label	P
	b) Model number, name or other means	See label	P
	Manufacturing location identified	Only one manufacturing location.	N
5.1.3	Mains supply		--
	Equipment is marked as follows:	See below	P
a)	Nature of supply:		--

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Clause	Requirement + Test	Result - Remark	Verdict
	1) a.c. RATED mains frequency or range of frequencies ……..…..:	50Hz	P
	2) d.c. with symbol 1		P
b)	RATED supply voltage(s) or range.....:	230V~ / 400V 3~	P
c)	Max. RATED power (W or VA)or input current.....:	Max. 80A	P
c)	The measured value not more than 110 %	(see appended table)	P
	If more than one voltage range:	See page 4	P
	Separate values marked; or		P
	Values differ by less than 20 %		P
d)	OPERATOR-set for different RATED supply voltages:		N
	Indicates the equipment set voltage		N
	PORTABLE EQUIPMENT indication is visible from the exterior		N
	Changing the setting changes the indication		N
e)	Accessory mains socket-outlets accepting standard mains plugs are marked:	No such accessory	N
	With the voltage if it is different from the mains supply voltage..... :		N
	For use only with specific equipment		N
	If not marked for specific equipment it is marked with:		N
	The maximum rated current or power; or		N
	Symbol 14 with full details in the documentation		N
5.1.4	Fuses		--
	OPERATOR replaceable fuse marking (see also 5.4.5).....:		N
5.1.5	Terminals, connections and operating devices	Comply with the standard	P
5.1.5.1	General		--
	Where necessary for safety, indication of purpose of terminals, connectors, controls and indicators marked	Comply with the standard	P
	If insufficient space, symbol 14 used		P
5.1.5.2	Terminals	See below	P
	Mains supply terminals identified		P
	Other terminal marking:		P
a)	functional earth terminals (symbol 5 used)		N
b)	protective conductor terminals:		--

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Clause	Requirement + Test	Result - Remark	Verdict
	Symbol 6 is placed close to or on the terminal; or		N
	Part of appliance inlet		N
c)	Terminals of control circuits which are permitted by 6.6.3 to be connected to accessible conductive parts, with symbol 7 of table 1 unless connection is self-evident;		N
d)	Hazardous live terminals supplied from the interior	Comply with the standard	P
	Symbol 14 used; or	⚠ See page 3	P
	RATINGS marked	See page 3	P
	Standard mains socket outlet; or		N
5.1.6	Switches and circuit breakers		P
	If disconnecting device, on or off position marked		P
	Symbols 9 and 10 of Table 1		P
	A lamp alone is not considered to be a satisfactory marking		N
	For a push-button switch		N
5.1.7	Equipment protected by double insulation or reinforced insulation		P
	Protected throughout (symbol 11 used)		N
	Only partially protected (symbol 11 not used)		P
5.1.8	Field-wiring terminal boxes		N
	If terminal or enclosure exceeds 60 °C:		N
	Cable temperature rating marked		N
	Marking visible or beside terminal		N
5.2	**Warning markings**		--
	Visible when ready for normal use		P
	Are near or on applicable parts		P
a)	Symbols shall be at least 2.75 mm high. Text shall be at least 1.5 mm high and contrast in colour with the background		P
b)	Symbols or text moulded, stamped or engraved in a material shall be at least 2.0 mm high. If not contrasting in colour, they shall have a depth or raised height of at least 0.5 mm		P
	If necessary marked with symbol 14		P
	Statement to isolate or disconnect		P
5.3	**Durability of markings**	See appended table	P

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Clause	Requirement + Test	Result - Remark	Verdict
	The required markings remain clear and legible in normal use		P
5.4	**Documentation**		--
5.4.1	General		P
	Equipment is accompanied by documentation which includes:		P
a)	Intended use	See user manual	P
b)	Technical specification	See user manual	P
c)	name and address of the manufacturer or supplier from whom technical assistance	See user manual	P
d)	Information specified in 5.4.2 to 5.4.5	See user manual	P
e)	information about how to mitigate RISKS	See user manual	P
f)	indicate that only accessories which meet the manufacturer's specifications shall be used	See user manual	P
g)	provide guidance on how to determine that the equipment is functioning correctly	See user manual	P
h)	instructions for lifting and carrying	See user manual	P
	Warning statements and a clear explanation of warning symbols	See user manual	P
	include a statement that it must be consulted in all cases where symbol 14 of Table 1 is marked	See user manual	P
	Documentation may be provided on printed or electronic media		P
5.4.2	Equipment ratings		--
	Documentation includes:		P
a)	Supply voltage or voltage range	See page 3	P
	Frequency or frequency range	Ditto	P
	Power or current rating	Ditto	P
b)	Description of all input and output connections	See user manual	P
c)	Rating of insulation of external circuits		P
d)	Statement of the range of environmental conditions		P
e)	Degree of protection (IEC 60529)	IPX0	N
5.4.3	Equipment installation	See user manual	P
	Documentation includes instructions for:		--
a)	Assembly, location and mounting	See user manual	P
b)	Protective earthing		N
c)	Connections to supply	See user manual	P

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Clause	Requirement + Test	Result - Remark	Verdict
d)	Permanently connected equipment:		P
	1) Supply wiring requirements		P
	2) If external switch or circuit-breaker, requirements and location recommendation		P
e)	Ventilation requirements	See user manual	P
f)	Special services (e. g. air, cooling liquid)		N
g)	Maximum sound power level		N
h)	Instructions about sound pressure		N
5.4.4	Equipment operation		--
	Instructions for use include:		P
a)	Identification of operating controls and modes		P
b)	Positioning for disconnection		P
c)	Interconnection		P
d)	Specification of intermittent operation limits		N
e)	Explanation of symbols used		P
f)	Replacement of consumable materials		N
g)	Cleaning and decontamination		P
h)	Listing of any poisonous or injurious gases and quantities		N
i)	Risk-reduction procedures relating to flammable liquids		N
j)	methods of reducing the RISKS of burns from surfaces permitted to exceed the temperature limits of 10.1		P
	A statement about protection impairment if used in a manner not specified by the manufacturer		P
5.4.5	Equipment maintenance and service		--
	Instructions include:		P
	Sufficient preventive maintenance and inspection information		P
	Replacement of supply cords		P
	Specific battery type		P
	Any manufacturer specified parts		P
	Rating and characteristics of fuses	See following table	P
	Provided for service personnel:		--
	a) product-specific risks that may affect the service personnel		P

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Clause	Requirement + Test	Result - Remark	Verdict
	b) protective measures for these risks		P
	c) verification of the safe state of the equipment after repair		P
5.4.6	Integration into systems or effects resulting from special conditions	--	
	Aspects resulting from integration into systems or effects resulting from special ambient or application conditions shall be described in the documentation		P

6	**PROTECTION AGAINST ELECTRIC SHOCK**	**(see appended table)**	**--**
6.1	**General**		**P**
6.1.1	Requirements		P
	Accessible parts not hazadous live in normal condition and single fault condition		P
	Conformity is checked by the determination of 6.2 and 6.3 followed by the tests of 6.4 to 6.11	See below	P
6.1.2	Exceptions		--
	it is not feasible for operating reasons to prevent the following parts being both accessible and hazardous live		P
	a) parts of lamps and lamp sockets after lamp removal		N
	b) parts intended to be replaced by an OPERATOR		P
	hazardous live during the replacement or other operator action, but only if they are accessible only by means of a tool and have a warning marking		P
	Capacitance test	(see appended tables)	P
	Parts not hazardous live 10 s after interruption of supply		P
6.2	**Determination of accessible parts**		**P**
6.2.1	General	(see appended table A.6)	P
6.2.2	Examination	10N with test finger	P
6.2.2	Openings above parts that are hazardous live		P
6.2.3	Openings for pre-set controls	No such controls	N
6.3	**Limit values for accessible parts**		**--**
6.3.1	Levels in normal condition	(see appended table)	N
6.3.2	Levels in single fault condition	(see appended table)	N
6.4	**Primary means of protection**		**P**

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Clause	Requirement + Test	Result - Remark	Verdict
6.4.1	General		P
	Accessible parts shall be prevented from becoming hazardous live by following:		P
6.4.2	Enclosures and protective barriers		P
	- meet the rigidity requirements of 8.1		P
	- for provide protection by basic insulation		N
	- provide protection by limiting access, clearances and creepage distances between accessible parts and hazardous live parts shall meet the requirements of 6.7		P
6.4.3	Basic insulation		P
	meet the requirements of 6.7		P
6.4.4	Impedance		N
	impedance used as a primary means of protection		--
	- a) limit the current or voltage to not more than the applicable level of 6.3.2		N
	- b) be rated for the maximum working voltage and for the amount of power that it will dissipate		N
	- c) meet the requirements of 6.7		N
6.5	**Additional means of protection in case of single fault conditions**		**P**
6.5.1	General		--
6.5.2	Protective bonding		N
6.5.2.1	General		--
	Accessible conductive parts:		--
	Bonded to the protective conductor terminal; or		N
	Separated by screen or barrier bonded to protective conductor terminal from parts which are hazardous live		N
6.5.2.2	Integrity of protective bonding		N
a)	Protective bonding consists of directly connected structural parts or discrete conductors or both; and withstands thermal and dynamic stresses		N
b)	Soldered connections:		N
	Independently secured		N
	Not used for other purposes		N
c)	Screw connections are secured		N
d)	Protective bonding not interrupted		N

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Clause	Requirement + Test	Result - Remark	Verdict
e)	Any moveable connection specifically designed, and meets 6.5.2.4		N
f)	No external metal braid of cables used		N
g)	If mains supply passes through:		--
	Means provided for passing protective conductor;		N
	Impedance meets 6.5.1.3.		N
h)	Protective conductors bare or insulated, if insulated, green/yellow		N
	Exceptions:		--
	1) earthing braids;		N
	2) internal protective conductors etc.;		N
	Green/yellow not used for other purposes		N
	terminal suitable, and meets 6.5.2.3		N
6.5.2.3	Protective conductor terminal		N
a)	Contact surfaces are metal		N
b)	Appliance inlet used		N
c)	For rewireable cords and permanently connected equipment, protective conductor terminal is close to mains supply terminals		N
d)	If no mains supply is required, any protective conductor terminal:		--
	Is near terminals of circuit for which protective earthing is necessary		N
	External if other terminals external		N
e)	Equivalent current-carrying capacity to mains supply terminals	(see appended table)	N
f)	If plug-in, makes first and breaks last		N
g)	If also used for other bonding purposes, protective conductor:		--
	Applied first;		N
	Secured independently;		N
	Unlikely to be removed by servicing; or		N
	Warning marking requires replacement of protective conductor		N
h)	Protective conductor of measuring circuit:		--
	1) Current rating;		N
	2) protective bonding:		N
	Not interrupted; or		N

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Clause	Requirement + Test	Result - Remark	Verdict
	Indirect bonding used (see 6.5.1.5)		N
i)	Functional earth terminals allow independent connection		N
j)	If a binding screw:		--
	Suitable size for bond wire		N
	Not smaller than M 4 (No. 6)		N
	At least 3 turns of screw engaged		N
k)	Contact pressure not capable of reduction by deformation of materials		N
	Passes tightening torque test	(see appended table)	N
6.5.2.4	Impedance of protective bonding of plug-connected equipment	(see appended table)	N
6.5.2.5	Impedance of protective bonding of permanently connected equipment	(see appended table)	N
6.5.2.6	Transformer protective bonding screen	(see appended table)	N
6.5.3	double insulation and reinforced insulation (see 6.7)	See 6.7	P
6.5.4	Protective impedance	(see appended table)	--
a)	single component used, that safety and reliability for protection against electric shock is assured		N
	- rated for twice the maximum working voltage		N
	- if a resistor, rated for twice the power dissipation for the maximum working voltage		N
b)	A combination of components used	No use such component	N
	Components, wires and connections are rated as required sw		N
6.5.5	Automatic disconnection of the supply		--
	If used, it meets :		P
a)	be rated to disconnect the load within the time specified in figure 2		P
b)	be rated for the maximum rated load conditions of the equipment		P
6.5.6	Current- or voltage-limiting device		--
	If used, it meets :		N
a)	be rated to limit the current or voltage to the levels not exceeding the values of 6.3.2		N
b)	shall be rated for the maximum working voltage and, if applicable, for the maximum operational current		P

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Clause	Requirement + Test	Result - Remark	Verdict
c)	clearance and creepage distance between the terminations of the current or voltage limiting device meet requirements of 6.7 for supplementary insulation		N
6.6	**Connections to external circuits**		**--**
6.6.1	General		--
	Connections do not cause accessible parts of the following to become hazardous live in normal condition or single fault condition:		N
	Separation of circuits provided; or		N
	Short circuit of separation does not cause a Hazard		N
	Instructions or markings include:		P
	a) rated conditions for terminal		N
	b) Required rating of external circuit insulation		N
6.6.2	terminals for external circuits		--
	terminals which receive a charge from an internal capacitor are not hazardous live	(see appended table)	N
6.6.3	Circuits with terminals which are hazardous live		--
	These circuits are:		--
	Not connected to accessible conductive parts; or		N
	Connected to accessible conductive parts, but are not mains circuits and have one terminal contact at earth potential		N
	No accessible conductive parts are hazardous live		N
6.6.4	Accessible terminals for stranded conductors		N
	No risk of accidental contact because:		--
	Located or shielded		N
	Self-evident or marked whether connected to accessible conductive parts		N
	Accessible terminals will not work loose		N
6.7	**Insulation requirements**		**--**
6.7.1	The nature of insulation		--
6.7.1.1	General		--
	requirements for insulation depend on:		--
	- the required level of insulation	Reinforce insulation	P
	- the maximum TRANSIENT OVERVOLTAGE	OVERVOLTAGE CATEGORY II	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- the maximum WORKING VOLTAGE	400V~	P
	- he POLLUTION DEGREE of the micro-environment	POLLUTION DEGREE 2	P
	- the maximum TEMPORARY OVERVOLTAGE		P
6.7.1.2	Clearances		--
	Multiplication factor	1 (rated operating altitude ≤ 2000m)	P
6.7.1.3	Creepage distances		--
	Material group IIIb	100 ≤ CTI < 175	P
6.7.1.4	Solid insulation		--
6.7.1.5	Requirements for insulation according to type of circuit	see 6.7.2, 6.7.3, K1, K2, K3	--
6.7.2	Insulation for MAINS CIRCUITS of OVERVOLTAGE CATEGORY II with a nominal supply voltage up to 300 V		P
6.7.2.1	**CLEARANCES and CREEPAGE DISTANCES**	**(See appended table)**	**P**
6.7.2.2	**Solid insulation**	**See below**	**P**
6.7.2.2.1	General		--
6.7.2.2.2	Moulded and potted parts	enclosure	P
6.7.2.2.3	Inner insulating layers of printed wiring boards		N
	For REINFORCED INSULATION (RI):		--
	a) the thickness of the insulation is at least 0,4 mm		N
	b) two separate layers, each of which is BASIC INSULATION (BI);		N
	c) two separate, and the combination of layers is REINFORCED INSULATION (RI)		N
6.7.2.2.4	Thin-film insulation	RI for transformer	P
	a) the thickness of the insulation is at least 0,4 mm	>1mm	P
	b) two separate layers, each of which is BASIC INSULATION (BI);		P
	c) two separate, and the combination of layers is REINFORCED INSULATION (RI)	Electric strength: 3000V~, 1min	P
6.7.3	Insulation for secondary circuits derived from MAINS CIRCUITS of OVERVOLTAGE CATEGORY II up to 300 V		--
6.7.3.1	General		--
6.7.3.2	Clearances		P
6.7.3.3	Creepage distances		P
6.7.3.4	**Solid insulation**		**P**

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Clause	Requirement + Test	Result - Remark	Verdict
6.7.3.4.1	General		P
6.7.3.4.2	Moulded and potted parts		P
6.7.3.4.3	Inner insulating layers of printed wiring boards		P
6.7.3.4.4	Thin-film insulation		N
6.8	**Procedure for voltage tests**	**(See appended table)**	**P**
6.8.1	General		--
6.8.2	Humidity preconditioning	40℃, 94%RH, 48h	--
6.8.3	Test procedures	(See appended table)	--
6.8.3.1	The a.c. voltage test		--
6.8.3.2	The 1 min d.c. voltage test		--
6.8.3.3	The impulse voltage withstand test		--
6.9	**Constructional requirements for protection against electric shock**		**--**
6.9.1	General		--
	If a failure could cause a hazard:		N
a)	Security of wiring connections		P
b)	Screws securing removable covers	No such covers	N
c)	Accidental loosening		P
6.9.2	Insulating materials		P
a)	Easily damaged materials not used		P
b)	Non-impregnated hydroscopic materials not used		P
6.9.3	Colour coding		P
	Green-and-yellow insulation shall not be used except for:		--
	a) protective earth conductors;		P
	b) PROTECTIVE BONDING conductors;		N
	c) potential equalization conductors for safety purposes;		N
	d) functional earth conductors.		N
6.10	Connection to mains supply source and connections between parts of equipment		--
6.10.1	Mains supply cords		--
	rated for maximum equipment current (see 5.1.3c)		N
	Cable complies with IEC 60227 or IEC 60245		N
	Heat-resistant if likely to contact hot parts		N
	Temperature rating (cord and inlet)		N

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Clause	Requirement + Test	Result - Remark	Verdict
	Green/yellow used only for connection to protective conductor terminals		N
	Detachable cords with IEC 60320 mains connectors:		--
	Conform to IEC 60799; or		N
	Have the current rating of the mains connector		N
6.10.2	Fitting of non-detachable mains supply cords		N
6.10.2.1	Cord entry		N
	protected against abrasion and sharp bends at the point where the cord enters the equipment		--
a)	an inlet or bushing with a smoothly rounded opening		N
b)	a reliably fixed flexible cord guard made of insulating material protruding		N
	Non-detachable cord protection:		N
6.10.2.2	Cord anchorages:		N
a)	Cord is not clamped by direct pressure from a screw		N
b)	Knots are not used		N
c)	Cannot push the cord into the equipment to cause a hazard		N
d)	No failure of cord insulation in anchorage with metal parts		N
e)	not loosen the cord anchorage without the use of a TOOL		N
f)	be designed so that cord replacement does not cause a HAZARD, and it shall be clear how the relief from strain is provided		N
	compression bushing:		N
	1) Clamps all types and sizes of mains cords; and		N
	2) Is suitable:		N
	For connection to terminals provided; or		N
	It is designed for screened mains cord		N
6.10.3	Plugs and connectors		--
	Mains supply plugs, connectors etc., conform with relevant specifications		P
	If equipment supplied at voltages below 6.3.2.a) or from a sole source:		P
	Plugs of supply cords do not fit mains sockets above rated supply voltage		N

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Clause	Requirement + Test	Result - Remark	Verdict
	Mains-type plugs used only for connection to mains supply		N
	Plug pins which receive a charge from an internal capacitor		N
	Accessory mains socket outlets:		N
	a) Marking if accepts a standard mains plug (see 5.1.3e)		N
	b) Input has a protective earth conductor if outlet has earth terminal contact		N
6.11	**Disconnection from supply source**		**--**
6.11.1	General	See below	P
	Disconnects all current carrying conductors		P
6.11.2	Exceptions		--
a)	Equipment supplied by low energy source; or		N
b)	Equipment connected to impedance protected supply; or		N
c)	Equipment constitutes an impedance protected load		N
6.11.3	Requirements according to type of equipment		--
6.11.3.1	Permanently connected equipment and multi-phase equipment		P
	Employs switch or circuit-breaker		P
	If switch or circuit-breaker is not part of the equipment, documentation specifies:		P
a)	Switch or circuit-breaker to be included in building installation		P
b)	Location		P
c)	Marking		P
6.11.3.2	Single-phase cord-connected equipment		P
	Equipment is provided with:		--
a)	Switch or circuit-breaker; or		P
b)	Appliance coupler (disconnectable without tool); or		P
c)	Separable plug (without locking device)		P
6.11.4	Disconnecting devices		--
6.11.4.1	General		--
	Electrically close to the supply		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Power-consuming components shall not be electrically located between the supply source and the disconnecting device		P
6.11.4.2	Switches and circuit-breakers		P
	When used as disconnection device:		--
	Meets IEC 60947-1 and IEC 60947-3		P
	Marked to indicate function		P
	Not incorporated in mains cord		P
	Does not interrupt protective earth conductor		P
6.11.4.3	Appliance couplers and plugs		--
	Where an appliance coupler or separable plug is used as the disconnecting device		N
	Readily identifiable and easily reached by the operator		N
	Single-phase portable equipment cord length ≤ 3 m		N
	Protective earth conductor connected first and disconnected last		N
7	**PROTECTION AGAINST MECHANICAL HAZARDS**		**--**
7.1	General	See below	--
	Conformity is checked by 7.2 to 7.7		P
7.2	**Sharp edges**		**--**
	All easily-touched parts of the equipment shall be smooth and rounded		P
	easily-touched parts of the equipment shall not cause an injury in SINGLE FAULT CONDITION		P
7.3	**Moving parts**		**N**
7.3.1	General		--
7.3.2	Exceptions		--
a)	For obviously intended to operate on parts or materials external to the equipment, shall be designed to minimize inadvertent touching of these moving parts		N
b)	If operator access permitted:		--
	1) Access requires tool		N
	2) Statement about training		N
	3) Warning markings or symbol 14		N

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Clause	Requirement + Test	Result - Remark	Verdict
7.3.3	RISK assessment for mechanical HAZARDS to body parts		--
	RISKS shall be reduced to a tolerable level by at least the applicable minimum protective measure of Table 12		N
7.3.4	Limitation of force and pressure		N
	The maximum tolerable continuous contact pressure is 50 N/cm^2, with a maximum force of 150 N.		N
	The maximum tolerable temporary force for body contact areas of at least 3 cm^2 is 250 N for a maximum duration of 0,75 s		N
7.3.5	Gap limitations between moving parts		N
7.3.5.1	Gap limitations between moving parts – Access normally allowed		N
7.3.5.2	Gap limitations between moving parts – Access normally prevented		N
7.4	**Stability**	Fixed or built-in equipment	N
	For each castor and support foot:		--
	- RATED to support a load of at least 4 times its normal load		N
	- tested according to d) and e)		N
	Conformity tests:		--
a)	10° tilt test		N
b)	multi-directional force test		N
c)	downward force test		N
d)	castor or support foot that supports the greatest load (M) is loaded with 4 times that load (4M)		N
e)	The castor or support foot that supports the greatest load is removed from the equipment and the equipment is placed on a flat surface		N
7.5	**Provisions for lifting and carrying**		**--**
7.5.1	General		--
	Equipment or parts having a mass of 18 kg or more	No Handles or grips	N
7.5.2	Handles and grips		N
	Handles or grips withstand four times weight		N
7.5.3	Lifting devices and supporting parts		--
	four times the maximum load		N
7.6	**Wall mounting**		**N**

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Clause	Requirement + Test	Result - Remark	Verdict
	Mounting brackets withstand four times weight		N
7.7	**Expelled parts**		**--**
	Equipment contains or limits the energy		P
	Protection not removable without the aid of a tool		P
8	**Mechanical resistance to shock and impact**		**--**
8.1	General		--
	After the tests of 8.2 to 8.3		P
	hazardous live parts not accessible		P
	Voltage tests of 6.8	(see appended table)	P
i)	no leaks of corrosive or harmful substances		P
ii)	enclosure shows no cracks (hazard)		P
iii)	clearances not less than their permitted values	(see appended table)	P
iv)	insulation of internal wiring remains undamaged		P
v)	barriers not damaged or loosened		P
vi)	No moving parts exposed, except permitted by 7.3		P
vii)	No damage which could cause spread of fire		P
8.2	**Enclosure rigidity tests**		**--**
8.2.1	Static test		--
	a force of 30 N applied by the hemispherical end of a hard rod of 12 mm diameter.	See 8.1	P
8.2.2	Impact test		--
	impact by a smooth steel sphere with a mass 500 g ± 25 g and with a diameter of approximately 50 mm	See 8.1	P
8.3	**Drop test**		**--**
8.3.1	Equipment other than hand-held equipment and direct plug-in equipment		N
8.3.2	Hand-held equipment and direct plug-in equipment		N
9	**Protection against the spread of fire**		**P**
9.1	**General**		**--**
	Conformity for each source of hazard or area of the equipment is checked by one of the following:	(See appended table)	--
a)	Fault test of 4.4; or	(See appended table)	P
b)	Application of 9.2 (eliminating or reducing the sources of ignition); or		P

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Clause	Requirement + Test	Result - Remark	Verdict
c)	Application of 9.3 (containment of fire within the equipment)		P
9.2	**Eliminating or reducing the sources of ignition within the equipment**	**See below**	**--**
a)	1) Limited-energy circuit (see 9.4); or		N
	2) Insulation meets the requirements for basic insulation; or	(see appended table)	P
	Bridging the insulation does not cause ignition	(see appended table)	P
b)	Any ignition hazard related to flammable liquids (see 9.5)	No flammable liquid	N
c)	No ignition occurs when tested in single fault condition	(see appended table)	N
9.3	**Containment of the fire within the equipment, should it occur**		**--**
9.3.1	General		--
a)	Energizing of the equipment is controlled by an operator held switch		P
b)	Enclosure is conform with constructional requirements of 9.3.2; and		P
	Requirements of 9.5 are met		P
9.3.2	Constructional requirements		P
a)	Connectors and insulating material have flammability classification FV2 or better	(see appended table)	P
b)	Insulated wires and cables shall retard flame propagation. Meet: IEC 60332	(see appended table)	P
c)	The enclosure is constructed as follows :	The equipment has bottom openings	--
	1) Bottom and sides constructed with:		P
	i) No openings; or		N
	ii) be made of metal with perforations as specified in Table 16; or		P
	iii) Metal screen with a mesh		N
	iv) openings with baffles according to Figure 12		P
	2) Material of enclosure and any baffle or flame barrier is made of:		--
	Metal (except magnesium); or		P
	Non metallic materials have flammability classification FV1 or better		N
	3) enclosure and any baffle or flame barrier have adequate rigidity		P

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Clause	Requirement + Test	Result - Remark	Verdict
9.4	**Limited-energy circuit**		**--**
a)	Potential not more than 30 r.m.s. and 42.4 V peak, or 60 V dc		N
b)	Current limited by one of following means:		N
	1) Inherently or by impedance; or		N
	2) Overcurrent protective device; or		N
	3) A regulating network limits also in single fault condition		N
c)	Is separated by at least basic insulation		N
	If overcurrent protective device used:		N
	Fuse or a non adjustable electromechanical device		N
9.5	**Requirements for equipment containing or using flammable liquids**	**No such liquids.**	**N**
	Flammable liquids contained in or specified for use with equipment do not cause spread of fire		N
	Risk is reduced to a tolerable level :	(see appended table)	N
a)	The temperature of surface or parts in contact with flammable liquids is 25 °C below fire point		N
b)	The quantity of liquid is limited		N
c)	Flames are contained within the equipment		N
	Detailed instructions for risk-reduction provided		N
9.6	**Overcurrent protection**		**--**
9.6.1	General		--
	Devices not in the protective conductor	Current fuse	P
	Fuses or single-pole circuit-breakers not fitted in neutral (multi-phase)		P
9.6.2	permanently connected equipment	Not such equipment	N
	Overcurrent device:		N
	Fitted within the equipment; or		N
	Specified in manufacturer's instructions		N
9.6.3	Other equipment		--
	Protection within the equipment		P

10	**Equipment temperature limits and resistance to heat**		**-**
10.1	**Surface temperature limits for protection against burns**		**P**
	Easily touched surfaces within the limits	(see appended table)	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Heated surfaces necessary for functional reasons exceeding specified values:		N
	Are recognizable as such by appearance or function; or		P
	Are marked with symbol 13	No use this mark	N
	Guards are not removable without tool		P
10.2	**Temperatures of windings**	**(see appended table)**	**P**
	Limits not exceeded in:		P
	normal condition		P
	single fault condition		P
10.3	**Other temperature measurements**	**(see appended table)**	**P**
	Following measurements conducted if applicable:		--
a)	Value of 60 °C of field-wiring terminal box not exceeded		N
b)	Surface of flammable liquids and parts in contact with this liquids		N
c)	Surface of non-metallic enclosures		P
d)	Parts made of insulating material supporting parts connected to mains supply		P
e)	Terminals carrying a current more than 0.5 A		P
10.4	**Conduct of temperature test**	**(see appended table)**	**P**
10.4.1	General		--
10.4.2	Temperature measurement of heating equipment		N
10.4.3	Equipment intended for installation in a cabinet or a wall		N
10.5	**Resistance to heat**		**P**
10.5.1	Integrity of clearance and creepage distances	(See appended table)	P
10.5.2	Non-metallic enclosures	(See appended table)	P
	After treatment:		--
	No hazardous live parts accessible;		P
	Tests of 8.1 and 8.2	(See appended table)	P
	In case of doubt, tests of 6.8 (without humidity preconditioning)	(See appended table)	N
10.5.3	Insulating material		--
a)	Parts supporting parts connected to mains supply		P
b)	Terminals carrying a current more than 0.5 A		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Examination of material data; or		P
	in case of doubt:		N
	1) Ball pressure test; or	See appended table	P
	2) Vicat softening test of ISO 306		N
11	**Protection against hazards from fluids**	**No fluids**	**N**
11.1	General		N
11.2	Cleaning	(See appended table)	N
11.3	Spillage	(See appended table)	N
11.4	Overflow	(See appended table)	N
11.5	Battery electrolyte		N
	Battery electrolyte leakage presents no hazard		N
11.6	Specially protected equipment		N
11.7	**Fluid pressure and leakage**		**--**
11.7.1	Maximum pressure		N
	Maximum pressure of any part does not exceed Prated		N
11.7.2	Leakage and rupture at high pressure	(See appended table)	N
	Test to IEC 60335 (refrigeration only)		N
11.7.3	Leakage from low-pressure parts	(See appended table)	N
11.7.4	Overpressure safety device		--
	Does not operate in normal use		N
	Meets ISO 4126-1; and		N
	It is conform with:		N
a)	Connected as close as possible to parts intended to be protected		N
b)	Easy access for inspection, maintenance and repair		N
c)	Adjustment only with tool		N
d)	No discharge towards person		N
e)	No hazard from deposit of discharged material		N
f)	Adequate discharge capacity		N
	No shut-off valve between overpressure safety device and protected parts		N

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Clause	Requirement + Test	Result - Remark	Verdict
12	**Protection against radiation, including laser sources, and against sonic and ultrasonic pressure**		**--**
12.1	General		N
	Equipment provides protection		N
12.2	**Equipment producing ionizing radiation**		**N**
12.2.1	Ionizing radiation	No ionizing radiation	N
	a) Meet the requirements of 12.2.1.2. or be tested, classified, and marked according to IEC 60405	(See appended table)	N
	b) uses or generates radiation but only emits stray radiation, it shall meet the requirements of 12.2.1.3		N
12.2.1.2	Equipment intended to emit radiation		N
	Equipment which contains radioactive substances or that generates x-rays		N
	If the effective dose rate at any easily reached point 50 mm from the outer surface exceeds 5 μSv/h:		N
	a) with symbol 17 of Table 1;		N
	b) for equipment containing one or more radioactive substances, with the abbreviations of the radionuclides		N
	c) either with the maximum dose rate value at 1 m, or with a dose rate value between 1 μSv/h and 5 μSv/h at the appropriate distance in m		N
	Measuring maximum radiation		N
	Equipment containing X-ray sources is set to produce the maximum possible level of radiation		N
12.2.1.3	Equipment not intended to emit radiation		N
	The effective dose rate of unintended stray radiation at any easily reached point 100 mm shall not exceed 1 μSv/h		N
12.2.2	Accelerated electrons		N
	which electrons are accelerated by voltages exceeding 5 kV cannot be opened without the use of a tool		N
12.3	**Ultra-violet (UV) radiation**	(Conformity test under consideration)	**N**
	No unintentional and hazardous escape of UV radiation		N
12.4	**Micro-wave radiation**		**N**
	Power density does not exceed 10 W/m^2:		

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Clause	Requirement + Test	Result - Remark	Verdict
12.5	**Sonic and ultrasonic pressure**		**N**
12.5.1	Sound level	(See appended table)	N
12.5.2	Ultrasonic pressure	(See appended table)	N
12.6	**Laser sources (IEC 60825-1)**		**N**
13	**Protection against liberated gases, explosion and implosion**		**--**
13.1	**Poisonous and injurious gases**	Not such gases	**N**
	Attached data/test reports demonstrate conformity		N
13.2	**Explosion and implosion**		**N**
13.2.1	Components		N
	Components liable to explode:		N
	Pressure release device provided; or		N
	Apparatus incorporates operator protection (see also 7.6)		N
	Pressure release device:		N
	Discharge without danger		N
	Cannot be obstructed		N
13.2.2	Batteries and battery charging	No inside batteries	N
	If explosion or fire hazard could occur:		N
	Protection incorporated in the equipment; or		N
	Instructions specify batteries with built-in protection		N
	In case of wrong type of battery used:		N
	No hazard; or		N
	Warning by marking and within instructions		N
	Equipment with means to charge rechargeable batteries:		N
	Warning against the charging of non-rechargeable batteries; and		N
	Type of rechargeable battery indicated; or		N
	Symbol 14 used		N
	Battery compartment design	(See appended table)	N
	Single component failure		N
	Polarity reversal test		N
13.2.3	Implosion of cathode ray tubes	No such tubes	N
	If maximum face dimensions > 160 mm:		N

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Clause	Requirement + Test	Result - Remark	Verdict
	Intrinsically protected and correctly mounted; or		N
	enclosure provides protection:		N
	If non-intrinsically protected:		N
	Screen not removable without tool		N
	If glass screen, not in contact with surface of tube		N

14	**Components and subassemblies**		**P**
14.1	General	See below	P
	Where safety is involved, components meet relevant requirements	(see appended table)	P
14.2	**Motors**		**N**
14.2.1	Motor temperatures		--
	Does not present a hazard when stopped or prevented form starting; or		N
	Protected by over-temperature or thermal protection device conform with 14.3		N
14.2.2	Series excitation motors		N
	Connected direct to device, if over-speeding causes a hazard		N
14.3	**Over-temperature protection devices**		**N**
	Devices operating in a single fault condition		--
a)	Reliable function is ensured		N
b)	Rated to interrupt maximum current and voltage		N
c)	Does not operate in normal use		N
	For self-resetting over-temperature protection device		--
	1) self-resetting over-temperature protection devices are caused to operate 200 times;		N
	2) non-self-resetting over-temperature protection devices, except thermal fuses, are reset after each operation and thus caused to operate 10 times;		N
	3) non-resetting over-temperature protection devices are caused to operate once.		N
14.4	**Fuse holders**		**--**
	No access to hazardous live parts		N
14.5	**Mains voltage selecting devices**		**N**

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Clause	Requirement + Test	Result - Remark	Verdict
	constructed so that a change from one voltage or one type of supply to another cannot occur accidentally		N
	5.1.3 d) for marking requirements		N
14.6	**Mains transformers tested outside equipment**		**N**
	short-circuit and overload tests in 4.4.2.7	(see Forms A.1)	N
14.7	**Printed circuit boards**	**See appended table**	**P**
	Data shows conformity with FV-1 of IEC 60707 or better; or	V-0	P
	Test shows conformity with FV-1 of IEC 60707 or better; or	See appended table	N
	Thin film flexible PCB with limited-energy circuit used		N
14.8	**Circuits or components used as transient overvoltage limiting devices**		**P**
	After test, no sign of overload or degradation		P

15	**Protection by interlocks**		**N**
15.1	General	Not interlocks	N
	Interlocks are designed to remove a hazard before operator exposed		N
15.2	Prevention of reactivation		N
15.3	Reliability		N
	Single fault unlikely to occur; or		N
	Cannot cause a hazard		N

16	**Hazards resulting from application**		**--**
16.1	**reasonably foreseeable misuse**		**P**
	No HAZARDS shall arise if adjustments, knobs, or other software-based or hardware-based controls are set in a way not intended, and not described in the instructions		P
	Other possible cases of REASONABLY FORESEEABLE MISUSE that are not addressed by specific requirements in this standard shall be addressed by RISK assessment (see Clause 17)		N
16.2	**Ergonomic aspects**		**--**
	For below which give rise to a HAZARD, a RISK assessment shall be documented:	No rise to hazard	--

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Clause	Requirement + Test	Result - Remark	Verdict
	a) limitation of body dimensions;		N
	b) displays and indicators;		N
	c) accessibility and conventions of controls;		N
	d) Arrangements of TERMINALS.		N
17	**RISK assessment**		**--**
	equipment shows that HAZARDS not fully addressed in Clauses 6 to 16		N
	a) risk analysis		N
	b) risk evaluation		N
	c) risk reduction		N
	risks remaining after a risk assessment shall be identified in the instructions for the responsible body.		N
	adequate information about how to mitigate these risks shall be given		N
	1) eliminate or reduce RISKS as far as possible		N
	2) take the necessary protective measures in relation to RISKS that cannot be eliminated		N
	3) inform users of the residual RISKS due to any shortcomings of the protective measures adopted		N

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Clause	Requirement + Test	Result - Remark	Verdict
ANNEX F	**ROUTINE TESTS**		--
	Manufacturer ´s declaration		P
ANNEX H	**QUALIFICATION OF CONFORMAL COATINGS FOR PROTECTION AGAINST POLLUTION**		--
H.1	**General**		N
	Conformal coatings meet the requirements of Clause H.2 and H.3.		N
H.2	**Technical properties**		N
	Technical properties of conformal coatings are suitable for the intended application. In particular:		—
	a) Manufacturer indicate that it is a coating for PWBs;		N
	b) RATED operating temperature include the temperature range of the indicated application;		N
	c) CTI, insulation resistance and dielectric strength are suitable for the intended application;		N
	d) Coating have adequate UV resistance, if it is exposed to sunlight;		N
	e) Flammability RATING of the coating is at least the required flammability RATING of the applied PWB.		N
H.3	**Qualification of coatings**	(see Form A.42)	N
	Coating complies with the conformity requirements.		N
ANNEX K	**INSULATION REQUIREMENTS NOT COVERED BY CLAUSE 6.7**	(see Forms A.15 and A.18)	N

Appendix tables

4.4	TABLE: Testing in single FAULT CONDITION – Results	Form A.1	P
	Ambient temperature (°C)	22.5℃	--
	Ambient temperature (°C)	22.3℃	--
	Test voltage	240V~, 50Hz	--

Test subclause	Fault No.	Fault	Test time	Comments	Verdict
4.4.2.6.1	U1 (pin 1-3)	s-c	5mins	Unit shut down, no damage, no hazards. No function	P

NOTE:

1, Record dielectric strength test on Form A.14 and temperature tests on Form A.20.

2, Record in the comments column for each test whether carried out during or after SINGLE FAULT CONDITION.

3, s-c=short circuit, o-c=open circuit, o-l=overload

5.1.3	TABLE: mains supply			P
	Marked rating.....:	230V~ / 400V 3~, 50/60Hz		--
	Phase.....:	Single-phase		--
	Frequency .....:	50Hz,		--
	Power / Current .....:	Max. 80A		--
Test No.	U (V) / F (Hz)	I (A)	I rated (A)	Condition / status
1	230V~/50Hz	76.1	80	Max. Load
3	400V~/50Hz	73.2	80	Max. Load
Remark: the measured value not exceed the marked value by more than 10%				

Appendix tables

5.3	TABLE: Durability of markings	Form A.4	P

Marking method (see NOTE)	Agent
1)	A Water
2)	B ☐ Isopropyl alcohol/ ☒ Petroleum spirit
3)	C (specify agent)
4)	D (specify agent)
5)	E (specify agent)

NOTE – Where applicable include print method, label material, ink or paint type, fixing method, adhesive and surface to which marking is fixed.

Marking location	Marking method (see above)
Identification (5.1.2)	1), 2)
Mains supply (5.1.3)	1), 2)
Fuses (5.1.4)	1), 2)
Terminals and operating devices (5.1.5.1)	1), 2)
Measuring circuit terminals (5.1.5.2)	1), 2)
Switches and circuit breakers (5.1.6)	1), 2)
Double/reinforced equipment (5.1.7)	Not such equipment
Field wiring Terminal boxes (5.1.8)	Not such equipment
Warning marking (5.2)	1), 2)
Battery charging (13.2.2)	No battery

Method	Test agent	Remains legible	Label loose	Curled edges	Comments
		Verdict	Verdict	Verdict	
1), 2)	A, B	Remains legible	No loose	No curled	All markings accordance with 5.1.2 to 5.2 test in this method, and pass the test

Appendix tables

6.2	**TABLE: List of accessible parts**		**Form A.6**	**P**
6.1.2	Exceptions	See below		--
6.2	Determination of accessible parts	See below		--

Item	Description	Determination method (NOTE 5)	Exception under 6.1.2 (NOTE 4)
1	Front Enclosure	Rigid test finger and Test pin 3 mm diameter	No hazard voltage

NOTE 1 – Test fingers and pins are to be applied without force unless a force is specified (see 6.2.1)
NOTE 2 – Special consideration should be given to inadequate insulation and high voltage parts (see 6.2)
NOTE 3 – Parts are considered to be ACCESSIBLE if they could be touched in the absence of any covering which is not considered to provide suitable insulation (see note to paragraph 1 of 6.4).
NOTE 4 – Capacitor test may be required (see Form A.7).

NOTE 5 – The determination methods are: visual; rigid test finger; jointed test finger; pin 3 mm diameter; pin 4 mm diameter.

Supplementary information:

There are no any hazardous parts accessible after installation.

6.3.1	**TABLE: Levels in NORMAL CONDITION**				**N**
Open-circuit voltage measurement on secondary output terminal:					
Open-circuit voltage measured between:	Condition	max. Voltage		Comments	
		V peak	V d.c. / V a.c.		
--	--	--	--	--	
--		--	--	--	

Touch current measured between:	Condition	Accessible current (mA)	Accessible current limit(mA)	Charged capacitance (μC/mJ)	Charged capacitance (μC/mJ)
--	--	--	--	--	--
--		--	--	--	--

Note: the Accessible current was measured according to 6.3.1 b) with the test circuit of figure A.1 connected between the specified points.

Input: 110% of rated supply voltage

Appendix tables

6.3.2	TABLE: Levels in SINGLE FAULT CONDITION		Form A.6	N
Open-circuit voltage measurement on secondary output terminal:				
Open-circuit voltage measured between:	Condition	max. Voltage		Comments
		V peak	V d.c. / V a.c.	
--	Single fault condition	--	--	Limit: --.

Touch current measured between:	Condition	Accessible current (mA)	Accessible current limit(mA)	Charged capacitance (μC/mJ)	Charged capacitance (μC/mJ)
--	Single fault condition	--	--	--	
--		--	--	--	

Note: the Accessible current was measured according to 6.3.1 b) with the test circuit of figure A.1 connected between the specified points.

Input: 110% of rated supply voltage

6.5.2.1	TABLE: Cross-sectional area of bonding conductors	N
Conductor location	Cross-sectional area	Verdict
--	--	--

6.5.2.3	TABLE: Tighting torque test		N
Conductor location	Size of Screw	Tighting torque (Nm)	Verdict
--	--	--	--

6.5.2.4	TABLE: Impedance of of plug-connected equipment			N
ACCESSIBLE part under test	Test current A	Voltage attained after 1 min V	Calculated resistance (maximum allowed 0,1 Ω) Ω	Verdict
--	--	--	--	--
Supplementary information:				

6.5.2.5	TABLE: Impedance of protective bonding of permanently connected equipment		N
ACCESSIBLE part under test	Test current A	Voltage attained after 1 min (maximum 10 V) V	Verdict
Supplementary information: Not permanently connector equipment			

Appendix tables

6.5.2.6	TABLE: Transformer protective bonding screen		N
ACCESSIBLE part under test	Test current A	Voltage attained after 1 min (maximum 10 V) V	Verdict
Supplementary information: Not permanently connector equipment			

6.5.3	TABLE: protective impedance		N
A high INTEGRITY single component			
Component	Location	Comments	
A combination of components			
Component	Location	Comments	
A combination of BASIC INSULATION and a current or voltage limiting device			
Component	Location	Comments	
Supplementary information:			

6.7.1	TABLE: protection against electric shock					P
clearance cl and creepage distance dcr at/of:	Up (V)	U r.m.s. (V)	required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
Enclosure to live parts	465	400	4.0	6.5	6.0	6.5

6.8	TABLE: Procedure for voltage tests (Dielectric strength tests)	P
4.4.4.1 b)	Conformity after application of fault conditions[1]	P
6.5.3	Supplementary insulation and reinforced insulation	N
6.6.1	Connections to external circuits	N
6.7.3.2	CLEARANCE	N
6.7.3.4	Solid insulation	P
6.10.2.2	Fitting of non-detachable MAINS SUPPLY cords[1]	N
8	Mechanical resistance to shock and impact	P
9.1 a) 2)	Eliminating or reducing the sources of ignition within the equipment	N
9.3 c)	Limited-energy circuit	P
11.2	Cleaning[1]	N
11.3	Spillage[1]	N
11.4	Overflow[1]	N

Appendix tables

11.6	Specially protected equipment[1]					N
[1] Record the fault, test or treatment applied before the dielectric strength test						
	Test site altitude.....:		< 2000m			--
	Test voltage correction factor (see Table 10).... :		1.0			--
Location or references from Forms A.2 and A.5	Clause or sub-clause	Humidity Yes/No	Working voltage V	Test voltage r.m.s./peak/d.c V	Comments	Verdict
Live part to accessible parts with foil	--	Yes	400	3000Vrms a.c.	No flashover or break down	P
Supplementary information:						

6.10.2.2	**TABLE: Cord anchorage**					**N**
Location	Mass kg	Pull N	Verdict	Torque Nm	Verdict	Comment
Supplementary information:Not fitting of non-detachable mains supply cords						

8	**TABLE: mechanical resistance to shock and impact**	**P**
Test part	Test condition	Test result
Enclosure	Static test: 30N, hard rod of Φ12mm,	No hazard
Enclosure	Impact test: 500g±25g, 50mm	No hazard

9.3	**TABLE: flammability of materials (IEC 60695-11-10)**		**N**
	Material tested .....:	Certificated materials	--
	Generic name .....:		--
	Material manufacturer .....:		--
	Type designation .....:		--
	Colour .....:		--
	Conditioning details .....:		--
	Thickness (mm) .....:	1 -	--
	Duration of flaming after first application (s) .....:	1 -	--
	Duration of flaming plus glowing after second application (s) .....:	1 -	--
	Specimen burns to holding clamp (Yes/No) .....:	1 -	--
	Cotton ignited (Yes/No) .....:	1 -	--
Supplementary information: PCB and plastic enclosure have through UL authentication. And the flammability classification are V-0.			

Appendix tables

9.4	TABLE: Limited-energy circuit					N
circuit / location	Open circuit voltage (V)	Maximum current (A)	Maximum available power (VA)	Overload protection (VA)	Limited current (Yes/No)	Comments
Supplementary information:						

10	TABLE: temperature tests		P
	Voltage (V) ..... :	440V~	--
	Frequency (Hz) ..... :	50Hz	--
	Duration (h, min) ..... :	4 h	--
	Ambient temperature Ta (°C) ..... :	See below	--

Part / location	Measured temperature Tm (°C)	Corrected maximum temperature(°C)	Maximum allowed temperature (°C)	Result	Comments
Enclosure	43.6	61	85	P	--
PCB under U1	54.9	72.3	85	P	--
Inside wire	38.7	56.1	105	P	--
Ambient	22.6	40	--	--	--
Supplementary information:					

10.5	TABLE: ball-pressure tests for thermoplastics		P
	Limited impression diameter (mm)	≤2 mm	--

Part	Test temperature (°C)	Impression diameter (mm)
Enclosure	125°C	1.2
PCB	125°C	0.8

11	TABLE: protection against hazards from fluids							N
location	cleaning	spillage	overflow	equipment plus liquid	working voltage (V)	test voltage (V)	result	comments

11.7.2	TABLE: leakage and rupture at high pressure					N
Part	Maximum permissible working pressure (pa)	Factor	Test pressure (pa)	Leakage test	Burst test	Comments

Appendix tables

11.7.3	TABLE: leakage from low-pressure parts		N
Part	Test pressure (Pa)	Result	Comments

12.2.1	TABLE: ionizing radiation		N
location	radiation (Sv/h)	result	comments

12.5.1	TABLE: sound level measurements	N
location	value (dBA)	calculated maximum sound pressure level

12.5.2	TABLE: ultrasonic pressure measurements		N
location	value (dB)	frequency (kHz)	result

13.2.2	TABLE: batteries tests		N
	Battery load and charging circuit diagram .....:	No battery used	--
	Battery type .....:		--
	Battery manufacturer .....:		--
	Battery model .....:		--
	Battery catalogue No. .....:		--
	Battery ratings .....:		--
	Reverse polarity installment test		--
Component	Result, open circuit	Result, short circuit	

Appendix tables

14.1	**TABLE: components**	**P**

Object/part No.	Manufacturer/ trademark	Type/ model	Technical data	Standard	Mark(s) of conformity[1])
Enclosure	Zhejiang Chimei Chemical Co., Ltd.	ABS	V-0	UL 94	UL
Enameled copper wire	JIANGSU DARTONG M&E CO.,LTD	Q (ZY/XY) BP-2/200	Class E, 120℃	UL1446	UL E237377
Inside plastic parts	Interchangeable	Interchangeable	V-0	UL 94	UL
PCB	Various	Various	V-1 or better, 130°C	UL746A, UL94	UL
Internal wire	Various	1015	26-18AWG, 105°C	UL758 EN61010-1	Tested with appliance & UL
[1]) an asterisk indicates a mark which assures the agreed level of surveillance					

Appendix tables

14.2.1	**TABLE: motor temperatures measurements**					**N**
	Voltage (V)..... :					--
	Frequency (Hz) ..... :					--
	Duration (h, min)..... :					--
	Ambient temperature Ta (℃)..... :					--
Motor No. and location	Insulation class	Measured temperature Tm (℃)	corrected maximum temperature Tm- Ta+ 40 (℃)	maximum allowed temperature (℃)	result	

14.3	**TABLE: overtemperature protection devices**			**N**
component	type	result	comments	
Note: Type: self-resetting SR, non-self-resetting NSR, non-resetting NR				

14.6	**TABLE: Short circuit (for Mains transformer)**	**Form A.39**	**N**
	Mains transformers tested outside equipment	Approved switch power supply	--
4.4.2.7.2	Short circuit		--
	Type ..... :		--
	Manufacturer ..... :		--
	Test in equipment		N
	Test on bench		N
	Temperature protection class of the lowest RATED winding (class or maximum RATED temperature) .:		--
	Winding identification ..... :		--
	Type of protector for winding ..... :		--
	Elapsed time ..... :		--
	Winding temperature, primary (°C) ..... :		**N**
	Winding temperature, secondary (°C) ..... :		**N**
	Tissue paper / cheesecloth OK ?		**N**
	Voltage test, primary to secondary (V) ..... :		**N**
	Voltage test, primary to core (V) ..... :		--

Appendix tables

14.6	**TABLE: Overload tests (for Mains transformer)**		**Form A.40**	**N**
	Mains transformers tested outside equipment	Approved switch power supply		
	Type ..... :			--
	Manufacturer ..... :			--
	Test in equipment			N
	Test on bench			N
	Temperature protection class of the lowest RATED winding (class or maximum RATED temperature) .:			--
	Winding identification ..... :			--
	Type of protector for winding ..... :			--
	Elapsed time ..... :			--
	Winding temperature, primary (°C) ..... :			**N**
	Winding temperature, secondary (°C) ..... :			**N**
	Tissue paper / cheesecloth OK ?			**N**
	Voltage test, primary to secondary (V) ..... :			**N**
	Voltage test, primary to core (V) ..... :			--

Product Photos

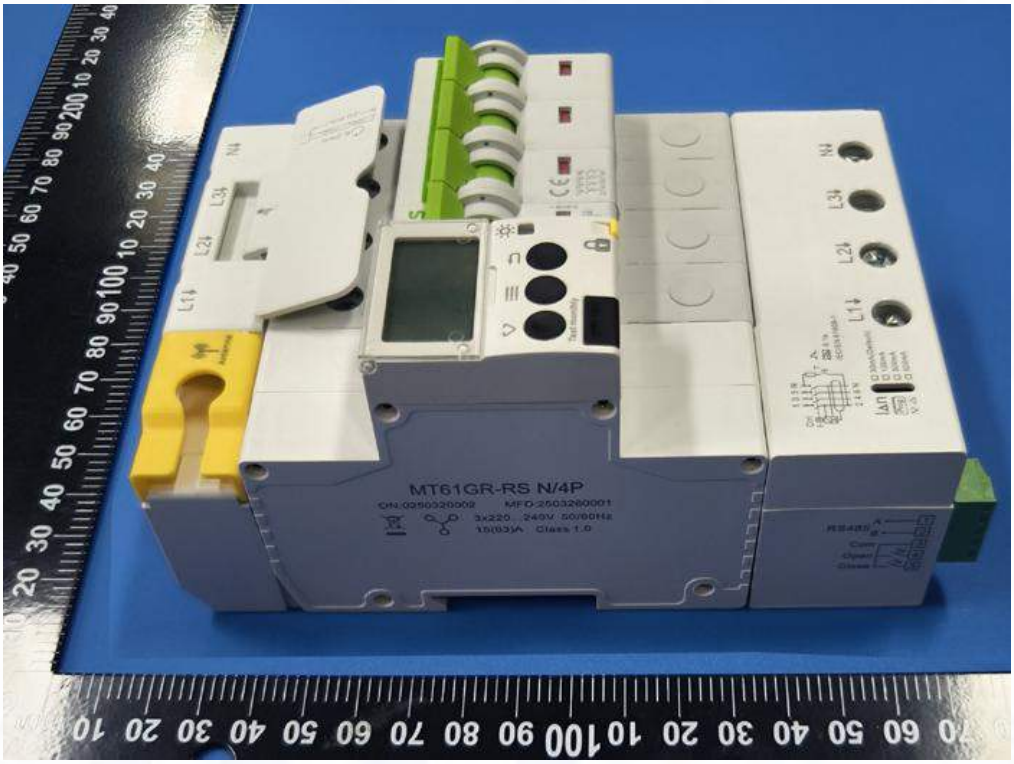

Fig. 1

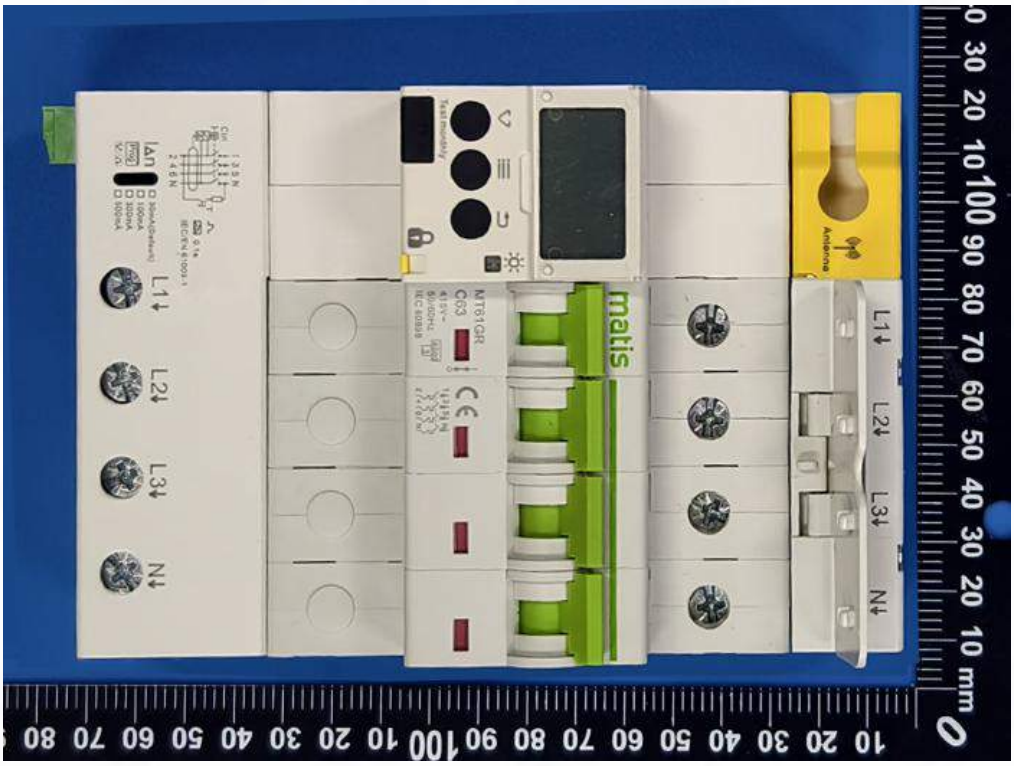

Fig. 2

---------- END OF REPORT ----------

TEST REPORT
IEC 60898-1
Circuit-breakers for over current protection for household and similar installations
Part 1 - Circuit-breakers for a.c. operation

Report Number. .....:	LCS190815025AS
Date of issue .....:	September 12, 2019
Total number of pages	57
Applicant's name.....:	SHANGHAI MATIS ELECTRC CO.,LTD.
Address .....:	BLOCK C, NO.888, HUANHU WEST 2ND ROAD, PUDONG, SHANGHAI, CHINA
Test specification:	
Standard .....:	IEC 60898-1:2015 ED2
Test procedure .....:	Type test
Non-standard test method.....:	N/A
Test Report Form No.....:	IEC60898_1
Test Report Form(s) Originator.....:	DEKRA Certification B.V.
Master TRF.....:	Dated 2015-09

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This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

The test results presented in this report relate only to the object tested.
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Test item description	AIOT ENERGY METER WITH MCB
Trade Mark	matis, matismart
Manufacturer	SHANGHAI MATIS ELECTRC CO.,LTD. BLOCK C, NO.888, HUANHU WEST 2ND ROAD, PUDONG, SHANGHAI, CHINA
Model/Type reference	MT61GP, M61WF, MT61NB, MT61LR
Ratings	Single Phase, 1P+N, 230V,50/60Hz, 6A,10A,16A,20A,25A,32A.40A.50A,63A,80A Three Phase, 3P+N, 400V,50/60Hz, 6A,10A,16A,20A,25A,32A.40A.50A,63A,80,100A

Testing procedure and testing location:

☒ **Testing Laboratory:**	Shenzhen LCS Compliance Testing Laboratory Ltd.	
Testing location/ address	101, 601, Xingyuan Industrial Park, Gushu Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China	
Tested by	Aic Huang / Test Engineer	
Checked by	Albert Lai / Project Engineer	
Approved by	Hart Qiu / Technical Director	

List of Attachments (including a total number of pages in each attachment):

Attachment No.1: Component assembly (1 pages)

Attachment No.2: Photo documentation (4 pages)

Summary of testing:

Tests performed (name of test and test clause): The submitted samples were found to comply with the requirements of: IEC 60898-1:2015 ED2 EN 60898-1:2019	**Testing location:** Shenzhen LCS Compliance Testing Laboratory Ltd. 101, 601, Xingyuan Industrial Park, Gushu Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China

Summary of compliance with National Differences (List of countries addressed):

--

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Copy of marking plate

The artwork below may be only a draft.

matis, matismart
AIOT ENERGY METER WITH MCB
Model: MT61GP
400V,50Hz,6A,10A,16A,20A,25A,32A.40A.50A,63A ,80A,100A,125A(4P/three phase)



SHANGHAI MATIS ELECTRC CO.,LTD.
MADE IN CHINA

Shenzhen LCS Compliance Testing Laboratory Ltd.
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Classification of installation and use.....:	--
Supply Connection.....:	--
.....:	
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement.....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)
Testing.....:	
Date of receipt of test item .....:	August 15, 2019
Date (s) of performance of tests.....:	From August 15, 2019- September 12, 2019

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

"*" This symbol refers to not within the scope of CNAS recognition.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :	☐ **Yes** ☒ **Not applicable**

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies).....:	SHANGHAI MATIS ELECTRC CO.,LTD. 4TH FLOOR, BLOCK 7A, SHAHU SCIENCE PARK, NO.183, LANE TINGLAN, WUZHONG, SUZHOU, JIANGSHU, CHINA

General product information:

1.This product is suitable for internal use

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Test item particulars.....	
Type of circuit-breaker ..... :	
Number of poles ..... :	☐ 1-P ☐ 1-P+N ☒ 2-P ☐ 3-P ☐ 3-P+N ☒ 4-P
Protection against external influences ..... :	☐enclosed ☒ unenclosed
Method of mounting ..... :	☐surface ☒ flush ☐ panel board
Method of connection ..... :	☒.not associated with the mechanical mounting ☐ associated with the mechanical mounting
Type of terminal ..... :	☐ screw [a) b)] ☒ pillar [a) b)] ☐ cage [a) b)] ☐ lug ☐ screw less[a)] ☐ flat quick connect [a)] ☐ plug-in ☐ screw-in [a)] copper conductors [b)] aluminium conductors
Instantaneous tripping current ..... :	☒ B ☒ C ☒ D
I^2t characteristic .....:	
Value of rated operational voltage (Ue) ..... :	☐ 120 V ☒ 230 V ☐ 240 V ☐ 120/240 V ☐ 230/400 V ☒ 400 V ☐ 240/415 V ☐ 415 V
Value of rated current (In) ..... :	6, 10, 16, 20, 25, 32, 40, 50, 63, 80, 100 A
Value of rated frequency ..... :	☒ 50 Hz ☒ 60 Hz
Ambient air temperature (°C) ..... :	☒ 30℃ ☐ 40℃ ☐ Other _____℃
Rated short-circuit capacity (Icn) ..... :	☐ 1,5 kA ☐ 3 kA ☐ 4,5 kA ☒ 6 kA ☐ 10 kA ☐ 15 kA ☐ 20 kA ☐ 25 kA
Rated impulse withstand voltage (Uimp)	☒ 2,5 kV ☐ 4 kV ☐ declared ___kV

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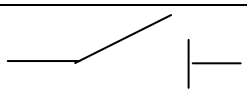
IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

	TESTS „A“ 1 SAMPLE	**A_1**	
6	**MARKING AND OTHER INFORMATION**		
	Circuit-breaker marked with:		--
	a) Manufacturer’s name or trade mark.....:	matis / matismart	P
	b) Type designation, catalogue number or other serial number.....:	MT61GP, M61WF, MT61NB, MT61LR	P
	c) Rated voltage (V).....:	230/400 VAC	P
	d) Rated current without symbol "A", preceded by the symbol of instantaneous tripping.....:	6,10,16,20,25,32,40,50,63A, 80,100	P
	e) Rated frequency (Hz) .....:	50/60 Hz	P
	f) Rated short circuit capacity (A) .....:	6000 A	P
	g) Wiring diagram		P
	h) Ambient air temperature, if different from 30℃		P
	i) Degree of protection, if different from IP20	IP20	P
	j) For D-type circuit-breakers: the maximum instantaneous tripping current, if higher than 20 In see table 2)		P
	k) Rated impulse withstand voltage Uimp if it is 2,5 kV	4kV	P
	l) Making and breaking capacity on an individual protected pole of multipole circuit-breakers (Icn1), if different from Icn	6000A	P
	Marking d) shall be readily visible when the CB is installed		P
	If, for small devices, the available space is insufficient, markings a), b), c), e), f), h), j) and l) may be put on the side or on the back of the CB		P
	Marking g) may be on the inside of any cover which has to be removed in order to connect the supply wires but shall not be on a label loosely attached to the CB		P
	Any other information not marked shall be given in the manufacturer’s documentation		P
	The suitability for isolation, which is provided by all circuit-breakers of this standard, may be indicated by the symbol on the device		P
	I^2t characteristic (documentation)		P
	Symbols on supply and load terminal		P
	Terminal for neutral conductor N		P

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Earth terminal if any (IEC 60417-5019)		N/A
	On - off position shall be clearly indicated - 0 I -		P
	For push-button CB the off push-button shall either be red or be marked with the symbol 0´		P
	Red not used for other push-button		P
	For CB with multiple current ratings, the maximum value is marked, the adjusted value indicated without ambiguity		P
	Marking shall be indelible and easily legible (not on removable parts), 15 s with water, 15 s with hexane (see cl. 9.3)		N/A
8.	**REQUIREMENTS FOR CONSTRUCTION AND OPERATION**		
8.1.1	**General**		
	Circuit-breakers shall be so designed and constructed that, in normal use, their performance is reliable and without danger to the user or surroundings		P
8.1.2	**Mechanism**		
	The moving contact shall be mechanically coupled so that all poles make and break together, whether operated manually or automatically, even if an overload occurs on one pole only		P
	The switched neutral shall close before and open after the protected pole (s)		P
	Neutral pole having adequate making and breaking capacity and CB with independent manual operation: all poles operate together including neutral pole		P
	CB shall have a trip free mechanism		P
	It shall be possible to switch the CB on and off by hand		P
	No intermediate position of the contacts		P
	Position of contacts shall be indicated		P
	Indication visible from the outside		P
	If the indication is on the actuating means, it shall, when released, automatically take up or stay in the position corresponding to that of the moving contacts; operating means shall have two different rest positions, except that, for automatic operation, a third distinct rest position may be provided		P

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Clause	Requirement + Test	Result - Remark	Verdict
	If a separate mechanical indicator is used to indicate the position of the main contacts, colour red shall be used for the on position and green for the off position.		N/A
	The action of the mechanism shall not be influenced by the position of enclosures		P
	If the cover is used as a guiding means for push-button, it shall not be possible to remove this button from the outside		P
	Operating means securely fixed, not possible to remove them without a tool		P
	For the up-down operating means the contacts shall be closed by the up movement.		P
8.1.3	**Clearances and creepage distances**		
	The minimum required clearances and creepage distances are based on the CB being designed for operating in an environment with pollution degree 2		P
	Compliance for item 1 in Table 4 is checked by measurement and by the test of 9.7.5.4.1 and 9.7.5.4.2. The test is carried out with samples not submitted to the humidity treatment described in 9.7.1.		P
	The clearances of items 2 and 4 (except accessible surface after installation) may be reduced provided that the measured clearances are not shorter than the minimum allowed in IEC 60664-1 for homogenous field conditions.		N/A
	In this case, after the humidity treatment in 9.7.1, compliance for item 2 and 4 and arrangements of 9.7.2 items b), c), d) and e) is checked:		P
	-Tests according to 9.7.2 to 9.7.4 as applicable		P
	-Test according to 9.7.5.2 with test voltages acc. Table 13 with test arrangements of 9.7.2 items b), c), d), e)		P
	If measurement does not show any reduced clearance, test 9.7.5.2 is not applied		P
	Compliance for item 3, checked by measurement		P
	The insulating materials are classified into Material Groups on the basis of their comparative tracking index (CTI) acc. to IEC 60664-1		P
	Clearances [mm] U_{imp}		--

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Clause	Requirement + Test	Result - Remark	Verdict
	4 kV (see table 4) 2,5 kV (see table 4)	4kV	P
	Minimum clearances (see table 4)		N/A
		minimum clearances [mm]	--
	1.between live parts (of the main circuits) which are separated when the CB is in off position ..... :		P
	2.between live parts of different polarity..... :		P
	3.between circuits supplied from different sources, one of which being PELV or SELV..... :		N/A
	4. between live parts and		P
	- accessible surfaces of operating means..... :		P
	- screws or other means for fixing covers ..... :		P
	- surface on which the base is mounted..... :		P
	- screws or other means for fixing the circuit breaker ..... :		P
	- metal covers or boxes..... :		P
	- other accessible metal parts ..... :		P
	- metal frames supporting the base (flush-type) . :		P
	Minimum creepage distances (see table 4)		P
	Material group	☐ III_b ☐ III_a ☐ II ☐ I	--
		minimum creepage distances [mm]	--
	1.between live parts (of the main circuits) which are separated when the CB is in off position ..... :		P
	2.between live parts of different polarity..... :		N/A
	3.between circuits supplied from different sources, one of which being PELV or SELV..... :		N/A
	4. between live parts and		P
	- accessible surfaces of operating means..... :		P
	- screws or other means for fixing covers ..... :		P
	- surface on which the base is mounted..... :		P
	- screws or other means for fixing the circuit breaker ..... :		P
	- metal covers or boxes..... :		P
	- other accessible metal parts ..... :		P
	- metal frames supporting the base (flush-type) . :		P

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Clause	Requirement + Test	Result - Remark	Verdict
8.1.4	**Screws, current-carrying parts and connections**		
8.1.4.1	Connections, withstand mechanical stresses occurring in normal use		P
	Screws for mounting of the CB not of the thread-cutting type		P
	Test according to cl. 9.4:		P
	- 10 times (screw Ø / torque Nm)	Ø___mm___Nm (see table 11) Ø___mm___Nm	N/A
	- 5 times (screw Ø / torque Nm)	Ø_4.8__mm_2.0__Nm (see table 11) Ø___mm___Nm	P
	Plug in connections tested by plugging in and pulling out five times		N/A
	After test connections have not become loose nor electrical function impaired		P
8.1.4.2	Screws with a thread of insulating material ensured correct introduction		N/A
8.1.4.3	Electrical connection: contact pressure not transmitted through insulating material, unless there is sufficient resilience in the metallic parts		P
8.1.4.4	Current-carrying parts including parts intended for protective conductors, if any, shall be made of a metal having, under the conditions occurring in the equipment, mechanical strength, electrical conductivity and resistance to corrosion adequate for their intended use. Examples below:		N/A
	- copper		N/A
	- alloy 58% copper for worked cold parts		P
	- alloy 50% copper for other parts		N/A
	- other metal		N/A
	In case of using ferrous alloys or suitably coated ferrous alloys, compliance to resistance to corrosion is checked by a test of resistance to rusting (see 9.16).		P
	The requirements of this subclause do not apply to contacts, magnetic circuits, heater elements, bimetals, shunts, parts of electronic devices or to screws, nuts, washers, clamping plates, similar parts of terminals and parts of the test circuit		P

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Clause	Requirement + Test	Result - Remark	Verdict
8.1.5	**Terminals for external conductors**		--
	Compliance is checked by inspection and by the tests as relevant for the type of connection:		--
	by tests of clause 9.5 for screw-type terminals		P
	by specific tests for plug-in or bolt-on CBs included in the standard		N/A
	by the tests of Annexes J, K		N/A
8.1.5.1	Terminals ensure the necessary contact pressure		P
9.5	Torque test:		
	- torque (Nm); diameter (mm).....:	2.0Nm, Ø4.8 mm	--
	- torque (Nm); diameter (mm).....:	25.0	--
	- torque (Nm); diameter (mm).....:		--
	- max. cross-sectional area (mm²) .....:		--
9.5.2	Pull test:		N/A
	Terminal shall be suitable for all types of conductors: rigid (solid or stranded) and flexible, unless otherwise specified by the manufacturer.		--
	Min. cross-section solid / stranded / flexible (mm²) .....:	Solid: 1,0 mm² Stranded: 1,5 mm 2 Flexible: 1,0 mm	--
	Max. cross-section solid / stranded / flexible (mm²) .....:	Solid: 16,0 mm² Stranded: 25,0 mm 2 Flexible: 16,0 mm	--
	Torque $^2/_3$ (Nm) .....:	1.33 Nm	--
	Pull for 1 min solid / stranded / flexible (N).....:	50N for 1,0 mm² 50N for 1,5 mm 2 90N for 16,0 mm² 100N for 25,0 mm²	P
	During the test no noticeable move of conductor		P
9.5.3	Torque test:		
	- torque $^2/_3$ (Nm).....:	1.33Nm	--
	- min. cross-sectional area (mm²) .....:	Solid: 1,0 mm² Stranded: 1,5 mm²	--
	- max. cross-sectional area (mm²) .....:	Solid: 16,0 mm² Stranded: 25,0 mm 2	--
	The conductor shows no damage		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Terminals have not worked loose and no damage		P
9.5.4	Terminals fitted with the largest cross-section area specified in Table 5, for stranded copper conductor.		P
	Max. cross-section stranded (mm^2) .....:	Stranded: 25,0 mm^2	--
	Torque $^2/_3$ (Nm) .....:	1,33Nm	--
	After the test no strand of conductor escaped outside		P
8.1.5.2	Terminals allow the connection of conductors of the following cross-sectional areas: (table 5)		P
	Rated current (A) / sections — Range of nominal cross to be clamped* (mm^2): Rigid (solid or stranded) conductors / Flexible conductors ≤ 13: 1 to 2,5 / 1 to 2,5 > 13 ≤ 16: 1 to 4 / 1 to 4 > 16 ≤ 25: 1,5 to 6 / 1,5 to 6 > 25 ≤ 32: 2,5 to 10 / 2,5 to 6 > 32 ≤ 50: 4 to 16 / 4 to 10 > 50 ≤ 80: 10 to 25 / 10 to 16 > 80 ≤ 100: 16 to 35 / 16 to 25 > 100 ≤ 125: 24 to 50 / 25 to 35	Solid conductors: 1,0mm 2 to 16,0mm 2 Stranded conductors: 1,5mm 2 to 25,0mm 2 flexible conductors: 1,0mm 2 to 16,0mm 2	P
	*It is required that, for current ratings up to and including 50 A, terminals be designed to clamp solid conductors as well as rigid stranded conductors. Nevertheless, it is permitted that terminals for conductors having cross-sections from 1 mm^2 up to 6 mm^2 be designed to clamp solid conductors only.		N/A
	- or terminals for external untreated aluminium conductors and with aluminium screw-type terminals for use with copper or with aluminium conductors according to Annex L.		N/A
8.1.5.3	Means for clamping the conductors in the terminals not serve to fix any other component (See test sub-clause 9.5)		P
8.1.5.4	Terminals for $I_N \leq 32$ A allow the connection of conductors without special preparation		P
8.1.5.5	Terminals shall have adequate mechanical strength; ISO thread or equivalent (See tests of sub-clause 9.4 and 9.5.2)		P

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Clause	Requirement + Test	Result - Remark	Verdict
8.1.5.6	Clamping of conductor without damage to the conductor (See test of sub-clause 9.5.3)		P
8.1.5.7	Clamping of conductor between metal surfaces (See tests of sub-clause 9.4 and 9.5.2)		P
8.1.5.8	Conductor shall not slip-out when the clamping screw or nuts are tightened (See test of sub-clause 9.5.4)		P
8.1.5.9	Terminals shall be properly fixed. No work loose when the clamping screws or nuts are tightened or loosened (See test of sub-clause 9.4)		P
8.1.5.10	Clamping screws or nuts of terminals for protective conductors adequately secured against accidental loosening		N/A
8.1.5.11	Pillar terminals shall allow full insertion and reliable clamping of the conductor		P
8.1.5.12	Screws and nuts of terminals for external conductors shall be in engagement with a metal thread, and the screws shall not be of tapping screw type		P
8.1.6	**Non-interchangeability**		
	For circuit-breakers intended to be mounted on bases forming a unit therewith (plug-in or screw-in type) it shall not be possible, without the aid of a tool, to replace a circuit-breaker when mounted as for normal use by another of the same make having a higher rated current, compliance is checked by inspection		N/A
8.1.7	**Mechanical mounting of plug-in circuit-breakers**		
8.1.7.1	The mechanical mounting of plug-in circuit-breakers, the holding in position of which does not depend solely on their plug-in connection(s), shall be reliable and have adequate stability		N/A
8.1.7.2	Plug-in type circuit-breakers, the holding in position of which does not depend solely on their plug-in connection(s) Compliance of the mechanical mounting is checked by the relevant test 9.13		N/A
8.1.7.3	Plug-in type circuit-breakers, the holding in position of which does depend solely on their plug-in connection(s) Compliance of the mechanical mounting is checked by the relevant test 9.13		N/A
8.2	**Protection against electric shock**		
	Live parts not accessible in normal use		P

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Clause	Requirement + Test	Result - Remark	Verdict
	For CB, other than plug-in type, external parts, other than screws and other means for fixing covers, which are accessible shall be of insulating material		P
	Unless the live parts are within an internal enclosure of insulating material: Lining - reliable fixed, - adequate thickness and - mechanical strength		N/A
	Inlet openings for cables shall be in insulating material or be provided with bushings or similar devices in insulating material Such device - shall be reliable fixed - shall have adequate mechanical strength		N/A
	For plug-in CB, external parts, other than screws and other means for fixing covers, which are accessible shall be in insulating material		N/A
	Metallic operating means insulated from live parts		N/A
	Metal parts of the mechanism not accessible and insulated from accessible metal parts, metal frames (for flush-type), screws or other means for fixing the base		P
	Replacement of plug-in CB possible without touching live parts		N/A
	Lacquer or enamel not considered		N/A
8.1.3	**Creepage distances [mm] (see table 4)**		
	Internal parts only	See above	--
9.6	**Test of protection against electric shock**		
	This verification is applicable to those parts of circuit breakers which are exposed to the operator when mounted as for normal use		P
	Use of test finger so designed that each jointed can be turned through an angle of 90°with respect to the finger		P
	Circuit-breaker with enclosures of thermoplastic material are additional tested at 35 ℃ for 1 min with a force of 75 N		N/A
8.10	**Resistance to heat**		
	CB sufficiently resistant to heat		P
9.14	**Test of resistance to heat**		

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Clause	Requirement + Test	Result - Remark	Verdict
9.14.1	Test:		
	- without removable covers ..... 1 h (100 ± 2) ℃		P
	- removable covers..... 1 h (70 ± 2) ℃		N/A
	After the test no access to live parts, marking still legible		P
9.14.2	Ball pressure test for external parts of insulating material (parts retaining current-carrying parts and parts of the protective circuit in position) T = 125℃ Ø of impression ≤ 2 mm	Impression: 1.2 mm (Enclosure)	P
9.14.3	Ball pressure test for external parts of insulating material (parts not retaining current-carrying parts and parts of the protective circuit in position T = (70 ± 2)℃ or T = ___ ℃ = (40 ± 2)℃ + max. temperature rise of sub-clause 9.8 Ø of impression ≤ 2 mm	Impression: 1.0 mm (Handle)	P
8.12	**Resistance to rusting**		
	Ferrous parts adequately protected against rusting		P
9.16	**Test of resistance to rusting:**		
	- 10 min immersed in a cold chemical degreaser such as methyl-chloroform or refined petrol		P
	- 10 min immersed in a 10% solution of chloride in water at 20℃		--
	- 10 min at 95% humidity at 20℃		--
	- 10 min at 100℃		--
	No sign of rust		--

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

	TESTS „A_2“ 3 samples	A_{2-1} A_{2-2} A_{2-3}	
8.11	**Resistance to abnormal heat and to fire**		
	External parts of insulating material shall not ignite or spread fire under fault or overload conditions		P
9.15	**Resistance to abnormal heat and to fire**		
	Test performed on a complete CB		P
	external parts retaining current-carrying parts and parts of the protective circuit in position ..... (960 ± 15)℃		P
	all other external parts ..... (650 ± 10)℃		P
	No visible flames, no sustained glowing, or		N/A
	flames and glowing extinguish within 30 s after removal .....:	2.8s	P
	No ignition of tissue paper or scorching of the pinewood board		P

	TESTS „B“ 3 samples	B_1 B_2 B_3	
8.3	**Dielectric properties and isolating capability**		
8.3.1	CB shall have adequate dielectric properties and shall ensure isolation:		P
8.3.2	Dielectric strength at power frequency		P
	Compliance is checked by the tests 9.7.1, 9.7.2 and 9.7.3 on circuit-breaker in new condition		P
8.3.3	Isolating capability		
	Circuit-breakers shall be suitable for isolation. Compliance is checked by the verification of compliance with the minimum clearances and creepage distances of item 1 of table 4 and by tests of 9.7.5.1 and 9.7.5.3.		P
8.3.4	Dielectric strength at rated impulse withstand voltage (Uimp)		
	Circuit-breakers shall adequately withstand impulse voltages. Compliance is checked by the tests of 9.7.5.2.		P
9.7	**Test of dielectric properties and isolating capability**		
9.7.5.4	Verification of resistance of the insulation of open contact and basic insulation against an impulse voltage in normal conditions		

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict
	These tests are not preceded by the humidity treatment described in 9.7.1.		P
	The test is carried out on an CB fixed on a metal support		P
	The impulses are given by a generator producing positive and negative impulses having a front time of 1,2μs, and a time to half-value of 50μs		P
	The shape of the impulses is adjusted with the CB under test connected to the impulse generator.		P
	rated impulse withstand voltage [kV]:	kV	--
	sea level of test laboratory [m]:	m	--
	test voltage (acc. Table 15) [kV]:	kV	--
9.7.5.4.2	CB in open position (contacts in open position)		
	The impulses are applied between:		--
	the line terminals connected together and the load terminals connected together		P
9.7.5.4.3	CB in closed position		
	A first series of tests is made applying the impulse voltage between the phase pole(s) and the neutral pole (or path) connected together and the metal support connected to the terminal(s) intended for the protective conductor(s), if any		P
	A second series of tests is made applying the impulse voltage between the phase pole(s), connected together, and the neutral pole (or path) of the CB		N/A
	Five positive impulses and five negative impulses are applied, the interval between consecutive impulses being at least 1 s for impulses of the same polarity and being at least 10 s for impulses of the opposite polarity.		P
	no disruptive discharges during the test		P
9.7.1	Resistance to humidity		
9.7.1.1	Preparation of the circuit-breaker for test		
	Inlet openings, if any, are left open; if knock-outs are provided, one of them is opened.		P
9.7.1.2	Test conditions		

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Clause	Requirement + Test	Result - Remark	Verdict
	The humidity treatment is carried out in humidity cabinet 91% to 95% and the temperature of the air between 20 ℃ and 30 ℃	Rf = 93 % T = 25 ℃	P
9.7.1.3	Test procedure.		
	The sample is kept in the cabinet for 48 h.		P
9.7.1.4	Conditions of the circuit breaker after the tests.		
	The sample show no damage within the meaning of this standard and shall withstand the tests of 9.7.2 and 9.7.3, 9.7.4 and 9.7.5.2		P
9.7.2	Insulation resistance of the main circuit		
9.7.2	After an interval between 30 min and 60 min flowing this treatment, the insulation resistance is measured 5 s after application of a d.c. voltage of approximately 500 V, consecutively as follows:	[MΩ] [MΩ] [MΩ]	P
	a) In off-position, between the terminals which are electrically connected together when the circuit-breaker is in the closed position ≥ 2 MΩ	>500 >500 >500	P
	b) in off-position, between each pole in turn and the others connected together ≥ 2 MΩ	>500 >500 >500	P
	c) in on-position, between all poles connected together and the frame ≥ 5 MΩ	>500 >500 >500	P
	d) between metal parts of mechanism and the frame ≥ 5 MΩ		N/A
	e) between the frame and metal foil in contact with the inner surface of the internal enclosure or lining of insulating material ≥ 5 MΩ		N/A
9.7.3	Dielectric strength of the main circuit		
	After the circuit-breakers have passed the tests of 9.7.2 the test voltage specified is applied for 1 min between the parts indicated in 9.7.2		P
	a) 2000 V		P
	b) 2000 V		P
	c) 2000 V		P
	d) 2000 V		N/A
	e) 2500 V		N/A
	No flashover or breakdown		P
9.7.4	Insulation resistance and dielectric strength of the auxiliary circuits		
	Insulation resistance of auxiliary circuits measured with 500 V DC after 1 min:		

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Clause	Requirement + Test	Result - Remark	Verdict
	1) between all auxiliary circuits and the frame (MΩ) ≥ 2 MΩ		N/A
	2) between each part of the auxiliary circuits which might be isolated from the other parts and the whole of the other parts connected together (MΩ) ≥ 2 MΩ		N/A
	Dielectric strength of auxiliary circuits measured with an AC voltage at rated frequency for 1 min:		--
	Rated voltage of auxiliary circuits (a.c. or d.c.) — Test voltage (V) ≤ 30 — 600 > 30 ≤ 50 — 1000 > 50 ≤ 110 — 1500 > 110 ≤ 250 — 2000 > 250 ≤ 500 — 2500	V	--
	1) between all auxiliary circuits and the frame		N/A
	2) between each part of the auxiliary circuits which might be isolated from the other parts and the whole of the other parts connected together		N/A
	No flashover or perforation		N/A
9.7.5.2	Verification of clearances with the impulse withstand voltage		
	If the measurement of clearances of items 2 and 4 in Table 4 shows a reduction of the required length, this test applies.		P
	The test is carried out on an CB fixed on a metal support and being in the closed position		P
	The impulses are given by a generator producing positive and negative impulses having a front time of 1,2μs, and a time to half-value of 50μs		N/A
	The shape of the impulses is adjusted with the CB under test connected to the impulse generator.		N/A
	test performed with:		--
	-surge impedance of the test apparatus ≤500Ω and surge protective devices disconnected before testing or		P
	-hybrid generator with an surge impedance of 2 Ω and surge protective devices not disconnected before testing		N/A

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict
	rated impulse withstand voltage [kV]:	kV	--
	see level of test laboratory [m]:	m	--
	test voltage (acc. Table 14) [kV]:	kV	--
	A first series of tests is made applying the impulse voltage between the phase pole(s) and the neutral pole (or path) connected together and the metal support connected to the terminal(s) intended for the protective conductor(s), if any		P
	A second series of tests is made applying the impulse voltage between the phase pole(s), connected together, and the neutral pole (or path) of the CB		N/A
	A third series of tests is made applying the impulse voltage between (and not tested during the two first sequences described here above):		--
	b) between each pole and the others connected together		P
	c) between all poles connected together and the frame		P
	d) between metal parts of the mechanism and the frame		P
	e) between the frame and a metal foil in contact with the inner surface of the lining of insulating material		P
	Five positive impulses and five negative impulses are applied, the interval between consecutive impulses being at least 1 s for impulses of the same polarity and being at least 10 s for impulses of the opposite polarity.		N/A
	no disruptive discharges during the test		N/A

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

8.4	**Temperature rise**				
	Temperature rise does not exceed the limiting values stated in table 6:	sect. __16.0_ mm²			--
9.8.2	Test current: I_N= (reach the steady-state value) Four-pole CB's: ☐ 1) Three poles loaded 2) One pole and neutral pole loaded ☑ 1) Four-poles loaded	I_N = _63_A			--
	Ambient air temperature.....:	Tamb= __21__℃			--
	Parts .....Temperature rise [K]	[K]	[K]	[K]	--
	L1	51	54	53	P
	L2	53	53	57	
	L3	50	54	56	
	L4(N)	49	51	53	
	L3				
	N				
	Terminals for external connections .....60 K				P
	External parts liable to be touched during manual operation of the circuit-breaker, including operating means of insulating material and metallic means for coupling of insulating operating means of several poles .....40 K	25	21	22	P
	External metallic parts of operating means...25 K				P
	Other external parts, including that face of the circuit-breaker is in direct contact with the mounting surface.....60 K	45	51	52	P
9.8.5	Measurement of power losses	B_1	B_2	B_3	P
	Power loss do not exceed the values stated in table 8				P
	Test current: I_N = __63_ A (reach the steady state value)		63A		P
	Loaded one pole after the other				P
	Max. power loss : ___13___ W	W	W	W	P
	L1	4.6	4.8	4.6	P

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IEC 60898-1					
Clause	Requirement + Test	Result - Remark			Verdict
	L2	5.3	4.6	4.8	
	L3 L4(N) L3 N	46 4.7	5.0 4.5	5.7 5.7	N/A
8.5	**Uninterrupted duty**				
	Circuit-breakers operate reliable even after long service				P
9.9	**28 day test**				
	28 cycles - 21 h with current - 3 h without current Cross-sectional area. ____ mm²	I_N = _63_A 16.0mm²			P
	During the test no tripping during the last period, temperature rise shall be measured				P
	Ambient air temperature.....:	23 ℃			P
	Parts .....Temperature rise [K]	[K]	[K]	[K]	P
	Terminals for external connections				P
	The temperature rise does not exceed the value measured during the temperature rise test (sub-clause 9.8) by more than 15 K				P
	Test current 1,45 I_N =__91.4__A				P
	- Tripping within	[s]	[s]	[s]	P
	- 1h (≤ 63 A)	4.5	3.5	3.6	P
	- 2h (> 63 A)				P

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

	TESTS „C“ 3 +3 samples				
8.7	**Test „C_1“ Mechanical and electrical endurance**	**C_{1-1}**	**C_{1-2}**	**C_{1-3}**	
	Circuit-breaker shall be capable to perform an adequate number of cycles with rated current				P
9.11.1	General test conditions				--
	Test: Test Voltage _____V (rated voltage) Test Current _____A (rated current) Power factor _____(0,85-0,9) Par. resistor _____ (Ω) Cross sect. area ____mm²	418V 63,2A 0,85 16,0mm²			--
9.11.2	Test procedure				
	The circuit-breaker is submitted to 4000 operating cycles with rated current.	4000 cycles			P
	- $I_N \leq 32$ A: 2 s on - 13 s off				N/A
	- $I_N > 32$ A: 2 s on - 28 s off	IN = 63 A			P
	During the test the circuit-breaker shall be operated as in normal use.				P
9.11.3	Conditions of the circuit breaker after the tests.				
	Following the test 9.11.2 the sample shall not show:				--
	- undue wear				P
	- discrepancy between the position of the moving contacts and corresponding position of the Indicating device				P
	- damage to the enclosure permitting access to live parts by test finger (see 9.6)				P
	- loosening of electrical or mechanical connections				P
	- seepage of sealing compound				N/A
	Moreover test current .....2,55 I_N_____A	161A			--
	Opening time not less 1 s or more than	[s]	[s]	[s]	--
	- 60 s (≤ 32 A)				N/A
	- 120 s (> 32 A)	19	27	13	P
	Dielectric strength reduced to 1500 V				P

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

9.12.11.2	**Test at reduced short-circuit currents**				
9.12.11.2.1	Test on all circuit-breakers				--
9.12.11.2.1	Test at reduced short-circuit currents: Fig. 3				--
	Test current:	Obtained			--
	- 500 A or 10 In	I test= ___656__A			--
	Test voltage 1,05 Un	Un = ___440____V			--
	Power factor 0,93-0,98	__0.95___			--
9.12.9.2	Test in free air copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	"a" = ___35_ mm			P
9.12.9.3	Test in enclosures copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	dimension of enclosure: _____x_____x_____mm			N/A
	I_{Peak} (A) max. value	__960_A			P
	Sequence: 6 x "O" and 3 x "CO"	[kA^2s]	[kA^2s]	[kA^2s]	--
	Max. $I^2t \leq$ _____kA^2s	37.0	65.0	111	P
	- No permanent arcing				P
	- No flash-over between poles or between poles and frame				P
	- No blowing of the fuses F and F′				P
	- Polyethylene foil shows no holes				P
	After the test:				--
9.12.12	Verification of the circuit-breaker after short-circuit tests				--
9.12.12.1	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.				P
	a) leakage current across open contacts, according to 9.7.5.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The circuit – breaker is in the open position	**C_{1-1}** [mA]	**C_{1-2}** [mA]	**C_{1-3}** [mA]	--
	The leakage current shall not exceed 2 mA L1	3.50	4.10	3.10	P
	L2	3.70	3.20	4.30	P
	L3	4.30	4.10	3.10	P
	L4(N)	3.10	4.10	2.40	P

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Electric strength test:		--
	Test voltage 1500 V (see 9.7.2)		--
	a)		P
	b)		P
	c)		P
	d)		--
	e) 2000 V		N/A

9.12.11.2.2	**Test „C_2“ Short-circuit test on circuit-breakers for use in IT systems**				
	Test current:				--
	- 500 A or 1,2 times the upper limit of the standard range of instantaneous tripping (see table 2) whichever is the higher, but < 2500 A. When tripping exceed 20 In the current adjusted at 1,2 times the upper limit even when higher 2500 A	I test= __1,55x10 3__A			--
	Test voltage 1,05 Un	Un = ___456__V			--
	Power factor 0,93-0,98	__0.95___			--
9.12.9.2	Test in free air copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	"a" = __35__ mm			P
9.12.9.3	Test in enclosures copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	dimension of enclosure: _____x_____x_____mm			N/A
	I_{Peak} (A) max. value	___1,78X10 3__A			P
	Sequence: "O" + "CO" on each protected pole	[kA^2s]	[kA^2s]	[kA^2s]	--
	Shifted point 30 °on the other protected pole	**C_{2-1}**	**C_{2-2}**	**C_{2-3}**	--
	Max. I^2t ≤ _____kA^2s L1 L2 L3 L4 (N)	67.0 67.0 ___ ___	65.1 65.1 ___ ___	66.5 66.5 ___ ___	P
	- No permanent arcing				P
	- No flash-over between poles or between poles and frame				P
	- No blowing of the fuses F and F′				P
	- Polyethylene foil shows no holes				P
	After the test:				--

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IEC 60898-1					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12.1	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.				--
	a) leakage current across open contacts, according to 9.7.5.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The circuit – breaker is in the open position	**C_{2-1}** [mA]	**C_{2-2}** [mA]	**C_{2-3}** [mA]	--
	The leakage current shall not exceed 2 mA L1	3.5	3.4	3.7	P
	L2	3.6	3.6	3.5	P
	L3	3.1	3.2	3.3	P
	L4(N)	2.9	3.3	3.0	P
	Electric strength test:				--
	Test voltage 1500 V (see 9.7.2)				--
	a)				P
	b)				P
	c)				P
	d)				N/A
	e) 2000 V				N/A

	TESTS „D“ 3 samples				
8.6	**Automatic operation**				--
8.6.1	Standard time-current zone				--
	Tripping characteristic of CB ensures adequate protection of the circuit, without premature operation.				P
9.10	**Tests „D_0“**	**D_{O-1}**	**D_{O-2}**	**D_{O-3}**	
	I_N (A)	63 A			--
	Sect. (mm²)	16 mm²			--
	Instantaneous tripping current	☐ B	☐ C	☑ D	--
9.10.2	Test of time-current characteristic				--
9.10.2.1	Test current 1,13 I_N (A) starting from cold for:	71.2 A			--
	- 1 h ($I_N \leq 63$ A)				P
	- 2 h ($I_N > 63$ A)				N/A
	No tripping				P
	Then steadily increased within 5 s to 1,45 I_N (A)				N/A
	- Tripping within	[min]	[min]	[mini]	--
	- 1h (≤ 63 A)	0.5	0.6	0.8	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- 2h (> 63 A)		N/A
9.10.2.2	Test current 2,55 I_N (A) starting from cold for:	161 A	--
	opening time not less than 1 s or more than	[s] [s] [s]	--
	- 60 s (≤ 32 A)		N/A
	- 120 s (> 32 A)	29 24 28	P
9.10.3	Test of instantaneous tripping and of correct opening of the contacts		P
9.10.3.1	General test conditions		P
	For the lower values of the test current the test is made once, at any convenient voltage.		P
	For the upper values of the test current the test is made at rated voltage Un(phase to neutral) with a power factor between 0,95 and 1.		N/A
	The sequence of operation is : O-CO-CO-CO Interval time: > 3 min		N/A
	The tripping time of the O operation is measured		N/A
	After each operation the indicating means shall show the open position of the contacts		P
9.10.3.2	☐ For circuit-breakers of the B – Type		
	Test current 3I_N (A), starting from cold	A	N/A
	Opening time:	[s] [s] [s]	--
	≥ 0,1 s		N/A
	Test current 5 I_N (A), starting from cold	A	N/A
	Tripping less than 0,1 s		N/A
9.10.3.3	☐ For circuit-breakers of the C – Type		
	Test current 5I_N (A), starting from cold	315 A	--
	Opening time:	[s] [s] [s]	--
	≥ 0,1 s	1.3 1.6 1.5	P
	Test current 10 I_N (A), starting from cold	630 A	--
--	Tripping less than 0,1 s	0.05 0.07 0.7	P
9.10.3.4	☐ For circuit-breakers of the D – Type		
	Test current 10I_N (A), starting from cold	630 A	--
	Opening time:	[s] [s] [s]	--
	≥ 0,1 s	1.2 1.3 1.2	P
	Test current 20 I_N (A) or to the maximum instantaneous tripping current(see cl. 6, item j), starting from cold	1260 A	--

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Clause	Requirement + Test	Result - Remark	Verdict
	Tripping less than 0,1 s	0.07 0.06 0.9	P
9.10.4	Test of effect of single pole loading on the tripping characteristic of multi-pole circuit-breakers:		--
	Test current 1,1 It (A), (two pole) starting from cold	_____A	--
	Tripping within	[min] [min] [min]	--
	- 1h (≤ 63 A)		N/A
	- 2h (> 63 A)		N/A
	Test current 1,2 It (A), (three pole or four pole) starting from cold	___110A__A	--
	Tripping within	[min] [min] [min]	--
	- 1h (≤ 63 A)	3.5 2.5 2.8	P
	- 2h (> 63 A)		N/A
9.10.5	Test of effect of ambient temperature on the tripping characteristics		--
	a) Ambient temperature of (35 ± 2) K below the ambient air reference temperature	T =_____5____℃	--
	Test current 1,13 I_N (A)	___71.2__A	--
	- Passed for 1h	>1h	P
	- Passed for 2h		N/A
	Current is then steadily increased to 1,9 I_N (A) within 5s	___120__A	--
	Tripping within	[min] [min] [mini]	--
	- 1h (≤ 63 A)	0.9 0.8 0.8	P
	- 2h (> 63 A)		N/A
	b) Ambient temperature of (10 ± 2) K above the ambient air reference temperature	T = +40℃	--
	Test current I_N (A)	___63___A	--
	No tripping within		--
	- 1h (≤ 63 A)	>1h	P
	- 2h (> 63 A)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

	Tests „D_1“	**D_{1-1} D_{1-2} D_{1-3}**	
8.9	**Resistance to mechanical shock and impact**		
	CB shall have adequate mechanical behaviour so as to withstand the stresses imposed during installation and use		P
9.13.1	Mechanical shock		--
	- 50 falls on two sides of vertical board C		P
	- Vertical board turned 90°		P
	- 50 falls on two sides of vertical board C		N/A
	During the test the circuit-breakers shall not open		N/A
9.13.2	Mechanical impact		--
9.13.2.2	All types:		--
	- Impact test: 10 blows-height 10 cm, no damage		P
9.13.2.3	Screw-in types:		--
	- Torque 2,5 Nm for 1 min, no damage		P
9.13.2.4	CB intended to be mounted on a rail		--
	- downward vertical 50 N for 1 min		P
	- upward vertical 50 N for 1 min, no damage		P
9.13.2.5	Plug-in types		--
	The circuit-breaker are mounted in their normal position, complete with plug-in base but without cables and any cover plate		N/A
	A force of 20 N applied for 1min to the circuit-breaker (see fig 16).		N/A
	During this test the circuit-breaker part shall not become loose from the base and shall not show damage impairing further use.		N/A
9.12.11.3	**Test at 1500 A:**		--
	Prospective current of 1500 A - power factor 0,93 to 0,98		--
	Prospective current obtained (A)	1,55x10 3 A	--
	Power factor	0.95	--
	Test voltage 1,05 Un	Utest = 456V	--
	Test circuit: figure	Figure 3	--
	T (min)	3 min	--

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IEC 60898-1					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.9.2	Test in free air copper wire F': ☐ 0,12 mm / ☑ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☑ 1,5 Ohm	"a" = __35__ mm			P
9.12.9.3	Test in enclosures copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	dimension of enclosure: _____x_____x_____mm			N/A
	Sequence	6-O, 3-CO			--
	I_{Peak} (A) max. value	2,8x10 3 A			--
	$I^2t \leq$ _____ kA^2s	[kA^2s]	[kA^2s]	[kA^2s]	--
	Max. $I^2t \leq$ _____kA^2s L1 L2 L3 L4(N)	_11.0__ __26.0_ 15.0_ ____	_10.0_ _23.0 _30.0 ___	8.00__ 13.0_ 31.0_ ___	P
	- No permanent arcing				P
	- No flash-over between poles or between poles and frame				P
	- No blowing of the fuses F and F′				P
	- Polyethylene foil shows no holes				P
	After the test:				--
9.12.12.1	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.				--
	a) leakage current across open contacts, according to 9.7.5.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The circuit – breaker is in the open position	**D_{1-1}** [mA]	**D_{1-2}** [mA]	**D_{1-3}** [mA]	--
	The leakage current shall not exceed 2 mA L1	3.50	4.60	4.30	P
	L2	3.90	3.50	4.20	P
	L3	3.30	4.80	4.60	P
	L4(N)	3.80	4.50	3.80	P
	Electric strength test:				--
	Test voltage 1500 V (see 9.7.2)				--
	a)				--
	b)				--
	c)				--
	d)				--
	e) 2000 V				P

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Clause	Requirement + Test	Result - Remark			Verdict
	Test current 0.85x non-tripping current (1,13 I_N)	60.5 A			--
	- Passed for 1h	>1h			P
	- Passed for 2h				N/A
	Current is then steadily increased to 1,1 x tripping current (1,45 I_N) within 5s	100.5 A			--
		D_{1-1} [min]	**D_{1-2}** [min]	**D_{1-3}** [min]	--
	Tripping within ☐ 1 hour / ☐ 2 hour	0.5	0.7	0.4	P

	TESTS „E_1“ 3 + 4 samples				
9.12.11.4.2	**Test E_1: Test at service short-circuit capacity**	**E_{1-1}**	**E_{1-2}**	**E_{1-3}**	--
	Service short-circuit capacity (Ics) .....:	7,50×10 3 A			--
	Test circuit: figure .....:	Figure 3			--
	Test voltage 1,05 Un	436V			--
	Prospective current .....:	7,50×10 3 A			--
	Prospective current obtained .....:	7,60x10 3 A			--
	Power factor .....:	0,45~0,50			--
	Power factor obtained .....:	0,47			--
	Sequence .....:	O-O-CO			--
	T (min) .....:	3min			--
9.12.9.2	Test in free air copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	"a" = 45 mm			P
9.12.9.3	Test in enclosures copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	dimensions of enclosure: _____x_____x_____mm			N/A
	I_{Peak} (A) max. value .....:	6,17x10 3 A			--
	$I^2t \leq$ _____ kA^2s	[kA^2s]	[kA^2s]	[kA^2s]	--
	Max. $I^2t \leq$ _____kA^2s L1 L2 L3 L4(N)	64.0 58.0 52.0 _____	69.0 49.0 73.0 ___	101 153 50.0 ___	P
	- No permanent arcing				P
	- No flash-over between poles or between poles and frame				P
	- No blowing of the fuses F and F′				P

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Clause	Requirement + Test	Result - Remark			Verdict
	- Polyethylene foil shows no holes				P
	After the test:				--
9.12.12.1	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.				P
	a) leakage current across open contacts, according to 9.7.5.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The circuit – breaker is in the open position	**E_{1-1}** [mA]	**E_{1-2}** [mA]	**E_{1-3}** [mA]	--
	The leakage current shall not exceed 2 mA L1	3.70	3.20	4.10	P
	L2	3.10	3.00	3.80	P
	L3	3.50	3.10	4.20	P
	L4(N)	3.60	2.60	3.10	P
	Electric strength test:				--
	Test voltage 1500 V (see 9.7.2)				--
	a)				P
	b)				P
	c)				P
	d)				N/A
	e) 2000 V				N/A
	Test current 0.85x non-tripping current (1,13 I_N)	___60.5___A			--
	- Passed for 1h	>1H			P
	- Passed for 2h				N/A
	Current is then steadily increased to 1,1 x tripping current (1,45 I_N) within 5s	___100.5__A			--
		E_{1-1} [min]	**E_{1-2}** [min]	**E_{1-3}** [min]	--
	Tripping within ☑ 1 hour / ☐ 2 hour	2.1	0.4	1.6	P

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

9.12.11.4.2	**Test „E_1"(Test at service short-circuit capacity) three phase tests for single circuit-breakers**	**E_{1-4}**	**E_{1-5}**	**E_{1-6}**	**P**
	Service short-circuit capacity (Ics) .....:	7,50x10 3 A			--
	Test circuit: figure .....:	Figure 3			--
	Test voltage 1,05 Un	436V			--
	Prospective current .....:	7,50x10 3 A			--
	Prospective current obtained.....:	7,60x10 3 A			--
	Power factor .....:	0,45~0,50			--
	Power factor obtained .....:	0,47			--
	Sequence .....:	O-O-CO			--
	T (min) .....:	3min			--
9.12.9.2	Test in free air copper wire F': ☐ 0,12 mm / ☑ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☑ 1,5 Ohm	"a" = __45_ mm			P
9.12.9.3	Test in enclosures copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	dimensions of enclosure: _____x_____x_____mm			N/A
	I_{Peak} (A) max. value .....:	__530___A			--
	- No permanent arcing				P
	- No flash-over between poles or between poles and frame				P
	- No blowing of the fuses F and F′				P
	- Polyethylene foil shows no holes				P
	After the test:				--
9.12.12.1	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.				--
	a) leakage current across open contacts, according to 9.7.5.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The circuit – breaker is in the open position	**E_{1-4}** [mA]	**E_{1-5}** [mA]	**E_{1-6}** [mA]	--
	The leakage current shall not exceed 2 mA L1	2.80	3.20	2.90	P
	L2	2.90	3.40	3.10	P
	L3	3.70	3.00	3.10	P
	L4(N)	2.90	2.80	3.90	P
	Electric strength test:				--

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IEC 60898-1					
Clause	Requirement + Test	Result - Remark			Verdict
	Test voltage 1500 V (see 9.7.2)				--
	a)				P
	b)				P
	c)				P
	d)				--
	e) 2000 V				--
	Test current 0.85x non-tripping current (1,13 I_N)	__0.96__A			P
	- Passed for 1h	>1H			P
	- Passed for 2h				N/A
	Current is then steadily increased to 1,1 x tripping current (1,45 I_N) within 5s	__1.60__A			N/A
		E_{1-4} [min]	**E_{1-5}** [min]	**E_{1-6}** [min]	--
	Tripping within ☐ 1 hour / ☐ 2 hour	12.3	5.6	8.3	P

	TESTS „E_2“ 3 + 4 samples				
9.12.11.4.3	**Test: E2 (Test at rated short-circuit capacity)**	**E_{2-1}**	**E_{2-2}**	**E_{2-3}**	**P**
	Rated short-circuit capacity (Icn)..... :	10kA			--
	Test circuit: figure ..... :	Figure 3			--
	Test voltage 1,05 Un	437V			--
	Prospective current ..... :	6kA			--
	Prospective current obtained ..... :	1,03x10 4 A			--
	Power factor ..... :	0,45~0,50			--
	Power factor obtained ..... :	0,48			--
	Sequence ..... :	O-CO			--
	T (min) ..... :	3min			--
9.12.9.2	Test in free air copper wire F': ☐ 0,12 mm / ☑ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☑ 1,5 Ohm	"a" = _45_ mm			P
9.12.9.3	Test in enclosures copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	dimensions of enclosure: _____x_____x_____mm			N/A
	I_{Peak} (A) max. value ..... :	5,73X10 3 A			--
	I²t ≤ __70__ kA^2s	[kA^2s]	[kA^2s]	[kA^2s]	--

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Clause	Requirement + Test	Result - Remark			Verdict
	Max. I²t ≤ _____kA²s L1	30.0	54.0	10.0	P
	L2	40.0	34.0	50.0	
	L3	60.0	9.00	23.0	
	L4(N)	_____	___	___	
	- No permanent arcing				P
	- No flash-over between poles or between poles and frame				P
	- No blowing of the fuses F and F′				P
	- Polyethylene foil shows no holes				P
	After the test:				--
9.12.12.2	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.				--
	a) leakage current across open contacts, according to 9.7.5.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The circuit – breaker is in the open position	**E_{2-1}** [mA]	**E_{2-2}** [mA]	**E_{2-3}** [mA]	--
	The leakage current shall not exceed 2 mA L1	5.30	5.50	6.30	P
	L2	5.60	5.50	5.70	P
	L3	5.50	5.70	5.90	P
	L4(N)	5.50	5.60	5.80	P
	Electric strength test:				--
	Test voltage 900 V (see 9.7.3)				--
	a)				P
	b)				P
	c)				P
	d)				N/A
	e)				N/A
	Test current 2,8 I_N	176 A			--
	Tripping within > 0,1 s up to	[s]	[s]	[s]	--
	- 60 s				N/A
	- 120 s	42	27	30	P

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

9.12.11.4.3	**Test „E_2"(Test at rated short-circuit capacity) three phase tests for single circuit-breakers**	**E_{2-4}**	**E_{2-5}**	**E_{2-6}**	**E_{2-7}**	**P**
	Rated short-circuit capacity (Icn)..... :	6kA				--
	Test circuit: figure ..... :	Figure 3				--
	Test voltage 1,05 Un	437 V				--
	Prospective current ..... :	6kA				--
	Prospective current obtained ..... :	1,03x10 4 A				--
	Power factor ..... :	0,45~0,50				--
	Power factor obtained ..... :	0,48				--
	Sequence ..... :	O-CO				--
	T (min) ..... :	3min				--
9.12.9.2	Test in free air copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	"a" = __45__ mm				--
9.12.9.3	Test in enclosures copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	dimensions of enclosure: _____x_____x_____mm				--
	I_{Peak} (A) max. value..... :	510 A				--
	- No permanent arcing					P
	- No flash-over between poles or between poles and frame					P
	- No blowing of the fuses F and F′					P
	- Polyethylene foil shows no holes					P
	After the test:					P
9.12.12.2	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.					--
	a) leakage current across open contacts, according to 9.7.5.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The circuit – breaker is in the open position	**E_{2-4}** [mA]	**E_{2-5}** [mA]	**E_{2-6}** [mA]	**E_{2-7}** [mA]	--
	The leakage current shall not exceed 2 mA L1					--
	L2					--
	L3					--
	L4(N)					---
	Electric strength test:					--
	Test voltage 900 V (see 9.7.3)					--

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IEC 60898-1						
Clause	Requirement + Test	Result - Remark				Verdict
	a)					---
	b)					--
	c)					--
	d)					--
	e)					--
	Test current 2,8 I_N	_____A				--
	Tripping within > 0,1 s up to	[s]	[s]	[s]	[s]	--
	- 60 s					--
	- 120 s					--

	TESTS „E_3“ 3 samples				
9.12.11.4.4	**Test: E_3 (Test at making and breaking capacity on an individual pole (Icn1)**	**E_{3-1}**	**E_{3-2}**	**E_{3-3}**	
	Icn1.....:	_____A			--
	Test circuit: figure .....:	_____			--
	Test voltage 1,05 Un	_____V			--
	Prospective current .....:	_____A			--
	Prospective current obtained .....:	_____A			--
	Power factor .....:	_____			--
	Power factor obtained .....:	_____			--
	Sequence .....:	_____			--
	T (min).....:	_____min			--
9.12.9.2	Test in free air copper wire F': ☒ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☒ 1,5 Ohm	“a” = _____ mm			--
9.12.9.3	Test in enclosures copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	dimensions of enclosure: _____x_____x_____mm			--
	I_{Peak} (A) max. value.....:	_____A			--
	I^2t ≤ _____ kA^2s	[kA^2s]	[kA^2s]	[kA^2s]	--
	Max. I^2t ≤ _____kA^2s L1 L2 L3 L4	____ ____ ____ ____	____ _____ ____ ____	____ ____ ____ ____	--
	- No permanent arcing				--

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IEC 60898-1					
Clause	Requirement + Test	Result - Remark			Verdict
	- No flash-over between poles or between poles and frame				N/A
	- No blowing of the fuses F and F′				N/A
	- Polyethylene foil shows no holes				N/A
	After the test:				--
9.12.12.2	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.				
	a) leakage current across open contacts, according to 9.7.5.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The circuit – breaker is in the open position	**E_{3-1}** [mA]	**E_{3-2}** [mA]	**E_{3-3}** [mA]	--
	The leakage current shall not exceed 2 mA L1				--
	L2				--
	L3				--
	L4				--
	Electric strength test:				--
	Test voltage 900 V (see 9.7.3)				--
	a)				--
	b)				--
	c)				-
	d)				--
	e)				--
	Test current 2,8 I_N	_____A			--
	Tripping within > 0,1 s up to	[s]	[s]	[s]	--
	- 60 s				--
	- 120 s				--

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Clause	Requirement + Test	Result - Remark	Verdict

	Annex E		
	Special requirements for auxiliary circuits for safety extra-low voltage		N/A
8.1.3	**Clearances and creepage distances**		
	Additional note to table 4 NOTE 4 live parts in auxiliary circuits intended to be connected to safety extra low voltages shall be separated from circuits with higher voltages in accordance with the requirements of 411.1.3.3 of IEC 60364-4-41		--
	Compliance is checked by inspection		--
9.7.4	**Dielectric strength of the auxiliary circuits**		
	Note: A test for circuits intended for connection to safety extra-low voltage is under consideration		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

	Annex J		
	Particular requirements for circuit-breakers with screw less type terminals for external copper conductors (In not exceeding 20 A, cross-sectional area up to 4 mm^2		N/A
J.6	**Marking**		
	Universal terminals		--
	- no marking		N/A
	Non-universal		--
	- declared for rigid-solid conductors	marked with: “sol”	N/A
	- declared for rigid(solid and stranded) .....:	marked with: “r”	N/A
	- declared for flexible conductors .....:	Marked with: “f”	N/A
	The markings should appear on the circuit-breaker or, if available space is not sufficient, on smallest package unit or in technical information .....:		N/A
	Indication of length of insulation to be removed on the circuit-breaker.....:	_____mm	N/A
J.7	**Standard conditions for operation in service**		
	Clause 7 applies		N/A
J.8	**Constructional requirements**		
	Clause 8 applies with the follow modifications:		N/A
	In clause 8.1.5 only –5.1, -5.2. –5.3, - 5.6 and - 5.7 apply		N/A
	Compliance is checked by inspection and by the tests of J.9.1 and J.9.2		N/A
J.8.1	**Connection or disconnection of conductors**		
	The connection or disconnection shall be made by:		N/A
	A general purpose tool or by a convenient device integral with the terminal or		N/A
	for rigid conductors by simple insertion		N/A
	For disconnection an operation other than a pull shall be necessary (push-wire terminals)		N/A
	Universal terminals shall accept rigid (solid or stranded and flexible unprepared conductors		N/A
	Non-universal terminals shall accept conductors declared by the manufacturer		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Compliance is checked by inspection and by the tests of J.9.1 and J.9.2		N/A
J.8.2	**Dimensions of connectable conductors**		
	The dimensions of connectable conductors are given in table J.1		N/A
	The ability to connect these conductors shall be checked by inspection and by the tests of J.9.1 and J.9.2		N/A
J.8.3	**Connectable cross-sectional areas**		
	The nominal cross-sections to be clamped are given in table J.2		N/A
	Compliance is checked by inspection and by the tests of J.9.1 and J.9.2		N/A
J.8.4	**Insertion and connection of conductors**		
	The insertion and disconnection of the conductors shall be made in accordance with the manufacturer's instructions		N/A
J.8.5	**Design and construction of terminals**		
	Terminals shall be designed and constructed that:		N/A
	- each conductor is clamped individually		N/A
	- connection or disconnection connectors connected or disconnected separate or same		N/A
	- inadequate insertion of the conductor is avoided		N/A
	Compliance is checked by inspection and by the tests of J.9.1 and J.9.2		N/A
J.8.6	**The terminals shall be resistant to ageing**		
	Compliance is checked by the tests of J.9.3		N/A
J.9	**Tests**		
	Clause 9 applies, by replacing 9.4 and 9.5 by the follow		N/A
J.9.1	**Test of reliability of screw less terminals**		
J.9.1.1	**Reliability of screw less system**		
	5 times connection and disconnection		N/A
	3 rigid conductors min. cross-section max. cross-section	_____mm^2 _____mm^2	N/A
	3 flexible conductors min. cross-section max. cross-section	_____mm^2 _____mm^2	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	After tests, the terminal shall not be damage in such a way as to impair its further use		N/A
J.9.1.2	**Test of reliability of connection**		
	3 terminals of poles of new sample are fitted with new copper conductors according table J.2		N/A
	rigid conductors min. cross-section max. cross-section	_____mm^2 _____mm^2	N/A
	flexible conductors min. cross-section max. cross-section	_____mm^2 _____mm^2	N/A
	Each conductor is either pushed as far as possible into the terminal or shall be inserted so that adequate connection is obvious		N/A
	After tests, no wire of the conductor shall have escaped outside the terminals		N/A
J.9.2	**Tests of reliability of terminals for external conductors: Mechanical strength**		
	Three terminals of new samples are fitted with new conductors of the type and of the minimum and maximum cross sectional area according table J.2.		N/A
	Each conductor is subjected to a pull force of value shown in table J.3. for 1 min		N/A
	Terminal screw torque : $^2/_3$ of table 11	_____ Nm	N/A
	rigid conductors min. cross-section max. cross-section	_____ mm^2 / _____N _____ mm^2 / _____N	N/A
	flexible conductors min. cross-section max. cross-section	_____ mm^2 / _____N _____ mm^2 / _____N	N/A
	During the test the conductor shall not slip out of the terminal		N/A
J.9.3	**Cycling test**		
	The test is carried out with new copper conductors having a cross sectional area according table 10	_____ mm^2	N/A
	The test is carried out on new samples(a sample is one pole, the number of which is defined below, according the type of terminal		N/A
	- universal terminals for rigid (solid and stranded) and flexible conductors	3 + 3 samples	N/A
	- non-universal terminals for solid conductors only	3 samples	N/A

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Clause	Requirement + Test	Result - Remark			Verdict
	-- non- universal terminals for rigid (solid and stranded) conductors	3 + 3 samples			N/A
	- non-universal terminals for flexible conductors only	3 samples			N/A
	The conductors are connected in series as in normal use to each of the three samples as defined on fig. J.1.				N/A
	The sample is provided with a hole or equivalent in order to measure the voltage drop on the terminal				N/A
	The test arrangement is placed in a heating cabinet which is initially on 20℃				N/A
	Except the cooling period the test current (rated current) is applied to the circuit	I test _____ A			N/A
	The samples shall be subjected to 192 temperature cycles, each cycle having a duration of $^{+}/_{-}$ 1 hour				N/A
	Description of the temperature cycle: In 20 min raised to 40℃, maintained for 10 min, then cool down in 20 min to 30 ℃, maintained for 10 min. For measurement of the voltage drop it is allowed to cool down to 20 ℃				N/A
	The maximum voltage drop, measured on each terminal, at the end of the 192nd cycle, with Inom. shall not exceed the smaller of the two following values - either 22,5 mV - or 1,5 times the value measured after the 24 cycle	Uv max. _____ mV			N/A
	Sample after 24 cycles: rigid conductors (mV) flexible conductors (mV)	J_1 _____ _____	J_2 _____ _____	J_3 _____ _____	N/A
	Sample after 192 cycles: rigid conductors (mV) flexible conductors (mV)	J_1 _____ _____	J_2 _____ _____	J_3 _____ _____	N/A
	After this test the samples shall show no changes evidently impairing further use, such as cracks, deformations or like				P

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

	Annex K		
	Particular requirements for circuit-breakers with flat quick-connect terminations		--
K.6	**Marking**		
	The whole of clause 6 applies		P
	Addition after the lettered item k		--
	The following information regarding the female connector according to IEC 61210 and the type of conductor to be used shall be given in the manufacturer's instructions		N/A
	a) manufacturers name or trade mark		--
	b) type reference		P
	c) information on cross-sections of conductors and colour code of insulating female connectors (see table K.1)		P
	d) the use of only silver or tin-plated copper alloys		N/A
K.7	**Standard conditions for operation in service**		
	Clause 7 applies		P
K.8	**Constructional requirements**		
	Clause 8 applies with the follow modifications:		P
	replacement of 8.1.3 by:		N/A
K.8.1	**Clearances and creepage distances (see annex B)**		
	Subclause 8.1.3 applies, the female connectors being fitted to the male tabs of the circuit-breaker		P
	Replacement of 8.1.5 by:		P
K.8.2	**Terminals for external conductors**		
K.8.2.1	Male tabs and female connectors shall be of a metal having mechanical strength, electrical conductivity and resistance to corrosion adequate for their intended use		N/A
K.8.2.2	The nominal width of male tab is 6,3 mm and the thickness 0,8 mm, applicable to rated currents up to and including 16 A NOTE 1:The use for rated currents up to and including 20 A is accepted in BE, FR, IT, PT, ES and US		N/A
	The dimensions of the male tab shall comply with those specified in table K.3 and in figures K.2, K3, K4, K5, where the dimensions A, B, C, D, E, F, J, M, N and Q are mandatory		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The dimensions of the female connector which may be fitted-on are given in figure K.6 and in table K.4		P
	Compliance is checked by inspection and by measurement	See table on page _____	P
K.8.2.3	**Male tabs shall be securely retained**		
	Compliance is checked by the mechanical overload test of K.9.1		P
K.9	**Tests**		
	Clause 9 applies, with follow modifications:		N/A
	Replacement of 9.5 by:		N/A
K.9.1	**Mechanical overload-force**		
	10 terminals of circuit-breakers, mounted as normal use are subjected to a axial push force and successively the axial pull force specified in table K2 applied to male tab once	push force 96 N pull force 88 N	P
	No damage which could impair further use shall occur to the tab or to the circuit-breaker in which the tab is integrated		N/A
	Addition to 9.8.3:		N/A
	Fine –wire thermocouples shall be placed in such a way as not to influence the contact or the connection area. An example of placement is shown in fig K.1		N/A

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

		Dimensions of tabs according Table K.3		Measured in mm	Verdict
		Minimum	Maximum		
A	Dimple	0,7	1,0	_____	P
	Hole	0,5	1,0	_____	P
B	Dimple	7,8 min		_____	P
	Hole	7,8 min		_____	P
C	Dimple	0,77	0,84	_____	P
	Hole	0,77	0,84	_____	P
D	Dimple	6,20	6,40	_____	P
	Hole	6,20	6,40	_____	P
E	Dimple	3,6	4,1	_____	P
	Hole	4,3	4,7	_____	P
F	Dimple	1,6	2,0	_____	P
	Hole	1,6	2,0	_____	P
J	Dimple	8°	12°	_____	P
	Hole	8°	12°	_____	P
M	Dimple	2,2	2,5	_____	P
	Hole	---	---	---	---
N	Dimple	1,8	2,0	_____	P
	Hole	---	---	---	---
P	Dimple	0,7	1,8	_____	P
	Hole	0,7	1,8	_____	P
Q	Dimple	8,9 min	---	_____	P
	Hole	8,9 min	---	_____	P
B3			7,8 max	_____	P
L2			3,5 max	_____	P

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

	Annex L		
	Specific requirements for circuit-breakers with screw-type terminals for external untreated aluminium conductors and with aluminium screw-type terminals for use with copper or with aluminium conductors		P
L.6	**Marking**		
	In addition to clause 6 the following apply:		P
	Terminal marking according table L.1, on the circuit breaker, near the terminals		--
	Conductor types accepted: Copper only Aluminium only Aluminium and copper	 ☐ None ☐ "Al" ☐ "Al/Cu"	P
	Other information concerning the number of conductors, screw torque (if different from table 11) and cross-section shall be indicated on the circuit-breaker	_____ Nm _____ mm^2	P
L.7	**Standard conditions for operation in service**		
	Clause 7 applies		N/A
L.8	**Constructional requirements**		
	Clause 8 applies with the following exceptions:		N/A
8.1.5.2	is completed by:		
	For connection of aluminium conductors, circuit-breakers shall be provided with screw-type terminals allowing the connection of conductors having nominal cross-sections as shown in table L.2		P
	Terminals for the connection of aluminium conductors and terminals of aluminium for the connection of copper or aluminium conductors shall have mechanical strength adequate to withstand the tests of 9.4, with the test conductors tightened with the torque indicated in table 11, or with the torque specified by the manufacturer, which shall never be lower than that specified in table 11.		N/A
	Compliance is checked by inspection, by measurement and by fitting in turn one conductor of the smallest and one of the largest cross-section areas as specified		N/A
8.1.5.4	Terminals shall allow the conductors to be connected without special preparation		P

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Compliance is checked by inspection and by the tests of L.9		P
L.9	**Tests**		
	Clause 9 applies with the following modifications/additions:		P
	For the tests which are influenced by the material of the terminal and the type of conductor that can be connected, the test conditions of table L.3 are applied		P
	Additionally the test of L.9.2 is carried out on terminals separated from the circuit-breaker		N/A
L.9.2	**Current cycling test**		
	This test is carried out on separate terminals		P
	The general arrangement of the samples shall be as shown in figure L.1		N/A
	90 % of torque stated by the manufacturer or selected in table 11 used for the specimens	torque:_____Nm	P
	The test is carried out with conductors according to table L.5. The length of the test conductor from the point of entry to the screw-type terminal specimens to the equalizer shall be as in table L.6	cross-section:_____mm^2 minimum conductor length:_____mm	P
	Cross section of equalizer not greater than that given in table L.7	max. crosssection_____mm^2	P
L.9.2.5	Test method and acceptance criteria		
	Test loop subjected to 500 cycles of 1h current-on and 1h current-off, starting at an a.c. current value of 1,12 times the test current value determined in table L.8	test current:_____A	P
	Near the end of each current-on period of the first 24 cycles, the current shall subsequently be adjusted to raise the temperature of the reference conductor to 75℃		N/A
	At the end of the 25th cycle the test current shall be adjusted the last time and the stable temperature shall be recorded as the first measurement. No further adjustment of test current for the remainder of the test		N/A
	Temperatures recorded for at least one cycle of each working day, and after approximately 25, 50, 75, 100, 125, 175, 225, 350, 425 and 500 cycles		N/A
	For each screw-type terminal		P
	- the temperature rise shall not exceed 110 K		P

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IEC 60898-1				
Clause	Requirement + Test	Result - Remark		Verdict
	- the stability factor Sf shall not exceed ±10 ℃			P
	ambient air temperature: _____℃	max. temperature rise [K]	max. stability factor Sf [℃]	P
	Terminal 1			P
	Terminal 2			P
	Terminal 3			P
	Terminal 4			P
	Terminal 5			P
	Terminal 6			P
	Terminal 7			P
	Terminal 8			P

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE: Heating Test		
	Test voltage (V) ..... :		—
	Ambient (^{o}C) .....:		—

Thermocouple Locations	max. temperature measured, (K)	max. temperature limit, (K)

Supplementary information:

	TABLE: Dielectric Strength	

Test voltage applied between:	Test potential applied (V)	Breakdown / flashover (Yes/No)

Supplementary information:

	TABLE: insulation resistance measurements	

Insulation resistance R between:	R (MΩ)	Required R (MΩ)
Between mains poles (primary fuse disconnected)		
Between parts separated by basic or supplementary insulation		
Between parts separated by double or reinforced insulation		

Supplementary information:

	TABLE: Impact Resistance		

Impacts per surface	Surface tested	Impact energy (Nm)	Comments

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:			

	TABLE: Clearance And Creepage Distance Measurements					
clearance cl and creepage distance dcr at/of:	**Up (V)**	**U r.m.s. (V)**	**Required cl (mm)**	**cl (mm)**	**required dcr (mm)**	**dcr (mm)**
Supplementary information:						

	TABLE: Ball Pressure Test of Thermoplastics		
Allowed impression diameter (mm) ..... :			—
Object/ Part No./ Material	Manufacturer/ trademark	Test temperature (°C)	Impression diameter (mm)
Supplementary information:			

	TABLE: Needle- flame test (NFT)				
Object/ Part No./ Material	Manufacturer/ trademark	Duration of application of test flame (ta); (s)	Ignition of specified layer Yes/No	Duration of burning (tb) (s)	Verdict
Supplementary information: **NFT not relevant (or applicable) for Parts of material classified as V-0 or V-1** **NFT not relevant (or applicable) for Base material of PCBs classified as V-0 or if relevant VTM-0**					

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE: Resistance to heat and fire - Glow wire tests

Object/ Part No./ Material	Manufacturer / trademark	Glow wire test (GWT); (℃)						Verdict
		550	650		750		850	
			te	ti	te	ti		

Object/ Part No./ Material	Manufacturer / trademark	Glow-wire flammability index (GWFI), ℃				GW ignition temp. (GWIT), ℃		Verdict
		550	650	750	850	675	775	

The test specimen passed the glow wire test (GWT) with no ignition [(t_e – t_i) ≤ 2s] (Yes/No):	
If no, then surrounding parts passed the needle-flame test of annex E (Yes/No)..... :	
The test specimen passed the test by virtue of most of the flaming material being withdrawn with the glow-wire (Yes/No)? ..... :	
Ignition of the specified layer placed underneath the test specimen (Yes/No)..... :	

Supplementary information:

550 ℃ GWT not relevant (or applicable) to parts of material classified at least HB40 or if relevant HBF The GWIT pre-selection option, the 850 ℃ GWFI pre -selection option, and the 850 ℃ GWT are not relevant (or applicable) for attended appliances.

TABLE: Threaded Part Torque Test

Threaded part identification	Diameter of thread (mm)	Column number (I, II, or III)	Applied torque (Nm)

Supplementary information:

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Attachment No. 1

APPENDED TABLE Critical components					
Object / part no.	Manufacturer / trademark	Type / model	Technical data	Standard	Mark(s) of Conformity
Plastic material	Suzhou Banleantone International Logistics CO,.Ltd	PA66	PA66	IEC/EN60998-2-1,IEC/EN60998-1	Test with appliance
Terminal block material	Foshan Huaru Copper Industry Co., Ltd	COPPER	COPPER	IEC/EN60998-2-1,IEC/EN60998-1	Test with appliance

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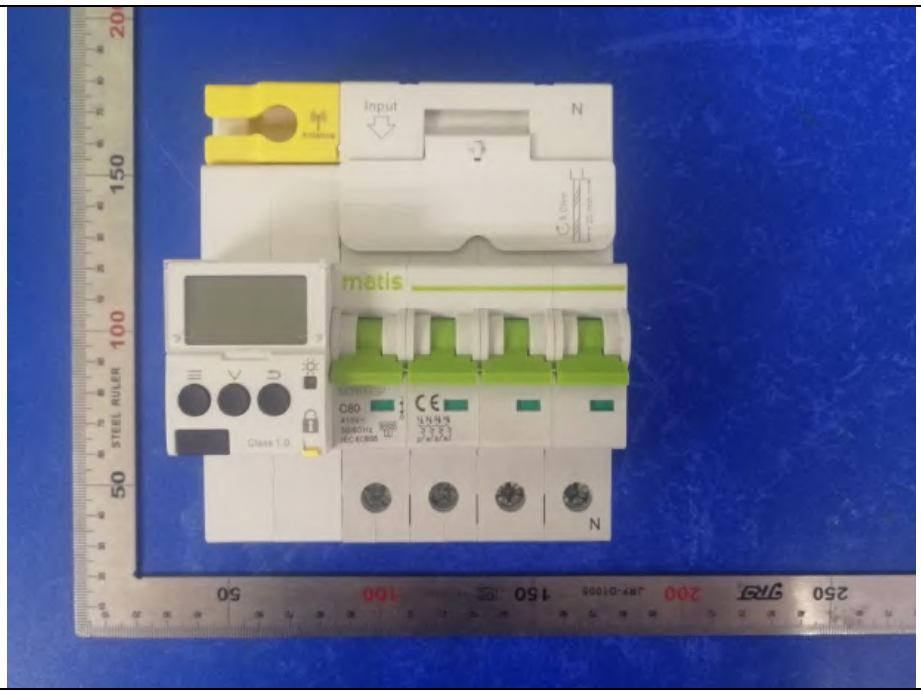
Attachment No. 2: photo documentation

Details of: External View



Details of: External View



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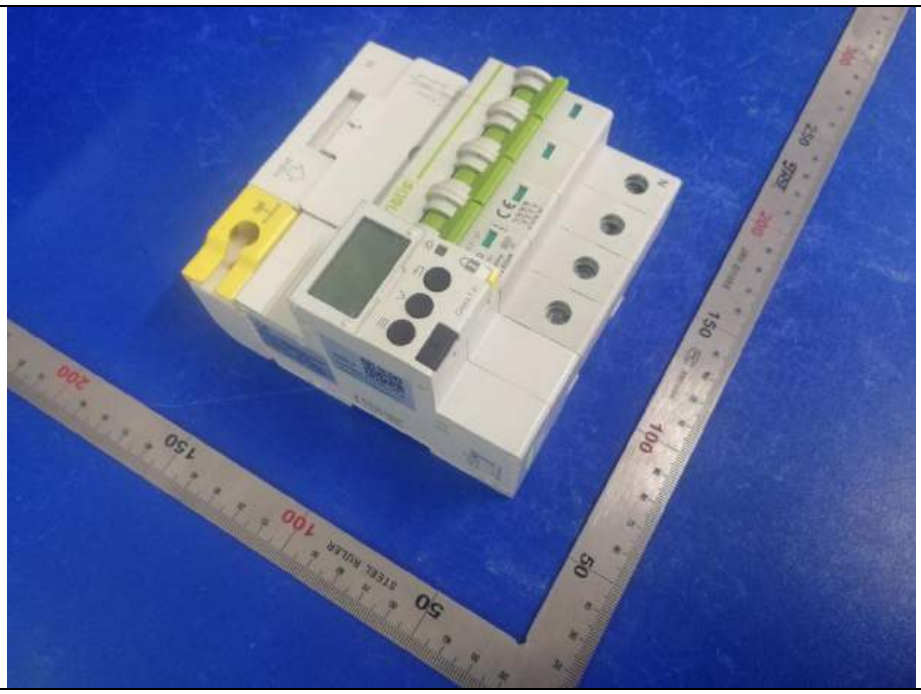

Details of: External View



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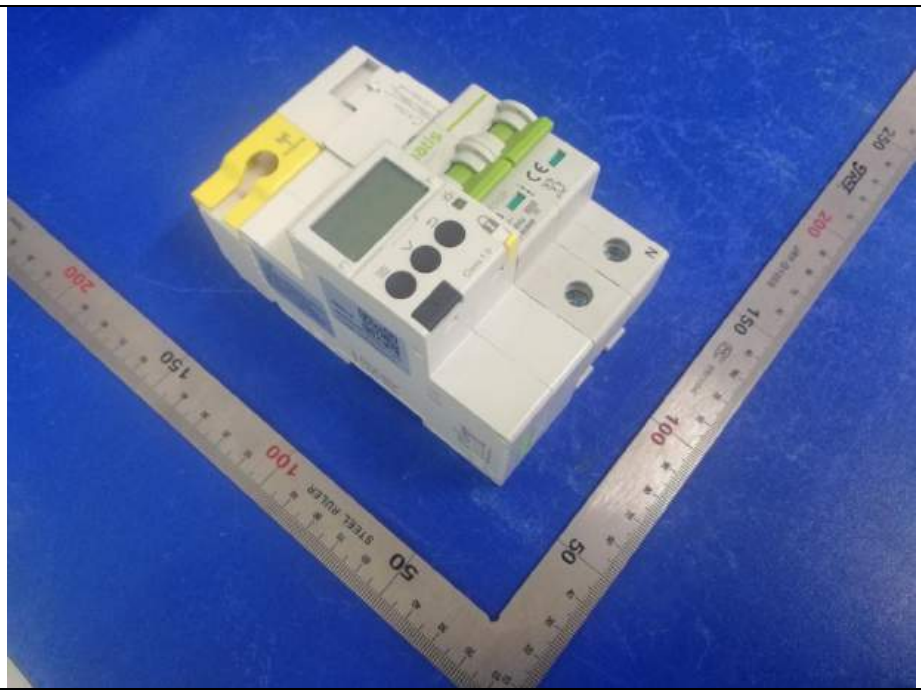
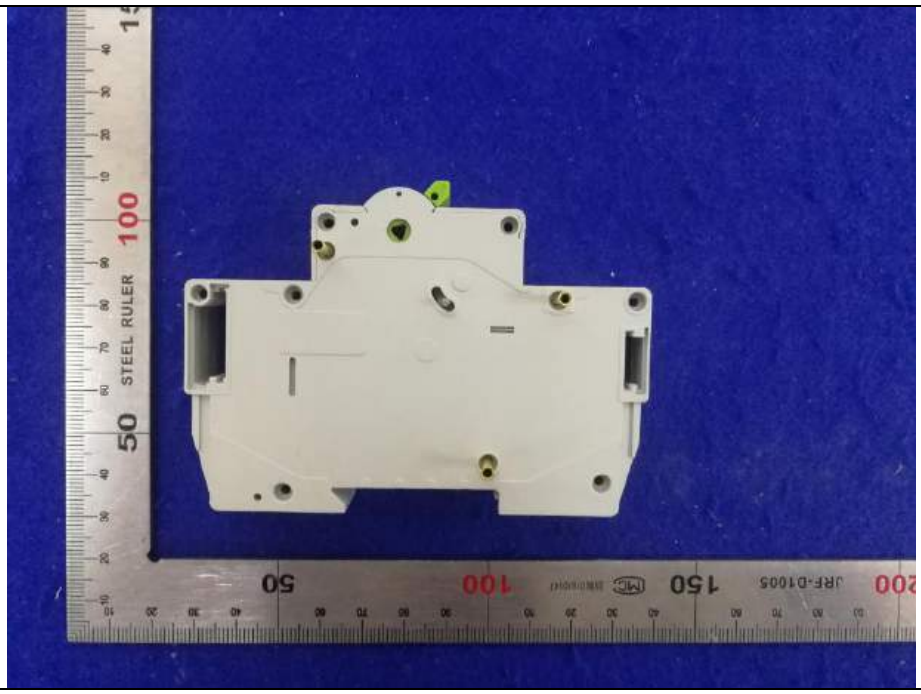


Details of: External View



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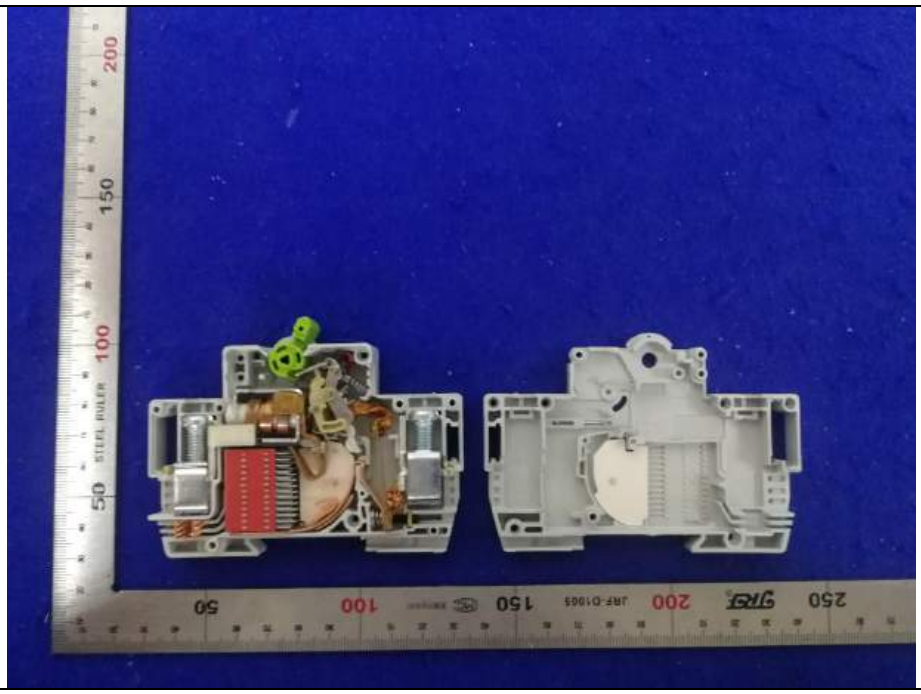
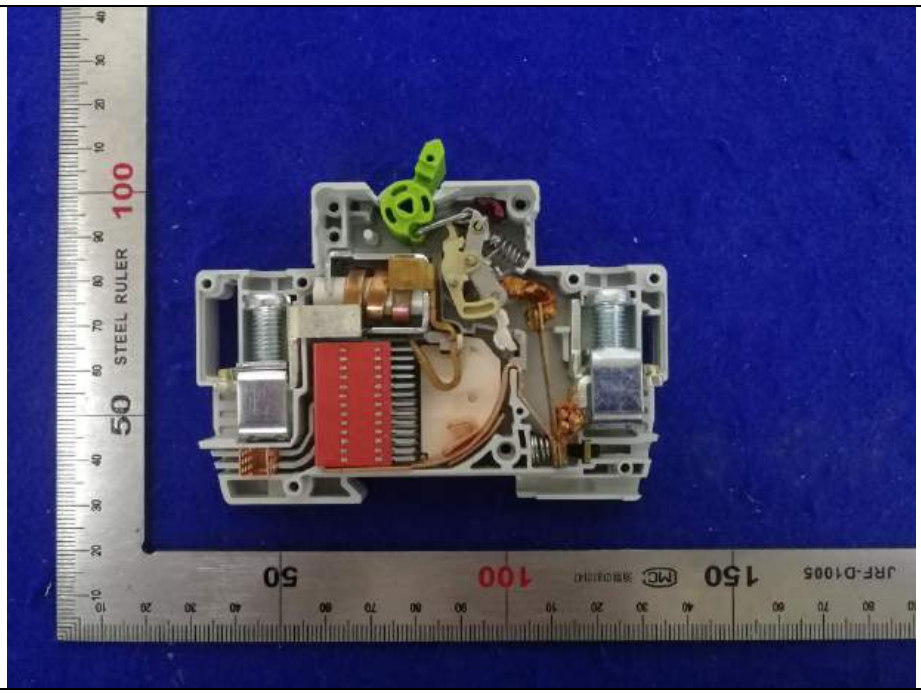
Attachment No. 2: photo documentation

Details of: Internal view



Details of: Internal view



----------End of test report----------

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TEST REPORT
IEC 60898-1
Circuit-breakers for over current protection for household and similar installations
Part 1 - Circuit-breakers for a.c. operation

Report Number. .....:	LCS190815025AS
Date of issue .....:	September 12, 2019
Total number of pages	57
Applicant's name.....:	SHANGHAI MATIS ELECTRC CO.,LTD.
Address .....:	BLOCK C, NO.888, HUANHU WEST 2ND ROAD, PUDONG, SHANGHAI, CHINA
Test specification:	
Standard .....:	IEC 60898-1:2015 ED2
Test procedure .....:	Type test
Non-standard test method.....:	N/A
Test Report Form No.....:	IEC60898_1
Test Report Form(s) Originator.....:	DEKRA Certification B.V.
Master TRF.....:	Dated 2015-09

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This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

The test results presented in this report relate only to the object tested.
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Test item description	AIOT ENERGY METER WITH MCB
Trade Mark	matis, matismart
Manufacturer	SHANGHAI MATIS ELECTRC CO.,LTD. BLOCK C, NO.888, HUANHU WEST 2ND ROAD, PUDONG, SHANGHAI, CHINA
Model/Type reference	MT61GP, M61WF, MT61NB, MT61LR
Ratings	Single Phase, 1P+N, 230V,50/60Hz, 6A,10A,16A,20A,25A,32A.40A.50A,63A,80A Three Phase, 3P+N, 400V,50/60Hz, 6A,10A,16A,20A,25A,32A.40A.50A,63A,80,100A

Testing procedure and testing location:

☒ **Testing Laboratory:**	Shenzhen LCS Compliance Testing Laboratory Ltd.	
Testing location/ address	101, 601, Xingyuan Industrial Park, Gushu Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China	
Tested by	Aic Huang / Test Engineer	
Checked by	Albert Lai / Project Engineer	
Approved by	Hart Qiu / Technical Director	

List of Attachments (including a total number of pages in each attachment):

Attachment No.1: Component assembly (1 pages)

Attachment No.2: Photo documentation (4 pages)

Summary of testing:

Tests performed (name of test and test clause): The submitted samples were found to comply with the requirements of: IEC 60898-1:2015 ED2 EN 60898-1:2019	**Testing location:** Shenzhen LCS Compliance Testing Laboratory Ltd. 101, 601, Xingyuan Industrial Park, Gushu Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China

Summary of compliance with National Differences (List of countries addressed):

--

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Copy of marking plate

The artwork below may be only a draft.

matis, matismart
AIOT ENERGY METER WITH MCB
Model: MT61GP
400V,50Hz,6A,10A,16A,20A,25A,32A.40A.50A,63A ,80A,100A,125A(4P/three phase)



SHANGHAI MATIS ELECTRC CO.,LTD.
MADE IN CHINA

Shenzhen LCS Compliance Testing Laboratory Ltd.
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Classification of installation and use.....:	--
Supply Connection.....:	--
.....:	
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement.....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)
Testing.....:	
Date of receipt of test item .....:	August 15, 2019
Date (s) of performance of tests.....:	From August 15, 2019- September 12, 2019

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

"*" This symbol refers to not within the scope of CNAS recognition.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :	☐ **Yes** ☒ **Not applicable**

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies).....:	SHANGHAI MATIS ELECTRC CO.,LTD. 4TH FLOOR, BLOCK 7A, SHAHU SCIENCE PARK, NO.183, LANE TINGLAN, WUZHONG, SUZHOU, JIANGSHU, CHINA

General product information:

1.This product is suitable for internal use

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Test item particulars.....	
Type of circuit-breaker ..... :	
Number of poles ..... :	☐ 1-P ☐ 1-P+N ☒ 2-P ☐ 3-P ☐ 3-P+N ☒ 4-P
Protection against external influences ..... :	☐enclosed ☒ unenclosed
Method of mounting ..... :	☐surface ☒ flush ☐ panel board
Method of connection ..... :	☒.not associated with the mechanical mounting ☐ associated with the mechanical mounting
Type of terminal ..... :	☐ screw [a) b)] ☒ pillar [a) b)] ☐ cage [a) b)] ☐ lug ☐ screw less[a)] ☐ flat quick connect [a)] ☐ plug-in ☐ screw-in [a)] copper conductors [b)] aluminium conductors
Instantaneous tripping current ..... :	☒ B ☒ C ☒ D
I^2t characteristic .....:	
Value of rated operational voltage (Ue) ..... :	☐ 120 V ☒ 230 V ☐ 240 V ☐ 120/240 V ☐ 230/400 V ☒ 400 V ☐ 240/415 V ☐ 415 V
Value of rated current (In) ..... :	6, 10, 16, 20, 25, 32, 40, 50, 63, 80, 100 A
Value of rated frequency ..... :	☒ 50 Hz ☒ 60 Hz
Ambient air temperature (°C) ..... :	☒ 30℃ ☐ 40℃ ☐ Other _____℃
Rated short-circuit capacity (Icn) ..... :	☐ 1,5 kA ☐ 3 kA ☐ 4,5 kA ☒ 6 kA ☐ 10 kA ☐ 15 kA ☐ 20 kA ☐ 25 kA
Rated impulse withstand voltage (Uimp)	☒ 2,5 kV ☐ 4 kV ☐ declared ___kV

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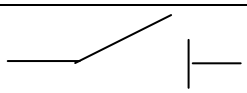
IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

	TESTS „A“ 1 SAMPLE	**A_1**	
6	**MARKING AND OTHER INFORMATION**		
	Circuit-breaker marked with:		--
	a) Manufacturer’s name or trade mark.....:	matis / matismart	P
	b) Type designation, catalogue number or other serial number.....:	MT61GP, M61WF, MT61NB, MT61LR	P
	c) Rated voltage (V).....:	230/400 VAC	P
	d) Rated current without symbol "A", preceded by the symbol of instantaneous tripping.....:	6,10,16,20,25,32,40,50,63A, 80,100	P
	e) Rated frequency (Hz) .....:	50/60 Hz	P
	f) Rated short circuit capacity (A) .....:	6000 A	P
	g) Wiring diagram		P
	h) Ambient air temperature, if different from 30℃		P
	i) Degree of protection, if different from IP20	IP20	P
	j) For D-type circuit-breakers: the maximum instantaneous tripping current, if higher than 20 In see table 2)		P
	k) Rated impulse withstand voltage Uimp if it is 2,5 kV	4kV	P
	l) Making and breaking capacity on an individual protected pole of multipole circuit-breakers (Icn1), if different from Icn	6000A	P
	Marking d) shall be readily visible when the CB is installed		P
	If, for small devices, the available space is insufficient, markings a), b), c), e), f), h), j) and l) may be put on the side or on the back of the CB		P
	Marking g) may be on the inside of any cover which has to be removed in order to connect the supply wires but shall not be on a label loosely attached to the CB		P
	Any other information not marked shall be given in the manufacturer’s documentation		P
	The suitability for isolation, which is provided by all circuit-breakers of this standard, may be indicated by the symbol on the device		P
	I^2t characteristic (documentation)		P
	Symbols on supply and load terminal		P
	Terminal for neutral conductor N		P

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Earth terminal if any (IEC 60417-5019)		N/A
	On - off position shall be clearly indicated - 0 I -		P
	For push-button CB the off push-button shall either be red or be marked with the symbol 0´		P
	Red not used for other push-button		P
	For CB with multiple current ratings, the maximum value is marked, the adjusted value indicated without ambiguity		P
	Marking shall be indelible and easily legible (not on removable parts), 15 s with water, 15 s with hexane (see cl. 9.3)		N/A
8.	**REQUIREMENTS FOR CONSTRUCTION AND OPERATION**		
8.1.1	**General**		
	Circuit-breakers shall be so designed and constructed that, in normal use, their performance is reliable and without danger to the user or surroundings		P
8.1.2	**Mechanism**		
	The moving contact shall be mechanically coupled so that all poles make and break together, whether operated manually or automatically, even if an overload occurs on one pole only		P
	The switched neutral shall close before and open after the protected pole (s)		P
	Neutral pole having adequate making and breaking capacity and CB with independent manual operation: all poles operate together including neutral pole		P
	CB shall have a trip free mechanism		P
	It shall be possible to switch the CB on and off by hand		P
	No intermediate position of the contacts		P
	Position of contacts shall be indicated		P
	Indication visible from the outside		P
	If the indication is on the actuating means, it shall, when released, automatically take up or stay in the position corresponding to that of the moving contacts; operating means shall have two different rest positions, except that, for automatic operation, a third distinct rest position may be provided		P

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Clause	Requirement + Test	Result - Remark	Verdict
	If a separate mechanical indicator is used to indicate the position of the main contacts, colour red shall be used for the on position and green for the off position.		N/A
	The action of the mechanism shall not be influenced by the position of enclosures		P
	If the cover is used as a guiding means for push-button, it shall not be possible to remove this button from the outside		P
	Operating means securely fixed, not possible to remove them without a tool		P
	For the up-down operating means the contacts shall be closed by the up movement.		P
8.1.3	**Clearances and creepage distances**		
	The minimum required clearances and creepage distances are based on the CB being designed for operating in an environment with pollution degree 2		P
	Compliance for item 1 in Table 4 is checked by measurement and by the test of 9.7.5.4.1 and 9.7.5.4.2. The test is carried out with samples not submitted to the humidity treatment described in 9.7.1.		P
	The clearances of items 2 and 4 (except accessible surface after installation) may be reduced provided that the measured clearances are not shorter than the minimum allowed in IEC 60664-1 for homogenous field conditions.		N/A
	In this case, after the humidity treatment in 9.7.1, compliance for item 2 and 4 and arrangements of 9.7.2 items b), c), d) and e) is checked:		P
	-Tests according to 9.7.2 to 9.7.4 as applicable		P
	-Test according to 9.7.5.2 with test voltages acc. Table 13 with test arrangements of 9.7.2 items b), c), d), e)		P
	If measurement does not show any reduced clearance, test 9.7.5.2 is not applied		P
	Compliance for item 3, checked by measurement		P
	The insulating materials are classified into Material Groups on the basis of their comparative tracking index (CTI) acc. to IEC 60664-1		P
	Clearances [mm] U_{imp}		--

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Clause	Requirement + Test	Result - Remark	Verdict
	4 kV (see table 4) 2,5 kV (see table 4)	4kV	P
	Minimum clearances (see table 4)		N/A
		minimum clearances [mm]	--
	1.between live parts (of the main circuits) which are separated when the CB is in off position ..... :		P
	2.between live parts of different polarity..... :		P
	3.between circuits supplied from different sources, one of which being PELV or SELV..... :		N/A
	4. between live parts and		P
	- accessible surfaces of operating means..... :		P
	- screws or other means for fixing covers ..... :		P
	- surface on which the base is mounted..... :		P
	- screws or other means for fixing the circuit breaker ..... :		P
	- metal covers or boxes..... :		P
	- other accessible metal parts ..... :		P
	- metal frames supporting the base (flush-type) . :		P
	Minimum creepage distances (see table 4)		P
	Material group	☐ III_b ☐ III_a ☐ II ☐ I	--
		minimum creepage distances [mm]	--
	1.between live parts (of the main circuits) which are separated when the CB is in off position ..... :		P
	2.between live parts of different polarity..... :		N/A
	3.between circuits supplied from different sources, one of which being PELV or SELV..... :		N/A
	4. between live parts and		P
	- accessible surfaces of operating means..... :		P
	- screws or other means for fixing covers ..... :		P
	- surface on which the base is mounted..... :		P
	- screws or other means for fixing the circuit breaker ..... :		P
	- metal covers or boxes..... :		P
	- other accessible metal parts ..... :		P
	- metal frames supporting the base (flush-type) . :		P

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Clause	Requirement + Test	Result - Remark	Verdict
8.1.4	**Screws, current-carrying parts and connections**		
8.1.4.1	Connections, withstand mechanical stresses occurring in normal use		P
	Screws for mounting of the CB not of the thread-cutting type		P
	Test according to cl. 9.4:		P
	- 10 times (screw Ø / torque Nm)	Ø___mm___Nm (see table 11) Ø___mm___Nm	N/A
	- 5 times (screw Ø / torque Nm)	Ø_4.8__mm_2.0__Nm (see table 11) Ø___mm___Nm	P
	Plug in connections tested by plugging in and pulling out five times		N/A
	After test connections have not become loose nor electrical function impaired		P
8.1.4.2	Screws with a thread of insulating material ensured correct introduction		N/A
8.1.4.3	Electrical connection: contact pressure not transmitted through insulating material, unless there is sufficient resilience in the metallic parts		P
8.1.4.4	Current-carrying parts including parts intended for protective conductors, if any, shall be made of a metal having, under the conditions occurring in the equipment, mechanical strength, electrical conductivity and resistance to corrosion adequate for their intended use. Examples below:		N/A
	- copper		N/A
	- alloy 58% copper for worked cold parts		P
	- alloy 50% copper for other parts		N/A
	- other metal		N/A
	In case of using ferrous alloys or suitably coated ferrous alloys, compliance to resistance to corrosion is checked by a test of resistance to rusting (see 9.16).		P
	The requirements of this subclause do not apply to contacts, magnetic circuits, heater elements, bimetals, shunts, parts of electronic devices or to screws, nuts, washers, clamping plates, similar parts of terminals and parts of the test circuit		P

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Clause	Requirement + Test	Result - Remark	Verdict
8.1.5	**Terminals for external conductors**		--
	Compliance is checked by inspection and by the tests as relevant for the type of connection:		--
	by tests of clause 9.5 for screw-type terminals		P
	by specific tests for plug-in or bolt-on CBs included in the standard		N/A
	by the tests of Annexes J, K		N/A
8.1.5.1	Terminals ensure the necessary contact pressure		P
9.5	Torque test:		
	- torque (Nm); diameter (mm).....:	2.0Nm, Ø4.8 mm	--
	- torque (Nm); diameter (mm).....:	25.0	--
	- torque (Nm); diameter (mm).....:		--
	- max. cross-sectional area (mm²) .....:		--
9.5.2	Pull test:		N/A
	Terminal shall be suitable for all types of conductors: rigid (solid or stranded) and flexible, unless otherwise specified by the manufacturer.		--
	Min. cross-section solid / stranded / flexible (mm²) .....:	Solid: 1,0 mm² Stranded: 1,5 mm 2 Flexible: 1,0 mm	--
	Max. cross-section solid / stranded / flexible (mm²) .....:	Solid: 16,0 mm² Stranded: 25,0 mm 2 Flexible: 16,0 mm	--
	Torque $^2/_3$ (Nm) .....:	1.33 Nm	--
	Pull for 1 min solid / stranded / flexible (N).....:	50N for 1,0 mm² 50N for 1,5 mm 2 90N for 16,0 mm² 100N for 25,0 mm²	P
	During the test no noticeable move of conductor		P
9.5.3	Torque test:		
	- torque $^2/_3$ (Nm).....:	1.33Nm	--
	- min. cross-sectional area (mm²) .....:	Solid: 1,0 mm² Stranded: 1,5 mm²	--
	- max. cross-sectional area (mm²) .....:	Solid: 16,0 mm² Stranded: 25,0 mm 2	--
	The conductor shows no damage		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Terminals have not worked loose and no damage		P
9.5.4	Terminals fitted with the largest cross-section area specified in Table 5, for stranded copper conductor.		P
	Max. cross-section stranded (mm^2) .....:	Stranded: 25,0 mm^2	--
	Torque $^2/_3$ (Nm) .....:	1,33Nm	--
	After the test no strand of conductor escaped outside		P
8.1.5.2	Terminals allow the connection of conductors of the following cross-sectional areas: (table 5)		P
	Rated current (A) / sections — Range of nominal cross to be clamped* (mm^2): Rigid (solid or stranded) conductors / Flexible conductors ≤ 13: 1 to 2,5 / 1 to 2,5 > 13 ≤ 16: 1 to 4 / 1 to 4 > 16 ≤ 25: 1,5 to 6 / 1,5 to 6 > 25 ≤ 32: 2,5 to 10 / 2,5 to 6 > 32 ≤ 50: 4 to 16 / 4 to 10 > 50 ≤ 80: 10 to 25 / 10 to 16 > 80 ≤ 100: 16 to 35 / 16 to 25 > 100 ≤ 125: 24 to 50 / 25 to 35	Solid conductors: 1,0mm 2 to 16,0mm 2 Stranded conductors: 1,5mm 2 to 25,0mm 2 flexible conductors: 1,0mm 2 to 16,0mm 2	P
	*It is required that, for current ratings up to and including 50 A, terminals be designed to clamp solid conductors as well as rigid stranded conductors. Nevertheless, it is permitted that terminals for conductors having cross-sections from 1 mm^2 up to 6 mm^2 be designed to clamp solid conductors only.		N/A
	- or terminals for external untreated aluminium conductors and with aluminium screw-type terminals for use with copper or with aluminium conductors according to Annex L.		N/A
8.1.5.3	Means for clamping the conductors in the terminals not serve to fix any other component (See test sub-clause 9.5)		P
8.1.5.4	Terminals for $I_N \leq 32$ A allow the connection of conductors without special preparation		P
8.1.5.5	Terminals shall have adequate mechanical strength; ISO thread or equivalent (See tests of sub-clause 9.4 and 9.5.2)		P

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Clause	Requirement + Test	Result - Remark	Verdict
8.1.5.6	Clamping of conductor without damage to the conductor (See test of sub-clause 9.5.3)		P
8.1.5.7	Clamping of conductor between metal surfaces (See tests of sub-clause 9.4 and 9.5.2)		P
8.1.5.8	Conductor shall not slip-out when the clamping screw or nuts are tightened (See test of sub-clause 9.5.4)		P
8.1.5.9	Terminals shall be properly fixed. No work loose when the clamping screws or nuts are tightened or loosened (See test of sub-clause 9.4)		P
8.1.5.10	Clamping screws or nuts of terminals for protective conductors adequately secured against accidental loosening		N/A
8.1.5.11	Pillar terminals shall allow full insertion and reliable clamping of the conductor		P
8.1.5.12	Screws and nuts of terminals for external conductors shall be in engagement with a metal thread, and the screws shall not be of tapping screw type		P
8.1.6	**Non-interchangeability**		
	For circuit-breakers intended to be mounted on bases forming a unit therewith (plug-in or screw-in type) it shall not be possible, without the aid of a tool, to replace a circuit-breaker when mounted as for normal use by another of the same make having a higher rated current, compliance is checked by inspection		N/A
8.1.7	**Mechanical mounting of plug-in circuit-breakers**		
8.1.7.1	The mechanical mounting of plug-in circuit-breakers, the holding in position of which does not depend solely on their plug-in connection(s), shall be reliable and have adequate stability		N/A
8.1.7.2	Plug-in type circuit-breakers, the holding in position of which does not depend solely on their plug-in connection(s) Compliance of the mechanical mounting is checked by the relevant test 9.13		N/A
8.1.7.3	Plug-in type circuit-breakers, the holding in position of which does depend solely on their plug-in connection(s) Compliance of the mechanical mounting is checked by the relevant test 9.13		N/A
8.2	**Protection against electric shock**		
	Live parts not accessible in normal use		P

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Clause	Requirement + Test	Result - Remark	Verdict
	For CB, other than plug-in type, external parts, other than screws and other means for fixing covers, which are accessible shall be of insulating material		P
	Unless the live parts are within an internal enclosure of insulating material: Lining - reliable fixed, - adequate thickness and - mechanical strength		N/A
	Inlet openings for cables shall be in insulating material or be provided with bushings or similar devices in insulating material Such device - shall be reliable fixed - shall have adequate mechanical strength		N/A
	For plug-in CB, external parts, other than screws and other means for fixing covers, which are accessible shall be in insulating material		N/A
	Metallic operating means insulated from live parts		N/A
	Metal parts of the mechanism not accessible and insulated from accessible metal parts, metal frames (for flush-type), screws or other means for fixing the base		P
	Replacement of plug-in CB possible without touching live parts		N/A
	Lacquer or enamel not considered		N/A
8.1.3	**Creepage distances [mm] (see table 4)**		
	Internal parts only	See above	--
9.6	**Test of protection against electric shock**		
	This verification is applicable to those parts of circuit breakers which are exposed to the operator when mounted as for normal use		P
	Use of test finger so designed that each jointed can be turned through an angle of 90°with respect to the finger		P
	Circuit-breaker with enclosures of thermoplastic material are additional tested at 35 ℃ for 1 min with a force of 75 N		N/A
8.10	**Resistance to heat**		
	CB sufficiently resistant to heat		P
9.14	**Test of resistance to heat**		

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict
9.14.1	Test:		
	- without removable covers ..... 1 h (100 ± 2) ℃		P
	- removable covers..... 1 h (70 ± 2) ℃		N/A
	After the test no access to live parts, marking still legible		P
9.14.2	Ball pressure test for external parts of insulating material (parts retaining current-carrying parts and parts of the protective circuit in position) T = 125℃ Ø of impression ≤ 2 mm	Impression: 1.2 mm (Enclosure)	P
9.14.3	Ball pressure test for external parts of insulating material (parts not retaining current-carrying parts and parts of the protective circuit in position T = (70 ± 2)℃ or T = ___ ℃ = (40 ± 2)℃ + max. temperature rise of sub-clause 9.8 Ø of impression ≤ 2 mm	Impression: 1.0 mm (Handle)	P
8.12	**Resistance to rusting**		
	Ferrous parts adequately protected against rusting		P
9.16	**Test of resistance to rusting:**		
	- 10 min immersed in a cold chemical degreaser such as methyl-chloroform or refined petrol		P
	- 10 min immersed in a 10% solution of chloride in water at 20℃		--
	- 10 min at 95% humidity at 20℃		--
	- 10 min at 100℃		--
	No sign of rust		--

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

	TESTS „A_2“ 3 samples	A_{2-1} A_{2-2} A_{2-3}	
8.11	**Resistance to abnormal heat and to fire**		
	External parts of insulating material shall not ignite or spread fire under fault or overload conditions		P
9.15	**Resistance to abnormal heat and to fire**		
	Test performed on a complete CB		P
	external parts retaining current-carrying parts and parts of the protective circuit in position ..... (960 ± 15)℃		P
	all other external parts ..... (650 ± 10)℃		P
	No visible flames, no sustained glowing, or		N/A
	flames and glowing extinguish within 30 s after removal .....:	2.8s	P
	No ignition of tissue paper or scorching of the pinewood board		P

	TESTS „B“ 3 samples	B_1 B_2 B_3	
8.3	**Dielectric properties and isolating capability**		
8.3.1	CB shall have adequate dielectric properties and shall ensure isolation:		P
8.3.2	Dielectric strength at power frequency		P
	Compliance is checked by the tests 9.7.1, 9.7.2 and 9.7.3 on circuit-breaker in new condition		P
8.3.3	Isolating capability		
	Circuit-breakers shall be suitable for isolation. Compliance is checked by the verification of compliance with the minimum clearances and creepage distances of item 1 of table 4 and by tests of 9.7.5.1 and 9.7.5.3.		P
8.3.4	Dielectric strength at rated impulse withstand voltage (Uimp)		
	Circuit-breakers shall adequately withstand impulse voltages. Compliance is checked by the tests of 9.7.5.2.		P
9.7	**Test of dielectric properties and isolating capability**		
9.7.5.4	Verification of resistance of the insulation of open contact and basic insulation against an impulse voltage in normal conditions		

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Clause	Requirement + Test	Result - Remark	Verdict
	These tests are not preceded by the humidity treatment described in 9.7.1.		P
	The test is carried out on an CB fixed on a metal support		P
	The impulses are given by a generator producing positive and negative impulses having a front time of 1,2μs, and a time to half-value of 50μs		P
	The shape of the impulses is adjusted with the CB under test connected to the impulse generator.		P
	rated impulse withstand voltage [kV]:	kV	--
	sea level of test laboratory [m]:	m	--
	test voltage (acc. Table 15) [kV]:	kV	--
9.7.5.4.2	CB in open position (contacts in open position)		
	The impulses are applied between:		--
	the line terminals connected together and the load terminals connected together		P
9.7.5.4.3	CB in closed position		
	A first series of tests is made applying the impulse voltage between the phase pole(s) and the neutral pole (or path) connected together and the metal support connected to the terminal(s) intended for the protective conductor(s), if any		P
	A second series of tests is made applying the impulse voltage between the phase pole(s), connected together, and the neutral pole (or path) of the CB		N/A
	Five positive impulses and five negative impulses are applied, the interval between consecutive impulses being at least 1 s for impulses of the same polarity and being at least 10 s for impulses of the opposite polarity.		P
	no disruptive discharges during the test		P
9.7.1	Resistance to humidity		
9.7.1.1	Preparation of the circuit-breaker for test		
	Inlet openings, if any, are left open; if knock-outs are provided, one of them is opened.		P
9.7.1.2	Test conditions		

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Clause	Requirement + Test	Result - Remark	Verdict
	The humidity treatment is carried out in humidity cabinet 91% to 95% and the temperature of the air between 20 ℃ and 30 ℃	Rf = 93 % T = 25 ℃	P
9.7.1.3	Test procedure.		
	The sample is kept in the cabinet for 48 h.		P
9.7.1.4	Conditions of the circuit breaker after the tests.		
	The sample show no damage within the meaning of this standard and shall withstand the tests of 9.7.2 and 9.7.3, 9.7.4 and 9.7.5.2		P
9.7.2	Insulation resistance of the main circuit		
9.7.2	After an interval between 30 min and 60 min flowing this treatment, the insulation resistance is measured 5 s after application of a d.c. voltage of approximately 500 V, consecutively as follows:	[MΩ] [MΩ] [MΩ]	P
	a) In off-position, between the terminals which are electrically connected together when the circuit-breaker is in the closed position ≥ 2 MΩ	>500 >500 >500	P
	b) in off-position, between each pole in turn and the others connected together ≥ 2 MΩ	>500 >500 >500	P
	c) in on-position, between all poles connected together and the frame ≥ 5 MΩ	>500 >500 >500	P
	d) between metal parts of mechanism and the frame ≥ 5 MΩ		N/A
	e) between the frame and metal foil in contact with the inner surface of the internal enclosure or lining of insulating material ≥ 5 MΩ		N/A
9.7.3	Dielectric strength of the main circuit		
	After the circuit-breakers have passed the tests of 9.7.2 the test voltage specified is applied for 1 min between the parts indicated in 9.7.2		P
	a) 2000 V		P
	b) 2000 V		P
	c) 2000 V		P
	d) 2000 V		N/A
	e) 2500 V		N/A
	No flashover or breakdown		P
9.7.4	Insulation resistance and dielectric strength of the auxiliary circuits		
	Insulation resistance of auxiliary circuits measured with 500 V DC after 1 min:		

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Clause	Requirement + Test	Result - Remark	Verdict
	1) between all auxiliary circuits and the frame (MΩ) ≥ 2 MΩ		N/A
	2) between each part of the auxiliary circuits which might be isolated from the other parts and the whole of the other parts connected together (MΩ) ≥ 2 MΩ		N/A
	Dielectric strength of auxiliary circuits measured with an AC voltage at rated frequency for 1 min:		--
	Rated voltage of auxiliary circuits (a.c. or d.c.) — Test voltage (V) ≤ 30 — 600 > 30 ≤ 50 — 1000 > 50 ≤ 110 — 1500 > 110 ≤ 250 — 2000 > 250 ≤ 500 — 2500	V	--
	1) between all auxiliary circuits and the frame		N/A
	2) between each part of the auxiliary circuits which might be isolated from the other parts and the whole of the other parts connected together		N/A
	No flashover or perforation		N/A
9.7.5.2	Verification of clearances with the impulse withstand voltage		
	If the measurement of clearances of items 2 and 4 in Table 4 shows a reduction of the required length, this test applies.		P
	The test is carried out on an CB fixed on a metal support and being in the closed position		P
	The impulses are given by a generator producing positive and negative impulses having a front time of 1,2μs, and a time to half-value of 50μs		N/A
	The shape of the impulses is adjusted with the CB under test connected to the impulse generator.		N/A
	test performed with:		--
	-surge impedance of the test apparatus ≤500Ω and surge protective devices disconnected before testing or		P
	-hybrid generator with an surge impedance of 2 Ω and surge protective devices not disconnected before testing		N/A

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict
	rated impulse withstand voltage [kV]:	kV	--
	see level of test laboratory [m]:	m	--
	test voltage (acc. Table 14) [kV]:	kV	--
	A first series of tests is made applying the impulse voltage between the phase pole(s) and the neutral pole (or path) connected together and the metal support connected to the terminal(s) intended for the protective conductor(s), if any		P
	A second series of tests is made applying the impulse voltage between the phase pole(s), connected together, and the neutral pole (or path) of the CB		N/A
	A third series of tests is made applying the impulse voltage between (and not tested during the two first sequences described here above):		--
	b) between each pole and the others connected together		P
	c) between all poles connected together and the frame		P
	d) between metal parts of the mechanism and the frame		P
	e) between the frame and a metal foil in contact with the inner surface of the lining of insulating material		P
	Five positive impulses and five negative impulses are applied, the interval between consecutive impulses being at least 1 s for impulses of the same polarity and being at least 10 s for impulses of the opposite polarity.		N/A
	no disruptive discharges during the test		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

8.4	**Temperature rise**				
	Temperature rise does not exceed the limiting values stated in table 6:	sect. __16.0_ mm²			--
9.8.2	Test current: I_N= (reach the steady-state value) Four-pole CB's: ☐ 1) Three poles loaded 2) One pole and neutral pole loaded ☑ 1) Four-poles loaded	I_N = _63_A			--
	Ambient air temperature.....:	Tamb= __21__℃			--
	Parts .....Temperature rise [K]	[K]	[K]	[K]	--
	L1	51	54	53	P
	L2	53	53	57	
	L3	50	54	56	
	L4(N)	49	51	53	
	L3				
	N				
	Terminals for external connections .....60 K				P
	External parts liable to be touched during manual operation of the circuit-breaker, including operating means of insulating material and metallic means for coupling of insulating operating means of several poles .....40 K	25	21	22	P
	External metallic parts of operating means...25 K				P
	Other external parts, including that face of the circuit-breaker is in direct contact with the mounting surface.....60 K	45	51	52	P
9.8.5	Measurement of power losses	B_1	B_2	B_3	P
	Power loss do not exceed the values stated in table 8				P
	Test current: I_N = __63_ A (reach the steady state value)		63A		P
	Loaded one pole after the other				P
	Max. power loss : ___13___ W	W	W	W	P
	L1	4.6	4.8	4.6	P

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Clause	Requirement + Test	Result - Remark			Verdict
	L2	5.3	4.6	4.8	
	L3 L4(N) L3 N	46 4.7	5.0 4.5	5.7 5.7	N/A
8.5	**Uninterrupted duty**				
	Circuit-breakers operate reliable even after long service				P
9.9	**28 day test**				
	28 cycles - 21 h with current - 3 h without current Cross-sectional area. ____ mm²	I_N = _63_A 16.0mm²			P
	During the test no tripping during the last period, temperature rise shall be measured				P
	Ambient air temperature.....:	23 ℃			P
	Parts .....Temperature rise [K]	[K]	[K]	[K]	P
	Terminals for external connections				P
	The temperature rise does not exceed the value measured during the temperature rise test (sub-clause 9.8) by more than 15 K				P
	Test current 1,45 I_N =__91.4__A				P
	- Tripping within	[s]	[s]	[s]	P
	- 1h (≤ 63 A)	4.5	3.5	3.6	P
	- 2h (> 63 A)				P

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Clause	Requirement + Test	Result - Remark	Verdict

	TESTS „C“ 3 +3 samples				
8.7	**Test „C_1“ Mechanical and electrical endurance**	**C_{1-1}**	**C_{1-2}**	**C_{1-3}**	
	Circuit-breaker shall be capable to perform an adequate number of cycles with rated current				P
9.11.1	General test conditions				--
	Test: Test Voltage _____V (rated voltage) Test Current _____A (rated current) Power factor _____(0,85-0,9) Par. resistor _____ (Ω) Cross sect. area ____mm²	418V 63,2A 0,85 16,0mm²			--
9.11.2	Test procedure				
	The circuit-breaker is submitted to 4000 operating cycles with rated current.	4000 cycles			P
	- $I_N \leq 32$ A: 2 s on - 13 s off				N/A
	- $I_N > 32$ A: 2 s on - 28 s off	IN = 63 A			P
	During the test the circuit-breaker shall be operated as in normal use.				P
9.11.3	Conditions of the circuit breaker after the tests.				
	Following the test 9.11.2 the sample shall not show:				--
	- undue wear				P
	- discrepancy between the position of the moving contacts and corresponding position of the Indicating device				P
	- damage to the enclosure permitting access to live parts by test finger (see 9.6)				P
	- loosening of electrical or mechanical connections				P
	- seepage of sealing compound				N/A
	Moreover test current .....2,55 I_N_____A	161A			--
	Opening time not less 1 s or more than	[s]	[s]	[s]	--
	- 60 s (≤ 32 A)				N/A
	- 120 s (> 32 A)	19	27	13	P
	Dielectric strength reduced to 1500 V				P

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

9.12.11.2	**Test at reduced short-circuit currents**				
9.12.11.2.1	Test on all circuit-breakers				--
9.12.11.2.1	Test at reduced short-circuit currents: Fig. 3				--
	Test current:	Obtained			--
	- 500 A or 10 In	I test= ___656__A			--
	Test voltage 1,05 Un	Un = ___440____V			--
	Power factor 0,93-0,98	__0.95___			--
9.12.9.2	Test in free air copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	"a" = ___35_ mm			P
9.12.9.3	Test in enclosures copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	dimension of enclosure: _____x_____x_____mm			N/A
	I_{Peak} (A) max. value	__960_A			P
	Sequence: 6 x "O" and 3 x "CO"	[kA^2s]	[kA^2s]	[kA^2s]	--
	Max. $I^2t \leq$ _____kA^2s	37.0	65.0	111	P
	- No permanent arcing				P
	- No flash-over between poles or between poles and frame				P
	- No blowing of the fuses F and F′				P
	- Polyethylene foil shows no holes				P
	After the test:				--
9.12.12	Verification of the circuit-breaker after short-circuit tests				--
9.12.12.1	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.				P
	a) leakage current across open contacts, according to 9.7.5.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The circuit – breaker is in the open position	**C_{1-1}** [mA]	**C_{1-2}** [mA]	**C_{1-3}** [mA]	--
	The leakage current shall not exceed 2 mA L1	3.50	4.10	3.10	P
	L2	3.70	3.20	4.30	P
	L3	4.30	4.10	3.10	P
	L4(N)	3.10	4.10	2.40	P

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Electric strength test:		--
	Test voltage 1500 V (see 9.7.2)		--
	a)		P
	b)		P
	c)		P
	d)		--
	e) 2000 V		N/A

9.12.11.2.2	**Test „C_2“ Short-circuit test on circuit-breakers for use in IT systems**				
	Test current:				--
	- 500 A or 1,2 times the upper limit of the standard range of instantaneous tripping (see table 2) whichever is the higher, but < 2500 A. When tripping exceed 20 In the current adjusted at 1,2 times the upper limit even when higher 2500 A	I test= __1,55x10 3__A			--
	Test voltage 1,05 Un	Un = ___456__V			--
	Power factor 0,93-0,98	__0.95___			--
9.12.9.2	Test in free air copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	"a" = __35__ mm			P
9.12.9.3	Test in enclosures copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	dimension of enclosure: _____x_____x_____mm			N/A
	I_{Peak} (A) max. value	___1,78X10 3__A			P
	Sequence: "O" + "CO" on each protected pole	[kA^2s]	[kA^2s]	[kA^2s]	--
	Shifted point 30 °on the other protected pole	**C_{2-1}**	**C_{2-2}**	**C_{2-3}**	--
	Max. I^2t ≤ _____kA^2s L1 L2 L3 L4 (N)	67.0 67.0 ___ ___	65.1 65.1 ___ ___	66.5 66.5 ___ ___	P
	- No permanent arcing				P
	- No flash-over between poles or between poles and frame				P
	- No blowing of the fuses F and F′				P
	- Polyethylene foil shows no holes				P
	After the test:				--

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IEC 60898-1					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12.1	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.				--
	a) leakage current across open contacts, according to 9.7.5.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The circuit – breaker is in the open position	**C_{2-1}** [mA]	**C_{2-2}** [mA]	**C_{2-3}** [mA]	--
	The leakage current shall not exceed 2 mA L1	3.5	3.4	3.7	P
	L2	3.6	3.6	3.5	P
	L3	3.1	3.2	3.3	P
	L4(N)	2.9	3.3	3.0	P
	Electric strength test:				--
	Test voltage 1500 V (see 9.7.2)				--
	a)				P
	b)				P
	c)				P
	d)				N/A
	e) 2000 V				N/A

	TESTS „D“ 3 samples				
8.6	**Automatic operation**				--
8.6.1	Standard time-current zone				--
	Tripping characteristic of CB ensures adequate protection of the circuit, without premature operation.				P
9.10	**Tests „D_0“**	**D_{O-1}**	**D_{O-2}**	**D_{O-3}**	
	I_N (A)	63 A			--
	Sect. (mm²)	16 mm²			--
	Instantaneous tripping current	☐ B	☐ C	☑ D	--
9.10.2	Test of time-current characteristic				--
9.10.2.1	Test current 1,13 I_N (A) starting from cold for:	71.2 A			--
	- 1 h ($I_N \leq 63$ A)				P
	- 2 h ($I_N > 63$ A)				N/A
	No tripping				P
	Then steadily increased within 5 s to 1,45 I_N (A)				N/A
	- Tripping within	[min]	[min]	[mini]	--
	- 1h (≤ 63 A)	0.5	0.6	0.8	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- 2h (> 63 A)		N/A
9.10.2.2	Test current 2,55 I_N (A) starting from cold for:	161 A	--
	opening time not less than 1 s or more than	[s] [s] [s]	--
	- 60 s (≤ 32 A)		N/A
	- 120 s (> 32 A)	29 24 28	P
9.10.3	Test of instantaneous tripping and of correct opening of the contacts		P
9.10.3.1	General test conditions		P
	For the lower values of the test current the test is made once, at any convenient voltage.		P
	For the upper values of the test current the test is made at rated voltage Un(phase to neutral) with a power factor between 0,95 and 1.		N/A
	The sequence of operation is : O-CO-CO-CO Interval time: > 3 min		N/A
	The tripping time of the O operation is measured		N/A
	After each operation the indicating means shall show the open position of the contacts		P
9.10.3.2	☐ For circuit-breakers of the B – Type		
	Test current 3I_N (A), starting from cold	A	N/A
	Opening time:	[s] [s] [s]	--
	≥ 0,1 s		N/A
	Test current 5 I_N (A), starting from cold	A	N/A
	Tripping less than 0,1 s		N/A
9.10.3.3	☐ For circuit-breakers of the C – Type		
	Test current 5I_N (A), starting from cold	315 A	--
	Opening time:	[s] [s] [s]	--
	≥ 0,1 s	1.3 1.6 1.5	P
	Test current 10 I_N (A), starting from cold	630 A	--
--	Tripping less than 0,1 s	0.05 0.07 0.7	P
9.10.3.4	☐ For circuit-breakers of the D – Type		
	Test current 10I_N (A), starting from cold	630 A	--
	Opening time:	[s] [s] [s]	--
	≥ 0,1 s	1.2 1.3 1.2	P
	Test current 20 I_N (A) or to the maximum instantaneous tripping current(see cl. 6, item j), starting from cold	1260 A	--

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Clause	Requirement + Test	Result - Remark	Verdict
	Tripping less than 0,1 s	0.07 0.06 0.9	P
9.10.4	Test of effect of single pole loading on the tripping characteristic of multi-pole circuit-breakers:		--
	Test current 1,1 It (A), (two pole) starting from cold	_____A	--
	Tripping within	[min] [min] [min]	--
	- 1h (≤ 63 A)		N/A
	- 2h (> 63 A)		N/A
	Test current 1,2 It (A), (three pole or four pole) starting from cold	___110A__A	--
	Tripping within	[min] [min] [min]	--
	- 1h (≤ 63 A)	3.5 2.5 2.8	P
	- 2h (> 63 A)		N/A
9.10.5	Test of effect of ambient temperature on the tripping characteristics		--
	a) Ambient temperature of (35 ± 2) K below the ambient air reference temperature	T =_____5____℃	--
	Test current 1,13 I_N (A)	___71.2__A	--
	- Passed for 1h	>1h	P
	- Passed for 2h		N/A
	Current is then steadily increased to 1,9 I_N (A) within 5s	___120__A	--
	Tripping within	[min] [min] [mini]	--
	- 1h (≤ 63 A)	0.9 0.8 0.8	P
	- 2h (> 63 A)		N/A
	b) Ambient temperature of (10 ± 2) K above the ambient air reference temperature	T = +40℃	--
	Test current I_N (A)	___63___A	--
	No tripping within		--
	- 1h (≤ 63 A)	>1h	P
	- 2h (> 63 A)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

	Tests „D_1“	**D_{1-1} D_{1-2} D_{1-3}**	
8.9	**Resistance to mechanical shock and impact**		
	CB shall have adequate mechanical behaviour so as to withstand the stresses imposed during installation and use		P
9.13.1	Mechanical shock		--
	- 50 falls on two sides of vertical board C		P
	- Vertical board turned 90°		P
	- 50 falls on two sides of vertical board C		N/A
	During the test the circuit-breakers shall not open		N/A
9.13.2	Mechanical impact		--
9.13.2.2	All types:		--
	- Impact test: 10 blows-height 10 cm, no damage		P
9.13.2.3	Screw-in types:		--
	- Torque 2,5 Nm for 1 min, no damage		P
9.13.2.4	CB intended to be mounted on a rail		--
	- downward vertical 50 N for 1 min		P
	- upward vertical 50 N for 1 min, no damage		P
9.13.2.5	Plug-in types		--
	The circuit-breaker are mounted in their normal position, complete with plug-in base but without cables and any cover plate		N/A
	A force of 20 N applied for 1min to the circuit-breaker (see fig 16).		N/A
	During this test the circuit-breaker part shall not become loose from the base and shall not show damage impairing further use.		N/A
9.12.11.3	**Test at 1500 A:**		--
	Prospective current of 1500 A - power factor 0,93 to 0,98		--
	Prospective current obtained (A)	1,55x10 3 A	--
	Power factor	0.95	--
	Test voltage 1,05 Un	Utest = 456V	--
	Test circuit: figure	Figure 3	--
	T (min)	3 min	--

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IEC 60898-1					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.9.2	Test in free air copper wire F': ☐ 0,12 mm / ☑ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☑ 1,5 Ohm	"a" = __35__ mm			P
9.12.9.3	Test in enclosures copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	dimension of enclosure: _____x_____x_____mm			N/A
	Sequence	6-O, 3-CO			--
	I_{Peak} (A) max. value	2,8x10 3 A			--
	$I^2t \leq$ _____ kA^2s	[kA^2s]	[kA^2s]	[kA^2s]	--
	Max. $I^2t \leq$ _____kA^2s L1 L2 L3 L4(N)	_11.0__ __26.0_ 15.0_ ____	_10.0_ _23.0 _30.0 ___	8.00__ 13.0_ 31.0_ ___	P
	- No permanent arcing				P
	- No flash-over between poles or between poles and frame				P
	- No blowing of the fuses F and F′				P
	- Polyethylene foil shows no holes				P
	After the test:				--
9.12.12.1	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.				--
	a) leakage current across open contacts, according to 9.7.5.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The circuit – breaker is in the open position	**D_{1-1}** [mA]	**D_{1-2}** [mA]	**D_{1-3}** [mA]	--
	The leakage current shall not exceed 2 mA L1	3.50	4.60	4.30	P
	L2	3.90	3.50	4.20	P
	L3	3.30	4.80	4.60	P
	L4(N)	3.80	4.50	3.80	P
	Electric strength test:				--
	Test voltage 1500 V (see 9.7.2)				--
	a)				--
	b)				--
	c)				--
	d)				--
	e) 2000 V				P

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Clause	Requirement + Test	Result - Remark			Verdict
	Test current 0.85x non-tripping current (1,13 I_N)	60.5 A			--
	- Passed for 1h	>1h			P
	- Passed for 2h				N/A
	Current is then steadily increased to 1,1 x tripping current (1,45 I_N) within 5s	100.5 A			--
		D_{1-1} [min]	**D_{1-2}** [min]	**D_{1-3}** [min]	--
	Tripping within ☐ 1 hour / ☐ 2 hour	0.5	0.7	0.4	P

	TESTS „E_1“ 3 + 4 samples				
9.12.11.4.2	**Test E_1: Test at service short-circuit capacity**	**E_{1-1}**	**E_{1-2}**	**E_{1-3}**	--
	Service short-circuit capacity (Ics) .....:	7,50×10 3 A			--
	Test circuit: figure .....:	Figure 3			--
	Test voltage 1,05 Un	436V			--
	Prospective current .....:	7,50×10 3 A			--
	Prospective current obtained .....:	7,60x10 3 A			--
	Power factor .....:	0,45~0,50			--
	Power factor obtained .....:	0,47			--
	Sequence .....:	O-O-CO			--
	T (min) .....:	3min			--
9.12.9.2	Test in free air copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	"a" = 45 mm			P
9.12.9.3	Test in enclosures copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	dimensions of enclosure: _____x_____x_____mm			N/A
	I_{Peak} (A) max. value .....:	6,17x10 3 A			--
	$I^2t \leq$ _____ kA^2s	[kA^2s]	[kA^2s]	[kA^2s]	--
	Max. $I^2t \leq$ _____kA^2s L1 L2 L3 L4(N)	64.0 58.0 52.0 _____	69.0 49.0 73.0 ___	101 153 50.0 ___	P
	- No permanent arcing				P
	- No flash-over between poles or between poles and frame				P
	- No blowing of the fuses F and F′				P

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Clause	Requirement + Test	Result - Remark			Verdict
	- Polyethylene foil shows no holes				P
	After the test:				--
9.12.12.1	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.				P
	a) leakage current across open contacts, according to 9.7.5.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The circuit – breaker is in the open position	**E_{1-1}** [mA]	**E_{1-2}** [mA]	**E_{1-3}** [mA]	--
	The leakage current shall not exceed 2 mA L1	3.70	3.20	4.10	P
	L2	3.10	3.00	3.80	P
	L3	3.50	3.10	4.20	P
	L4(N)	3.60	2.60	3.10	P
	Electric strength test:				--
	Test voltage 1500 V (see 9.7.2)				--
	a)				P
	b)				P
	c)				P
	d)				N/A
	e) 2000 V				N/A
	Test current 0.85x non-tripping current (1,13 I_N)	___60.5___A			--
	- Passed for 1h	>1H			P
	- Passed for 2h				N/A
	Current is then steadily increased to 1,1 x tripping current (1,45 I_N) within 5s	___100.5__A			--
		E_{1-1} [min]	**E_{1-2}** [min]	**E_{1-3}** [min]	--
	Tripping within ☑ 1 hour / ☐ 2 hour	2.1	0.4	1.6	P

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

9.12.11.4.2	**Test „E_1"(Test at service short-circuit capacity) three phase tests for single circuit-breakers**	**E_{1-4}**	**E_{1-5}**	**E_{1-6}**	**P**
	Service short-circuit capacity (Ics) .....:	7,50x10 3 A			--
	Test circuit: figure .....:	Figure 3			--
	Test voltage 1,05 Un	436V			--
	Prospective current .....:	7,50x10 3 A			--
	Prospective current obtained.....:	7,60x10 3 A			--
	Power factor .....:	0,45~0,50			--
	Power factor obtained .....:	0,47			--
	Sequence .....:	O-O-CO			--
	T (min) .....:	3min			--
9.12.9.2	Test in free air copper wire F': ☐ 0,12 mm / ☑ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☑ 1,5 Ohm	"a" = __45_ mm			P
9.12.9.3	Test in enclosures copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	dimensions of enclosure: _____x_____x_____mm			N/A
	I_{Peak} (A) max. value .....:	__530___A			--
	- No permanent arcing				P
	- No flash-over between poles or between poles and frame				P
	- No blowing of the fuses F and F′				P
	- Polyethylene foil shows no holes				P
	After the test:				--
9.12.12.1	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.				--
	a) leakage current across open contacts, according to 9.7.5.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The circuit – breaker is in the open position	**E_{1-4}** [mA]	**E_{1-5}** [mA]	**E_{1-6}** [mA]	--
	The leakage current shall not exceed 2 mA L1	2.80	3.20	2.90	P
	L2	2.90	3.40	3.10	P
	L3	3.70	3.00	3.10	P
	L4(N)	2.90	2.80	3.90	P
	Electric strength test:				--

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IEC 60898-1					
Clause	Requirement + Test	Result - Remark			Verdict
	Test voltage 1500 V (see 9.7.2)				--
	a)				P
	b)				P
	c)				P
	d)				--
	e) 2000 V				--
	Test current 0.85x non-tripping current (1,13 I_N)	__0.96__A			P
	- Passed for 1h	>1H			P
	- Passed for 2h				N/A
	Current is then steadily increased to 1,1 x tripping current (1,45 I_N) within 5s	__1.60__A			N/A
		E_{1-4} [min]	**E_{1-5}** [min]	**E_{1-6}** [min]	--
	Tripping within ☐ 1 hour / ☐ 2 hour	12.3	5.6	8.3	P

	TESTS „E_2“ 3 + 4 samples				
9.12.11.4.3	**Test: E2 (Test at rated short-circuit capacity)**	**E_{2-1}**	**E_{2-2}**	**E_{2-3}**	**P**
	Rated short-circuit capacity (Icn)..... :	10kA			--
	Test circuit: figure ..... :	Figure 3			--
	Test voltage 1,05 Un	437V			--
	Prospective current ..... :	6kA			--
	Prospective current obtained ..... :	1,03x10 4 A			--
	Power factor ..... :	0,45~0,50			--
	Power factor obtained ..... :	0,48			--
	Sequence ..... :	O-CO			--
	T (min) ..... :	3min			--
9.12.9.2	Test in free air copper wire F': ☐ 0,12 mm / ☑ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☑ 1,5 Ohm	"a" = _45_ mm			P
9.12.9.3	Test in enclosures copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	dimensions of enclosure: _____x_____x_____mm			N/A
	I_{Peak} (A) max. value ..... :	5,73X10 3 A			--
	I²t ≤ __70__ kA^2s	[kA^2s]	[kA^2s]	[kA^2s]	--

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IEC 60898-1					
Clause	Requirement + Test	Result - Remark			Verdict
	Max. I²t ≤ _____kA²s L1	30.0	54.0	10.0	P
	L2	40.0	34.0	50.0	
	L3	60.0	9.00	23.0	
	L4(N)	_____	___	___	
	- No permanent arcing				P
	- No flash-over between poles or between poles and frame				P
	- No blowing of the fuses F and F′				P
	- Polyethylene foil shows no holes				P
	After the test:				--
9.12.12.2	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.				--
	a) leakage current across open contacts, according to 9.7.5.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The circuit – breaker is in the open position	**E_{2-1}** [mA]	**E_{2-2}** [mA]	**E_{2-3}** [mA]	--
	The leakage current shall not exceed 2 mA L1	5.30	5.50	6.30	P
	L2	5.60	5.50	5.70	P
	L3	5.50	5.70	5.90	P
	L4(N)	5.50	5.60	5.80	P
	Electric strength test:				--
	Test voltage 900 V (see 9.7.3)				--
	a)				P
	b)				P
	c)				P
	d)				N/A
	e)				N/A
	Test current 2,8 I_N	176 A			--
	Tripping within > 0,1 s up to	[s]	[s]	[s]	--
	- 60 s				N/A
	- 120 s	42	27	30	P

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

9.12.11.4.3	**Test „E_2"(Test at rated short-circuit capacity) three phase tests for single circuit-breakers**	**E_{2-4}**	**E_{2-5}**	**E_{2-6}**	**E_{2-7}**	**P**
	Rated short-circuit capacity (Icn)..... :	6kA				--
	Test circuit: figure ..... :	Figure 3				--
	Test voltage 1,05 Un	437 V				--
	Prospective current ..... :	6kA				--
	Prospective current obtained ..... :	1,03x10 4 A				--
	Power factor ..... :	0,45~0,50				--
	Power factor obtained ..... :	0,48				--
	Sequence ..... :	O-CO				--
	T (min) ..... :	3min				--
9.12.9.2	Test in free air copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	"a" = __45__ mm				--
9.12.9.3	Test in enclosures copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	dimensions of enclosure: _____x_____x_____mm				--
	I_{Peak} (A) max. value..... :	510 A				--
	- No permanent arcing					P
	- No flash-over between poles or between poles and frame					P
	- No blowing of the fuses F and F′					P
	- Polyethylene foil shows no holes					P
	After the test:					P
9.12.12.2	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.					--
	a) leakage current across open contacts, according to 9.7.5.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The circuit – breaker is in the open position	**E_{2-4}** [mA]	**E_{2-5}** [mA]	**E_{2-6}** [mA]	**E_{2-7}** [mA]	--
	The leakage current shall not exceed 2 mA L1					--
	L2					--
	L3					--
	L4(N)					---
	Electric strength test:					--
	Test voltage 900 V (see 9.7.3)					--

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IEC 60898-1						
Clause	Requirement + Test	Result - Remark				Verdict
	a)					---
	b)					--
	c)					--
	d)					--
	e)					--
	Test current 2,8 I_N	_____A				--
	Tripping within > 0,1 s up to	[s]	[s]	[s]	[s]	--
	- 60 s					--
	- 120 s					--

	TESTS „E_3“ 3 samples				
9.12.11.4.4	**Test: E_3 (Test at making and breaking capacity on an individual pole (Icn1)**	**E_{3-1}**	**E_{3-2}**	**E_{3-3}**	
	Icn1.....:	_____A			--
	Test circuit: figure .....:	_____			--
	Test voltage 1,05 Un	_____V			--
	Prospective current .....:	_____A			--
	Prospective current obtained .....:	_____A			--
	Power factor .....:	_____			--
	Power factor obtained .....:	_____			--
	Sequence .....:	_____			--
	T (min).....:	_____min			--
9.12.9.2	Test in free air copper wire F': ☒ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☒ 1,5 Ohm	“a” = _____ mm			--
9.12.9.3	Test in enclosures copper wire F': ☐ 0,12 mm / ☐ 0,16 mm resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm	dimensions of enclosure: _____x_____x_____mm			--
	I_{Peak} (A) max. value.....:	_____A			--
	I^2t ≤ _____ kA^2s	[kA^2s]	[kA^2s]	[kA^2s]	--
	Max. I^2t ≤ _____kA^2s L1 L2 L3 L4	____ ____ ____ ____	____ _____ ____ ____	____ ____ ____ ____	--
	- No permanent arcing				--

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IEC 60898-1					
Clause	Requirement + Test	Result - Remark			Verdict
	- No flash-over between poles or between poles and frame				N/A
	- No blowing of the fuses F and F′				N/A
	- Polyethylene foil shows no holes				N/A
	After the test:				--
9.12.12.2	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.				
	a) leakage current across open contacts, according to 9.7.5.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The circuit – breaker is in the open position	**E_{3-1}** [mA]	**E_{3-2}** [mA]	**E_{3-3}** [mA]	--
	The leakage current shall not exceed 2 mA L1				--
	L2				--
	L3				--
	L4				--
	Electric strength test:				--
	Test voltage 900 V (see 9.7.3)				--
	a)				--
	b)				--
	c)				-
	d)				--
	e)				--
	Test current 2,8 I_N	_____A			--
	Tripping within > 0,1 s up to	[s]	[s]	[s]	--
	- 60 s				--
	- 120 s				--

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

	Annex E		
	Special requirements for auxiliary circuits for safety extra-low voltage		N/A
8.1.3	**Clearances and creepage distances**		
	Additional note to table 4 NOTE 4 live parts in auxiliary circuits intended to be connected to safety extra low voltages shall be separated from circuits with higher voltages in accordance with the requirements of 411.1.3.3 of IEC 60364-4-41		--
	Compliance is checked by inspection		--
9.7.4	**Dielectric strength of the auxiliary circuits**		
	Note: A test for circuits intended for connection to safety extra-low voltage is under consideration		N/A

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

	Annex J		
	Particular requirements for circuit-breakers with screw less type terminals for external copper conductors (In not exceeding 20 A, cross-sectional area up to 4 mm^2		N/A
J.6	**Marking**		
	Universal terminals		--
	- no marking		N/A
	Non-universal		--
	- declared for rigid-solid conductors	marked with: “sol”	N/A
	- declared for rigid(solid and stranded) .....:	marked with: “r”	N/A
	- declared for flexible conductors .....:	Marked with: “f”	N/A
	The markings should appear on the circuit-breaker or, if available space is not sufficient, on smallest package unit or in technical information .....:		N/A
	Indication of length of insulation to be removed on the circuit-breaker.....:	_____mm	N/A
J.7	**Standard conditions for operation in service**		
	Clause 7 applies		N/A
J.8	**Constructional requirements**		
	Clause 8 applies with the follow modifications:		N/A
	In clause 8.1.5 only –5.1, -5.2. –5.3, - 5.6 and - 5.7 apply		N/A
	Compliance is checked by inspection and by the tests of J.9.1 and J.9.2		N/A
J.8.1	**Connection or disconnection of conductors**		
	The connection or disconnection shall be made by:		N/A
	A general purpose tool or by a convenient device integral with the terminal or		N/A
	for rigid conductors by simple insertion		N/A
	For disconnection an operation other than a pull shall be necessary (push-wire terminals)		N/A
	Universal terminals shall accept rigid (solid or stranded and flexible unprepared conductors		N/A
	Non-universal terminals shall accept conductors declared by the manufacturer		N/A

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Compliance is checked by inspection and by the tests of J.9.1 and J.9.2		N/A
J.8.2	**Dimensions of connectable conductors**		
	The dimensions of connectable conductors are given in table J.1		N/A
	The ability to connect these conductors shall be checked by inspection and by the tests of J.9.1 and J.9.2		N/A
J.8.3	**Connectable cross-sectional areas**		
	The nominal cross-sections to be clamped are given in table J.2		N/A
	Compliance is checked by inspection and by the tests of J.9.1 and J.9.2		N/A
J.8.4	**Insertion and connection of conductors**		
	The insertion and disconnection of the conductors shall be made in accordance with the manufacturer's instructions		N/A
J.8.5	**Design and construction of terminals**		
	Terminals shall be designed and constructed that:		N/A
	- each conductor is clamped individually		N/A
	- connection or disconnection connectors connected or disconnected separate or same		N/A
	- inadequate insertion of the conductor is avoided		N/A
	Compliance is checked by inspection and by the tests of J.9.1 and J.9.2		N/A
J.8.6	**The terminals shall be resistant to ageing**		
	Compliance is checked by the tests of J.9.3		N/A
J.9	**Tests**		
	Clause 9 applies, by replacing 9.4 and 9.5 by the follow		N/A
J.9.1	**Test of reliability of screw less terminals**		
J.9.1.1	**Reliability of screw less system**		
	5 times connection and disconnection		N/A
	3 rigid conductors min. cross-section max. cross-section	_____mm^2 _____mm^2	N/A
	3 flexible conductors min. cross-section max. cross-section	_____mm^2 _____mm^2	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	After tests, the terminal shall not be damage in such a way as to impair its further use		N/A
J.9.1.2	**Test of reliability of connection**		
	3 terminals of poles of new sample are fitted with new copper conductors according table J.2		N/A
	rigid conductors min. cross-section max. cross-section	_____mm^2 _____mm^2	N/A
	flexible conductors min. cross-section max. cross-section	_____mm^2 _____mm^2	N/A
	Each conductor is either pushed as far as possible into the terminal or shall be inserted so that adequate connection is obvious		N/A
	After tests, no wire of the conductor shall have escaped outside the terminals		N/A
J.9.2	**Tests of reliability of terminals for external conductors: Mechanical strength**		
	Three terminals of new samples are fitted with new conductors of the type and of the minimum and maximum cross sectional area according table J.2.		N/A
	Each conductor is subjected to a pull force of value shown in table J.3. for 1 min		N/A
	Terminal screw torque : $^2/_3$ of table 11	_____ Nm	N/A
	rigid conductors min. cross-section max. cross-section	_____ mm^2 / _____N _____ mm^2 / _____N	N/A
	flexible conductors min. cross-section max. cross-section	_____ mm^2 / _____N _____ mm^2 / _____N	N/A
	During the test the conductor shall not slip out of the terminal		N/A
J.9.3	**Cycling test**		
	The test is carried out with new copper conductors having a cross sectional area according table 10	_____ mm^2	N/A
	The test is carried out on new samples(a sample is one pole, the number of which is defined below, according the type of terminal		N/A
	- universal terminals for rigid (solid and stranded) and flexible conductors	3 + 3 samples	N/A
	- non-universal terminals for solid conductors only	3 samples	N/A

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IEC 60898-1					
Clause	Requirement + Test	Result - Remark			Verdict
	-- non- universal terminals for rigid (solid and stranded) conductors	3 + 3 samples			N/A
	- non-universal terminals for flexible conductors only	3 samples			N/A
	The conductors are connected in series as in normal use to each of the three samples as defined on fig. J.1.				N/A
	The sample is provided with a hole or equivalent in order to measure the voltage drop on the terminal				N/A
	The test arrangement is placed in a heating cabinet which is initially on 20℃				N/A
	Except the cooling period the test current (rated current) is applied to the circuit	I test _____ A			N/A
	The samples shall be subjected to 192 temperature cycles, each cycle having a duration of $^{+}/_{-}$ 1 hour				N/A
	Description of the temperature cycle: In 20 min raised to 40℃, maintained for 10 min, then cool down in 20 min to 30 ℃, maintained for 10 min. For measurement of the voltage drop it is allowed to cool down to 20 ℃				N/A
	The maximum voltage drop, measured on each terminal, at the end of the 192nd cycle, with Inom. shall not exceed the smaller of the two following values - either 22,5 mV - or 1,5 times the value measured after the 24 cycle	Uv max. _____ mV			N/A
	Sample after 24 cycles: rigid conductors (mV) flexible conductors (mV)	J_1 _____ _____	J_2 _____ _____	J_3 _____ _____	N/A
	Sample after 192 cycles: rigid conductors (mV) flexible conductors (mV)	J_1 _____ _____	J_2 _____ _____	J_3 _____ _____	N/A
	After this test the samples shall show no changes evidently impairing further use, such as cracks, deformations or like				P

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

	Annex K		
	Particular requirements for circuit-breakers with flat quick-connect terminations		--
K.6	**Marking**		
	The whole of clause 6 applies		P
	Addition after the lettered item k		--
	The following information regarding the female connector according to IEC 61210 and the type of conductor to be used shall be given in the manufacturer's instructions		N/A
	a) manufacturers name or trade mark		--
	b) type reference		P
	c) information on cross-sections of conductors and colour code of insulating female connectors (see table K.1)		P
	d) the use of only silver or tin-plated copper alloys		N/A
K.7	**Standard conditions for operation in service**		
	Clause 7 applies		P
K.8	**Constructional requirements**		
	Clause 8 applies with the follow modifications:		P
	replacement of 8.1.3 by:		N/A
K.8.1	**Clearances and creepage distances (see annex B)**		
	Subclause 8.1.3 applies, the female connectors being fitted to the male tabs of the circuit-breaker		P
	Replacement of 8.1.5 by:		P
K.8.2	**Terminals for external conductors**		
K.8.2.1	Male tabs and female connectors shall be of a metal having mechanical strength, electrical conductivity and resistance to corrosion adequate for their intended use		N/A
K.8.2.2	The nominal width of male tab is 6,3 mm and the thickness 0,8 mm, applicable to rated currents up to and including 16 A NOTE 1:The use for rated currents up to and including 20 A is accepted in BE, FR, IT, PT, ES and US		N/A
	The dimensions of the male tab shall comply with those specified in table K.3 and in figures K.2, K3, K4, K5, where the dimensions A, B, C, D, E, F, J, M, N and Q are mandatory		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The dimensions of the female connector which may be fitted-on are given in figure K.6 and in table K.4		P
	Compliance is checked by inspection and by measurement	See table on page _____	P
K.8.2.3	**Male tabs shall be securely retained**		
	Compliance is checked by the mechanical overload test of K.9.1		P
K.9	**Tests**		
	Clause 9 applies, with follow modifications:		N/A
	Replacement of 9.5 by:		N/A
K.9.1	**Mechanical overload-force**		
	10 terminals of circuit-breakers, mounted as normal use are subjected to a axial push force and successively the axial pull force specified in table K2 applied to male tab once	push force 96 N pull force 88 N	P
	No damage which could impair further use shall occur to the tab or to the circuit-breaker in which the tab is integrated		N/A
	Addition to 9.8.3:		N/A
	Fine –wire thermocouples shall be placed in such a way as not to influence the contact or the connection area. An example of placement is shown in fig K.1		N/A

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

		Dimensions of tabs according Table K.3		Measured in mm	Verdict
		Minimum	Maximum		
A	Dimple	0,7	1,0	_____	P
	Hole	0,5	1,0	_____	P
B	Dimple	7,8 min		_____	P
	Hole	7,8 min		_____	P
C	Dimple	0,77	0,84	_____	P
	Hole	0,77	0,84	_____	P
D	Dimple	6,20	6,40	_____	P
	Hole	6,20	6,40	_____	P
E	Dimple	3,6	4,1	_____	P
	Hole	4,3	4,7	_____	P
F	Dimple	1,6	2,0	_____	P
	Hole	1,6	2,0	_____	P
J	Dimple	8°	12°	_____	P
	Hole	8°	12°	_____	P
M	Dimple	2,2	2,5	_____	P
	Hole	---	---	---	---
N	Dimple	1,8	2,0	_____	P
	Hole	---	---	---	---
P	Dimple	0,7	1,8	_____	P
	Hole	0,7	1,8	_____	P
Q	Dimple	8,9 min	---	_____	P
	Hole	8,9 min	---	_____	P
B3			7,8 max	_____	P
L2			3,5 max	_____	P

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

	Annex L		
	Specific requirements for circuit-breakers with screw-type terminals for external untreated aluminium conductors and with aluminium screw-type terminals for use with copper or with aluminium conductors		P
L.6	**Marking**		
	In addition to clause 6 the following apply:		P
	Terminal marking according table L.1, on the circuit breaker, near the terminals		--
	Conductor types accepted: Copper only Aluminium only Aluminium and copper	 ☐ None ☐ "Al" ☐ "Al/Cu"	P
	Other information concerning the number of conductors, screw torque (if different from table 11) and cross-section shall be indicated on the circuit-breaker	_____ Nm _____ mm^2	P
L.7	**Standard conditions for operation in service**		
	Clause 7 applies		N/A
L.8	**Constructional requirements**		
	Clause 8 applies with the following exceptions:		N/A
8.1.5.2	is completed by:		
	For connection of aluminium conductors, circuit-breakers shall be provided with screw-type terminals allowing the connection of conductors having nominal cross-sections as shown in table L.2		P
	Terminals for the connection of aluminium conductors and terminals of aluminium for the connection of copper or aluminium conductors shall have mechanical strength adequate to withstand the tests of 9.4, with the test conductors tightened with the torque indicated in table 11, or with the torque specified by the manufacturer, which shall never be lower than that specified in table 11.		N/A
	Compliance is checked by inspection, by measurement and by fitting in turn one conductor of the smallest and one of the largest cross-section areas as specified		N/A
8.1.5.4	Terminals shall allow the conductors to be connected without special preparation		P

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Compliance is checked by inspection and by the tests of L.9		P
L.9	**Tests**		
	Clause 9 applies with the following modifications/additions:		P
	For the tests which are influenced by the material of the terminal and the type of conductor that can be connected, the test conditions of table L.3 are applied		P
	Additionally the test of L.9.2 is carried out on terminals separated from the circuit-breaker		N/A
L.9.2	**Current cycling test**		
	This test is carried out on separate terminals		P
	The general arrangement of the samples shall be as shown in figure L.1		N/A
	90 % of torque stated by the manufacturer or selected in table 11 used for the specimens	torque:_____Nm	P
	The test is carried out with conductors according to table L.5. The length of the test conductor from the point of entry to the screw-type terminal specimens to the equalizer shall be as in table L.6	cross-section:_____mm^2 minimum conductor length:_____mm	P
	Cross section of equalizer not greater than that given in table L.7	max. crosssection_____mm^2	P
L.9.2.5	Test method and acceptance criteria		
	Test loop subjected to 500 cycles of 1h current-on and 1h current-off, starting at an a.c. current value of 1,12 times the test current value determined in table L.8	test current:_____A	P
	Near the end of each current-on period of the first 24 cycles, the current shall subsequently be adjusted to raise the temperature of the reference conductor to 75℃		N/A
	At the end of the 25th cycle the test current shall be adjusted the last time and the stable temperature shall be recorded as the first measurement. No further adjustment of test current for the remainder of the test		N/A
	Temperatures recorded for at least one cycle of each working day, and after approximately 25, 50, 75, 100, 125, 175, 225, 350, 425 and 500 cycles		N/A
	For each screw-type terminal		P
	- the temperature rise shall not exceed 110 K		P

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IEC 60898-1				
Clause	Requirement + Test	Result - Remark		Verdict
	- the stability factor Sf shall not exceed ±10 ℃			P
	ambient air temperature: _____℃	max. temperature rise [K]	max. stability factor Sf [℃]	P
	Terminal 1			P
	Terminal 2			P
	Terminal 3			P
	Terminal 4			P
	Terminal 5			P
	Terminal 6			P
	Terminal 7			P
	Terminal 8			P

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE: Heating Test		
	Test voltage (V) ..... :		—
	Ambient (^{o}C) .....:		—

Thermocouple Locations	max. temperature measured, (K)	max. temperature limit, (K)

Supplementary information:

	TABLE: Dielectric Strength	

Test voltage applied between:	Test potential applied (V)	Breakdown / flashover (Yes/No)

Supplementary information:

	TABLE: insulation resistance measurements	

Insulation resistance R between:	R (MΩ)	Required R (MΩ)
Between mains poles (primary fuse disconnected)		
Between parts separated by basic or supplementary insulation		
Between parts separated by double or reinforced insulation		

Supplementary information:

	TABLE: Impact Resistance		

Impacts per surface	Surface tested	Impact energy (Nm)	Comments

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:			

	TABLE: Clearance And Creepage Distance Measurements					
clearance cl and creepage distance dcr at/of:	**Up (V)**	**U r.m.s. (V)**	**Required cl (mm)**	**cl (mm)**	**required dcr (mm)**	**dcr (mm)**
Supplementary information:						

	TABLE: Ball Pressure Test of Thermoplastics		
Allowed impression diameter (mm) ..... :			—
Object/ Part No./ Material	Manufacturer/ trademark	Test temperature (°C)	Impression diameter (mm)
Supplementary information:			

	TABLE: Needle- flame test (NFT)				
Object/ Part No./ Material	Manufacturer/ trademark	Duration of application of test flame (ta); (s)	Ignition of specified layer Yes/No	Duration of burning (tb) (s)	Verdict
Supplementary information: **NFT not relevant (or applicable) for Parts of material classified as V-0 or V-1** **NFT not relevant (or applicable) for Base material of PCBs classified as V-0 or if relevant VTM-0**					

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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE: Resistance to heat and fire - Glow wire tests

Object/ Part No./ Material	Manufacturer / trademark	Glow wire test (GWT); (℃)						Verdict
		550	650		750		850	
			te	ti	te	ti		

Object/ Part No./ Material	Manufacturer / trademark	Glow-wire flammability index (GWFI), ℃				GW ignition temp. (GWIT), ℃		Verdict
		550	650	750	850	675	775	

The test specimen passed the glow wire test (GWT) with no ignition [(t_e – t_i) ≤ 2s] (Yes/No):	
If no, then surrounding parts passed the needle-flame test of annex E (Yes/No)..... :	
The test specimen passed the test by virtue of most of the flaming material being withdrawn with the glow-wire (Yes/No)? ..... :	
Ignition of the specified layer placed underneath the test specimen (Yes/No)..... :	

Supplementary information:

550 ℃ GWT not relevant (or applicable) to parts of material classified at least HB40 or if relevant HBF The GWIT pre-selection option, the 850 ℃ GWFI pre -selection option, and the 850 ℃ GWT are not relevant (or applicable) for attended appliances.

TABLE: Threaded Part Torque Test

Threaded part identification	Diameter of thread (mm)	Column number (I, II, or III)	Applied torque (Nm)

Supplementary information:

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Attachment No. 1

APPENDED TABLE Critical components					
Object / part no.	Manufacturer / trademark	Type / model	Technical data	Standard	Mark(s) of Conformity
Plastic material	Suzhou Banleantone International Logistics CO,.Ltd	PA66	PA66	IEC/EN60998-2-1,IEC/EN60998-1	Test with appliance
Terminal block material	Foshan Huaru Copper Industry Co., Ltd	COPPER	COPPER	IEC/EN60998-2-1,IEC/EN60998-1	Test with appliance

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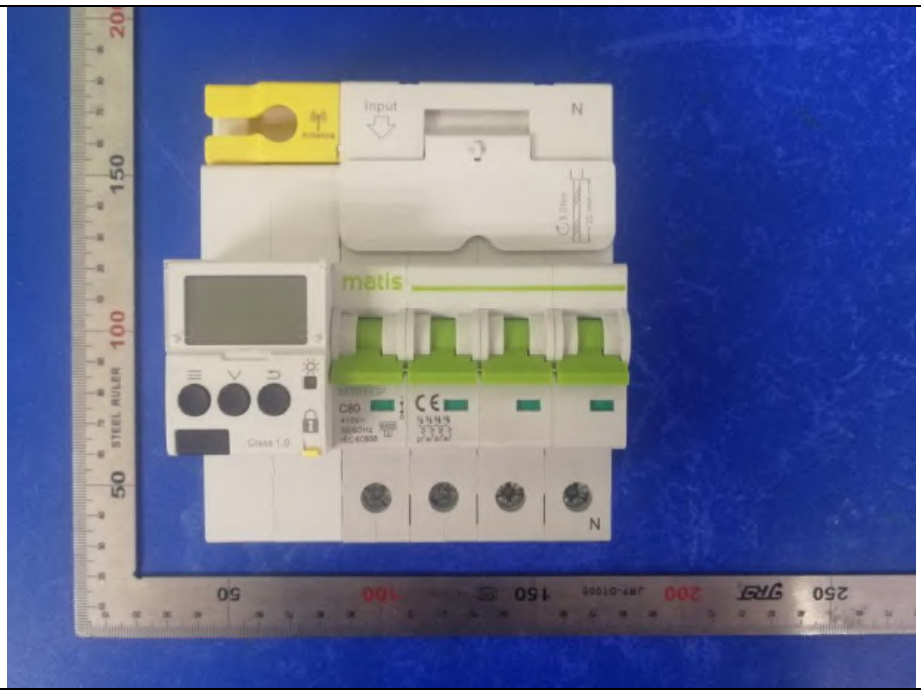
Attachment No. 2: photo documentation

Details of: External View



Details of: External View



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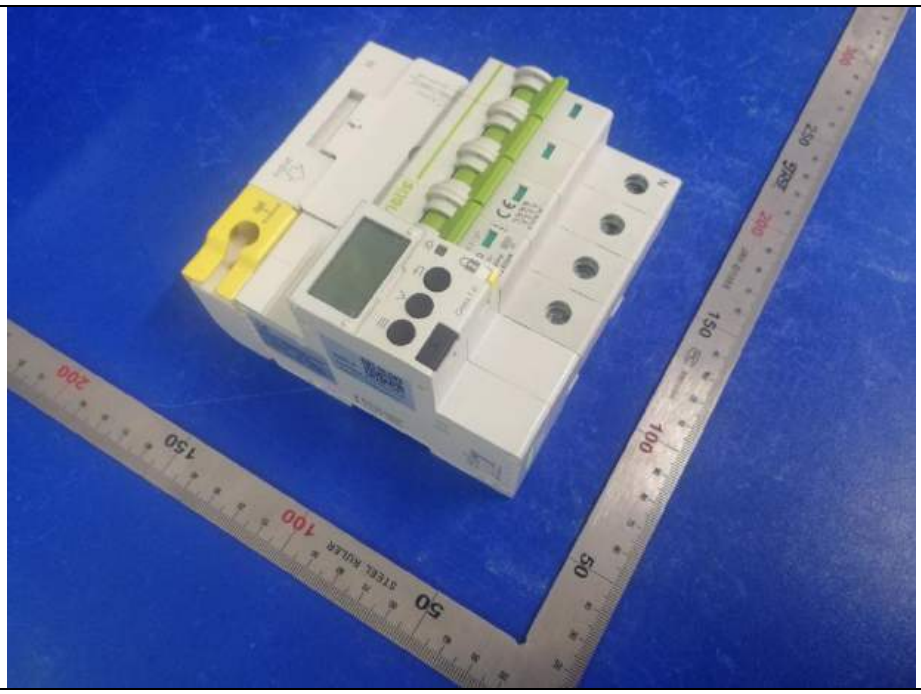

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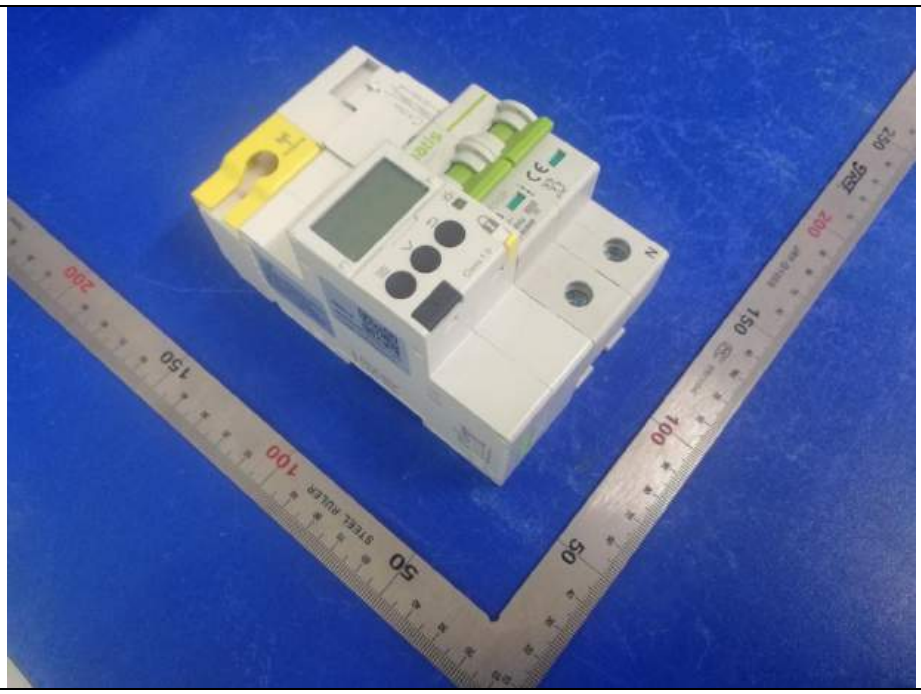

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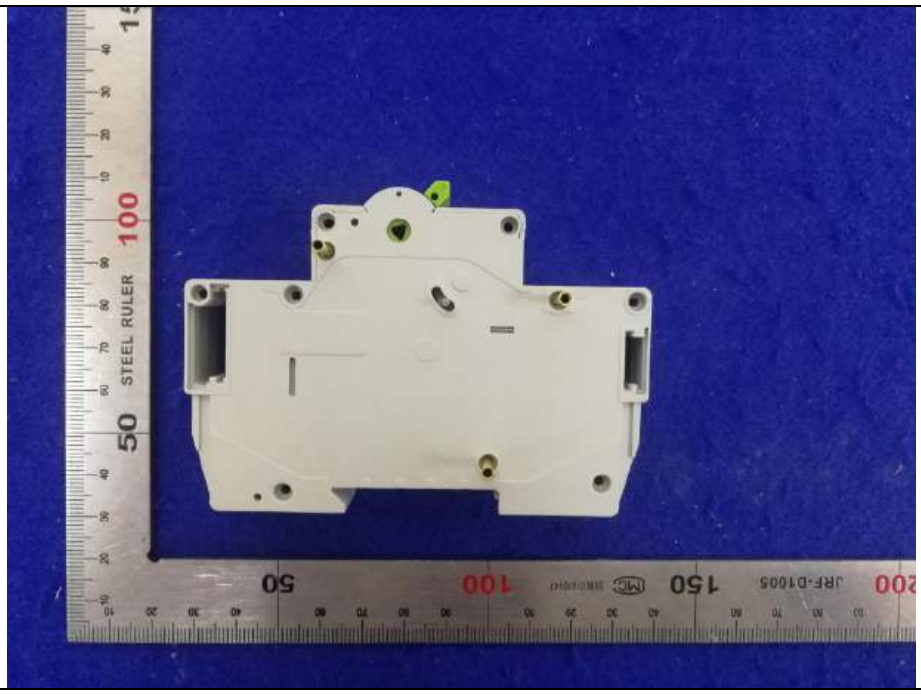

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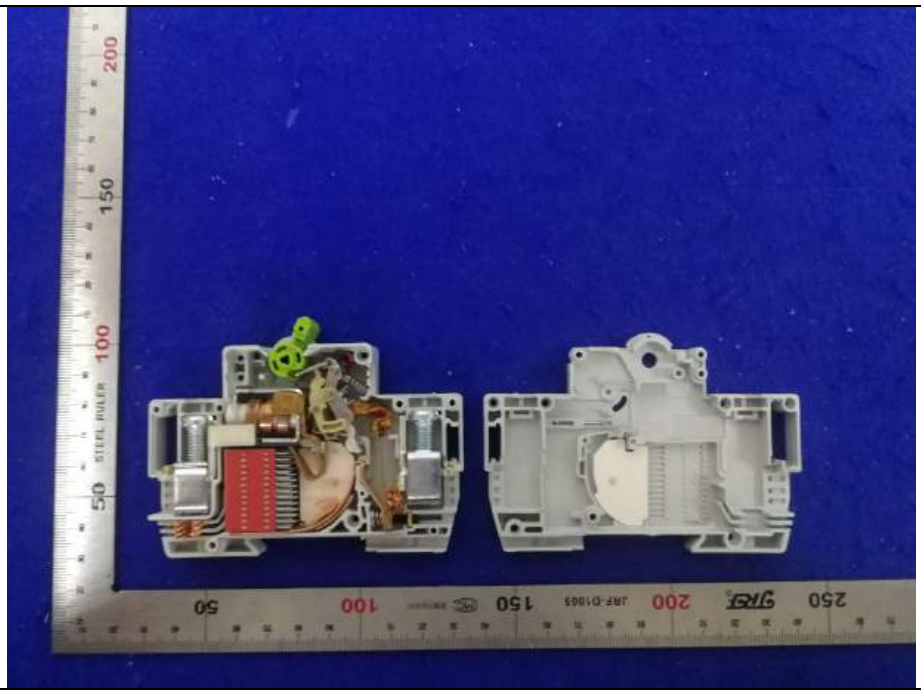
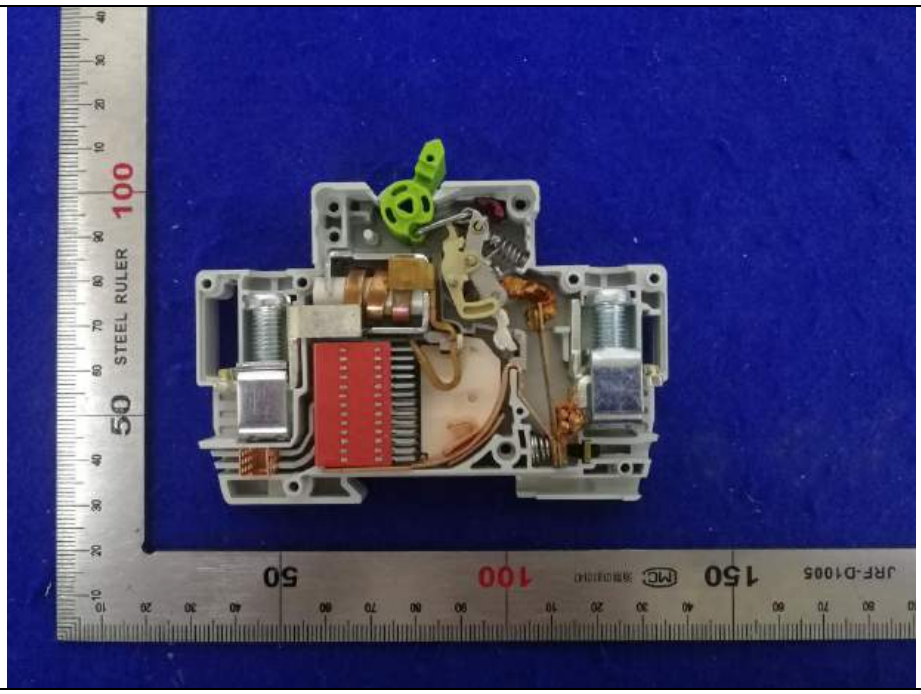
Attachment No. 2: photo documentation

Details of: Internal view



Details of: Internal view



----------End of test report----------

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Report No.: B19X70228

170009013402

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检测
TESTING
CNAS L0570

TEST REPORT

EUT Name: Smart IoT Power Meter with Breaker

Model Name: MT61GP,1P+N.230V.0~80A

Applicant: Shanghai Matis Electric Co,Ltd.

Manufacturer: Shanghai Matis Electric Co., Ltd.

Test Type: Commissioned Test

China Telecommunication Technology Labs.

PRECAUTIONS

1. **The Inspection Report without "the special inspection seal" or "the official seal of inspection institution" is invalid.**
2. **The printed Inspection Report should be stamped by "the Paging Seal".**
3. **The duplications of the Inspection Report without "the special inspection seal" or "the official seal of inspection institution" are invalid.**
4. **The Inspection Report without the signature of "Approver", "Reviewer" and "Inspector" is invalid.**
5. **The Inspection Report is invalid if there is any alter.**
6. **The Inspection Report is only responsible for the provided sample and test items. The information of the sample (e.g. *Deliverer, Origin, Manufacture*, etc.) is provided by the client and the lab is not responsible for its authenticity.**
7. **For benefits of the client, if there are any questions, please contact us in 15 days since the Inspection Report is delivered.**
8. **Any partial copy of the Inspection Report without written approval of the lab is forbidden.**
9. **The sample will be preserved for 60 days. The overdue sample will be disposed by the lab**
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    National Quality Supervision and Inspection Center of Internet of Things Communication Products,

    Quality Supervision and Inspection Center of Graphic Communication Equipment of Information Industry,

    Beijing Mobile Communication Equipment Quality Supervision and Inspection Center of Information Industry,

    Beijing Telephone Exchange Equipment Quality Supervision and Inspection Center of Information Industry,

    Post and Telecommunication Industry Product Quality Supervision and Inspection Center of Information Industry,

    Communication and Electromagnetic Compatibility Quality Supervision and Inspection Center of Information Industry,

    Quality Supervision and Inspection Center for Communication Equipment Anti-Seismic Performance of Information Industry,

    Communication Software Evaluation Center of Information Industry.

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China Telecommunication Technology Labs.

TEST REPORT

EUT Name	Smart IoT Power Meter with Breaker	**Model Name**	MT61GP,1P+N.230V.0~80A
Applicant	Shanghai Matis Electric Co,Ltd.	**Test Type**	Commissioned Test
Manufacturer	Shanghai Matis Electric Co,Ltd.	**Date of Receiving Samples**	January 18, 2019
Test Location	China Telecommunication Technology Labs.	**Deliverer**	Zhang Jian Wei
Sample Quantity	2pcs	**Check Item**	30
Initial Sample	The initial samples state are in good condition and meet related requirements.		
Test Standard	GB/T 17626.2-2006《Electromagnetic compatibility Test and measurement technology Electrostatic discharge immunity test》 GB 4208-2008 《Case Protection Grade（IP grade）》 GB/T 9254-2008 《Radio disturbance limits and methods of measurement for information technology equipment》 GB/T 2423.1-2008 《Environmental testing of electric and electronic products Test A: Basic information of low temperature Part 2: Test method》 GB/T 2423.2-2008 《Environmental testing of electric and electronic products Test B: Basic information of high temperature Part 2: Test method》 GB/T 2423.4-2008 《Environmental testing of electric and electronic products - Part 2: Test methods Test Db alternating heat and humidity (12hrs + 12hrs cycle)》		
Test Conclusion	MT61GP,1P+N.230V.0~80A (Smart IoT Power Meter with Breaker) were tested, with al performances and technical results as below: MT61GP reached all technical data and passed all 30 tests, and met all terms requested in standards of: GB/T 17626.2-2006《Electromagnetic compatibility Test and measurement technology Electrostatic discharge immunity test》, GB 4208-2008 《Case Protection Grade（IP grade）》, GB/T 9254-2008 《Radio disturbance limits and methods of measurement for information technology equipment》and requirements specified in the《Enterprise Standard Q/Matis 0001S-2018》. (Seal for the test report) Issue Date：February 18, 2019		
Remark	The test results in this report are in accordance with GB/T 17215.211-2006 "General requirements for AC electrical measurement equipment, test and test conditions Part 11: Measurement equipment", DL/T 614-2007 "Multi-function electric energy meter" and "Enterprise standard Q/" Matis 0001S-2018" requirements.		

Approver: 王景 **Reviewer:** 张虎 **Inspector:** 徐越

TEST RESULTS

No.	Test item		Unit	Requirement	Test Result	Conclusion
1	Outlook and Structure		--	All device buttons are flexible in operation, clear display, normal brightness and backlight. After network connected, the indicator is clear and no flashing. The outer case should not have cracks or pitting. The trademark, model and technical parameters of the device should be accurate.	Meet requirements	**Pass**
2	Case Safety	Electric shock protection	--	The device structure should make sure its live lines are not easily accessible after being installed and wired. The case protection grade should comply with the IP2X specified in GB 4208.	Meet requirements	**Pass**
3		Case fire hazard	--	Terminal block: 960 °C ± 10 ° C; Case: 650 ° C ± 10 ° C; Operation time: 30s ± 1s. The glow wire can touch any random place of the device. The terminal block and case should be safe to prevent flame spread or catch fire due to thermal overload of live line.	Meet requirements	**Pass**
4	Insulation Features	Insulation resistance	--	Applied voltage of 500 VDC to the test point for 5s, the insulation resistance is no less than 5 MΩ. After the constant humidity and heat test, the insulation resistance is no less than 2 MΩ.	Normal：＞10MΩ Constant humidity and heat：＞10MΩ	**Pass**
5		Voltage withstand test	--	Applied voltage of 2000V/50Hz to the test point for 1 min, the device has no flash or break down. The leakage current trip value of the test device is set to 100 mA.	No flash or break down Meet requirements	**Pass**
6	Temperature Rise		--	The temperature rise of each component should not exceed the specified limit and no damage on device function or safety. Connection terminal block 60K Accessible external components when manually operates device, including the operating parts of insulation material and the metal parts of pole connecting: 40K The external metal part of operating parts: 25K Other external components, including the surface of the device , in direct touch with the mounting face: 60K	Terminal connection：26K plastic external parts：33K Meet requirements	**Pass**

TEST RESULTS

No.	Test item		Unit	Requirement	Test Result	Conclusion
7	Technical Requirements on Operation Function and Power Supply		--	The device should operate correctly at any supply voltage between 0.85 and 1.1 times the rated voltage (Un), ie: 1, can do remote close and open 2, the host computer can read the measurement data of device. 3, the LCD display can read device parameters and measurement data	Meet requirements	**Pass**
8	Mechanical and electrical life		--	The device can withstand the specified operation life: each operation cycle includes once open and close, and unloaded operations (mechanical life) is 2000 times.	Meet requirements	**Pass**
9	Environmental Adaptability	Low temperature test	--	The test is carried out in accordance with GB/T 2423.1 under the following conditions: —The meter is not in working state; —Temperature: -25 °C ± 3 °C, indoor energy meter; —Test period: 16hrs, energy meter used indoor; After the test, the error should be less than 2%.	Error change: -0.14% Meet requirements	**Pass**
10		High temperature test	--	The test is carried out in accordance with GB/T 2423.1 under the following conditions: —The meter is not in working state; —Temperature: +70 °C ± 2 °C; —Test period: 72hrs; After the test, the error should be less than 2%.	Error change: +0.06% Meet requirements	**Pass**
11		Humidity and heat test	--	The test is carried out in accordance with GB/T 2423.4 under the following conditions: —Voltage line and auxiliary lines connected with reference voltage; —The current line has no current; —Alternating mode: 1; —Max. temperature: +40°C±2°C, indoor meter; — No treatmentS to remove surface moisture; —Test time: 6 cycles. At test, there should be no signs of corrosion that may affect the functional characteristics of the meter. The error should be less than 2%.	Error change: +0.10% Meet requirements	**Pass**
12	Automatic Reclosing Feature		--	If it has no earth leakage detection function after disconnection, the device will automatically reclose once after 20s-60s when disconnected. If failed to reclose, it will try reclosing again after 15 minutes. If failed twice, the device will try the third time after another 15 minutes. If failed in third time, the device will stop auto reclosing. If the device owns leakage detection function after disconnection, the requirements are as follows: 1. If failed 3 times in 1 min, the device can't do auto reclose again. 2, Detection voltage: <24V Successful closing means that the closing state can be kept for 5 seconds without trip after reclosed.	Meet requirements	**Pass**

TEST RESULTS

No.	Test item		Unit	Requirement	Test Result	Conclusion
13	Over/under Voltage and Action Time		--	Overvoltage value is AC 280±5V, and recover value AC 275±5V. Undervoltage value is AC 175±5V and recover value is AC 180±5V, the device output should be disconnected and protection time less than 60s.	Protection time:58s Meet requirements	**Pass**
14	Over Current and Action Time		--	Input current higher than AC100±2A, the load output should be disconnected and time less than 300ms.	Protection time: 30ms Meet requirements	**Pass**
15	Overload and Action Time		--	Input power higher than 22±1kW, the load output should be disconnected and time less than 300ms.	Protection time: 30ms Meet requirements	**Pass**
16	Communication Mode	RS485	--	It can read online status of the device, measure data, real time data and realize the remote opening and closing through upper computer software.	Meet requirements	**Pass**
17		GSM		It can read online status of the device, measure data, real time data and realize remote opening and closing through the “Device Management Platform” on web..	Meet requirements	**Pass**
18		WCDMA		It can read online status of the device, measure data, real time data and realize remote opening and closing through the “Device Management Platform” on web..	Meet requirements	**Pass**

TEST RESULTS

No.	Test item	Unit	Requirement	Test Result	Conclusion
19	Voltage Error	--	AC 175V--280V， Error< 0.5%	**+0.15%**	**Pass**
20	Current, Power, Energy Error / Balance load	--	2% to 5% Imax: cosφ=1, 5% to 100% Imax: cosφ = 0.5L, 0.8C, Error< 0.5%.	**Error** / **Total** A / -0.04% P / +0.05% KWH / +0.08%	**Pass**
21	Start	--	Under start current（0.004Ib）, the meter should start to work and record continuously	Ib=15A、20A Meet requirements	**Pass**
22	Potential Start	--	While voltage of 115% Un and no current, the test output of the device should not have more than one pulse. The shortest test time t is shown in the formula below. $\Delta t \leq \frac{600 \times 10^6}{k \cdot m \cdot U_n \cdot I_{max}}$ K, single phase is 1, three phase is 3, m is pulse constant: 400, Un is voltage 230V, and Imax is 80.	Meet requirements	**Pass**
23	Power Consumption	--	Voltage line apparent power consumption：≤10VA	2VA Meet requirements	**Pass**
24		--	Voltage line active power consumption：≤2W	1W Meet requirements	**Pass**
25		--	Current line apparent power consumption：≤4VA	2VA	**Pass**

TEST RESULTS

No.	Test item	Unit	Requirement	Test Result	Conclusion
26	Device Performance under Electric Surge	--	The device should be sufficiently resistant to ground surge currents flowing through the capacitive load and through devices flashover. The time-delay type device should have sufficient resistance to tripping current to the ground surge current flowing through the flashover. Apply 1.2/50 us (8/20 us) combined wave and 2kV between the power line (L-N), and no malfunction should occur. The power line (L-N) is applied with a 1.2/50 us, 4kV surge voltage, and the sample works normally without damage. The power cable L flows through 8/20 us and 20kA lightning current to N. When the surge protector installed, the sample works normally without damaged.	Meet requirements	**Pass**
27	Electrostatic Discharge Disturbance Test	--	The test shall be carried out in accordance with GB/T 17626.2 under the following conditions: —It is used as desktop device test; —The device is working: • The voltage line and the auxiliary line are connected to the reference voltage; • The current line has no current (open circuit); —Contact discharge; —Test voltage, 8kV; —Number of discharges: 10 (with the most sensitive polarity); —If the discharge cannot be connected due to the absence of exposed metal parts, the air is discharged at a test voltage of 15 kV. The electrostatic discharge should not cause the meter to produce a change greater than x units and the test output should not produce a signal amount greater than the equivalent x unit of measure. $x = 10^{-6} m U_n I_{max}$ In the test, a temparory decrease or loss of function or performance is allowed.	Meet requirements	**Pass**

TEST RESULTS

No.	Test item	Unit	Requirement	Test Result	Conclusion
28	Fast Transient Impulse Burst Test	--	The test shall be carried out in accordance with GB/T 17626.4 under the following conditions: —It is used as desktop device test; —The device is working: • The voltage line and the auxiliary line are connected to the reference voltage; • The basic current Ib (corresponding rated current In) and cosφ (corresponding sinφ) are specified according to the corresponding standards; —Cable length between the coupler and the EUT: ⩽ 1m; —The test voltage shall be applied in the form of a common mode (line to ground): • voltage line; • Current line, is isolated from the voltage line during normal use; • Auxiliary lines, are isolated from voltage lines during normal use; —Test voltage on current and voltage lines: 4kV; —Test voltage on auxiliary lines with reference voltage exceeding 40V: 2kV; —Test time: 60s for each polarity; In the test, a temporary decrease or loss of function or performance is allowed, and the error should be less than 2%.	Error change：-0.15% Meet requirements	**Pass**
29	Conducted Disturbance Immunity Test of RF Field Induction	--	The test shall be carried out in accordance with GB/T 17626.6 under the following conditions: —It is used as desktop device test; —The device is working: • The voltage line and the auxiliary line are connected to the reference voltage; • The basic current Ib (corresponding rated current In) and cosφ (corresponding sinφ) are specified according to the corresponding standards; —Frequency range: 150kHz ~ 80MHz, —Voltage level: 10V. The condition of the equipment should not be disturbed during the test and the error should be less than 1%.	Error change：-0.18% Meet requirements	**Pass**
30	Radio Interference Restrain	--	The test shall be carried out in accordance with GB 9254 under the following conditions. As a bench-top device, the voltage line shall be connected to each connector. An unshielded cable of length 1 m shall be used. The device is in working condition: the electric circuit and the auxiliary line are connected. Specific voltage; current between 0.1Ib (In) and 0.2 Ib (In) (extracted by linear load and connected by 1m long unshielded cable). The test results shall comply with the requirements of GB 9254 Class B equipment.	Meet requirements	**Pass**

Test Sample Pictures



MT61GP,1P+N.230V.0~80A

Smart IoT Power Meter with Breaker

Test Equipments, Enviroment and Others

Index	Instrument	Model	Code	Note
1	Test finger	BND-A/B/C/D	BND20140728-01\BND20140526	——
2	Glow wire tester	GW-3020	614G0001	——
3	Digital high resistance meter	1865+	E5-14322590	——
4	AC voltage withstand tester	7473	1430115	——
5	Recorder	MV2048	S5N906006	——
6	Constant temperature and humidity testing machine	GTH-150-60-CP-SD	MAA0803-001	——
7	Digital power meter	WT310E	C3TB09014E	——
8	Multi-function surge generator	SG5020G	EC5661601	——
9	Combined immunity tester	CCS600	ES0801654	——
10	Electrostatic discharge test system	EDS 20H	ES0101306	——
11	Signal generator	SMR27	100003	——
12	Antenna (bilateral speaker)	HF906	100038	——
13	Network Analyzer	E8362B	MY43021471	——
14	Electromagnetic wave chamber	8500	/	——

Description of test:

None

Address of Test	China Telecommunication Technology Labs.	
Date of Test	January 21st,2019 to January 31th,2019	
Condition of Test	Temperature：(18～22)℃	Humidity：(45～55)%RH

Report No.: B19X70222

170009013402

TEST REPORT

EUT Name: Smart IoT Power Meter with Breaker

Model Name: MT61GP,3P+N,400V,0~100A

Applicant: Shanghai Matis Electric Co,Ltd.

Manufacturer: Shanghai Matis Electric Co,Ltd.

Test Type: Commissioned Test

China Telecommunication Technology Labs.

PRECAUTIONS

1. **The Inspection Report without "the special inspection seal" or "the official seal of inspection institution" is invalid.**
2. **The printed Inspection Report should be stamped by "the Paging Seal".**
3. **The duplications of the Inspection Report without "the special inspection seal" or "the official seal of inspection institution" are invalid.**
4. **The Inspection Report without the signature of "Approver", "Reviewer" and "Inspector" is invalid.**
5. **The Inspection Report is invalid if there is any alter.**
6. **The Inspection Report is only responsible for the provided sample and test items. The information of the sample (e.g. *Deliverer, Origin, Manufacture*, etc.) is provided by the client and the lab is not responsible for its authenticity.**
7. **For benefits of the client, if there are any questions, please contact us in 15 days since the Inspection Report is delivered.**
8. **Any partial copy of the Inspection Report without written approval of the lab is forbidden.**
9. **The sample will be preserved for 60 days. The overdue sample will be disposed by the lab**
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    National Quality Supervision and Inspection Center of Internet of Things Communication Products,

    Quality Supervision and Inspection Center of Graphic Communication Equipment of Information Industry,

    Beijing Mobile Communication Equipment Quality Supervision and Inspection Center of Information Industry,

    Beijing Telephone Exchange Equipment Quality Supervision and Inspection Center of Information Industry,

    Post and Telecommunication Industry Product Quality Supervision and Inspection Center of Information Industry,

    Communication and Electromagnetic Compatibility Quality Supervision and Inspection Center of Information Industry,

    Quality Supervision and Inspection Center for Communication Equipment Anti-Seismic Performance of Information Industry,

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Address: No.28 Xinjiekouwai Street, Xicheng District, Beijing, P.R.China

Zip code: 100088

Phone: 010-82051479

Fax: 010-82051535

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E-MAIL: ptpic@163.com

China Telecommunication Technology Labs.

TEST REPORT

EUT Name	Smart IoT Power Meter with Breaker	**Model Name**	MT61GP,3P+N,400V,0~100A
Applicant	Shanghai Matis Electric Co,Ltd.	**Test Type**	Commissioned Test
Manufacturer	Shanghai Matis Electric Co,Ltd.	**Date of Receiving Samples**	January 18, 2019
Test Location	China Telecommunication Technology Labs.	**Deliverer**	Zhang Jian Wei
Sample Quantity	2pcs	**Check Item**	32
Initial Sample	The initial samples state are in good condition and meet related requirements.		
Test Standard	GB/T 17626.2-2006《Electromagnetic compatibility Test and measurement technology Electrostatic discharge immunity test》 GB 4208-2008 《Case Protection Grade（IP grade）》 GB/T 9254-2008 《Radio disturbance limits and methods of measurement for information technology equipment》 GB/T 2423.1-2008 《Environmental testing of electric and electronic products Test A: Basic information of low temperature Part 2: Test method》 GB/T 2423.2-2008 《Environmental testing of electric and electronic products Test B: Basic information of high temperature Part 2: Test method》 GB/T 2423.4-2008 《Environmental testing of electric and electronic products - Part 2: Test methods Test Db alternating heat and humidity (12hrs + 12hrs cycle)》		
Test Conclusion	MT61GP,3P+N,400V,0~100A (Smart IoT Power Meter with Breaker) were tested, with al performances and technical results as below: MT61GP reached all technical data and passed all 32 tests, and met all terms requested in standards of: GB/T 17626.2-2006《Electromagnetic compatibility Test and measurement technology Electrostatic discharge immunity test》, GB 4208-2008 《Case Protection Grade（IP grade）》, GB/T 9254-2008 《Radio disturbance limits and methods of measurement for information technology equipment》and requirements specified in the《Enterprise Standard Q/Matis 0001S-2018》. (Seal for the test report) Issue Date：February 18, 2019		
Remark	The test results in this report are in accordance with GB/T 17215.211-2006 "General requirements for AC electrical measurement equipment, test and test conditions Part 11: Measurement equipment", DL/T 614-2007 "Multi-function electric energy meter" and "Enterprise standard Q/" Matis 0001S-2018" requirements.		

Approver: **Reviewer:** **Inspector:**

TEST RESULTS

No.	Test item		Unit	Requirement	Test Result	Conclusion
1	Outlook and Structure		--	All device buttons are flexible in operation, clear display, normal brightness and backlight. After network connected, the indicator is clear and no flashing. The outer case should not have cracks or pitting. The trademark, model and technical parameters of the device should be accurate.	Meet requirements	**Pass**
2	Case Safety	Electric shock protection	--	The device structure should make sure its live lines are not easily accessible after being installed and wired. The case protection grade should comply with the IP2X specified in GB 4208.	Meet requirements	**Pass**
3		Case fire hazard	--	Terminal block: 960 °C ± 10 ° C; Case: 650 ° C ± 10 ° C; Operation time: 30s ± 1s. The glow wire can touch any random place of the device. The terminal block and case should be safe to prevent flame spread or catch fire due to thermal overload of live line.	Meet requirements	**Pass**
4	Insulation Features	Insulation resistance	--	Applied voltage of 500 VDC to the test point for 5s, the insulation resistance is no less than 5 MΩ. After the constant humidity and heat test, the insulation resistance is no less than 2 MΩ.	Normal：＞10MΩ Constant humidity and heat：＞10MΩ	**Pass**
5		Voltage withstand test	--	Applied voltage of 2000V/50Hz to the test point for 1 min, the device has no flash or break down. The leakage current trip value of the test device is set to 100 mA.	No flash or break down Meet requirements	**Pass**
6	Temperature Rise		--	The temperature rise of each component should not exceed the specified limit and no damage on device function or safety. Connection terminal block 60K Accessible external components when manually operates device, including the operating parts of insulation material and the metal parts of pole connecting: 40K The external metal part of operating parts: 25K Other external components, including the surface of the device , in direct touch with the mounting face: 60K	Terminal connection：26K plastic external parts：35K Meet requirements	**Pass**

TEST RESULTS

No.	Test item		Unit	Requirement	Test Result	Conclusion
7	Technical Requirements on Operation Function and Power Supply		--	The device should operate correctly at any supply voltage between 0.85 and 1.1 times the rated voltage (Un), ie: 1, can do remote close and open 2, the host computer can read the measurement data of device. 3, the LCD display can read device parameters and measurement data	Meet requirements	**Pass**
8	Mechanical and electrical life		--	The device can withstand the specified operation life: each operation cycle includes once open and close, and unloaded operations (mechanical life) is 2000 times.	Meet requirements	**Pass**
9	Environmental Adaptability	Low temperature test	--	The test is carried out in accordance with GB/T 2423.1 under the following conditions: —The meter is not in working state; —Temperature: -25 °C ± 3 °C, indoor energy meter; —Test period: 16hrs, energy meter used indoor; After the test, the error should be less than 2%.	Error change: -0.04% Meet requirements	**Pass**
10		High temperature test	--	The test is carried out in accordance with GB/T 2423.1 under the following conditions: —The meter is not in working state; —Temperature: +70 °C ± 2 °C; —Test period: 72hrs; After the test, the error should be less than 2%.	Error change: +0.08% Meet requirements	**Pass**
11		Humidity and heat test	--	The test is carried out in accordance with GB/T 2423.4 under the following conditions: —Voltage line and auxiliary lines connected with reference voltage; —The current line has no current; —Alternating mode: 1; —Max. temperature: +40°C±2°C, indoor meter; — No treatmentS to remove surface moisture; —Test time: 6 cycles. At test, there should be no signs of corrosion that may affect the functional characteristics of the meter. The error should be less than 2%.	Error change: +0.12% Meet requirements	**Pass**
12	Automatic Reclosing Feature		--	If it has no earth leakage detection function after disconnection, the device will automatically reclose once after 20s-60s when disconnected. If failed to reclose, it will try reclosing again after 15 minutes. If failed twice, the device will try the third time after another 15 minutes. If failed in third time, the device will stop auto reclosing. If the device owns leakage detection function after disconnection, the requirements are as follows: 1. If failed 3 times in 1 min, the device can't do auto reclose again. 2, Detection voltage: <24V Successful closing means that the closing state can be kept for 5 seconds without trip after reclosed.	Meet requirements	**Pass**

TEST RESULTS

No.	Test item		Unit	Requirement	Test Result	Conclusion
13	Over/under Voltage and Action Time		--	Overvoltage value is AC 280±5V, and recover value AC 275±5V. Undervoltage value is AC 175±5V and recover value is AC 180±5V, the device output should be disconnected and protection time less than 60s.	Protection time:57s Meet requirements	**Pass**
14	Over Current and Action Time		--	Input current higher than AC100±2A, the load output should be disconnected and time less than 300ms.	Protection time: 30ms Meet requirements	**Pass**
15	Overload and Action Time		--	Input power higher than 22±1kW, the load output should be disconnected and time less than 300ms.	Protection time: 30ms Meet requirements	**Pass**
16	Phase Loss and Action Time			The device owns phase loss protection, and action time les than 60s.	Protection time: 57s Meet requirements	**Pass**
17	Phase Imbalance and Action Time			The judgement value is 2%, and time less than 60s.	Protection time: 57s Meet requirements	**Pass**
18	Communication Mode	RS485	--	It can read online status of the device, measure data, real time data and realize the remote opening and closing through upper computer software.	Meet requirements	**Pass**
19		GSM		It can read online status of the device, measure data, real time data and realize remote opening and closing through the “Device Management Platform” on web..	Meet requirements	**Pass**
20		WCDMA		It can read online status of the device, measure data, real time data and realize remote opening and closing through the “Device Management Platform” on web..	Meet requirements	**Pass**

TEST RESULTS

No.	Test item		Unit	Requirement	Test Result				Conclusion
21	Voltage Error		--	AC 175V--280V， Error< 0.5%	**Error**	**A**	**B**	**C**	**Pass**
					V	+0.24%	+0.22%	+0.15%	
22	Current, Power, Energy Error	Balance load	--	2% to 5% Imax: cosφ=1, 5% to 100% Imax: cosφ = 0.5L, 0.8C, Error< 0.5%.	**Error**	**Total**			**Pass**
					A	-0.27%			
					P	-0.12%			
					KWH	-0.08%			
		Imbalance load		5% to 100% Imax: cosφ = 1 Error< 0.5%.	**Error**	**A**	**B**	**C**	**Pass**
					A	+0.05%	+0.12%	+0.14%	
					P	+0.12%	+0.20%	+0.08%	
					KWH	+0.06%	+0.13%	+0.15%	
				10% to 100% Imax: cosφ = 0.5L Error< 0.5%.	**Error**	**A**	**B**	**C**	
					A	+0.12%	+0.22%	+0.10%	
					P	+0.14%	+0.25%	+0.11%	
					KWH	+0.15%	+0.27%	+0.15%	
23	Start		--	Under start current（0.004Ib）, the meter should start to work and record continuously	Meet requirements				**Pass**
24	Potential Start		--	While voltage of 115% Un and no current, the test output of the device should not have more than one pulse. The shortest test time t is shown in the formula below. $\Delta t \leq \frac{600 \times 10^6}{k \cdot m \cdot U_n \cdot I_{max}}$ K, single phase is 1, three phase is 3, m is pulse constant: 400, Un is voltage 230V, and Imax is 80.	Meet requirements				**Pass**
25	Power Consumption		--	Voltage line apparent power consumption：≤10VA	4VA Meet requirements				**Pass**
26			--	Voltage line active power consumption：≤2W	1W Meet requirements				**Pass**
27			--	Current line apparent power consumption：≤4VA	3VA				**Pass**

TEST RESULTS

No.	Test item	Unit	Requirement	Test Result	Conclusion
28	Device Performance under Electric Surge	--	The device should be sufficiently resistant to ground surge currents flowing through the capacitive load and through devices flashover. The time-delay type device should have sufficient resistance to tripping current to the ground surge current flowing through the flashover. Apply 1.2/50 us (8/20 us) combined wave and 2kV between the power line (L-N), and no malfunction should occur. The power line (L-N) is applied with a 1.2/50 us, 4kV surge voltage, and the sample works normally without damage. The power cable L flows through 8/20 us and 20kA lightning current to N. When the surge protector installed, the sample works normally without damaged.	Meet requirements	**Pass**
29	Electrostatic Discharge Disturbance Test	--	The test shall be carried out in accordance with GB/T 17626.2 under the following conditions: —It is used as desktop device test; —The device is working: • The voltage line and the auxiliary line are connected to the reference voltage; • The current line has no current (open circuit); —Contact discharge; —Test voltage, 8kV; —Number of discharges: 10 (with the most sensitive polarity); —If the discharge cannot be connected due to the absence of exposed metal parts, the air is discharged at a test voltage of 15 kV. The electrostatic discharge should not cause the meter to produce a change greater than x units and the test output should not produce a signal amount greater than the equivalent x unit of measure. $x = 10^{-6} m U_n I_{max}$ In the test, a temparory decrease or loss of function or performance is allowed.	Meet requirements	**Pass**

TEST RESULTS

No.	Test item	Unit	Requirement	Test Result	Conclusion
30	Fast Transient Impulse Burst Test	--	The test shall be carried out in accordance with GB/T 17626.4 under the following conditions: —It is used as desktop device test; —The device is working: • The voltage line and the auxiliary line are connected to the reference voltage; • The basic current Ib (corresponding rated current In) and cosφ (corresponding sinφ) are specified according to the corresponding standards; —Cable length between the coupler and the EUT: ⩽ 1m; —The test voltage shall be applied in the form of a common mode (line to ground): • voltage line; • Current line, is isolated from the voltage line during normal use; • Auxiliary lines, are isolated from voltage lines during normal use; —Test voltage on current and voltage lines: 4kV; —Test voltage on auxiliary lines with reference voltage exceeding 40V: 2kV; —Test time: 60s for each polarity; In the test, a temporary decrease or loss of function or performance is allowed, and the error should be less than 2%.	Error change：+0.10% Meet requirements	**Pass**
31	Conducted Disturbance Immunity Test of RF Field Induction	--	The test shall be carried out in accordance with GB/T 17626.6 under the following conditions: —It is used as desktop device test; —The device is working: • The voltage line and the auxiliary line are connected to the reference voltage; • The basic current Ib (corresponding rated current In) and cosφ (corresponding sinφ) are specified according to the corresponding standards; —Frequency range: 150kHz ~ 80MHz, —Voltage level: 10V. The condition of the equipment should not be disturbed during the test and the error should be less than 1%.	Error change：+0.08% Meet requirements	**Pass**
32	Radio Interference Restrain	--	The test shall be carried out in accordance with GB 9254 under the following conditions. As a bench-top device, the voltage line shall be connected to each connector. An unshielded cable of length 1 m shall be used. The device is in working condition: the electric circuit and the auxiliary line are connected. Specific voltage; current between 0.1Ib (In) and 0.2 Ib (In) (extracted by linear load and connected by 1m long unshielded cable). The test results shall comply with the requirements of GB 9254 Class B equipment.	Meet requirements	**Pass**

Test Sample Pictures



MT61GP, Three Phase, 3P+N, AC400V, 0~100A

Smart IoT Power Meter with Breaker

Test Equipments, Enviroment and Others

Index	Instrument	Model	Code	Note
1	Test finger	BND-A/B/C/D	BND20140728-01\BND20140526	——
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3	Digital high resistance meter	1865+	E5-14322590	——
4	AC voltage withstand tester	7473	1430115	——
5	Recorder	MV2048	S5N906006	——
6	Constant temperature and humidity testing machine	GTH-150-60-CP-SD	MAA0803-001	——
7	Digital power meter	WT310E	C3TB09014E	——
8	Multi-function surge generator	SG5020G	EC5661601	——
9	Combined immunity tester	CCS600	ES0801654	——
10	Electrostatic discharge test system	EDS 20H	ES0101306	——
11	Signal generator	SMR27	100003	——
12	Antenna (bilateral speaker)	HF906	100038	——
13	Network Analyzer	E8362B	MY43021471	——
14	Electromagnetic wave chamber	8500	/	——

Description of test:

None

Address of Test	China Telecommunication Technology Labs.	
Date of Test	January 21st,2019 to January 31th,2019	
Condition of Test	Temperature：(18～22)℃	Humidity：(45～55)%RH

Report No.	LCS190815026AS
Total pages	24 pages

Test Report

NAME OF SAMPLE	:	AIOT ENERGY METER WITH MCB
MODEL	:	MT61GP, MT641WF, MT61LR
INSPECTION CLASSIFICATION	:	Commission test
APPLICANT	:	SHANGHAI MATIS ELECTRC CO., LTD.
MANUFACTURER	:	SHANGHAI MATIS ELECTRC CO., LTD.

Shenzhen LCS Compliance Testing Laboratory Ltd.

Test Report

Name of sample	AIOT ENERGY METER WITH MCB	Trademark	matis, matismart
Model	MT61GP, MT641WF, MT61LR	Meter Constant	400 imp/kWh
Specifications	Three Phase, 3P+N, 415V, 50/60Hz, 80A, LCD register type		
Applicant	SHANGHAI MATIS ELECTRC CO., LTD.		
Address	BLOCK C, NO.888, HUANHU WEST 2ND ROAD, PUDONG, SHANGHAI, CHINA		
Manufacture	SHANGHAI MATIS ELECTRC CO., LTD.		
Address	BLOCK C, NO.888, HUANHU WEST 2ND ROAD, PUDONG, SHANGHAI, CHINA		
Test Lab.	Shenzhen LCS Compliance Testing Laboratory Ltd.		
Address of test Lab.	101, 201 Building A and 301 Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, Guangdong, China		
Date of delivering	2019-10-08	Quantity of sample	3 pcs
Date of test	2019-10-08 to 2019-12-09	Ambient Temperature	15-35°C; 45-75%RH
Test procedure	Type test	Installation	Direct Connection
Test standard	IEC 62053-21: 2003 Electricity metering equipment(a.c.) Particular requirements -Part21: Static meters for active energy(classes1 and 2) IEC 62052-11: 2003 Electricity metering equipment(a.c.)-General requirements, tests and test conditions -Part11: Metering equipment		
Test result	Measured data see report attached.		
Metering accuracy	Class 1.0		

Tested by: Aic Huang Test engineer		Signature:	2019-12-09
Checked by: Albert Lai Project engineer		Signature:	2019-12-09
Approved by: Hart Qiu Technical Director		Signature:	2019-12-09

General remarks:

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"(See Enclosure #)" refers to additional information appended to the report.

"(See appended table)" refers to a table appended to the report.

Possible test case verdicts:

- test case does not apply to the test object..... : N/A
- test object does meet the requirement..... : P (Pass)
- test object does not meet the requirement..... : F (Fail)

Copy of marking plate:

N/A

General product information:

1. The samples for each group of testing were selected randomly from the samples provided by the manufacturer.
2. All models can use for Single Phase power supply, 1P+N. All models are identical except for the model name.
3. All test were conducted on the model MT61GP, Three Phase power supply.

Item	Requirement - Test	Result - Remark	Verdict
1	Test of limits of errors due to variation of the current	See table 1	P
2	Test of starting condition	See table 2	P
3	Test of no-load conditions	See table 3	P
4	Test of meter constant	See table 4	P
5	AC voltage tests	See table 5	P
6	Impulse voltage test	See table 6	P
7	Test of ambient temperature influence	See table 7	P
8	Test of influence of self-heating	See table 8	P
9	Test of influence of voltage variation	See table 9	P
10	Test of influence of frequency variation	See table 10	P
11	Test of magnetic induction of external origin (0. 5mT)	See table 11	P
12	Test of the influence of harmonies	See table 12	P
13	Test of influence of short time over currents	See table 13	P
14	Spring hammer test	See table 14	P
15	Test of resistance to heat and fire	See table 15	P
16	Test of power consumption	See table 16	P
17	Test of influence of heating	See table 17	P
18	Test of continuous magnetic induction of external origin	See table 18	P
19	Marking and elements test	See table 19	P
20	Test of supply voltage operating range	See table 20	P
21	Test of initial start-up	See table 21	P
22	Test of solar radiation	See table 22	P
23	Damp heat cyclic test	See table 23	P
24	Vibration test	See table 24	P
25	Shock test	See table 25	P
26	Dry heat test	See table 26	P
27	Cold test	See table 27	P
28	Test of immunity to electromagnetic HF fields	See table 28	P

Item	Requirement - Test	Result - Remark	Verdict
29	Fast transient burst test	See table 29	P
30	Tests of the effect of voltage dips and short interruptions	See table 30	P
31	Radio interference measurement	See table 31	P
32	Surge immunity test	See table 32	P
33	Test of immunity to conducted disturbances, induced radio-frequency fields	See table 33	P

Table 1. Test of limits of errors due to variation of the current

1. Requirement: IEC62053-21:2003 IEC62052-11:2003

2. Test method: When the meter is under the reference conditions, the percentage errors shall not exceed the limits.

3. Test equipment: Meter calibration device

4. Test result: Reference voltage 415V Current 80A Reference frequency 50Hz

Current	Power factor (cosφ)	Percentage error limits (%)	Test result (%)		
			1#	2#	3#
0.05I_b	1.0	±1.5	0.3	0.2	0.2
0.1 I_b	1.0	±1.0	0.3	0.4	0.4
0.5 I_b	1.0	±1.0	0.0	0.1	0.2
I_b	1.0	±1.0	0.4	0.5	0.6
0.5 I_{max}	1.0	±1.0	0.0	0.0	0.1
I_{max}	1.0	±1.0	0.4	0.3	0.3
0.1 I_b	0.5L	±1.5	0.2	0.3	0.2
0.2 I_b	0.5L	±1.0	0.1	0.3	0.1
0.5 I_b	0.5L	±1.0	0.2	0.2	0.2
I_b	0.5L	±1.0	0.3	0.4	0.2
0.5 I_{max}	0.5L	±1.0	0.2	0.3	0.2
I_{max}	0.5L	±1.0	0.0	-0.1	-0.1
0.1 I_b	0.8C	±1.5	-0.3	-0.3	-0.2
0.2 I_b	0.8C	±1.0	-0.3	-0.2	-0.3
0.5 I_b	0.8C	±1.0	-0.4	-0.4	-0.3
I_b	0.8C	±1.0	0.0	0.0	-0.1
I_{max}	0.8C	±1.0	-0.2	-0.3	-0.3
Test conclusion			**Pass**		

Table 2. Test of starting condition

1. Requirement: IEC62053-21:2003 IEC62052-11:2003

2. Test method: The meter shall start and continue to register 0.004Ibband 0.005Ib

3. Test equipment: Meter calibration device

4. Test result: Reference voltage 415V Current 80A Reference frequency 50Hz.

Power factor (cosφ)	Current	Test result		
		1#	2#	3#
1.0	0.004I_b	Pass	Pass	Pass
Test conclusion		**Pass**		

Table 3. Test of no-load conditions

1. Requirement: IEC62053-21:2003 IEC62052-11:2003

2. Test method: The current circuit shall be open circuit and a voltage of 115% of the reference voltage shall be applied to the voltage circuits.

3. Test equipment: Meter calibration device

4. Test result: Reference voltage 415V Reference frequency 50Hz

Voltage	Test result		
	1#	2#	3#
115% of the reference voltage	Pass	Pass	Pass
Test conclusion	**Pass**		

Table 4. Test of meter constant

1. Requirement: IEC62053-21:2003 IEC62052-11:2003

2. Test method: It shall be verified that the relation between the test output and the indication on the display complies with the marking on the name-plate.

3. Test equipment: Meter calibration device

4. Test result: Reference voltage 415V Current 80A Reference frequency 50Hz

Power factor (cosφ)	Test result（imp/k Wh）		
	1#	2#	3#
1.0	1000	1000	1000
Test conclusion	**Pass**		

Table 5. AC voltage tests

1. Requirement: IEC62053-21:2003IEC62052-11:2003

2. Test method: The test voltage shall be substantially sinusoidal, having a frequency between 45Hzand 65Hz, and applied for 1 min. During this test no flashover, disruptive discharge or puncture shall occur.

3. Test equipment: Tester 860A

4. Test result:

Test Voltage r.m.s	Test Result		
	1#	2#	3#
4kV	Pass	Pass	Pass
Test conclusion	**Pass**		

Table 6. Impulse voltage test

1. Requirement: IEC62053-21:2003IEC62052-11:2003

2. Test method: The impulse voltage is applied ten times with one polarity and then repeated with the other polarity. The minimum time between the impulses shall be3s.

3. Test equipment: Tester XTS-11A

4. Test result:

Impulse Voltage	Test Result		
	1#	2#	3#
Impulse waveform 1.2/50 μ s,6kV	Pass	Pass	Pass
Cosφ=1.0, I_b error(%)	0.1	0.2	0.1
Test conclusion	**Pass**		

Table 7. Test of ambient temperature influence

1. Requirement: IEC62053-21:2003 IEC62052-11:2003

2. Test method: The determination of the mean temperature coefficient for a given temperature shall be made over a temperature range 10K above and 10 K below that temperature, but in no case shall the temperature be outside the specified operating temperature range.

3. Test equipment: High and low temperature test chambers and Meter calibration device

4. Test result: Reference voltage 415V Current 80A Reference frequency 50Hz

Current	Power factor（cosφ）	Temperature	Limits of mean temperature coefficient（%/K）	Test result（%/K）		
				1#	2#	3#
0.1I_b	1.0	-10℃~10℃	0.05	0.008	0.020	0.006
I_b	1.0		0.05	0.006	0.015	0.019
I_{max}	1.0		0.05	-0.005	0.004	-0.016
0.2 I_b	0.5L		0.07	0.000	0.010	-0.011
I_b	0.5L		0.07	-0.005	-0.003	0.008
I_{max}	0.5L		0.07	-0.003	0.006	0.011
0.1 I_b	1.0	10℃~30℃	0.05	0.005	0.000	0.007
I_b	1.0		0.05	0.007	-0.007	0.003
I_{max}	1.0		0.05	-0.009	-0.008	-0.017
0.2 I_b	0.5L		0.07	0.007	0.012	-0.007
I_b	0.5L		0.07	-0.001	0.012	-0.012
I_{max}	0.5L		0.07	-0.008	-0.005	0.003
0.1 I_b	1.0	30℃~45℃	0.05	0.003	-0.003	-0.009
I_b	1.0		0.05	0.006	-0.009	-0.003
I_{max}	1.0		0.05	0.012	0.021	0.025
0.2 I_b	0.5L		0.07	-0.005	-0.015	0.008
I_b	0.5L		0.07	-0.004	-0.012	-0.001
I_{max}	0.5L		0.07	0.014	0.011	0.016
Test conclusion				**Pass**		

Table 8. Test of influence of self-heating

1. Requirement: IEC62053-21:2003 IEC62052-11:2003

2. Test Method: After the voltage circuits have been energized at reference voltage for at least 2h for class 1, without any current in the current circuits, the maximum current shall be applied to the current circuits, the meter error shall be measured at unity power factor immediately after the current is applied.

3. Test Equipment: Meter calibration device

4. Test Result: Reference voltage 415V Current 80A Reference frequency 50Hz

Current	Power factor (cosφ)	Limits of variation (%)	Test result (%)		
			1#	2#	3#
I_{max}	1.0	0.7	0.04	0.04	0.03
I_{max}	0.5L	1.0	0.02	0.03	0.03
Test conclusion			**Pass**		

Table 9. Test of influence of voltage variation

1. Requirement: IEC62053-21:2003IEC62052-11:2003

2. Test method: Test the variation in percentage errors when voltage variation at ±10%.

3. Test equipment: Meter calibration device

4. Test result: Reference voltage 415V Current 80A Reference frequency 50Hz

Current	Power factor (cosφ)	Voltage (V)	Limits of variation (%)	Test result (%)		
				1#	2#	3#
0.05I_b	1.0	198	0.7	0.00	-0.02	0.00
I_b	1.0	198	0.7	0.02	0.04	0.02
I_{max}	1.0	198	0.7	0.04	0.05	0.05
0.1 I_b	0.5L	198	1.0	0.04	0.03	0.04
I_b	0.5L	198	1.0	-0.01	-0.02	0.01
I_{max}	0.5L	198	1.0	0.03	0.04	0.03
0.05 I_b	1.0	242	0.7	0.03	0.04	0.03
I_b	1.0	242	0.7	0.03	0.04	0.03
I_{max}	1.0	242	0.7	0.03	0.04	0.04
0.1 I_b	0.5L	242	1.0	0.03	0.02	0.05
I_b	0.5L	242	1.0	-0.01	-0.02	-0.01
I_{max}	0.5L	242	1.0	0.00	0.00	0.01
Test conclusion				**Pass**		

Table 10. Test of influence of frequency variation

1. Requirement: IEC62053-21:2003IEC62052-11:2003

2. Test method: Test the variation in percentage errors when frequency variation at +2%.

3. Test equipment: Meter calibration device

4. Test result: Reference voltage 415V Current 80A Reference frequency 50Hz

Current	Power factor （cosφ）	frequency (Hz)	Limits of variation （%）	Test result（%）		
				1#	2#	3#
0.05I_b	1.0	49	0.5	0.03	0.02	0.03
I_b	1.0	49	0.5	0.04	0.05	0.04
I_{max}	1.0	49	0.5	0.02	0.03	0.03
0.1 I_b	0.5L	49	0.7	0.04	0.03	0.04
I_b	0.5L	49	0.7	0.01	0.02	0.01
I_{max}	0.5L	49	0.7	0.03	0.02	0.02
0.05 I_b	1.0	51	0.5	0.05	0.06	0.06
I_b	1.0	51	0.5	0.02	0.03	0.01
I_{max}	1.0	51	0.5	0.03	0.03	0.03
0.1 I_b	0.5L	51	0.7	0.02	0.02	0.02
I_b	0.5L	51	0.7	0.06	0.05	0.06
I_{max}	0.5L	51	0.7	0.08	0.08	0.08
Test conclusion				**Pass**		

Table 11. Test of magnetic induction of external origin (0.5 mT)

1. Requirement: IEC62053-21:2003 IEC62052-11:2003

2. Test method: A magnetic induction of external origin of 0.5 mT produced by a current of the same frequency as that of the voltage applied to the meter and under the most unfavorable conditions of phase and direction shall not cause a variation in the percentage error of the meter exceeding limits of variation.

3. Test equipment: Meter calibration device External magnetic field test bench

4. Test result: Reference voltage 415V Current 80A Reference frequency 50Hz

Current	Power factor （cosφ）	Direction of magnetic		Limits of variation （%）	Test result（%）		
					1#	2#	3#
I_b	1.0	Upright	Same phase	2.0	0.05	0.05	0.06
			60°	2.0	0.07	0.07	0.07
		Parallel	Same phase	2.0	0.06	0.06	0.05
			60°	2.0	0.07	0.07	0.07
Test conclusion					**Pass**		

Table 12. Test of the influence of harmonies

1. Requirement: IEC62053-21:2003 IEC62052-11:2003
2. Test method: Test the variation in percentage errors at power with harmonic
3. Test equipment: Meter calibration device
4. Test result: Reference voltage 415V Current 80A Reference frequency 50Hz

Influence quantity	Current	Power factor（cosφ）	Limits of variation（%）	Test result（%）		
				1#	2#	3#
Harmonic components in the current and voltage circuits	0.5 I_{max}	1.0	0.8	0.09	0.09	0.09
Sub-harmonics in the A.C. Current circuits	0.5 I_b	1.0	3.0	-0.05	-0.05	-0.05
odd-harmonics in the A.C. Current circuits	0.5 I_b	1.0	3.0	0.08	0.09	0.08
DC and even harmonics in the Current circuits	$\frac{I_{max}}{\sqrt{2}}$	1.0	3.0	0.01	0.00	0.01
Test conclusion				**Pass**		

Table 13. Test of influence of short time over currents

1. Requirement: IEC62053-21:2003 IEC62052-11:2003
2. Test method: After the application of the short-time over current, the meter shall perform correctly when back to its initial working.
3. Test equipment: Pulse current test bench and Meter calibration device
4. Test result: Reference voltage 415V Current 80A Reference frequency 50Hz

Current	Power factor（cosφ）	Limits of variation（%）	Test result（%）		
			1#	2#	3#
I_b	1.0	1.5	0.12	0.12	0.13
Test conclusion			**Pass**		

Table 14. Spring hammer test

1. Requirement: IEC62053-21:2003 IEC62052-11:2003
2. Test method: The meter shall be mounted in its normal working position and the spring hammer shall act on the outer surfaces of the meter cover(including windows) and on the terminal cover with a kinetic energy of0.2JH0.02J.
3. Test equipment: Impact test bench
4. Test result:

Test part	Test requirement	Test result		
		1#	2#	3#
Outside surface	No damage	Pass	Pass	Pass
Terminal cover	No damage	Pass	Pass	Pass
Test conclusion		**Pass**		

Table 15. Test of resistance to heat and fire

1. Requirement: IEC62053-21:2003 IEC62052-11:2003
2. Test method: The contact with the glow wire may occur at any random location . If the terminal block is integral with the meter base, it is sufficient to carry out the test only on the terminal block.
3. Test equipment: Hot wire test device
4. Test result:

Location	Temperature （℃）	Requirement	Test result		
			1#	2#	3#
Terminal block	960	No bum	Pass	Pass	Pass
Terminal Cover	650	No bum	Pass	Pass	Pass
Case	650	No bum	Pass	Pass	Pass
Test conclusion			**Pass**		

Table 16. Test of power consumption

1. Requirement: IEC62053-21:2003 IEC62052-11:2003
2. Test method: The power consumption in the voltage and current circuit at reference values of the influence quantities
3. Test equipment: Low power factor wattmeter and DMM
4. Test result: Reference voltage 415V Current 80A Reference frequency 50Hz

Test item	Specified range of power consumption（active）	Test result（%）		
		1#	2#	3#
Voltage circuit	2W	0.93W	0.93W	0.93W
	10VA	1.45VA	1.45VA	1.45VA
Current circuit	4VA	0.13VA	0.13VA	0.13VA
Test conclusion		**Pass**		

Table 17. Test of influence of heating

1. Requirement: IEC62053-21:2003 IEC62052-11:2003

2. Test method: With each current circuit of the meter carrying maximum current and with each voltage circuit carrying 1.15times the reference voltage, the temperature rise of the external surface shall not exceed 25K, with an ambient temperature of 40℃.

3. Test equipment: Digital thermometer

4. Test result: Voltage 253V Current 80A Reference frequency 50Hz Temperature 40℃

Test temperature arise part	Limits of temperature rise （K）	Test result		
		1#	2#	3#
Outside surface of cover	25	8.3	8.5	8.2
Test conclusion		**Pass**		

Table 18. Test of continuous magnetic induction of external origin

1. Requirement: IEC62053-21:2003 IEC62052-11:2003

2. Test method: Put 1000At magnetic field to touchable part of the meter surface.

3. Test equipment: DC steady current source and Meter calibration device

4. Test result: Reference voltage 415V Current 80A Reference frequency 50Hz

Current	Location	Power factor （cosφ）	Limits of variation（%）	Test result（%）		
				1#	2#	3#
I_b	Front	1.0	2.0	0.15	0.15	0.15
I_b	Up	1.0	2.0	0.14	0.14	0.13
I_b	Left	1.0	2.0	0.13	0.12	0.14
I_b	Right	1.0	2.0	0.11	0.10	0.11
Test conclusion				**Pass**		

Table 19. Marking and elements test

1.Requirement:IEC62053-21:2003 IEC62052-11:2003

2.Test method: Checked by inspection

3.Test equipment: Checked by inspection

4.Test result:

Test item	Test Result		
	1#	2#	3#
Case	Pass	Pass	Pass
Name-plates and marking	Pass	Pass	Pass
Terminal and Line connecting diagram	Pass	Pass	Pass
Clearance and creep age distances	Pass	Pass	Pass
Seal	Pass	Pass	Pass
Test conclusion	**Pass**		

Table 20. Test of supply voltage operating range

1. Requirement: IEC62053-21:2003 IEC62052-11:2003
2. Test method: IEC62053-21:2003 IEC62052-11:2003
3. Test equipment: Meter calibration device
4. Test result: Reference voltage 415V Current 80A Reference frequency 50Hz

Supply voltage operating range	Test Result		
	1#	2#	3#
Operating range(0.9~1.1)U_b Limit operating range0~1.15 U_b	Pass	Pass	Pass
Test conclusion	**Pass**		

Table 21. Test of initial start-up

1. Requirement: IEC62053-21:2003 IEC62052-11:2003
2. Test method: IEC62053-21:2003 IEC62052-11:2003
3. Test equipment: Meter calibration device
4. Test result: Reference voltage 415V Reference frequency 50Hz

Test item	Test Result		
	1#	2#	3#
Initial start-up	Pass	Pass	Pass
Test conclusion	**Pass**		

Table 22. Test of solar radiation

1. Requirement: IEC62053-21:2003 IEC62052-11:2003
2. Test method: IEC62053-21:2003 IEC62052-11:2003
3. Test equipment: Xenon climate test chamber
4. Test result:

Test condition	Requirement	Test result		
		1#	2#	3#
8h irradiation and 16h darkness 3 cycles Humidity：95% Temperature：55℃	The appearance and, in particular,the legibility of markings shall not be altered.The function of meter shall not be impaired.	Pass	Pass	Pass
Test conclusion		**Pass**		

Table 23. Damp heat cyclic test

1. Requirement: IEC62053-21:2003 IEC62052-11:2003

2. Test method: After damp heat cyclic test, the meter shall show no damage or change of the information and shall operate correctly.

3. Test equipment: Damp heat cyclic test chambers and Meter calibration device

4. Test result: Reference voltage 415V Current 80A Reference frequency 50Hz

Current	Power factor (cosφ)	Percentage error limits (%)	Test result (%)		
			1#	2#	3#
0.05I_b	1.0	±1.5	0.2	0.2	0.3
0.1 I_b	1.0	±1.0	0.4	0.4	0.3
0.5 I_b	1.0	±1.0	0.2	0.3	0.1
I_b	1.0	±1.0	0.1	0.1	-0.1
0.5 I_{max}	1.0	±1.0	0.1	0.1	0.2
I_{max}	1.0	±1.0	0.1	0.0	0.1
0.1 I_b	0.5L	±1.5	0.4	0.5	0.3
0.2 I_b	0.5L	±1.0	0.0	0.0	0.0
0.5 I_b	0.5L	±1.0	0.1	0.0	0.1
I_b	0.5L	±1.0	0.3	0.3	0.4
0.5 I_{max}	0.5L	±1.0	0.0	-0.1	-0.1
I_{max}	0.5L	±1.0	-0.2	-0.1	-0.1
0.1 I_b	0.8C	±1.5	0.1	0.0	0.1
0.2 I_b	0.8C	±1.0	-0.3	-0.4	-0.4
0.5 I_b	0.8C	±1.0	-0.3	-0.4	-0.2
I_b	0.8C	±1.0	-0.2	-0.3	-0.2
I_{max}	0.8C	±1.0	-0.1	-0.2	-0.1
Test conclusion			**Pass**		

Table 24. Vibration test

1. Requirement: IEC62053-21:2003 IEC62052-11:2003

2. Test method: The meter shall show no damage or change of the information and shall operate correctly in accordance with the requirements of this standard after the test.

3. Test equipment: Vibration test bench and Meter calibration device

4. Test result: Reference voltage 415V Current 80A Reference frequency 50Hz

Current	Power factor (cosφ)	Percentage error limits (%)	Test result (%)		
			1#	2#	3#
0.05I_b	1.0	±1.5	0.2	0.1	0.2
0.1 I_b	1.0	±1.0	0.3	0.2	0.2
0.5 I_b	1.0	±1.0	0.3	0.4	0.2
I_b	1.0	±1.0	0.1	0.0	0.1
0.5 I_{max}	1.0	±1.0	0.3	0.2	0.3
I_{max}	1.0	±1.0	0.2	0.3	0.1
0.1 I_b	0.5L	±1.5	0.0	0.0	-0.1
0.2 I_b	0.5L	±1.0	0.2	0.4	0.2
0.5 I_b	0.5L	±1.0	0.1	0.2	0.2
I_b	0.5L	±1.0	0.0	-0.1	-0.1
0.5 I_{max}	0.5L	±1.0	0.1	0.2	0.1
I_{max}	0.5L	±1.0	-0.2	-0.1	-0.3
0.1 I_b	0.8C	±1.5	-0.1	0.0	-0.1
0.2 I_b	0.8C	±1.0	-0.1	-0.2	-0.1
0.5 I_b	0.8C	±1.0	0.1	0.0	0.0
I_b	0.8C	±1.0	0.0	-0.1	-0.1
I_{max}	0.8C	±1.0	-0.1	0.0	-0.1
Test conclusion			**Pass**		

Table 25. Shock test

1. Requirement: IEC62053-21:2003 IEC62052-11:2003

2. Test method: The meter shall show no damage or change of the information and shall operate corectly in accordance with the requirements of this standard after the test.

3. Test equipment: Shock test bench and Meter calibration device

4. Test result: Reference voltage 415V Current 80A Reference frequency 50Hz

Current	Power factor (cosφ)	Percentage error limits (%)	Test result (%)		
			1#	2#	3#
0.05I_b	1.0	±1.5	0.4	0.4	0.5
0.1 I_b	1.0	±1.0	0.4	0.5	0.4
0.5 I_b	1.0	±1.0	0.0	0.1	0.0
I_b	1.0	±1.0	0.4	0.5	0.5
0.5 I_{max}	1.0	±1.0	0.0	0.0	0.0
I_{max}	1.0	±1.0	0.2	0.2	0.3
0.1 I_b	0.5L	±1.5	0.2	0.3	0.1
0.2 I_b	0.5L	±1.0	0.2	0.3	0.2
0.5 I_b	0.5L	±1.0	0.0	0.0	-0.1
I_b	0.5L	±1.0	-0.1	0.0	-0.2
0.5 I_{max}	0.5L	±1.0	0.0	0.1	-0.1
I_{max}	0.5L	±1.0	0.0	0.0	0.1
0.1 I_b	0.8C	±1.5	0.1	0.1	0.2
0.2 I_b	0.8C	±1.0	0.1	0.1	0.0
0.5 I_b	0.8C	±1.0	-0.2	-0.3	-0.3
I_b	0.8C	±1.0	-0.3	-0.2	-0.4
I_{max}	0.8C	±1.0	0.1	0.0	0.2
Test conclusion			**Pass**		

Table 26. Dry heat test

1. Requirement: IEC62053-21:2003IEC62052-11:2003

2. Test method: After dry heat test, the meter shall show no damage or change of the information and shall operate correctly.

3. Test equipment: High and low temperature test chambers and Meter calibration device

4. Test result: Reference voltage 415V Current 80A Reference frequency 50Hz

Current	Power factor (cosφ)	Percentage error limits (%)	Test result (%)		
			1#	2#	3#
0.05I_b	1.0	±1.5	0.3	0.4	0.2
0.1 I_b	1.0	±1.0	0.2	0.1	0.2
0.5 I_b	1.0	±1.0	0.4	0.3	0.4
I_b	1.0	±1.0	0.4	0.5	0.5
0.5 I_{max}	1.0	±1.0	-0.1	0.1	-0.2
I_{max}	1.0	±1.0	0.3	0.2	0.4
0.1 I_b	0.5L	±1.5	0.4	0.4	0.5
0.2 I_b	0.5L	±1.0	0.3	0.4	0.4
0.5 I_b	0.5L	±1.0	0.0	-0.1	0.1
I_b	0.5L	±1.0	-0.1	-0.1	-0.1
0.5 I_{max}	0.5L	±1.0	0.0	0.1	0.1
I_{max}	0.5L	±1.0	0.1	0.0	0.2
0.1 I_b	0.8C	±1.5	-0.2	-0.2	-0.2
0.2 I_b	0.8C	±1.0	-0.2	-0.3	-0.3
0.5 I_b	0.8C	±1.0	0.1	0.2	0.0
I_b	0.8C	±1.0	0.1	0.2	0.1
I_{max}	0.8C	±1.0	-0.2	-0.3	-0.2
Test conclusion			**Pass**		

Table 27. Cold test

1. Requirement: IEC62053-21:2003 IEC62052-11:2003

2. Test method: After cold test, the meter shall show no damage or change of the information and shall operate correctly.

3. Test equipment: High and low temperature test chambers and Meter calibration device

4. Test result: Reference voltage 415V Current 80A Reference frequency 50Hz.

Current	Power factor (cosφ)	Percentage error limits (%)	Test result (%)		
			1#	2#	3#
0.05I_b	1.0	±1.5	0.2	0.3	0.4
0.1 I_b	1.0	±1.0	0.2	0.3	0.1
0.5 I_b	1.0	±1.0	0.1	0.2	0.2
I_b	1.0	±1.0	0.2	0.3	0.3
0.5 I_{max}	1.0	±1.0	-0.1	-0.2	0.1
I_{max}	1.0	±1.0	0.1	0.0	0.0
0.1 I_b	0.5L	±1.5	0.4	0.5	0.3
0.2 I_b	0.5L	±1.0	0.3	0.3	0.2
0.5 I_b	0.5L	±1.0	0.4	0.3	0.3
I_b	0.5L	±1.0	0.2	0.2	0.4
0.5 I_{max}	0.5L	±1.0	0.2	0.2	0.1
I_{max}	0.5L	±1.0	0.2	0.2	0.2
0.1 I_b	0.8C	±1.5	0.1	0.0	0.0
0.2 I_b	0.8C	±1.0	-0.2	-0.2	-0.1
0.5 I_b	0.8C	±1.0	0.2	0.3	0.3
I_b	0.8C	±1.0	0.1	0.1	0.1
I_{max}	0.8C	±1.0	-0.2	-0.3	-0.1
Test conclusion			**Pass**		

Table 28. Test of immunity to electromagnetic HF fields

1. Requirement: IEC62053-21:2003 IEC62052-11:2003

2. Test method:1) Without any current in the current circuits, test the change in the register. With basic current Ib and power factor equal to 1.

2) At sensitive frequencies or frequencies of dominant interest, test the variation of error.

3. Test equipment Signal generator and Power amplifier and Power amplifier

4. Test result: Power factor1.0 Reference voltage 415V Current 80A Reference frequency 50Hz

Test field strength	Frequency (MHz)	Limits of variation (%)	Test result (%)		
			1#	2#	3#
10V/m	80	2.0	-0.1	-0.1	0.0
	100		0.1	0.0	0.1
	120		0.1	0.1	0.0
	200		0.1	0.2	0.2
	200		0.0	-0.1	0.1
	400		0.1	0.2	0.0
	500		0.0	0.1	0.1
	600		0.0	0.0	0.0
	700		0.1	0.2	0.1
	800		-0.1	0.0	0.0
	900		0.0	0.0	-0.1
	1000		0.1	0.1	0.0
	1100		0.0	0.1	-0.1
	1200		0.0	0.1	-0.1
	1300		0.0	0.0	-0.1
	1400		0.2	0.3	0.4
	1500		0.2	0.2	0.2
	1600		0.3	0.2	0.4
	1700		0.1	0.2	0.2
	1800		0.2	0.3	0.2
	1900		0.3	0.2	0.2
	2000		0.2	0.1	0.2
Test conclusion			**Pass**		

Reference voltage 415V Reference frequency 50Hz.

Frequency band and field strength	Limits of charge in the register	Test result		
		1#	2#	3#
80~2000MHz 30V/m	≤0.00704kWh	Pass	Pass	Pass
	No output			
Test conclusion		**Pass**		

Table 29. Fast transient burst test

1. Requirement: IEC62053-21:2003 IEC62052-11:2003
2. Test method: IEC62053-21:2003 IEC62052-11:2003
3. Test equipment: Burst generator
4. Test result: Reference voltage 415V Reference frequency 50Hz

Test voltage	Test content	Test result		
		1#	2#	3#
4kV	Pulse Output	Pass	Pass	Pass
Register function	≤0.0704kWh	Pass	Pass	Pass
Test conclusion		**Pass**		

Table 30. Tests of the effect of voltage dips and short interruptions

1. Requirement: IEC62053-21:2003 IEC62052-11:2003
2. Test method: IEC62053-21:2003 IEC62052-11:2003
3. Test equipment: Cycle drop device and Meter calibration device
4. Test result: Reference voltage 415V Reference frequency 50Hz

Interrupt voltage and time	Test content	Limits of change in the register	Test result（%）		
			1#	2#	3#
∆U=100% 1s/50ms	Register Function	≤0.00704kWh	Pass	Pass	Pass
	Output pulse	No output	Pass	Pass	Pass
∆U=100% 20ms	Register Function	≤0.00704kWh	Pass	Pass	Pass
	Output pulse	No output	Pass	Pass	Pass
∆U=50% 1min	Register Function	≤0.00704kWh	Pass	Pass	Pass
	Output pulse	No output	Pass	Pass	Pass
I_b	Error(%)		0.1	0.1	0.2
Test conclusion			**Pass**		

Table 31. Radio interference measurement

1. Requirement: IEC62053-21:2003 IEC62052-11:2003

2. Test method: IEC62053-21:2003 IEC62052-11:2003

3. Test equipment: Electromagnetic disturbance test receiver and Three-phase power supply network of artificial

4. Test result: a. Limit value of conducted disturbances: Power factor 1.0 Reference voltage 415V Curent0.5A

Frequency (MHz)	Limits dB(μV)		Test result		
	Peak value	Average value	1#	2#	3#
0.15~0.50	66~56	56~46	≤22	≤22	≤22
0.50~5	56	46	≤26	≤26	≤26
5~30	50	50	≤21	≤21	≤21
Test conclusion			**Pass**		

b. Limit value of radiation disturbances: Power factor 1.0 Reference voltage 415V Curent0.5A

Frequency (MHz)	Peak value dB(μV/m)	Test result		
		1#	2#	3#
30~230	40	≤21	≤21	≤21
230~1000	47	≤24	≤24	≤24
Test conclusion		**Pass**		

Table 32. Surge immunity test

1. Requirement: IEC62053-21:2003IEC62052-11:2003

2. Test method: After application of the surge immunity, test the change in the register.

3. Test equipment: Surge generator

4. Test result: Reference frequency 50Hz Reference voltage 415V

Test content	Limits of charge in the register	Test result		
		1#	2#	3#
Register function	≤0.0704kWh	Pass	Pass	Pass
Pulse Output	No output	Pass	Pass	Pass
Test conclusion		**Pass**		

Table 33. Test of immunity to conducted disturbances, induced radio-frequency fields

1. Requirement: IEC62053-21:2003 IEC62052-11:2003
2. Test method: IEC62053-21:2003 IEC62052-11:2003
3. Test equipment: Conducted disturbances test system
4. Test result: Power factor 1.0 Reference voltage 415V Current 80A Reference frequency 50Hz

Test field strength	Frequency (MHz)	Limits of variation (%)	Test result (%)		
			1#	2#	3#
10V/m	0.15	2.0	0.0	-0.1	-0.1
	0.5		0.2	0.1	0.1
	5.0		0.2	0.3	0.1
	10.0		0.4	0.3	0.5
	20.0		0.1	0.2	0.1
	50.0		-0.1	0.0	0.0
	80.0		0.1	0.0	0.0
Test conclusion			**Pass**		

Reference voltage 415V Reference frequency 50Hz

Test content	Limits of charge in the register	Test result		
		1#	2#	3#
Frequency range:150kHz~80MHz	≤0.0704kWh	Pass	Pass	Pass
	No output	Pass	Pass	Pass
Test conclusion		**Pass**		

Attachment No.1 Photo Documentation

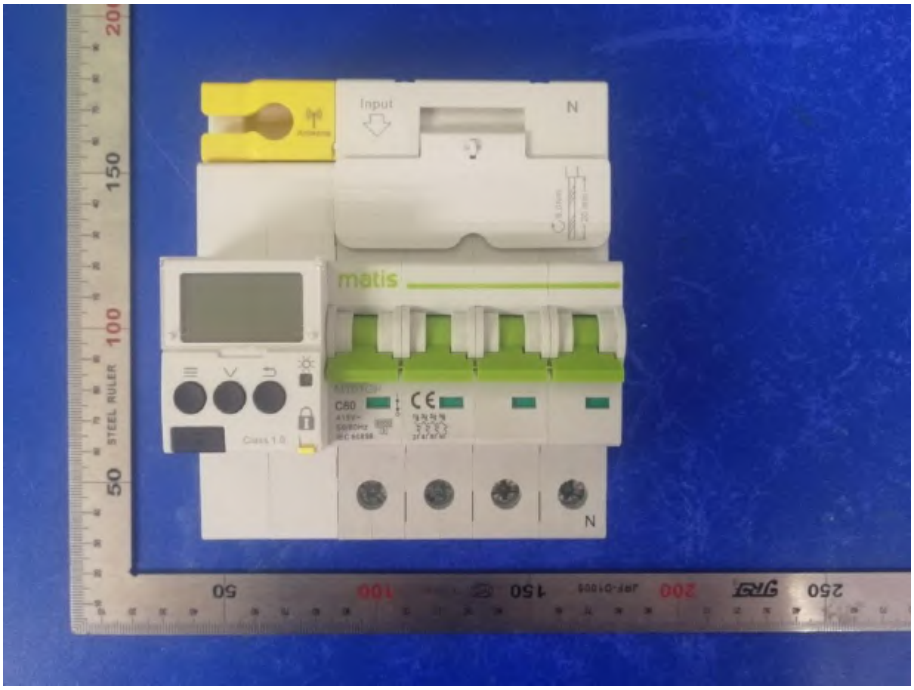


Figure 1 External View

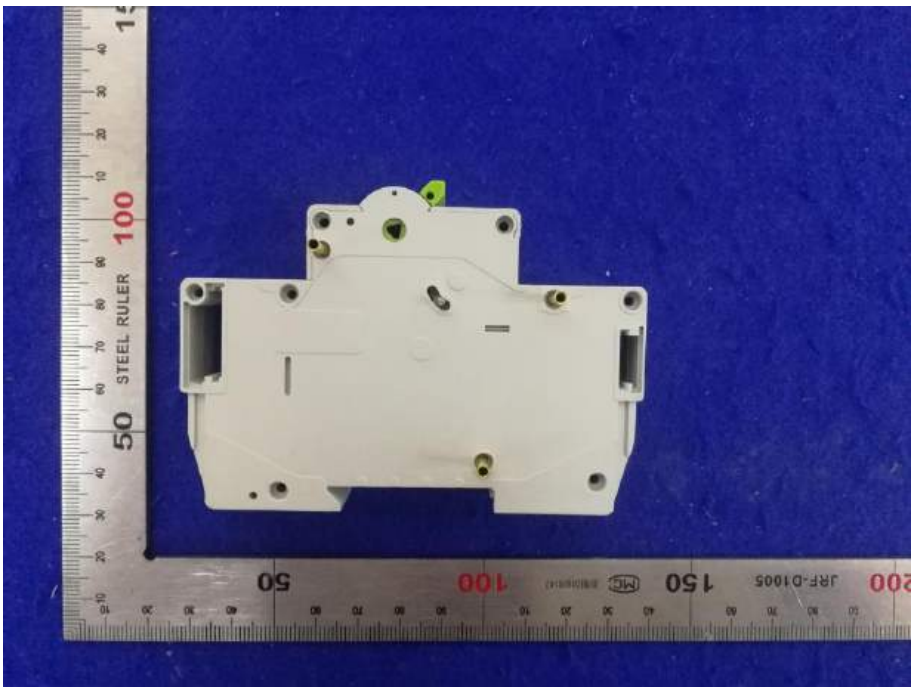


Figure 2 External View

Attachment No.1 Photo Documentation

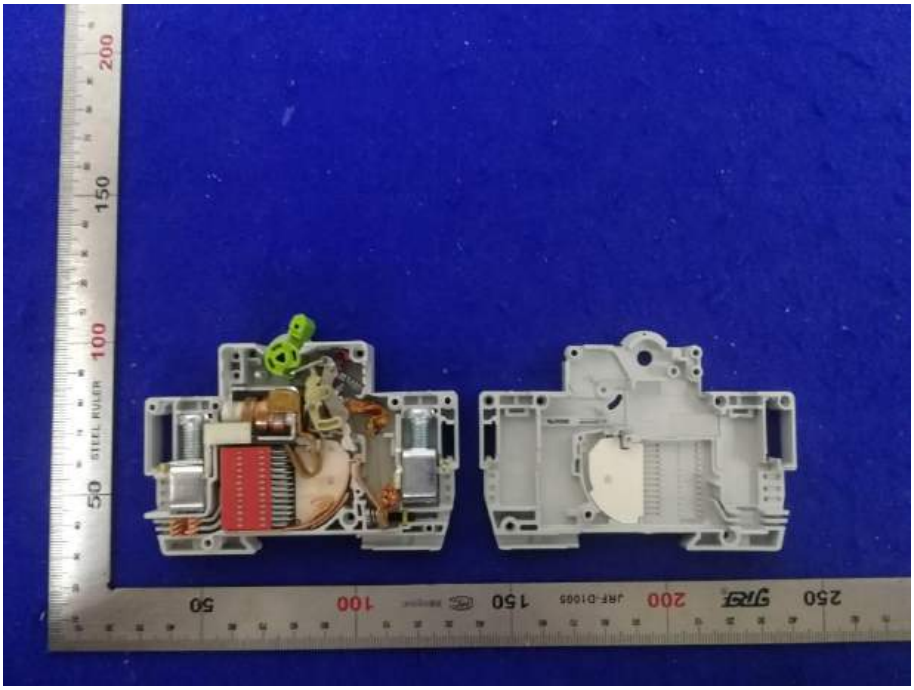


Figure 3 Internal View

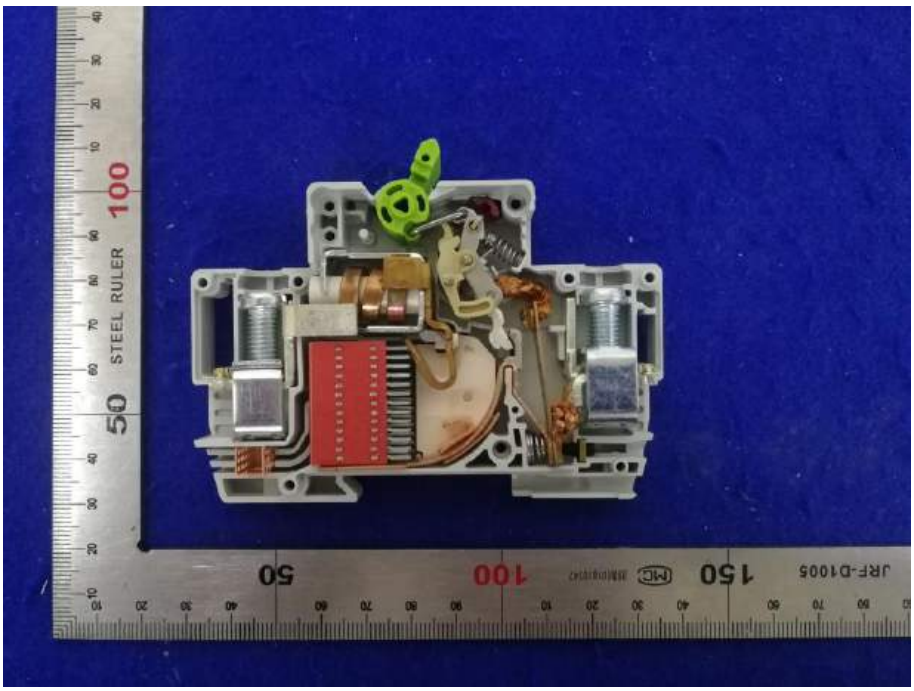


Figure 4 Internal View

--- END OF TEST REPORT ---

China Compulsory products certification

TEST REPORT

☐new application ☐alteration ☐supervision ☐recheck ☑ others: Use certificated result

Application No.: A2018CCC0307-2813677

Name of Product: Miniature circuit breaker

Model/Type: MM61-125

Testing laboratory: ZhongJian Quality Test & Certification Research Institute Co.,Ltd.

Name of Product: Miniature circuit breaker Model/Type: MM61-125 Sample quantity: 4 pcs Sample from: Send sample Date of receipt of test item: 2018.02.04 Date of issue: 2018.03.17	**Applicant**: SHANGHAI MATIS ELECTRIC CO.,LTD **Address of Applicant**: Room318-320, No.83,Huanhu West Road 3,Pudong,Shanghai **Producer(manufacturer)**: SHANGHAI MATIS ELECTRIC CO.,LTD **Address of producer(manufacturer)**: Room318-320,No.83,Huanhu West Road 3,Pudong,Shanghai Zhejiang, P.R . **Factory**: ZHEJIANG DELING TECHNOLOGY CO.,LTD **Address of Factory**: 1/F,4/F,5/F,2nd Producing Building, Helong Anti-explosion Electric Co.,Ltd., No.477 Jingqi Road, Yueqing Center Industrial Zone, Yueqing, Zhejiang Province, P.R.China

Test Conclusion: The project meets the certificated result.

This application certification unit covered by the product specifications and relevant case description:

MM61-125; Ue: AC230V/400V(1P), AC400V(2P, 3P, 4P); Ui: 500V; Uimp: 4kV; In:100A,125A; Icn=Ics=6000A: Instantaneous trip type: B, C, D: Number of poles:1P,2P,3P,4P(All extremely are protected)

Approved by: Lou Yunsheng

Signature: Louyunsheng

Date of issue: 2018.03.17

Remark:

The report constituent

Report Content	have or not	Pages	Report No.
Cover	√	1	HJ2018-726
Home page	√	1	HJ2018-726
The report constituent	√	1	HJ2018-726
The safety type test report	√	9	HJ2018-726
Electromagnetic compatibility type test report			
Back cover	√	1	

This report consists of a row √ all content in the table.

Judge: P Test results meet the requirements.
F Test results do not conform to the requirements.
N Requirement does not apply to the product, or don't do the test.

The safety type test report

Application No.: A2017CCC0307-2650875

Name of Product: Miniature circuit breaker

Model/Type: MM61-125

Sample quantity: 4 pcs

Sample product serial number: /

Date of receipt of test item: 2018.02.04

Sample from: Send sample

Notice of sampling No.: /

Applicant:
SHANGHAI MATIS ELECTRIC CO.,LTD
Address of Applicant:
Room318-320, No.83,Huanhu West Road 3,Pudong,Shanghai
Producer(manufacturer):
SHANGHAI MATIS ELECTRIC CO.,LTD
Address of producer(manufacturer):
Room318-320,No.83,Huanhu West Road 3,Pudong,Shanghai Zhejiang, P.R .
Factory:
ZHEJIANG DELING TECHNOLOGY CO.,LTD
Address of Factory:
1/F,4/F,5/F,2nd Producing Building, Helong Anti-explosion Electric Co.,Ltd., No.477 Jingqi Road, Yueqing Center Industrial Zone, Yueqing, Zhejiang Province, P.R.China

Test according to the standard : IEC 60898-1:2015-03 Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations – Part 1: Circuit-breakers for a.c. operation

Test Conclusion:The project meets the certificated result.

This application certification unit covered by the product specifications and relevant case description:
MM61-125; Ue: AC230V/400V(1P), AC400V(2P, 3P, 4P); Ui: 500V; Uimp: 4kV; In:100A,125A; Icn=Ics=6000A: Instantaneous trip type: B, C, D: Number of poles:1P,2P,3P,4P(All extremely are protected)
Deliver samples by this unit for the verification, the sample is in accordance with the certified (2017010307026547)product.

Tested by:	Xu Liang	Signature:		Date: 2018.03.17
Checked by:	Sun Ronglin	Signature:		Date: 2018.03.17
Approved by:	Lou Yunsheng	Signature:		Date: 2018.03.17

Testing Laboratory: ZhongJian Quality Test & Certification Research Institute Co.,Ltd.

Remark:

Using the model certification has been awarded the certificate results	The information of the original certified result	The difference between the original certified result
Applicant	ZHEJIANG DELING TECHNOLOGY CO.,LTD	SHANGHAI MATIS ELECTRIC CO.,LTD
Address of Applicant	1/F,4/F,5/F,2nd Producing Building, Helong Anti-explosion Electric Co.,Ltd., No.477 Jingqi Road, Yueqing Center Industrial Zone, Yueqing, Zhejiang Province, P.R.China	Room318-320, No.83,Huanhu West Road 3,Pudong,Shanghai
Model/Type	CBRB7-125	MM61-125
The original certificate No.	2017010307026547	
Certificate of testing institutions	Zhejiang province quality testing academy of sciences(Zhejiang Fangyuan electrical equipment inspection Co., Ltd.)(C-06801-1C161739)	

Declaration：This test report reference number for the ‘C-06801-1C161739’ report, except change the applicant name, address, model, the product structure and technical parameters are the same with the original certified result.
Sample No.: #1：1P D100；#2：2P D125；#3：3P D125；#4：4P D125

Sample description and explanation

1.Product's composition and construction characteristics (brief description of the construction):
Including main parts of the product, means of operation, installation and wiring,and etc.,
and also the following information:
Main parts of the product: Plastic enclosure,Contact terminal ,Instantaneous release, Bimetallic element, Arc suppressing transformer etc.;
means of operation: manual operation;
installation: Standard rail installation;
wiring: Screw crimping.

1). Product model and Current shell frame level: MM61-125; 125A

2). Drawings offered and their serial numbers:

General assembly drawing: MM61-125; 2DL.253.034.1~4, 2DL.259.034.1~4

Electromagnetic trip block diagrams: 5DL.636.032.1~2(B); 5DL.636.033.1~2(C); 5DL.636.034.1~2(D)

3). Contact Material Name/Serial number: Fixed contact: AgC(5), Moving contact: AgNi(20)

4). Moving contact dimension: 5.0mm×4.0mm×1.4(R)mm

5). Fixed contact dimension: 6.0mm×4.0mm×1.0mm

6). Contact parameter: Contact gap: ≥5.5mm ,Terminal pressure: ≥6N ,Over travel: ≥1.2mm

7). Descriptions and specifications of materials of soft connection:

TSR soft copper brush copper stranded wire: 100A: 6.0mm^2; 125A: 8.0mm^2

8). Thermal element Name/Serial number: See table 1

9). Descriptions and specifications of resistance wire material: /

10). Skeleton tripping device Name/Serial number: Fire-retardant reinforced nylon PA66

11). The trip coil wire specifications and number of turns:

100A/125A: specification 2×7.5copper plateT2, Number of turns: 1 turn

12). Core material Name/Serial number: cold-drawn round steel Q235

13). Tripping device and latched device description & specification of materials:

Latched device/ Fire-retardant reinforced nylon PA46;

Tripping device / Spring steel wire 1Cr18Ni9

14). Descriptions and specifications of spring material: Spring steel wire 1Cr18Ni9

15). Terminal and the suitable type of screw thread diameter: M6

16). The shell Material Name/Serial number: Fire-retardant reinforced nylon PA66

Sample description and explanation

2. Main technical Parameter:

1). Rated voltage (Ue): AC230/400V(1P), AC400V(2P、3P、4P)

2). Rated insulation voltage (Ui): 500V

3). Rated impulse withstand voltage(Uimp): 4kV

4). Rated current(In): 100A, 125A

5). Rated short-time making capacity(Icn): 6000A

6). Running short circuit capacity(Ics): 6000A

7). Number of poles:1P,2P,3P,4P(All extremely are protected)

8). The instantaneous tripping types: B,C,D

9). The benchmark environment temperature: 30℃

10). Raster distance:(mm): 60mm

11). Material group: IIIa

Table 1

rated current	Zhejiang tiansheng shuangjin technology co. Ltd.		Wenzhou yada bimetal components co. Ltd.		Wenzhou tongda bimetal co. Ltd.	
	Serical number of Material	Material thickness	Serical number of Material	Material thickness	Serical number of Material	Material thickness
100A	TB180/05	1.0	YDTBRS	1.0	FPA721-5	1.0
125A	TB180/05	1.2	YDTBRS	1.2	FPA721-5	1.2

Sample description and explanation

3. Description of product series and explanation of model/ type:

3.1 Among the model types within this application:

a. With the same basic design

☑Y □N_____

b. Each pole of the external physical size is the same

☑ Y □N _____

c. Except inside current-carrying fitting different cross-sectional area, internal current carrying parts material, coating and the same size

☑ Y □N _____

d. Terminal blocks with similar structure

☑ Y □N _____

e. Contact size, material, structure and connect the same way

☑ Y □N _____

f. Manual operator (materials and physical properties) is the same

☑ Y □N_____

g. Mold material and insulation material is the same

☑ Y □N _____

h. Arc extinguishing device arcing way, material and structure is the same

☑ Y □N_____

i. In addition to the size and material of the current trip device, the basic structure of the overcurrent tripping device is the same

☑ Y □N _____

j. In addition to the instantaneous tripping device working coil number of turns and different cross-sectional area, the instantaneous tripping device at the same basic structure

☑ Y □N_____

k. The voltage rating for the same type of power distribution circuit

☑ Y □N_____

l. Multipole circuit breaker is composed of single circuit breaker, or the same as the single-pole breaker of components assembled, besides extremely with the external partition between each pole of the same size shape

☑Y □N _____

3.2 Series description(Description for different type and different current):

MM61-125 series miniature circuit breaker case frame size curren is 125A, instantaneous trip characteristics are type B, type C, type D, The rated current is divided into 100A and 125A in two specifications. The circuit breakers with different rated current are only of different thermal element brand and soft connection sectional area, and the other structures are completely the same. The circuit breaker with different number of poles has the same structure except the external connection between poles and multi-pole connection handle. According to the number of poles, it is divided into 1P, 2P, 3P and 4P. Instantaneous trip type: B type, C type, D type.

3.3 Explanation of model/ type:

M	M	61	-	125
(1)	(2)	(3)		(4)

(1) Enterprise code
(2) Miniature circuit breaker
(3) Design sequence
(4) Frame size current(A)

Sample description and explanation

4. Description of special structure (if necessary):
/
5. Situation of certification:
The original certificate No.: 2017010307026547;

Sample description and explanation

6. Safety components/parts list:

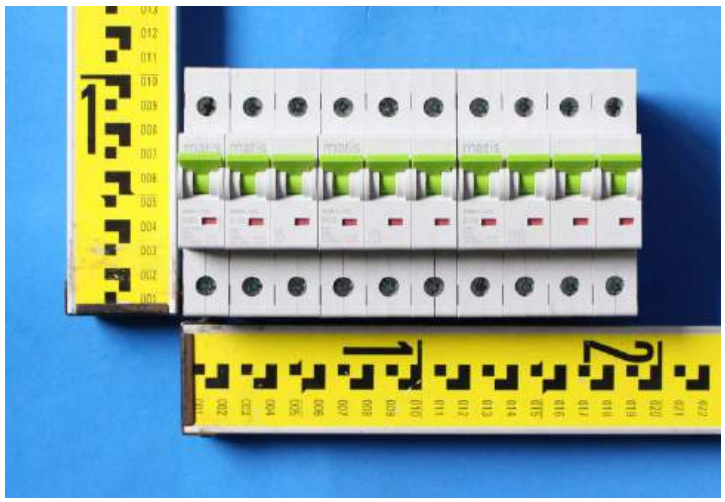
Item No.	Name of components/parts	Description of Parts/Material	Type/Model Serial number	Supplier(Factory)
1	shell (engine base, cover, hand shank)	engine base, cover, hand shank / Fire-retardant reinforced nylon	PA66	Zhejiang Jieda Electric Appliance Co.,Ltd.; Zhejiang fengyuan electric parts co. Ltd.; Wenzhou chengcheng electric co. Ltd;
2	Latched device, Tripping device	Latched device / fire-retardant reinforced nylon	AgCdO15	
		Tripping device / stainless steel wire	T2Y2	Wenzhou Youxin Electric Co.,Ltd. Zhejiang Baofeng Mechanical&Electrical Co.,Ltd. Zhejiang Deling Technology.Co.,Ltd
3	Moving contact, Fixed contace	Moving contact / AgNi(20)	AgNi(20)	Shanghai people electric appliance factory; Zhongxi Group Co.,Ltd.; Fuda Alloy Materials Co.,Ltd.;
		Fixed contace / AgC(5)	AgC(5)	
4	contactor spring	Spring steel wire	1Cr18Ni9	Yueqing Dongfeng Spring Manufacturing Co.,Ltd. Wenzhou Heli Spring Manufacturing Co.,Ltd. Yueqing Xinli Hardware Spring Factory Yueqing Qingzhuo Spring Complete Set Factory
5	magnetic release	iron core / cold-drawn round steel	Q235	Yueqing yiwan hardware products co. Ltd.; Yueqing Jijia Electric Appliances; Component Factory;
		spring /Spring steel wire	1Cr18Ni9	Yueqing Dongfeng Spring Manufacturing Co.,Ltd. Wenzhou Heli Spring Manufacturing Co.,Ltd. Yueqing Xinli Hardware Spring Factory Yueqing Qingzhuo Spring Complete Set Factory
6	arc-control device	arc chute /cold-drawn round steel	Q235	Zhejiang Baofeng Mechanical&Electrical Co.,Ltd. Wenzhou Youxin Electric Co.,Ltd. Yueqing Wanxing Automation Equipment Co.,Ltd. Yueqing qiligang harvest punch parts factory
		flash barrier / cold-drawn round steel	number one	
7	bimetallic element	Thermostartic Bimetal steel strip	See table 1	Wenzhou yada bimetal components co. Ltd.; Wenzhou tongda bimetal co. Ltd.; Zhejiang Tiansheng Shuangjin Technology Co.,Ltd.

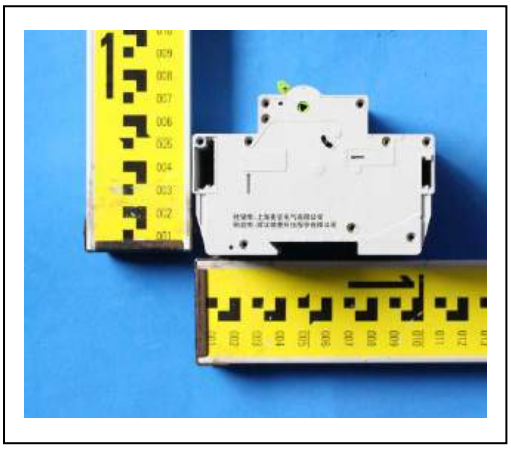
Note1: for the above listed safety parts, if there are more than one supplier/factory, then the supplier/factory which provides the safety parts for samples for the type test should be put in the first place.

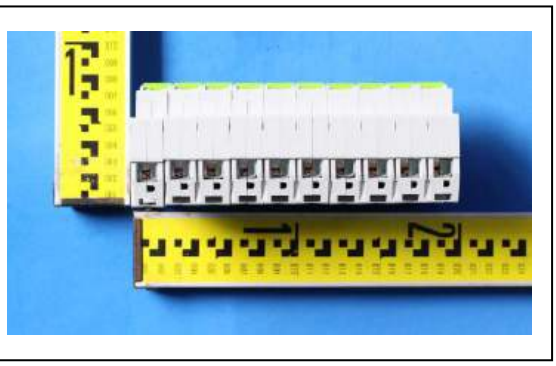
Note 2: We declare that for the above listed safety parts, if there are more than one supplier/factory, then there should be no difference in terms of performance between the safety part used in the samples for type tests and other safety parts provided by the other suppliers/factories above listed.

Product pictures

7. Product profile photo (Including external, internal structure and nameplate):





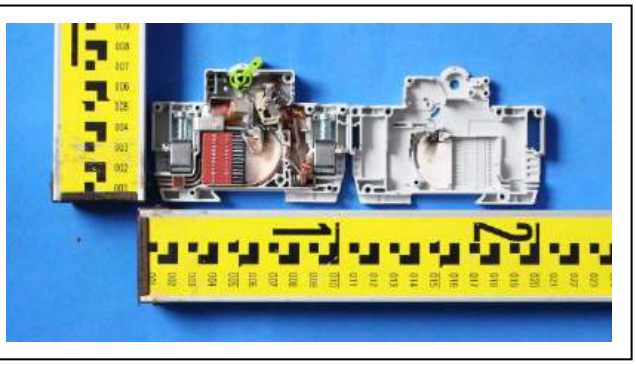


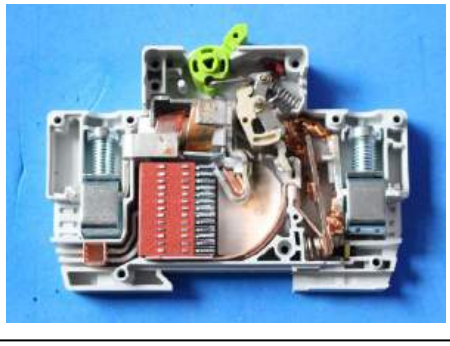






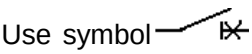






Inspection items summary table

Item No.	Inspection items	According to the standard terms and conditions	Inspection result
A/01	Marking and other product information	6	P
2	General	8.1.1	See C-06801-1C161739
3	Mechanism	8.1.2	
4	Non-interchangeability	8.1.6	
5	Test of indelibility of marking	9.3	P
6	Test of reliability of screws, current-carrying parts and connections	9.4	See C-06801-1C161739
7	Tests of reliability of screw-type terminals for external copper conductors	9.5	
8	Test of protection against electric shock	9.6	
9	Test of resistance of heat	9.14	
10	Resistance to abnormal heat and to fire (glow-wire test)	9.15	
11	Test of resistance to rusting	9.16	
B/12	Test of dielectric properties and isolating capability	9.7	See C-06801-1C161739
13	Test of temperature-rise and measurement of power loss	9.8	
14	28-day test	9.9	
C_1 /15	Test of mechanical and electrical endurance	9.11	See C-06801-1C161739
16	Test on all circuit-breakers	9.12.11.2.1	See C-06801-1C161739
17	Verification of the circuit-breaker after short-circuit tests	9.12.12	
C_2/18	Short-circuit test on circuit-breakers rated 230V or 230/400V for verifying their suitability for use in IT systems	9.12.11.2.2	See C-06801-1C161739
19	Verification of the circuit-breaker after short-circuit tests	9.12.12	
D /20	Test of tripping characteristic	9.10	See C-06801-1C161739
21	Mechanical stresses	9.13	
22	Test at 1500A	9.12.11.3	
23	Verification of the circuit-breaker after short-circuit tests	9.12.12	
D_0/24	Test of tripping characteristic	9.10	See C-06801-1C161739
E_1/25	Test at service short-circuit capacity(Ics)	9.12.11.4.2	See C-06801-1C161739
26	Verifications after the tests at reduced short-circuit currents	9.12.12.1	
	blank below		

Clause	Requirement + Test	Result - Remark #1	Verdict
	Program A (2P D63)		
6	Marking and other product information		P
	Manufacturer's name or trade mark:	ZHEJIANG DELING TECHNOLOGY CO.,LTD	
	Type designation, catalogue number or serial number:	MM61-125	
	Rated voltage:	230/400V~	
	Rated current:	D100	
	Rated frequency:	50Hz	
	Rated short-circuit capacity:	6000A	
	Wiring diagram:	meet the requirement	
	Open and closed position:	closed 'O OFF' open 'I ON'	
	Use symbol  indicate its suitable for isolation	meet the requirement	
	Neutral pole with the letter 'N'	/	
	The inlet and outlet	meet the requirement	
	Reference calibration temperature, if different from 30℃	30℃	
	Degree of protection (only if different from IP20)	IP20	
	The D type circuit breaker: maximum instantaneous tripping current (if more than 20 in)	20In	
	Rated impulse withstand voltage Uimp (if it's 2.5kV)	4kV	
	Terminals intended for the protective conductor, if any, shall be indicated by the symbol	/	
	Marking shall be indelible and easily legible, and shall not be placed on screws, washers or other removable parts.	meet the requirement	
9.3	Test of indelibility of marking The test is made by rubbing the marking by hand for 15s with a piece of cotton soaked with water and again. After the test, the marking shall be easily legible. It shall not be easily possible to remove labels and they shall show no curling.	meet the requirement	P

STATEMENT

This report test results is valid for the test sample only;

This report shall not be part of the copy without permission;

If there is any objection to this report, please submit it within 15 days from the date of receipt of the report.

Detection unit: ZhongJian Quality Test & Certification Research Institute Co.,Ltd

Address: No.352 Banshan Road, HangZhou Postcode: 310022

Tel: 0571-88296682 Fax: 0571-88296681

E-MAIL: HDJC001@163.COM

Vojenský technický ústav, s.p.
odštěpný závod VTÚPV
Víta Nejedlého 691, 682 01 Vyškov, Czech Republic

CERTIFICATE
N° VTÚPV – 056 / 2025 / ZAHR

Applicant: **Shanghai Matis Electric Co., Ltd.**
上海麦豆电气有限公司
Room 320, No. 83, Huanhu West Third Road, Pudong, Shanghai, China

Product: **Smart Metering Breaker**

Tested Model: MT61GR
Derived Models: MT61GP

Manufacturer: **Shanghai Matis Electric**
Room 320, No. 83, Huanhu West Third Road, Pudong, Shanghai, China

Rating and principal characteristics: Power supply: 230/400 V AC;
Rated Current: 80 A max;
Frequency: 50 Hz

Test results are described in the Test Reports No.:
STE05232515S (tests made by STE Testing Laboratory Co., Ltd.)

The sample of tested product conforms with the requirements of the following standards harmonized with the LVD Directive No. 2014/35/EU

- EN 61010-1: 2010 + A1: 2019

This certificate is valid until: **25. 06. 2030**

After preparation of the necessary technical documentation as well as the conformity declaration, the required CE marking can be affixed on the product. Other relevant directives have to be observed.
The CE mark shall appear according to this sample:

CE

odštěpný závod VTÚPV
VTÚPV
VOJENSKÝ TECHNICKÝ ÚSTAV, s.p.

Vyškov 25. 06. 2025

Tel./Fax: +420 910 105 580
e-mail: milan.bezdek@vtusp.cz
http://www.vtusp.cz

Milan Bezděk
Certification Head

CERTIFICATE
of Conformity

Reference No. : **LCS190815025AS**

Applicant : **SHANGHAI MATIS ELECTRC CO.,LTD.**

Address : **BLOCK C, NO.888, HUANHU WEST 2ND ROAD, PUDONG, SHANGHAI, CHINA**

Trademark : **Matis matismart**

Product : **AIOT ENERGY METER WITH MCB**

Model(s) : **MT61GP, M61WF, MT61NB, MT61LR**

Parameters : **Single Phase, 1P+N, 230V,50/60Hz,**
6A,10A,16A,20A,25A,32A.40A.50A,63A,80A
Three Phase, 3P+N, 400V,50/60Hz,
6A,10A,16A,20A,25A,32A.40A.50A,63A,80,100A

The submitted products have been tested by us with the listed standards and found in compliance with the following European Directives:

The LVD Directive 2014/35/EU

EN 60898-1:2019

The tests were performed in normal operation mode. The test results apply only to the particular sample tested and to the specific tests carried out. This certificate applies specifically to the sample investigated in our test reference number only.

The CE markings as shown below can be affixed on the product after preparation of necessary technical documentation.

Other relevant Directives have to be observed.

CE

ate of issue: September 12, 2019

Manager

Testing Service APPROVED

Guangzhou LCS Compliance Testing Laboratory Ltd.
No 44-1, Qianfeng North Road, Shiqi town, Panyu District, Guangzhou City, China
Tel: (86)020-39166689 Fax: (86)020-39166619
Http://www.lcs-cert.com Email: webmaster@lcs-cert.com

扫码查询真伪
Scan,Query authenticity

CERTIFICATE
of Conformity

Reference No.	:	LCS190815026AS
Applicant	:	SHANGHAI MATIS ELECTRC CO.,LTD.
Address	:	BLOCK C, NO.888, HUANHU WEST 2ND ROAD, PUDONG, SHANGHAI, CHINA
Trademark	:	matis
Product	:	SMART PROTECTED POWER METER
Model(s)	:	MT61GP,MT641WF,MT61TR
Parameters	:	230V,50Hz,6A,10A,16A,20A,25A,32A,40A,50A,63A,80A,100A,125A(2P/single phase) 400V,50Hz,6A,10A,16A,20A,25A,32A,40A,50A,63A,80A,100A,125A(2P/single phase)

The submitted products have been tested by us with the listed standards and found in compliance with the following European Directives:

The LVD Directive 2014/35/EU

EN 61010-1:2010,AMD1:2019

The tests were performed in normal operation mode. The test results apply only to the particular sample tested and to the specific tests carried out. This certificate applies specifically to the sample investigated in our test reference number only.

The CE markings as shown below can be affixed on the product after preparation of necessary technical documentation.

Other relevant Directives have to be observed.

CE

Date of issue: September 12, 2019

Center of Testing Service
Manager
APPROVED

Shenzhen LCS Compliance Testing Laboratory Ltd.
1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Tel: (86)755-82591330 Fax: (86)755-82591332
Http://www.lcs-cert.com Email: webmaster@lcs-cert.com

Appendix C for Photographs of The EUT



Fig. 1



Fig. 2

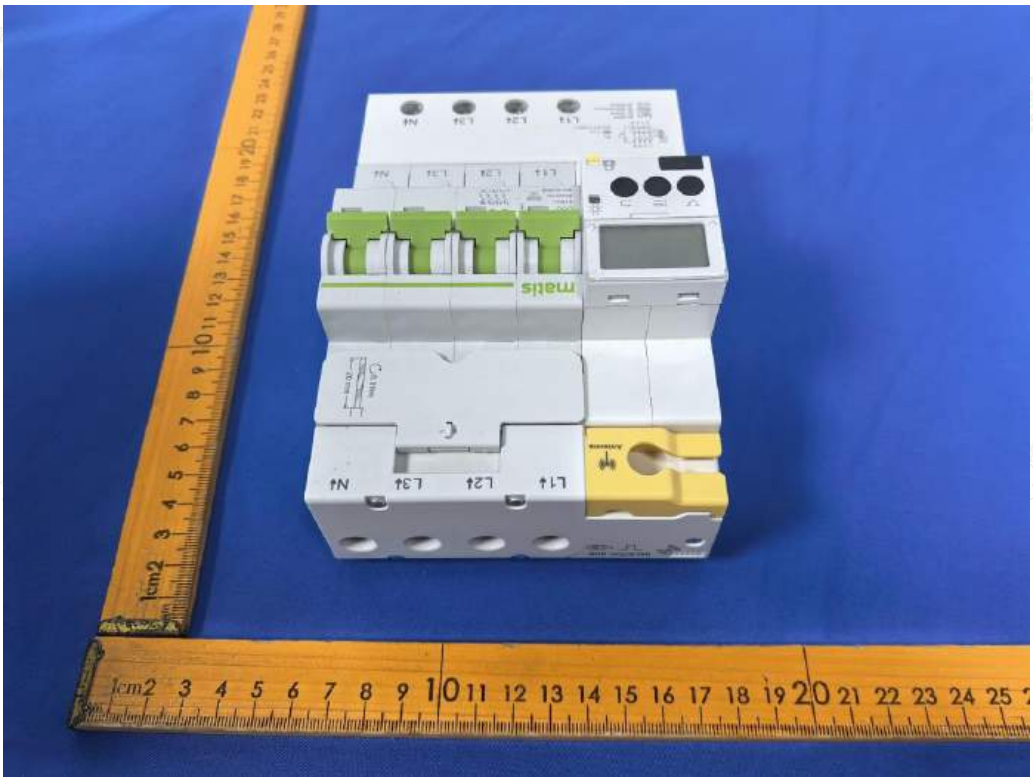

matis
N1
L31
L21
L11
1cm2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

Fig. 3


matis
L1↓
L2↓
L3↓
N↓
1cm2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

Fig. 4



Fig. 5



Fig. 6

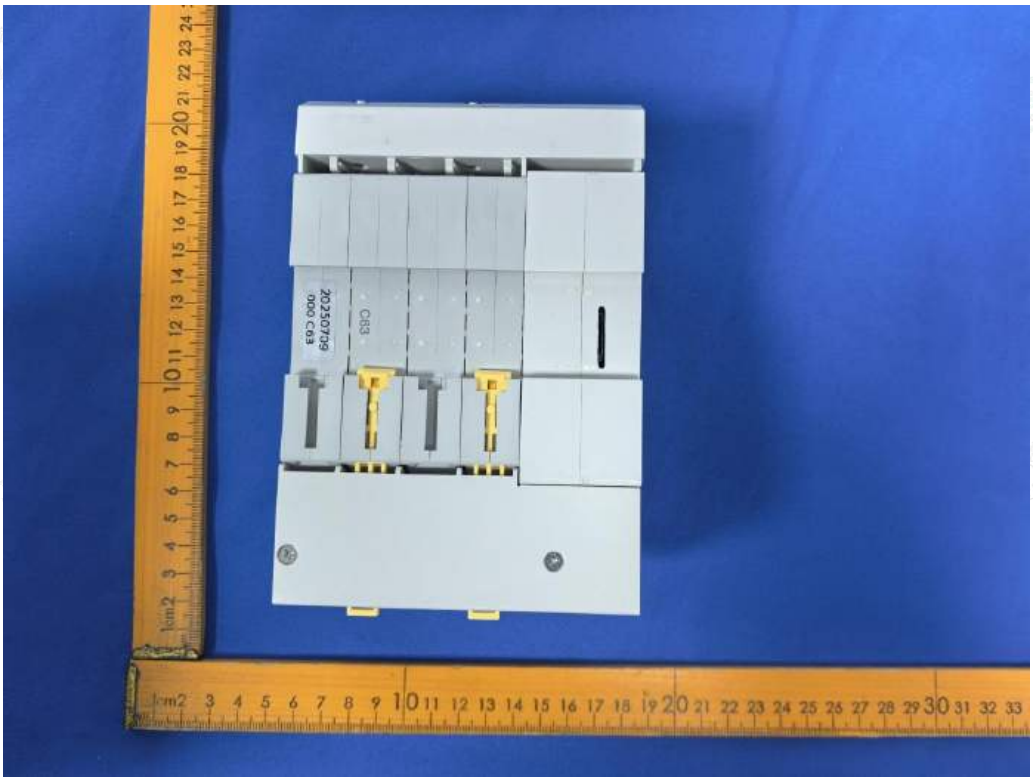


Fig. 7



Fig. 8


MT61GR-4G N/EUR/4P
4G LTE Cat-1 Network: LTE / GSM
ON:0260414001 2604270001
3x220...240V 50/60Hz
15(63)A Class 1.0
4G LTE Cat-1
RS485 A B
Com
Open
Close
12x15 ×0.8 mm
Metal face down

Fig. 9

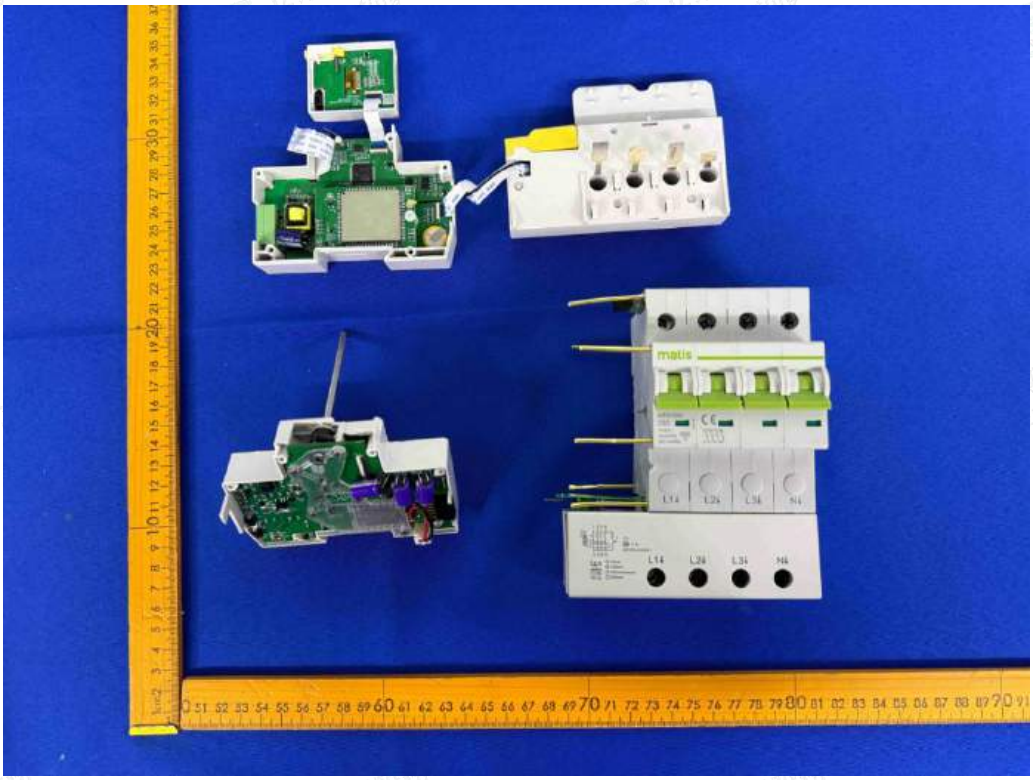


Fig. 10

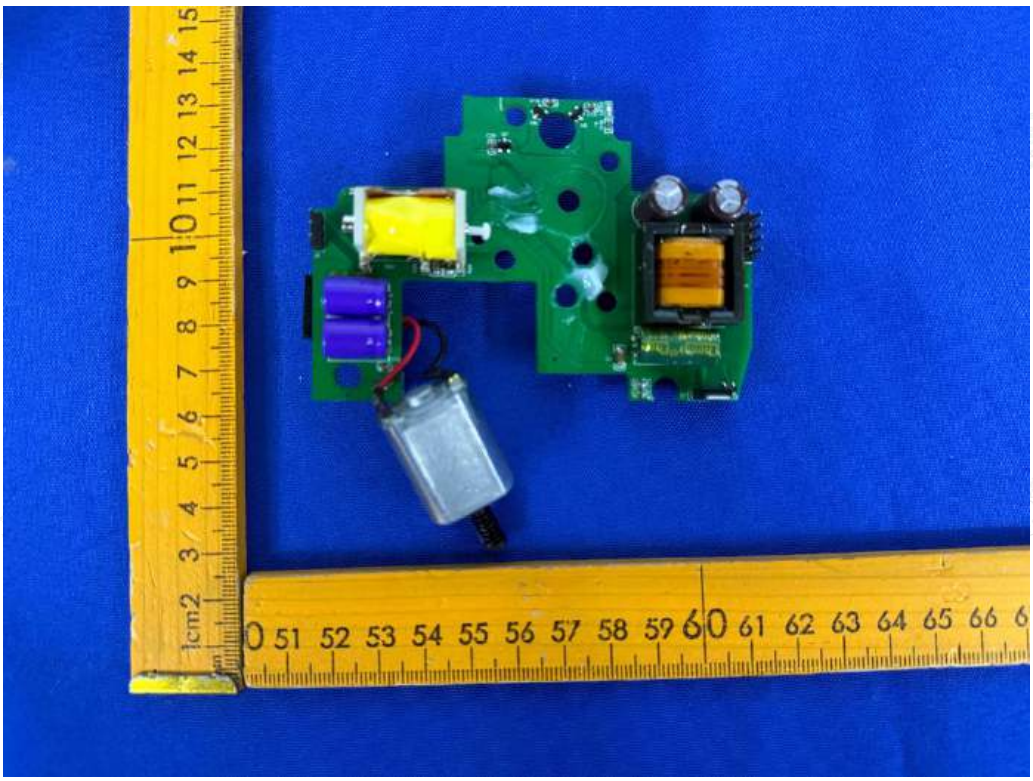


Fig. 11

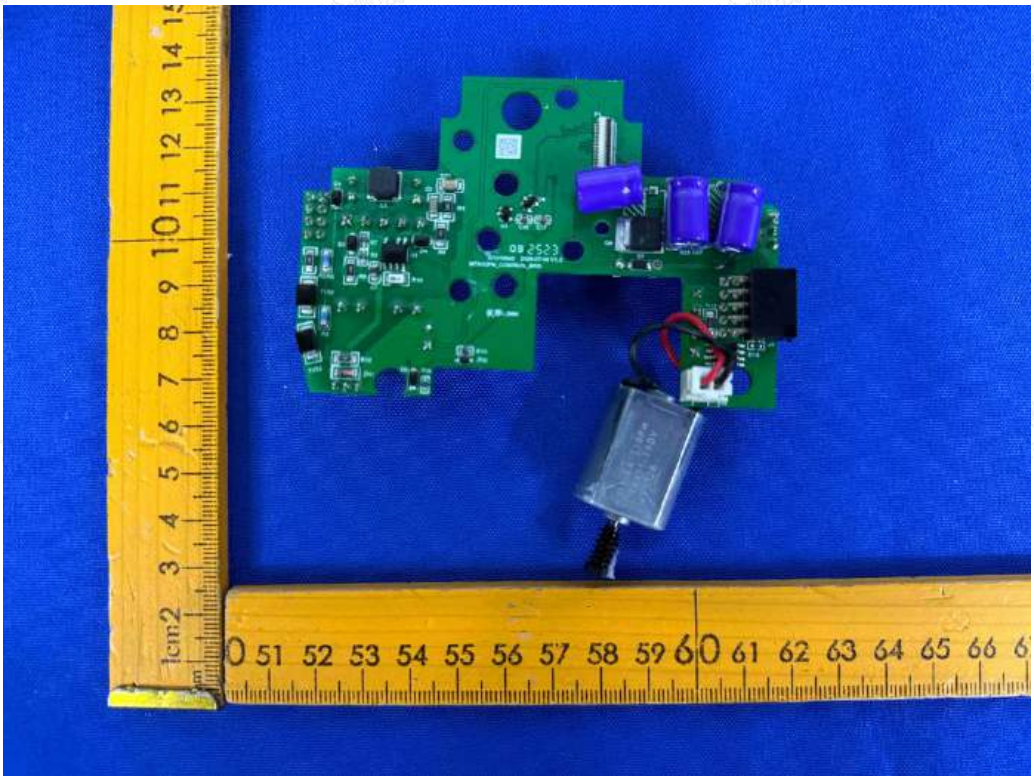


Fig. 12

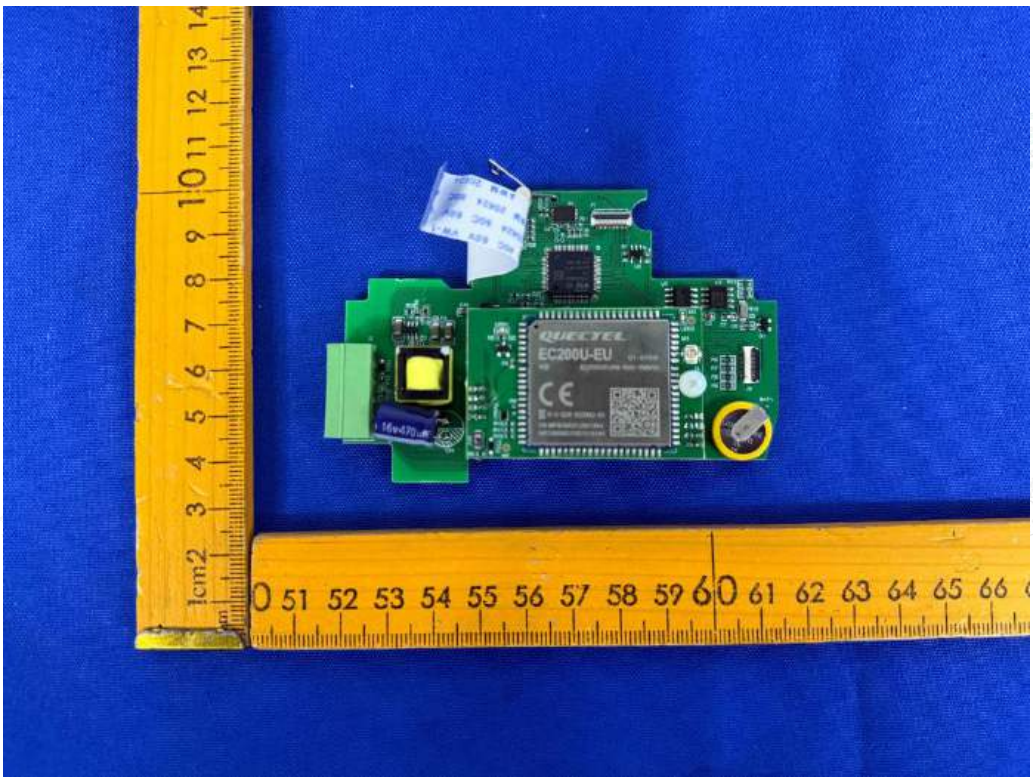


Fig. 13

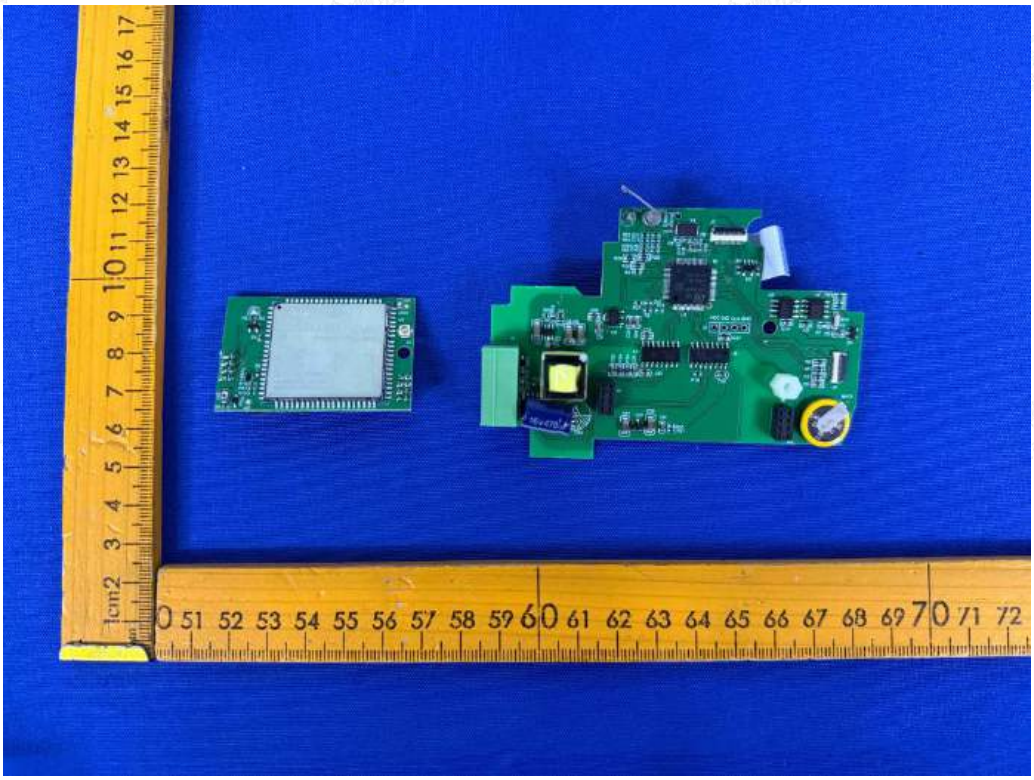


Fig. 14

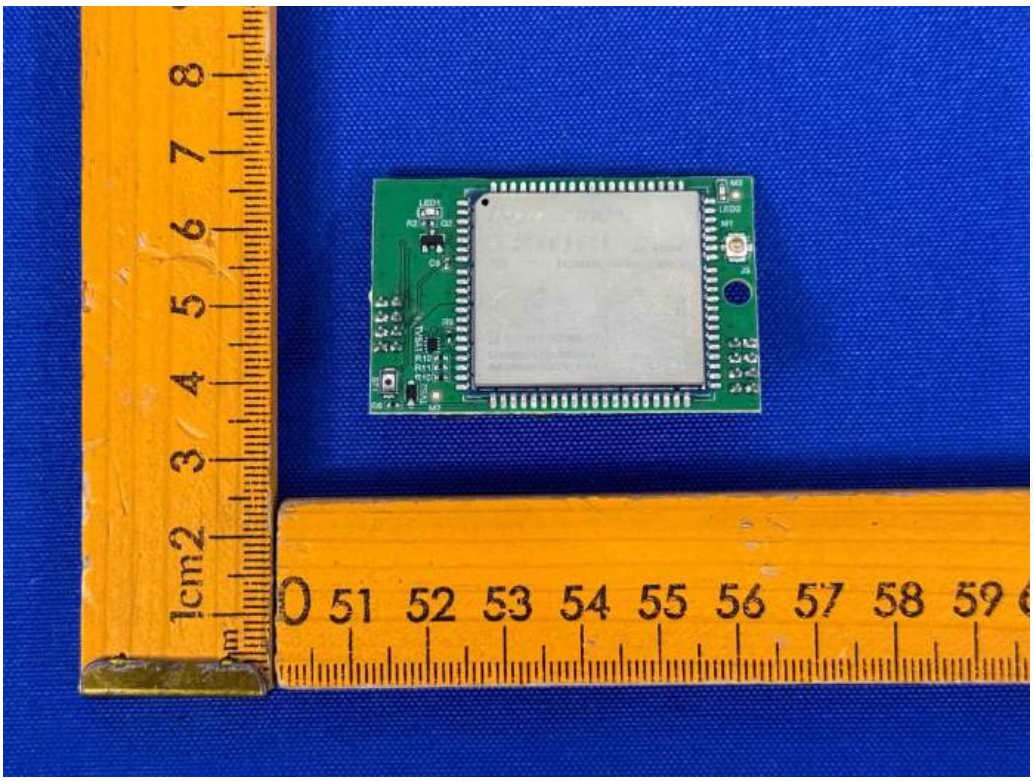


Fig. 15

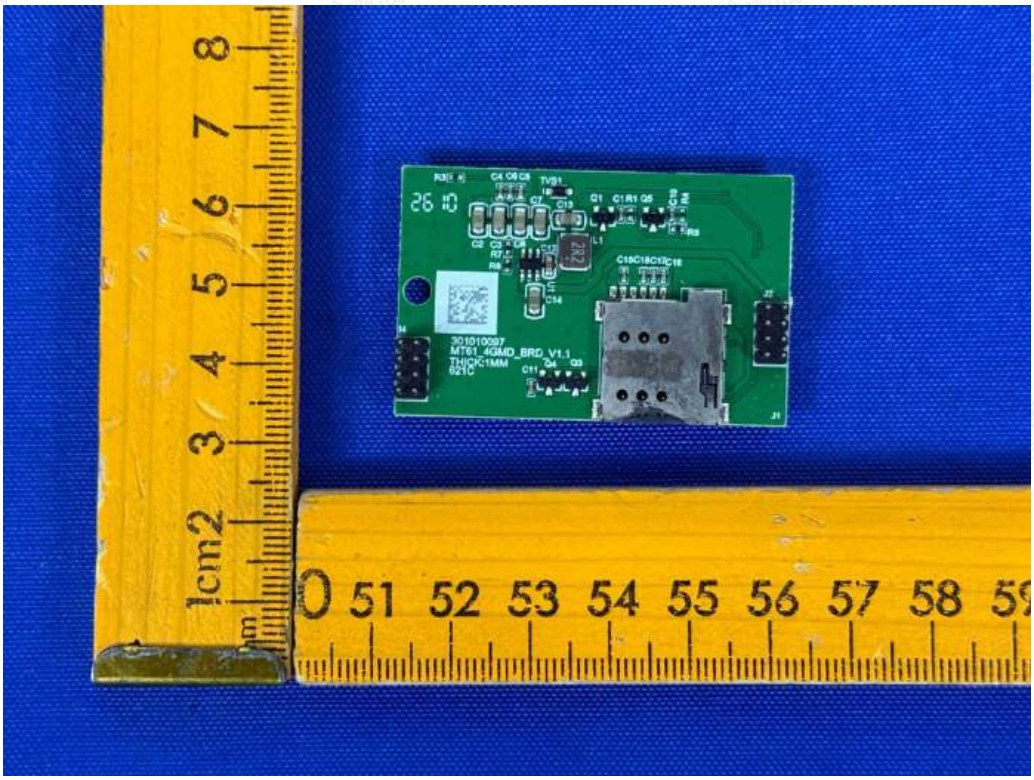


Fig. 16

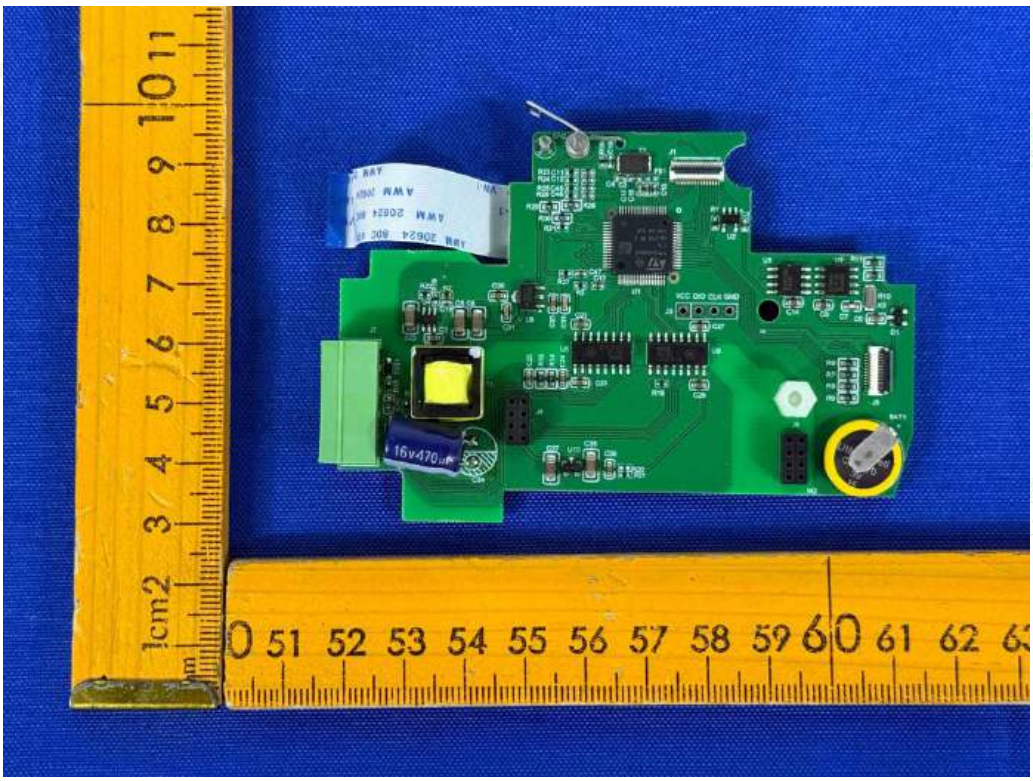


Fig. 17

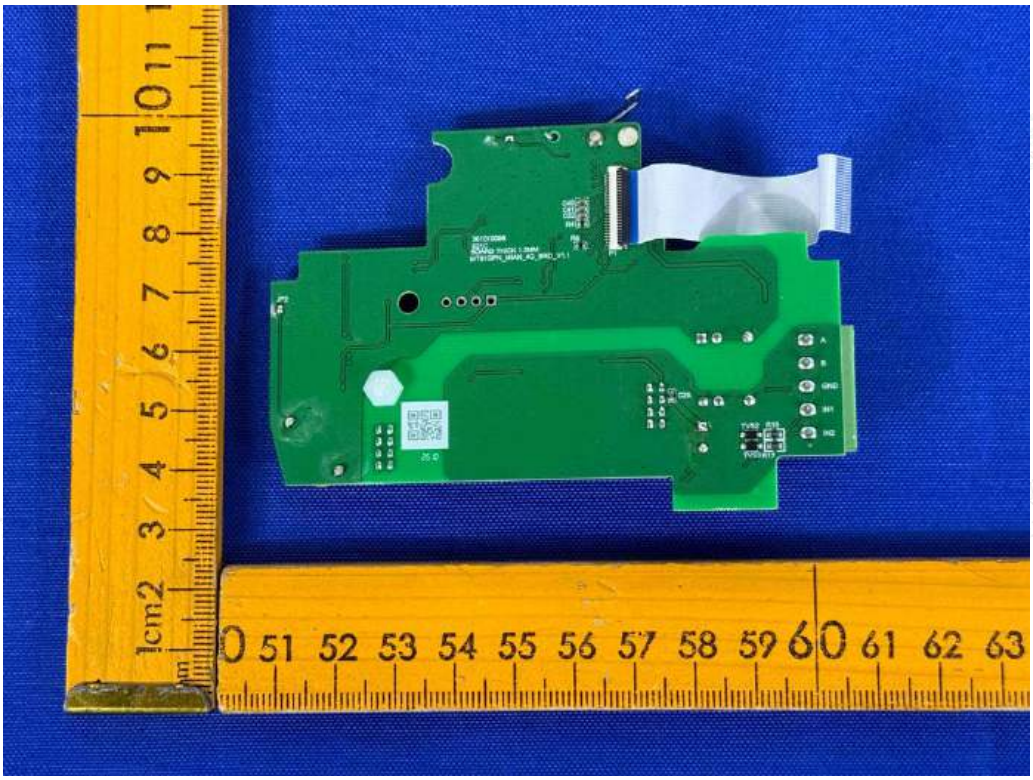


Fig. 18

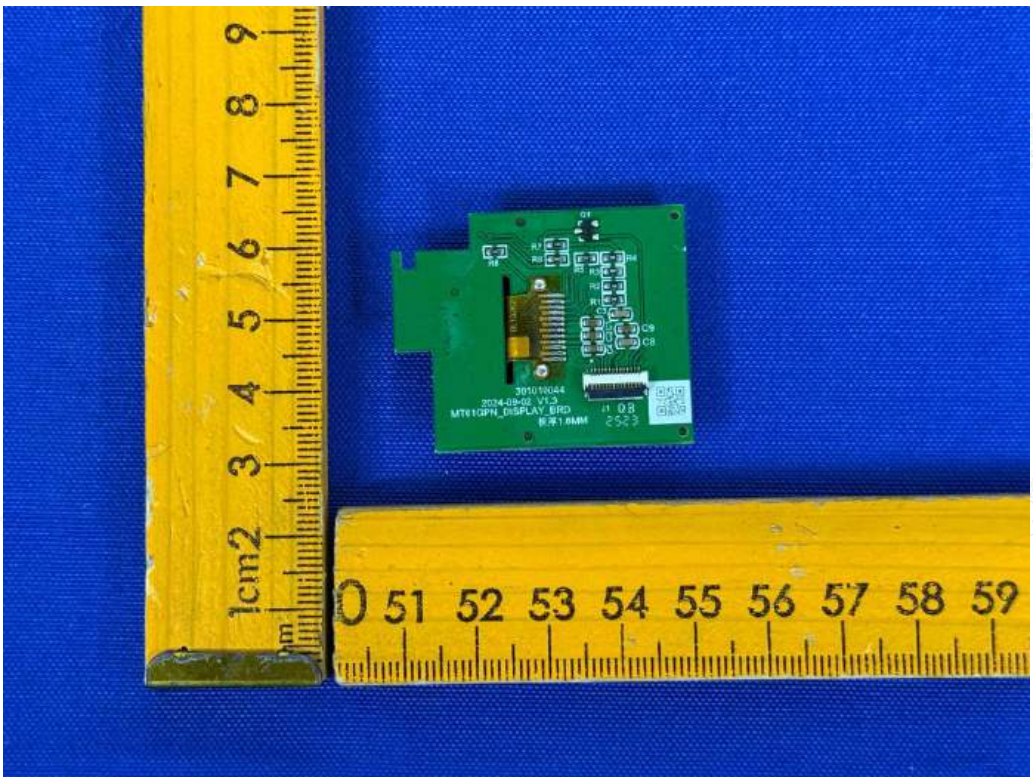


Fig. 19

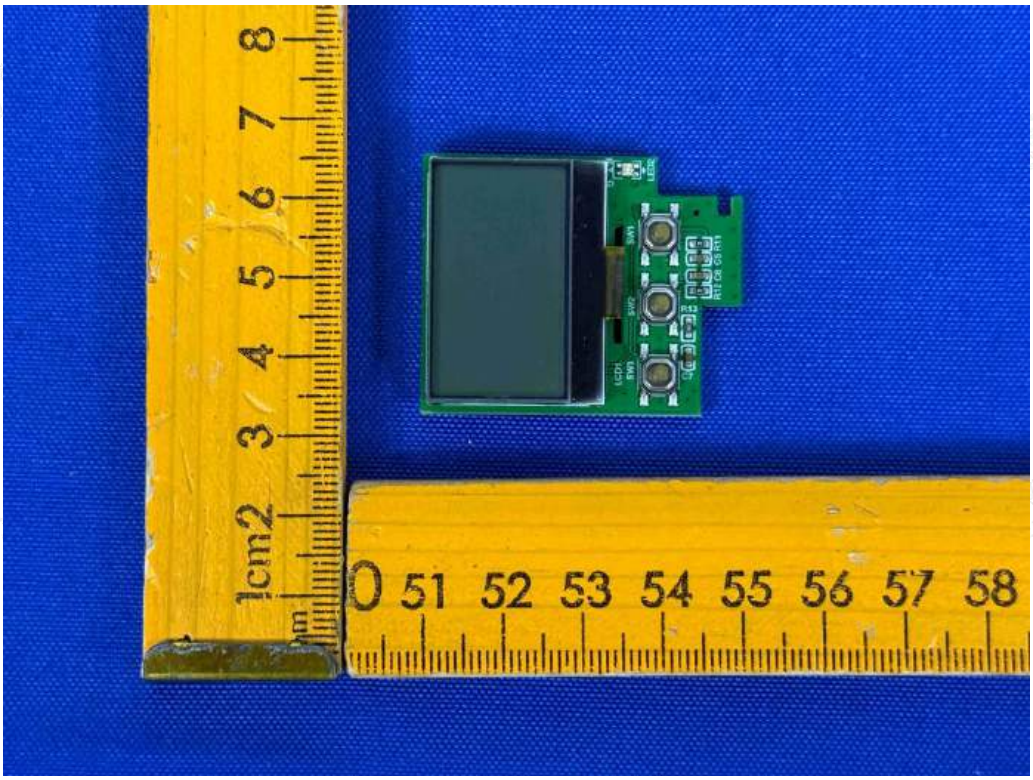


Fig. 20

Appendix D for Photographs of Test Setup_RF



Spurious Emission Below 1GHz



Spurious Emission Above 1GHz

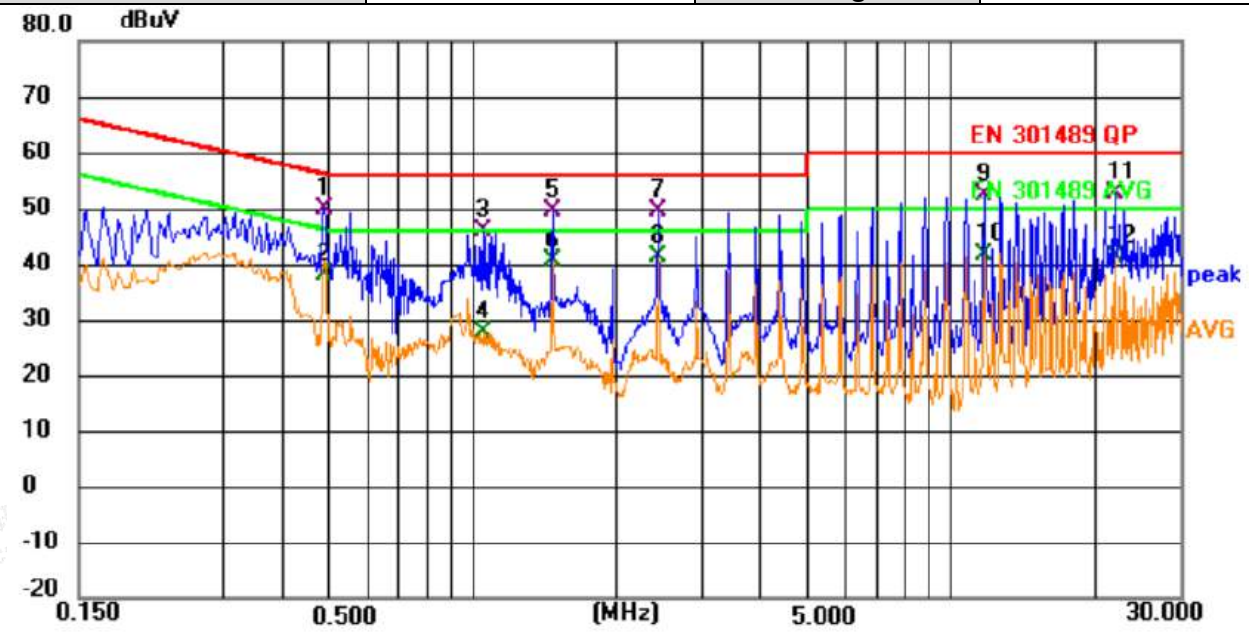
Appendix A for Emission and Immunity test results

Product Name: Smart Metering RCBO/MCB

Test Model: MT61GR

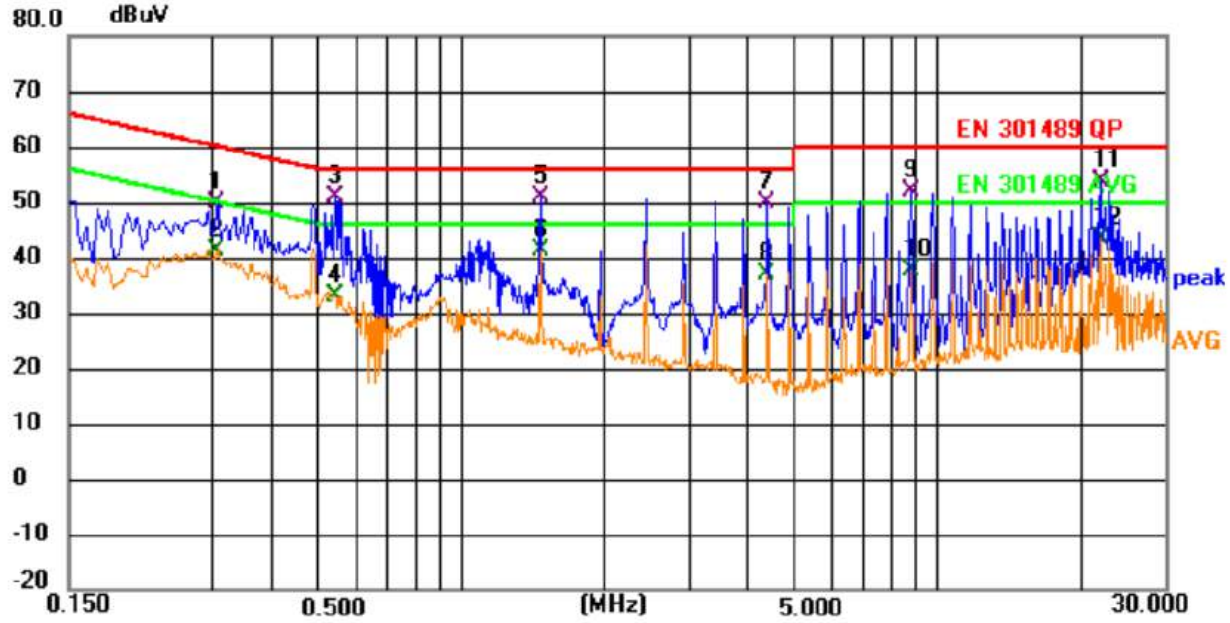
A.1 Line Conducted Emission

Test Model	MT61GR	**Test Mode**	TM1
Environmental Conditions	24.6℃, 56.8% RH	**Test Engineer**	Jerry Chu
Pol.	Line	**Test Voltage**	AC 230V/50Hz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.487	29.49	20.31	49.80	56.22	-6.42	QP	
2		0.487	17.58	20.31	37.89	46.22	-8.33	AVG	
3		1.054	26.22	19.62	45.84	56.00	-10.16	QP	
4		1.054	7.98	19.62	27.60	46.00	-18.40	AVG	
5		1.468	29.92	19.65	49.57	56.00	-6.43	QP	
6		1.468	20.83	19.65	40.48	46.00	-5.52	AVG	
7		2.445	29.90	19.71	49.61	56.00	-6.39	QP	
8	*	2.445	21.62	19.71	41.33	46.00	-4.67	AVG	
9		11.733	32.27	20.14	52.41	60.00	-7.59	QP	
10		11.733	21.41	20.14	41.55	50.00	-8.45	AVG	
11		22.006	33.20	19.54	52.74	60.00	-7.26	QP	
12		22.006	21.68	19.54	41.22	50.00	-8.78	AVG	

Test Model	MT61GR	Test Mode	TM1
Environmental Conditions	24.6℃, 56.8% RH	Test Engineer	Jerry Chu
Pol.	Neutral	Test Voltage	AC 230V/50Hz

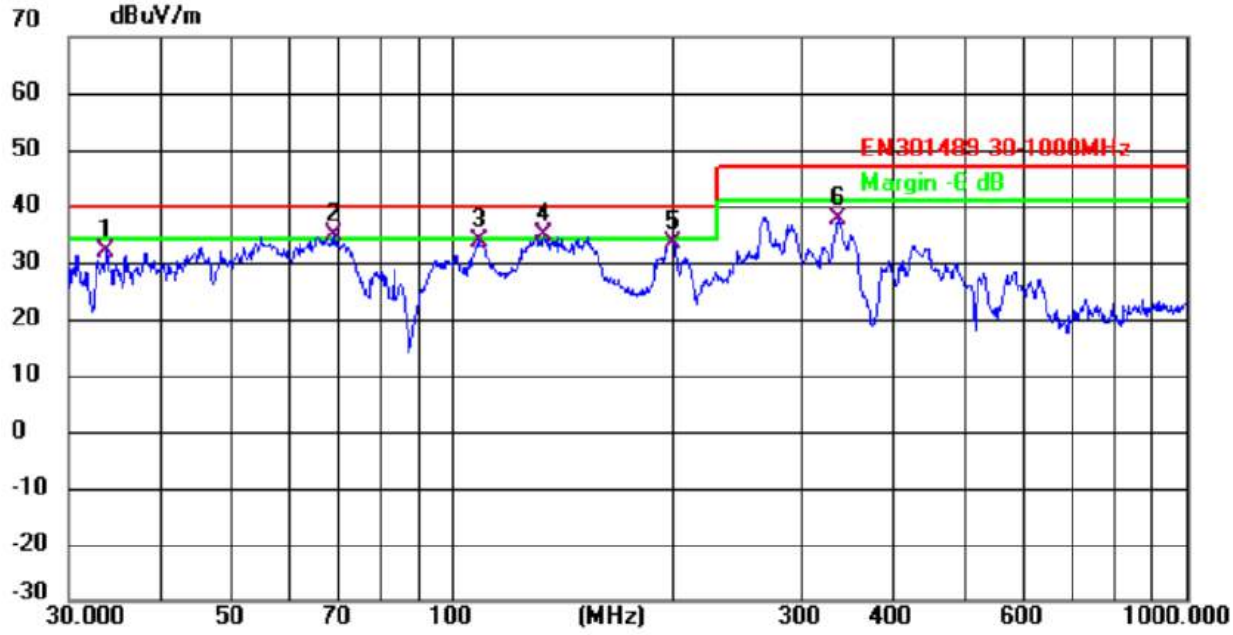


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.307	29.45	20.32	49.77	60.05	-10.28	QP	
2		0.307	20.98	20.32	41.30	50.05	-8.75	AVG	
3		0.541	30.79	20.20	50.99	56.00	-5.01	QP	
4		0.541	12.79	20.20	32.99	46.00	-13.01	AVG	
5		1.468	31.35	19.68	51.03	56.00	-4.97	QP	
6	*	1.468	21.66	19.68	41.34	46.00	-4.66	AVG	
7		4.398	30.00	19.78	49.78	56.00	-6.22	QP	
8		4.398	17.25	19.78	37.03	46.00	-8.97	AVG	
9		8.799	31.58	20.32	51.90	60.00	-8.10	QP	
10		8.799	17.27	20.32	37.59	50.00	-12.41	AVG	
11		22.002	34.26	19.49	53.75	60.00	-6.25	QP	
12		22.002	24.06	19.49	43.55	50.00	-6.45	AVG	

Note: For conducted emission and radiated emission test, a power supply of 230VAC and 120VAC was used for testing respectively, and only recorded the worst case of 230VAC.
Margin= Reading Level + Correct Factor – Limit
Correct Factor=Lisn Factor+Cable Factor

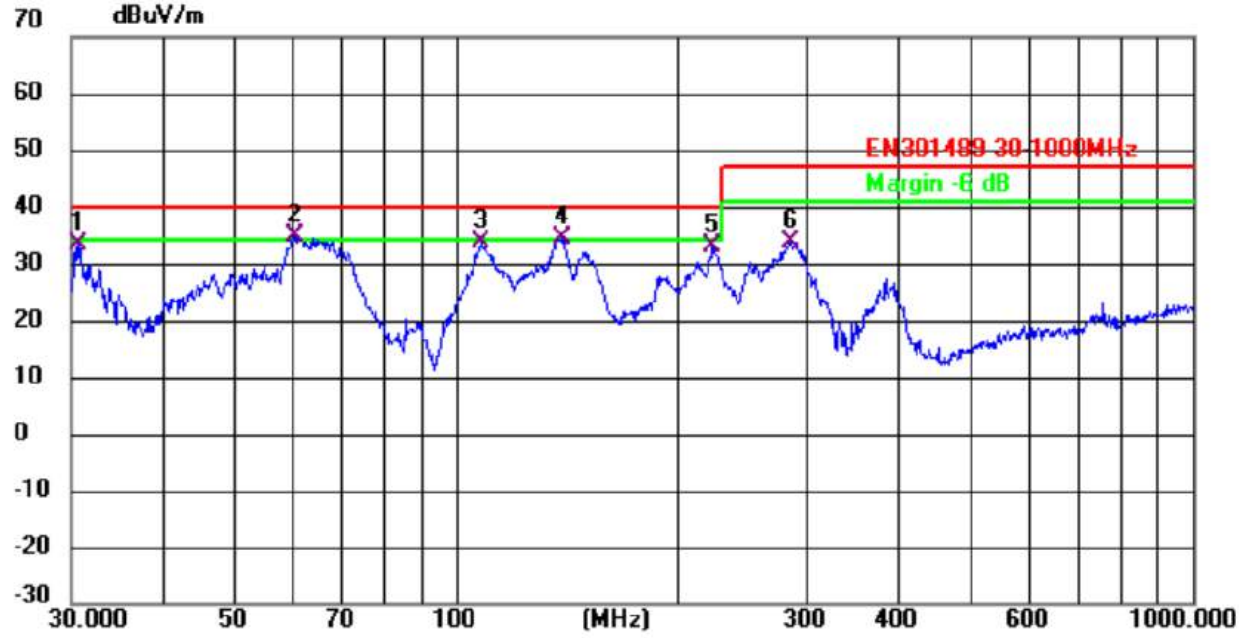
A.3 Radiated Disturbance

Test Model	MT61GR	Test Mode	TM1
Environmental Conditions	23.8℃, 52.1% RH	Test Engineer	Jerry Chu
Pol.	Vertical	Detector Function	Quasi-peak
Distance	3m	Test Voltage	AC 230V/50Hz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		33.7986	51.17	-19.15	32.02	40.00	-7.98	QP	
2	!	68.8721	55.52	-20.72	34.80	40.00	-5.20	QP	
3		109.0286	53.85	-20.25	33.60	40.00	-6.40	QP	
4	*	133.1510	56.86	-21.87	34.99	40.00	-5.01	QP	
5		199.9855	51.80	-18.39	33.41	40.00	-6.59	QP	
6		334.8588	52.66	-14.93	37.73	47.00	-9.27	QP	

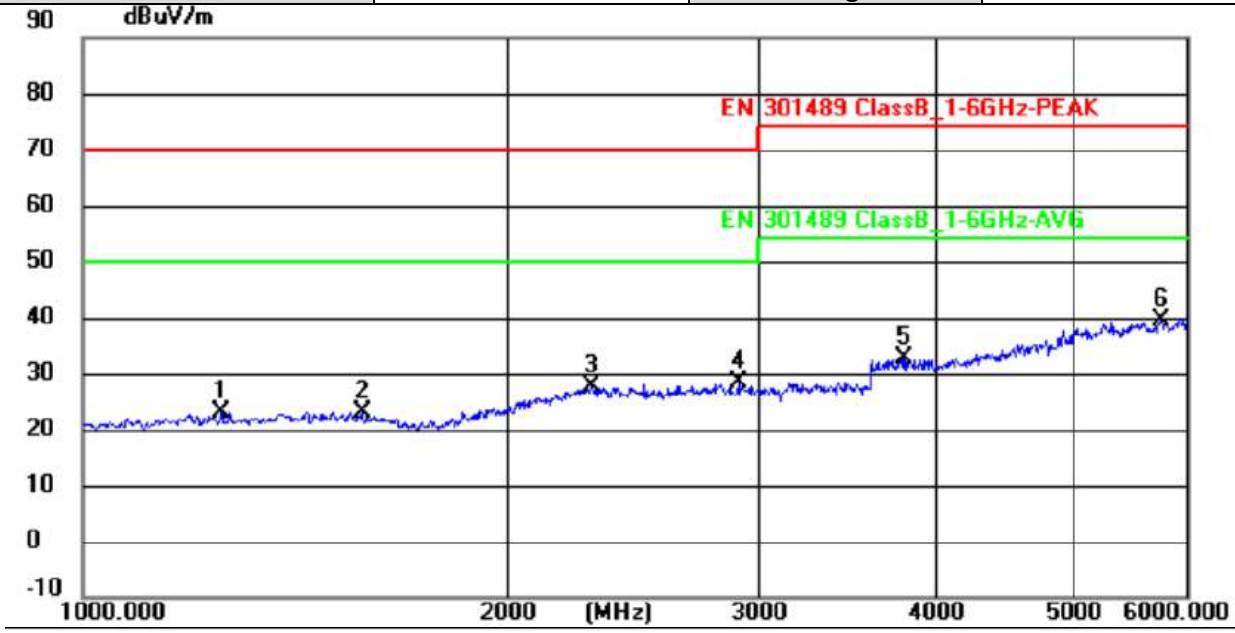
Test Model	MT61GR	Test Mode	TM1
Environmental Conditions	23.8℃, 52.1% RH	Test Engineer	Jerry Chu
Pol.	Horizontal	Detector Function	Quasi-peak
Distance	3m	Test Voltage	AC 230V/50Hz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		30.7454	53.07	-19.64	33.43	40.00	-6.57	QP	
2	*	60.2801	52.47	-17.79	34.68	40.00	-5.32	QP	
3		108.2666	52.48	-18.66	33.82	40.00	-6.18	QP	
4	!	138.8734	55.93	-21.56	34.37	40.00	-5.63	QP	
5		222.9502	51.81	-18.84	32.97	40.00	-7.03	QP	
6		284.9767	50.57	-16.81	33.76	47.00	-13.24	QP	

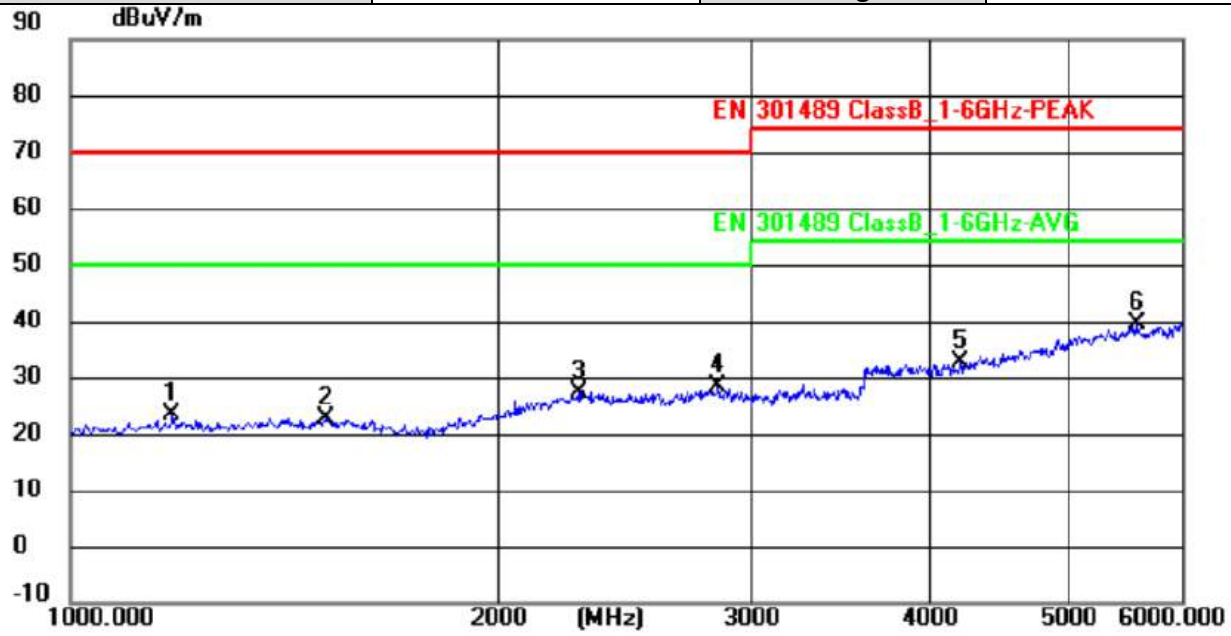
Note: Margin= Reading Level + Correct Factor – Limit
Correct Factor=Antenna Factor+Cable Factor – Pre-Amplifier Factor

Test Model	MT61GR	Test Mode	TM1(Above 1GHz)
Environmental Conditions	23.5℃, 52.1% RH	Test Engineer	Jerry Chu
Pol.	Vertical	Detector Function	Peak + AV
Distance	3m	Test Voltage	AC 230V/50Hz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		1255.0000	35.77	-12.68	23.09	70.00	-46.91	peak	
2		1575.0000	35.34	-12.17	23.17	70.00	-46.83	peak	
3		2290.0000	36.32	-8.67	27.65	70.00	-42.35	peak	
4		2900.0000	36.69	-8.41	28.28	70.00	-41.72	peak	
5		3800.0000	39.28	-6.55	32.73	74.00	-41.27	peak	
6	*	5770.0000	40.54	-0.96	39.58	74.00	-34.42	peak	

Test Model	MT61GR	Test Mode	TM1(Above 1GHz)
Environmental Conditions	23.5℃, 52.1% RH	Test Engineer	Jerry Chu
Pol.	Horizontal	Detector Function	Peak + AV
Distance	3m	Test Voltage	AC 230V/50Hz



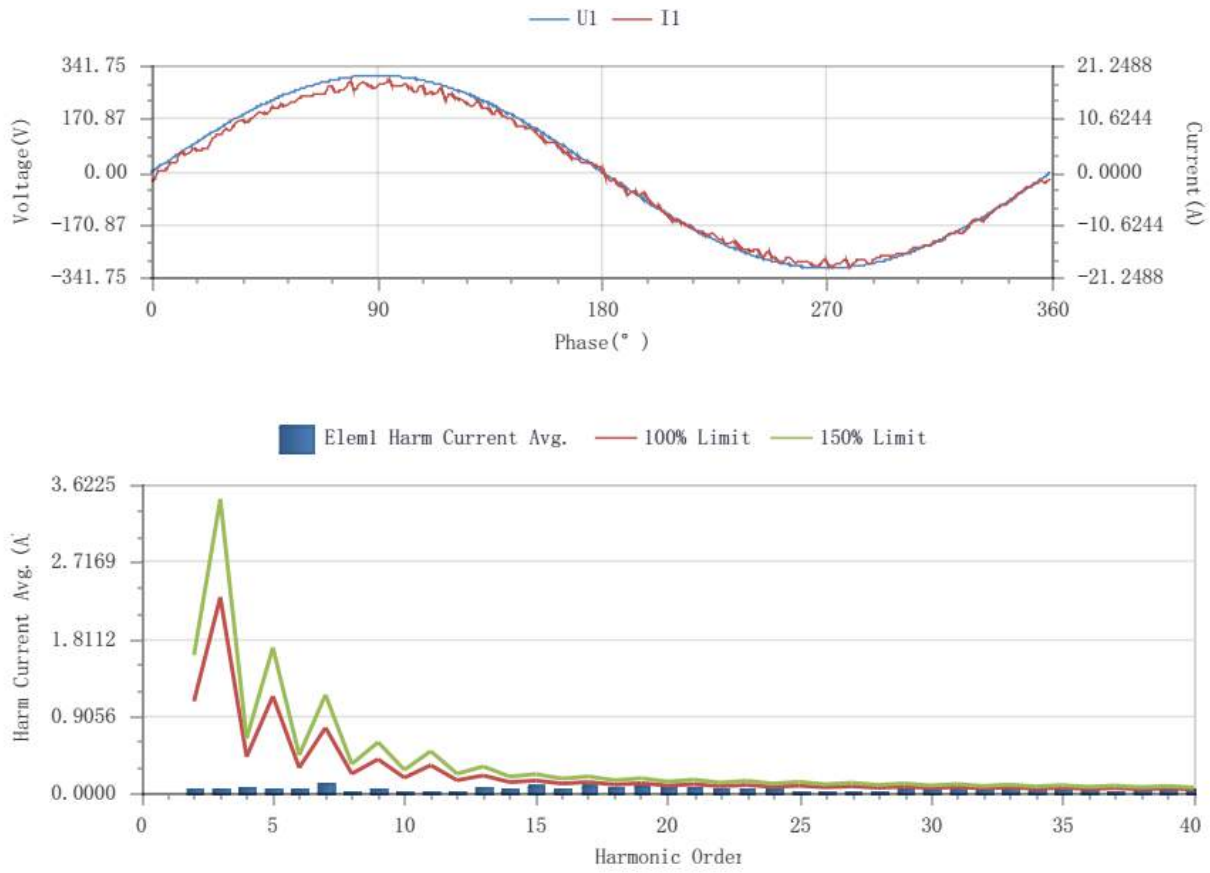
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		1180.0000	35.93	-12.54	23.39	70.00	-46.61	peak	
2		1510.0000	34.64	-12.12	22.52	70.00	-47.48	peak	
3		2275.0000	36.02	-8.80	27.22	70.00	-42.78	peak	
4		2845.0000	36.58	-8.14	28.44	70.00	-41.56	peak	
5		4205.0000	38.30	-5.78	32.52	74.00	-41.48	peak	
6	*	5580.0000	40.64	-1.31	39.33	74.00	-34.67	peak	

Note:
1. Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
2. Measurements above show only up to 6 maximum emissions noted.
3. Data of measurement within this frequency range shown " -- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. Factor = Antenna Factor + Cable Loss + Amplifier Factor
   Emission Level = Reading level + Factor
   Margin = Emission Level - Limit

A.4 Harmonic Current Emissions

Test Model	MT61GR	Test Mode	TM1
Test Engineer	Jerry Chu	Test Voltage	AC 230V/50Hz
Environmental Conditions	24.8℃, 55.7% RH		

Customer : Result : Pass



Customer : Result : Pass

Total Current Harmonic and Some Odd Harmonic Parameters

THC(A)	0.3432	THD(%)	2.71	POHC(A)	0.1476	POHC Limit(A)	0.2514

Maximum Value of Relevant Parameter During Test Period

Urms(V)	219.43	Freq(Hz)	49.999
Irms(A)	12.7072	Ipeak(A)	19.6352
I1(A)	12.6858	ICF	1.6075
P(W)	2784.6	λ	0.9982

Individual Harmonics and Limit Judgment

Order(n)	Harmonics Current Avg.(A)	100% Limit(A)	Limit Percent(%)	Harmonics Current Max.(A)	150% Limit(A)	Limit Percent(%)	Result
2	0.0442	1.0800	N/A	0.0518	1.6200	N/A	Pass
3	0.0385	2.3000	N/A	0.0414	3.4500	N/A	Pass
4	0.0634	0.4300	N/A	0.0680	0.6450	N/A	Pass
5	0.0361	1.1400	N/A	0.0394	1.7100	N/A	Pass
6	0.0391	0.3000	N/A	0.0424	0.4500	N/A	Pass
7	0.1228	0.7700	15.95	0.1252	1.1550	10.84	Pass
8	0.0252	0.2300	N/A	0.0280	0.3450	N/A	Pass
9	0.0495	0.4000	N/A	0.0515	0.6000	N/A	Pass
10	0.0142	0.1840	N/A	0.0160	0.2760	N/A	Pass
11	0.0222	0.3300	N/A	0.0244	0.4950	N/A	Pass
12	0.0245	0.1533	N/A	0.0266	0.2300	N/A	Pass
13	0.0676	0.2100	N/A	0.0701	0.3150	N/A	Pass
14	0.0435	0.1314	N/A	0.0466	0.1971	N/A	Pass
15	0.0941	0.1500	62.73	0.0967	0.2250	42.97	Pass
16	0.0581	0.1150	N/A	0.0612	0.1725	N/A	Pass
17	0.1022	0.1324	77.19	0.1048	0.1985	52.78	Pass
18	0.0643	0.1022	N/A	0.0678	0.1533	N/A	Pass
19	0.0892	0.1184	75.36	0.0925	0.1776	52.10	Pass
20	0.0669	0.0920	N/A	0.0738	0.1380	N/A	Pass
21	0.0666	0.1071	N/A	0.0732	0.1607	N/A	Pass
22	0.0493	0.0836	N/A	0.0539	0.1255	N/A	Pass
23	0.0384	0.0978	N/A	0.0418	0.1467	N/A	Pass
24	0.0357	0.0767	N/A	0.0402	0.1150	N/A	Pass
25	0.0253	0.0900	N/A	0.0288	0.1350	N/A	Pass
26	0.0281	0.0708	N/A	0.0317	0.1062	N/A	Pass
27	0.0276	0.0833	N/A	0.0316	0.1250	N/A	Pass
28	0.0342	0.0657	N/A	0.0384	0.0986	N/A	Pass
29	0.0396	0.0776	N/A	0.0448	0.1164	N/A	Pass
30	0.0445	0.0613	N/A	0.0502	0.0920	N/A	Pass
31	0.0691	0.0726	N/A	0.0786	0.1089	72.16	Pass
32	0.0532	0.0575	N/A	0.0709	0.0863	N/A	Pass
33	0.0608	0.0682	N/A	0.0681	0.1023	N/A	Pass
34	0.0460	0.0541	N/A	0.0597	0.0812	N/A	Pass
35	0.0423	0.0643	N/A	0.0461	0.0964	N/A	Pass
36	0.0355	0.0511	N/A	0.0427	0.0767	N/A	Pass
37	0.0334	0.0608	N/A	0.0372	0.0912	N/A	Pass
38	0.0377	0.0484	N/A	0.0421	0.0726	N/A	Pass
39	0.0387	0.0577	N/A	0.0438	0.0865	N/A	Pass
40	0.0506	0.0460	N/A	0.0565	0.0690	N/A	Pass

Customer : Result : Pass

Voltage Relevant Parameter During Test Period and Judgment

Item	Nominal Value	Measured Value	Error Value	Allowable Error Value	Result
Urms(V)	220.00	219.40	0.60	±2.0%	Pass
Frequency(Hz)	50.000	49.995	0.005	±0.5%	Pass

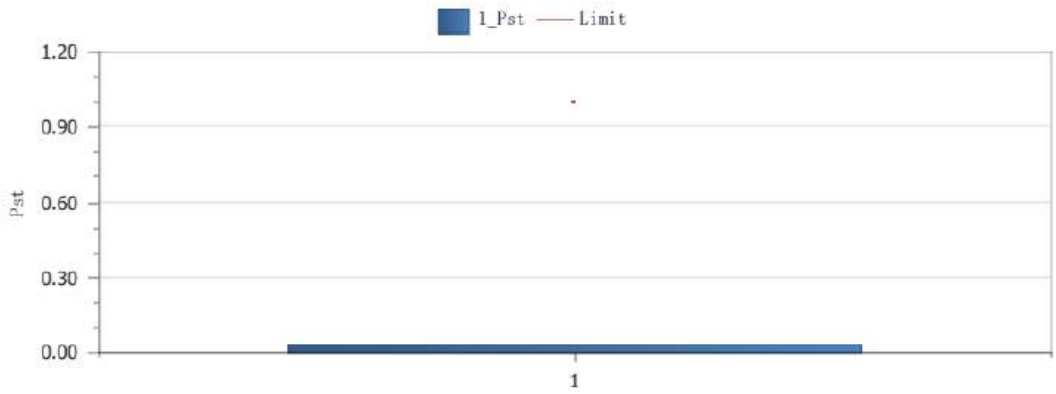
Individual Harmonics Voltage and Limit Judgment

Order(n)	U[k](V)	Uhdf(%)	Limit(%)	Result
1	219.417	100.007	---	Pass
2	0.035	0.016	0.200	Pass
3	0.031	0.014	0.900	Pass
4	0.016	0.007	0.200	Pass
5	0.019	0.009	0.400	Pass
6	0.012	0.005	0.200	Pass
7	0.021	0.009	0.300	Pass
8	0.008	0.004	0.200	Pass
9	0.022	0.010	0.200	Pass
10	0.009	0.004	0.200	Pass
11	0.009	0.004	0.100	Pass
12	0.012	0.005	0.100	Pass
13	0.012	0.005	0.100	Pass
14	0.013	0.006	0.100	Pass
15	0.016	0.007	0.100	Pass
16	0.015	0.007	0.100	Pass
17	0.023	0.010	0.100	Pass
18	0.016	0.007	0.100	Pass
19	0.013	0.006	0.100	Pass
20	0.018	0.008	0.100	Pass
21	0.010	0.004	0.100	Pass
22	0.013	0.006	0.100	Pass
23	0.017	0.008	0.100	Pass
24	0.010	0.004	0.100	Pass
25	0.025	0.011	0.100	Pass
26	0.011	0.005	0.100	Pass
27	0.032	0.014	0.100	Pass
28	0.016	0.007	0.100	Pass
29	0.035	0.016	0.100	Pass
30	0.020	0.009	0.100	Pass
31	0.041	0.019	0.100	Pass
32	0.021	0.010	0.100	Pass
33	0.037	0.017	0.100	Pass
34	0.020	0.009	0.100	Pass
35	0.031	0.014	0.100	Pass
36	0.016	0.007	0.100	Pass
37	0.027	0.012	0.100	Pass
38	0.018	0.008	0.100	Pass
39	0.028	0.013	0.100	Pass
40	0.025	0.011	0.100	Pass

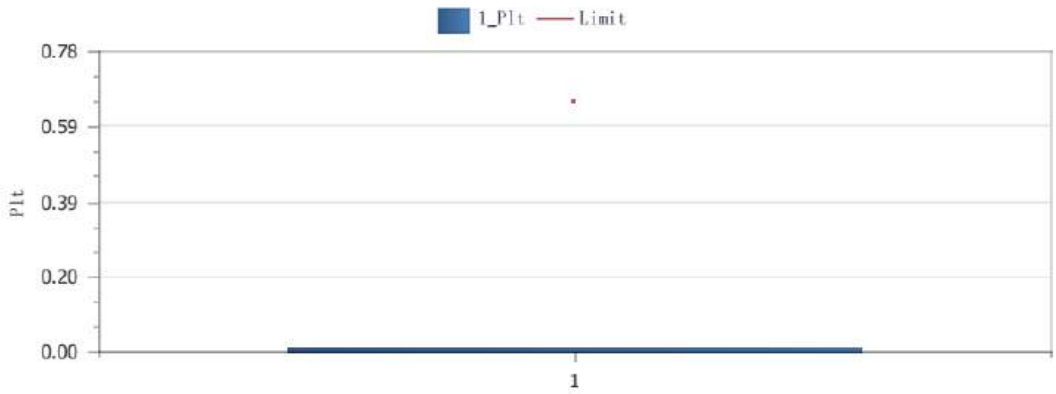
A.5 Voltage Fluctuation and Flicker

Test Model	MT61GR	Test Mode	TM1
Test Engineer	Jerry Chu	Test Voltage	AC 230V/50Hz
Environmental Conditions	24.8℃, 55.7% RH		

Pst and Limit



Plt and Limit



Relevant Parameter and Judgment During Test Period

Voltage at end of test	230.017V		
Voltage Fluctuation and Flicker	Test Value	Test Limit	Result
Tmax	0ms	500ms	Pass
dc	0.00%	3.30%	Pass
dmax	0.00%	4.00%	Pass
Pst	0.026	1.000	Pass
Plt	0.011	0.650	Pass

Elem1 Test Parameters

Count	dc(%)	dmax(%)	Tmax(ms)	Pst	Plt
1	0.00	0.00	0.00	0.026	0.011

A.6 RF Electromagnetic Field (80 MHz - 6000 MHz)

Test Model	MT61GR	Test Engineer	Jerry Chu
Environmental Conditions	23.4℃, 52.4% RH	Test Voltage	AC 230V/50Hz

TM1-TM9 Test Result:

EUT Working Mode	Antenna Polarity	Frequency (MHz)	Fielded Strength (V/m)	Observation	Position	Conclusion
E-UTRA Band 1 Traffic	Vertical	80-6000	3	CT,CR	Front, Right, Left, Back, Top, Bottom	Pass
	Horizontal	80-6000	3	CT,CR	Front, Right, Left, Back, Top, Bottom	Pass
E-UTRA Band 1 Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back, Top, Bottom	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back, Top, Bottom	Pass
E-UTRA Band 3 Traffic	Vertical	80-6000	3	CT,CR	Front, Right, Left, Back, Top, Bottom	Pass
	Horizontal	80-6000	3	CT,CR	Front, Right, Left, Back, Top, Bottom	Pass
E-UTRA Band 3 Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back, Top, Bottom	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back, Top, Bottom	Pass
E-UTRA Band 7 Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back, Top, Bottom	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back, Top, Bottom	Pass
E-UTRA Band 7 Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back, Top, Bottom	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back, Top, Bottom	Pass
E-UTRA Band 8 Traffic	Vertical	80-6000	3	CT,CR	Front, Right, Left, Back, Top, Bottom	Pass
	Horizontal	80-6000	3	CT,CR	Front, Right, Left, Back, Top, Bottom	Pass
E-UTRA Band 8 Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back, Top, Bottom	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back, Top, Bottom	Pass
E-UTRA Band 20 Traffic	Vertical	80-6000	3	CT,CR	Front, Right, Left, Back, Top, Bottom	Pass
	Horizontal	80-6000	3	CT,CR	Front, Right, Left, Back,	Pass

					Top, Bottom	
E-UTRA Band 20 Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back, Top, Bottom	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back, Top, Bottom	Pass
E-UTRA Band 28 Traffic	Vertical	80-6000	3	CT,CR	Front, Right, Left, Back, Top, Bottom	Pass
	Horizontal	80-6000	3	CT,CR	Front, Right, Left, Back, Top, Bottom	Pass
E-UTRA Band 28 Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back, Top, Bottom	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back, Top, Bottom	Pass
E-UTRA Band 38 Traffic	Vertical	80-6000	3	CT,CR	Front, Right, Left, Back, Top, Bottom	Pass
	Horizontal	80-6000	3	CT,CR	Front, Right, Left, Back, Top, Bottom	Pass
E-UTRA Band 38 Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back, Top, Bottom	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back, Top, Bottom	Pass
E-UTRA Band 40 Traffic	Vertical	80-6000	3	CT,CR	Front, Right, Left, Back, Top, Bottom	Pass
	Horizontal	80-6000	3	CT,CR	Front, Right, Left, Back, Top, Bottom	Pass
E-UTRA Band 40 Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back, Top, Bottom	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back, Top, Bottom	Pass
E-UTRA Band 41 Traffic	Vertical	80-6000	3	CT,CR	Front, Right, Left, Back, Top, Bottom	Pass
	Horizontal	80-6000	3	CT,CR	Front, Right, Left, Back, Top, Bottom	Pass
E-UTRA Band 41 Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back, Top, Bottom	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back, Top, Bottom	Pass

TM10 Test Result:

EUT Working Mode	Antenna Polarity	Frequency (MHz)	Fielded Strength (V/m)	Observation	Position	Conclusion
Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back, Top, Bottom	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back, Top, Bottom	Pass

Note: The EUT performance complied with performance criteria for CT&CR to MS Function and there is no any degradation of performance and function.
During the test, the Maximum Bit Error Ratio was less than 0.001
During the test, the Maximum Block Error Ratio was less than 0.01
For E-UTRA Band 1/3/7/8/20/28/38/40/41 (In the data transfer mode), the throughput is ≥ 95 % of the maximum throughput of the reference measurement channel as specified in annex C in TS 136 101 [13] with parameters specified in tables 7.3.1-1 and 7.3.1-2 in TS 136 101 [13] during the test sequence.
For equipment that supports a PER , the minimum performance level shall be PER less than or equal to 10%.

A.7 Electrostatic Discharge

Electrostatic Discharge Test Results			
Standard	☐ IEC 61000-4-2 ☑ EN 61000-4-2		
Applicant	SHANGHAI MATIS ELECTRIC CO.,LTD.		
EUT	Smart Metering RCBO/MCB	**Temperature**	24.2℃
M/N	MT61GR	**Humidity**	52.3％
Criterion	B	**Pressure**	1021mbar
Test Mode	TM1-TM10	**Test Engineer**	Jerry Chu

TEST RESULT OF TM1-TM9

Test Voltage	Coupling	Observation	Result (Pass/Fail)
±2KV, ±4kV	Contact Discharge	TT, TR	Pass
±2KV, ±4kV, ±8kV	Air Discharge	TT, TR	Pass
±2KV, ±4kV	Indirect Discharge HCP	TT, TR	Pass
±2KV, ±4kV	Indirect Discharge VCP	TT, TR	Pass

TEST RESULT OF TM10

Test Voltage	Coupling	Result (Pass/Fail)
±2KV, ±4kV	Contact Discharge	Pass
±2KV, ±4kV, ±8kV	Air Discharge	Pass
±2KV, ± 4kV	Indirect Discharge HCP	Pass
±2KV, ±4kV	Indirect Discharge VCP	Pass

Note: The EUT performance complied with performance criteria for TT&TR to MS Function and there is no any degradation of performance and function.

A.8 Electrical Fast Transient Immunity

Electrical Fast Transient/Burst Test Results			
Standard	☐ IEC 61000-4-4 ☑ EN 61000-4-4		
Applicant	SHANGHAI MATIS ELECTRIC CO.,LTD.		
EUT	Smart Metering RCBO/MCB	**Temperature**	23.2℃
M/N	MT61GR	**Humidity**	54.1％
Test Mode	TM1-TM10	**Criterion**	B
Test Engineer	Jerry Chu		

TEST RESULT OF TM1-TM9				
Line	**Test Voltage**	**Polarity**	**Observation**	**Result (Pass/Fail)**
L	1KV	+/-	TT, TR	Pass
N	1KV	+/-	TT, TR	Pass
L-N	1KV	+/-	TT, TR	Pass

TEST RESULT OF TM10			
Line	**Test Voltage**	**Polarity**	**Result (Pass/Fail)**
L	1KV	+/-	Pass
N	1KV	+/-	Pass
L-N	1KV	+/-	Pass

A.9 RF Common Mode

Injected Currents Susceptibility Test Results			
Standard	☐ IEC 61000-4-6 ☑ EN 61000-4-6		
Applicant	SHANGHAI MATIS ELECTRIC CO.,LTD.		
EUT	Smart Metering RCBO/MCB	**Temperature**	22.3℃
M/N	MT61GR	**Humidity**	53.5%
Test Mode	TM1-TM10	**Criterion**	A
Test Engineer	Jerry Chu		

TEST RESULT OF TM1-TM9				
Frequency Range (MHz)	**Strength (Unmodulated)**	**Injected Position**	**Observation**	**Result (Pass/Fail)**
0.15 ~ 80	3V	AC Mains	CT, CR	Pass

TEST RESULT OF TM10			
Frequency Range (MHz)	**Strength (Unmodulated)**	**Injected Position**	**Result (Pass/Fail)**
0.15 ~ 80	3V	AC Mains	Pass

Remark:
1. Modulation Signal:1kHz 80% AM

Note: The EUT performance complied with performance criteria for CT&CR to MS Function and there is no any degradation of performance and function.
During the test, the Maximum Bit Error Ratio was less than 0.001
During the test, the Maximum Block Error Ratio was less than 0.01
For E-UTRA Band 1/3/7/8/20/28/38/40/41 (In the data transfer mode), the throughput is ≥ 95 % of the maximum throughput of the reference measurement channel as specified in annex C in TS 136 101 [13] with parameters specified in tables 7.3.1-1 and 7.3.1-2 in TS 136 101 [13] during the test sequence.
For equipment that supports a PER , the minimum performance level shall be PER less than or equal to 10%.

A.10 Surges, Line to Line and Line to Ground

Surge Immunity Test Result			
Standard	☐ IEC 61000-4-5 ☑ EN 61000-4-5		
Applicant	SHANGHAI MATIS ELECTRIC CO.,LTD.		
EUT	Smart Metering RCBO/MCB	**Temperature**	23.4℃
M/N	MT61GR	**Humidity**	52.0%
Test Mode	TM1-TM10	**Criterion**	B
Test Engineer	Jerry Chu		

TEST RESULT OF TM1-TM9

Location	Polarity	Phase Angle	Number of Pulse	Pulse Voltage (KV)	Observation	Result (Pass/Fail)
L-N	+	0°, 90°, 180°, 270°	5	1.0	TT, TR	Pass
	-	0°, 90°, 180°, 270°	5	1.0	TT, TR	Pass

TEST RESULT OF TM10

Location	Polarity	Phase Angle	Number of Pulse	Pulse Voltage (KV)	Result (Pass/Fail)
L-N	+	0°, 90°, 180°, 270°	5	1.0	Pass
	-	0°, 90°, 180°, 270°	5	1.0	Pass

Note: Verification shall be performed on the generators and coupling/decoupling network prior to the test.

A.11 Voltage Dips/Interruptions Immunity Test

Voltage Dips And Interruptions Test Results			
Standard	☐ IEC 61000-4-11 ☑ EN 61000-4-11		
Applicant	SHANGHAI MATIS ELECTRIC CO.,LTD.		
EUT	Smart Metering RCBO/MCB	**Temperature**	22.3℃
M/N	MT61GR	**Humidity**	53.4％
Test Mode	TM1-TM10	**Criterion**	B&C
Test Engineer	Jerry Chu		

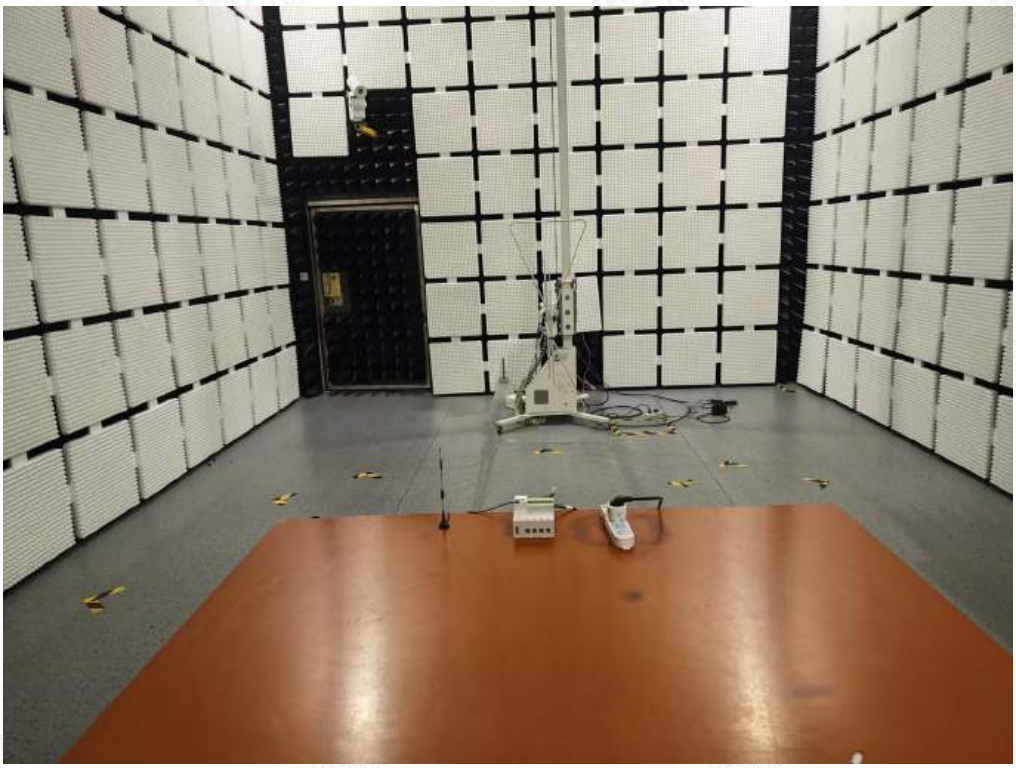
TEST RESULT OF TM1-TM9				
Test Level % U_T	**Voltage Dips & Short Interruptions % U_T**	**Duration (in periods)**	**Observation**	**Result (Pass/Fail)**
0	100	0.5P	TT, TR	Pass
70	30	25P	TT, TR	Pass
0	100	250P	TT, TR	Pass

TEST RESULT OF TM10			
Test Level % U_T	**Voltage Dips & Short Interruptions % U_T**	**Duration (in periods)**	**Result (Pass/Fail)**
0	100	0.5P	Pass
70	30	25P	Pass
0	100	250P	Pass

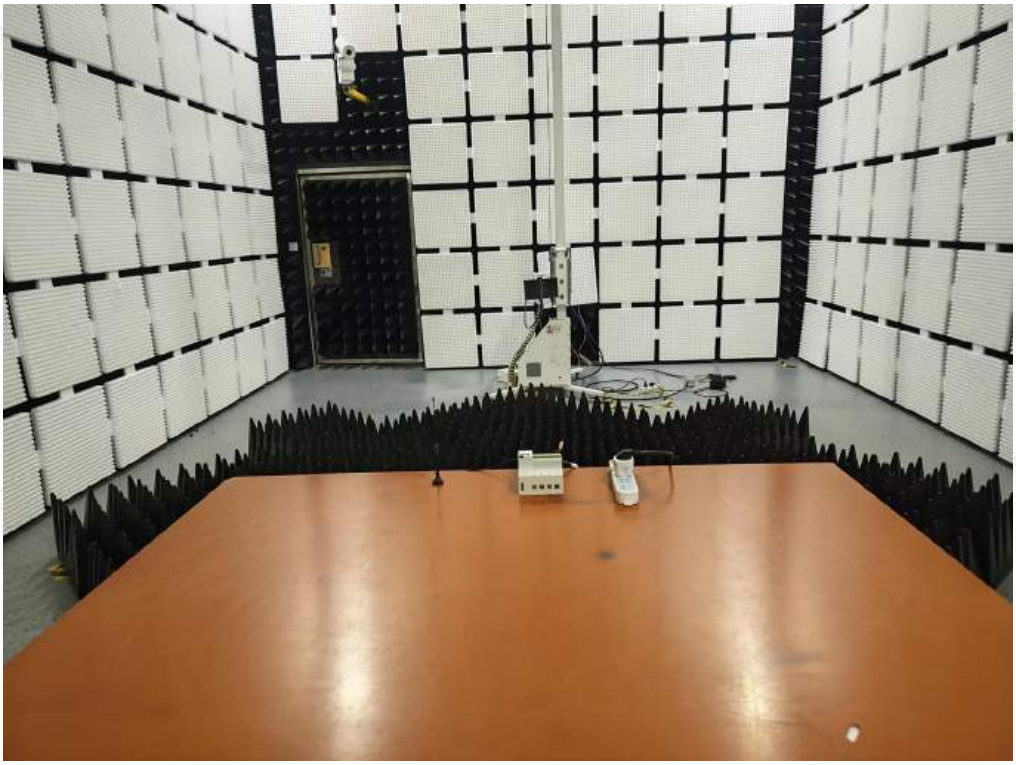
Appendix B for Photographs of Test Setup_EMC



Power Line Conducted Emission



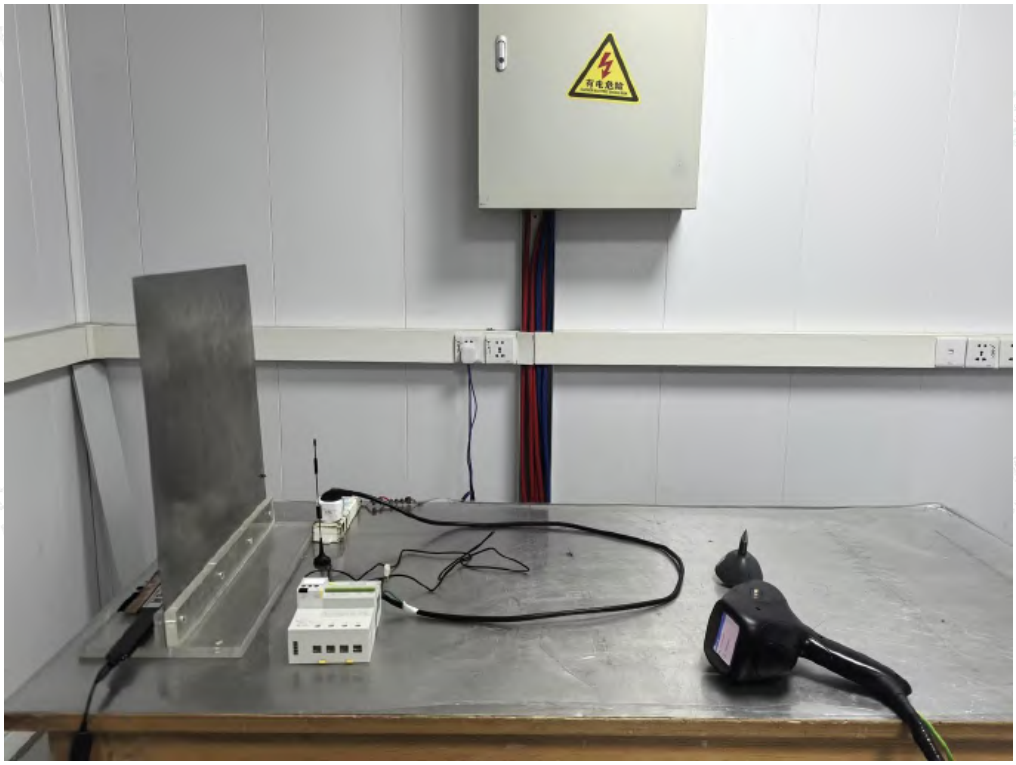
Radiated Emission Below 1 GHz



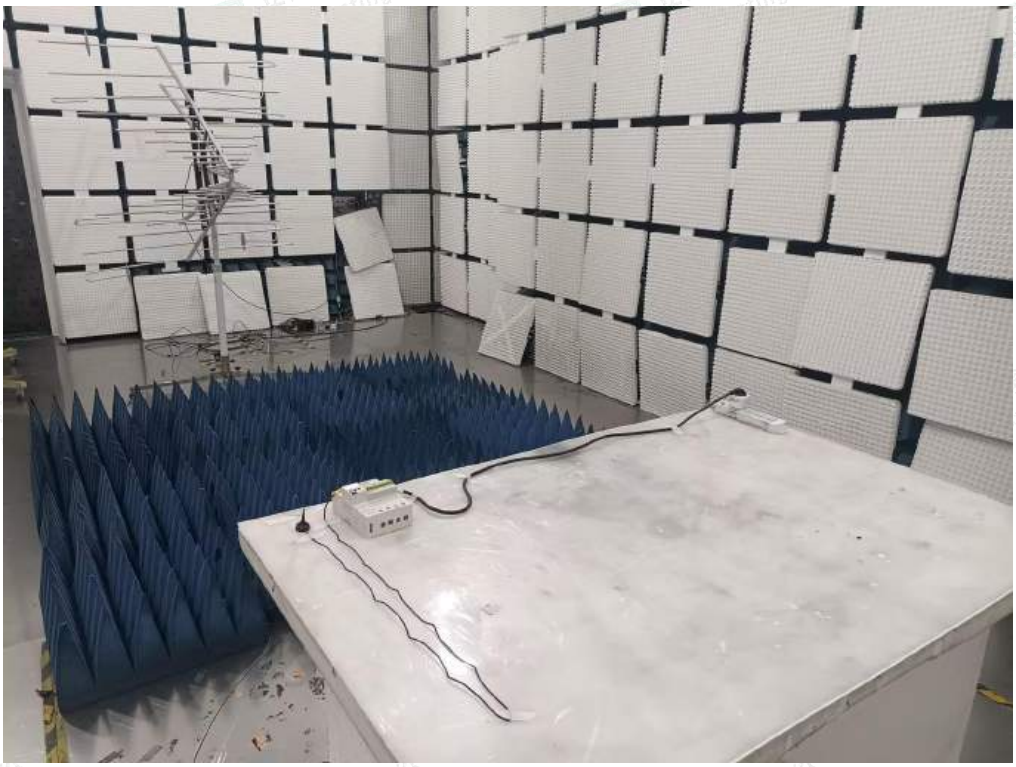
Radiated Emission Above 1 GHz



Voltage Fluctuations and Flicker



Electrostatic Discharge



RF Electromagnetic Field (80MHz to 1000MHz)



RF Electromagnetic Field (1000MHz to 6000MHz)



Fast Transients Common Mode



RF Common Mode (0.15 MHz to 80MHz)



Surges



Voltage Dips and Interruptions

EMC TEST REPORT

For

SHANGHAI MATIS ELECTRIC CO.,LTD.

Smart Metering RCBO/MCB

Test Model: MT61GR

Additional Model No.: Please Refer to Page 6

Prepared for	:	SHANGHAI MATIS ELECTRIC CO.,LTD.
Address	:	Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	Room 101/201, Building A, and Room 101/301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Tel	:	(+86)755-82591330
Fax	:	(+86)755-82591332
Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com
Date of receipt of test sample	:	August 19, 2026
Number of tested samples	:	2
Sample No.	:	A260817067-1, A260817067-2
Serial number	:	Prototype
Date of Test	:	August 19, 2026 ~ September 20, 2026
Date of Report	:	September 21, 2026

Shenzhen LCS Compliance Testing Laboratory Ltd.
Add: Room 101/201, Building A, and Room 101/301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com
Scan code to check authenticity

EMC TEST REPORT ETSI EN 301 489-1 V2.2.3 (2019-11) & ETSI EN 301 489-52 V1.3.1 (2024-11)		
Report Reference No.	:	**LCSA08176105EA**
Date Of Issue	:	September 21, 2026
Testing Laboratory Name	:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	:	Room 101/201, Building A, and Room 101/301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure.....	:	Full application of Harmonised standards■ Partial application of Harmonised standards□ Other standard testing method□
Applicant's Name	:	**SHANGHAI MATIS ELECTRIC CO.,LTD.**
Address	:	Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306
Test Specification		
Standard.....	:	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-52 V1.3.1 (2024-11)
TRF Originator	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	:	Dated 2017-06
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Test Item Description.	:	**Smart Metering RCBO/MCB**
Trade Mark.....	:	Matis/Matismart
Test Model	:	MT61GR
Ratings.....	:	Please Refer to Page 6
Result	:	**Pass**

Compiled by:	Supervised by:	Approved by:
Jack Liu/ Administrator	Kevin Huang/ RF Manager	Gavin Liang/ Manager

Shenzhen LCS Compliance Testing Laboratory Ltd.
Add: Room 101/201, Building A, and Room 101/301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com
Scan code to check authenticity

EMC -- TEST REPORT

Test Report No. : LCSA08176105EA	September 21, 2026 Date of issue

Test Model.....	: MT61GR
EUT.....	: Smart Metering RCBO/MCB
Applicant.....	**: SHANGHAI MATIS ELECTRIC CO.,LTD.**
Address.....	: Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: SHANGHAI MATIS ELECTRIC CO.,LTD.**
Address.....	: Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306
Telephone.....	: /
Fax.....	: /
Factory.....	**: SHANGHAI MATIS ELECTRIC CO.,LTD.**
Address.....	: Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306
Telephone.....	: /
Fax.....	: /

Test Result	**Pass**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Shenzhen LCS Compliance Testing Laboratory Ltd.
Add: Room 101/201, Building A, and Room 101/301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com
Scan code to check authenticity

Revision History

Report Version	Issue Date	Revision Content	Revised By
000	September 21, 2026	Initial Issue	---

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1. GENERAL INFORMATION

1.1. Product Description for Equipment Under Test (EUT)

EUT	: Smart Metering RCBO/MCB
Test Model	: MT61GR
Additional Model No.	: MT61GP
Model Declaration	: PCB board, structure and internal of these model(s) are the same, So no additional models were tested
Ratings	: Ue: 230/240VAC(2P); 400/415VAC(4P) 50/60Hz; In: 6/10/16/20/25/32/40/50/63A/80A/100A/125A (B/C/D-type); Icn=Ics=6,0kA IΔn= 30, 100, 300mA,500mA; Type -A & -AC; With time delay: type S Energy Accuracy: class 1
Hardware Version	: 1.0
Software Version	: 1.0
LTE	:
Support Band	: ☒E-UTRA Band 1(EU-Band) ☒E-UTRA Band 3(EU-Band) ☒E-UTRA Band 5(Non EU-Band) ☒E-UTRA Band 7(EU-Band) ☒E-UTRA Band 8(EU-Band) ☒E-UTRA Band 20(EU-Band) ☒E-UTRA Band 28(EU-Band) ☒E-UTRA Band 38(EU-Band) ☒E-UTRA Band 40(EU-Band) ☒E-UTRA Band 41(EU-Band)
LTE Release Version	: R8
FDD Band	: Uplink: E-UTRA Band 1: 1920MHz~1980MHz E-UTRA Band 3: 1710MHz~1785MHz E-UTRA Band 7: 2500MHz~2570MHz E-UTRA Band 8: 880MHz~915MHz E-UTRA Band 20: 832MHz~862MHz E-UTRA Band 28: 703MHz~748MHz Downlink: E-UTRA Band 1: 2110MHz~2170MHz E-UTRA Band 3: 1805MHz~1880MHz E-UTRA Band 7: 2620MHz~2690MHz E-UTRA Band 8: 925MHz~960MHz E-UTRA Band 20: 791MHz~821MHz E-UTRA Band 28: 758MHz~803MHz
TDD Band	: E-UTRA Band 38: 2570MHz~2620MHz E-UTRA Band 40: 2300MHz~2400MHz E-UTRA Band 41: 2496-2690MHz
Type Of Modulation	: QPSK/16QAM
Antenna Description	: External Antenna -0.93dBi (max.) For E-UTRA Band 1 -0.22dBi (max.) For E-UTRA Band 3 -3.29dBi (max.) For E-UTRA Band 7 -1.41dBi (max.) For E-UTRA Band 8 -1.15dBi (max.) For E-UTRA Band 20

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-4.31dBi (max.) For E-UTRA Band 28
-1.92dBi (max.) For E-UTRA Band 38
-1.73dBi (max.) For E-UTRA Band 40
0.31dBi (max.) For E-UTRA Band 41

Power Class : Class 3

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1.2. Objective

ETSI EN 301 489-1	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility
ETSI EN 301 489-52	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 52: Specific conditions for Cellular Communication User Equipment (UE) radio and ancillary equipment; Harmonised Standard for ElectroMagnetic Compatibility

The objective is to determine compliance with ETSI EN 301 489-1 V2.2.3 (2019-11), ETSI EN 301 489-52 V1.3.1 (2024-11).

1.3. Related Submittal(s)/Grant(s)

No Related Submittals.

1.4. Test Methodology

All measurements contained in this report were conducted with ETSI EN 301 489-1 V2.2.3 (2019-11), ETSI EN 301 489-52 V1.3.1 (2024-11).

1.5. Description of Test Facility

NVLAP Accreditation Code is 600167-0.

FCC Designation Number is CN5024.

CAB identifier is CN0071.

CNAS Registration Number is L4595.

1.6. Support Equipment List

Manufacturer	Description	Model	Serial Number	Certificate
---	---	---	---	---

1.7. External I/O

I/O Port Description	Quantity	Cable
---	---	---

1.8. Measurement Uncertainty

Item	MU	Remark
Uncertainty for Power point Conducted Emissions Test	2.42dB	
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.54dB	Polarize: V
	4.1dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	2.08dB	Polarize: H
	2.56dB	Polarize: V
Uncertainty for radio frequency	0.01ppm	
Uncertainty for conducted RF Power	0.65dB	
Uncertainty for temperature	0.2℃	
Uncertainty for humidity	1%	
Uncertainty for DC and low frequency voltages	0.06%	

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1.9. Description of Test Modes

There was 10 test Modes. TM1 to TM10 were shown below:		
TM1	:	Operate in For E-UTRA Band 1 mode
TM2	:	Operate in For E-UTRA Band 3 mode
TM3	:	Operate in For E-UTRA Band 7 mode
TM4	:	Operate in For E-UTRA Band 8 mode
TM5	:	Operate in For E-UTRA Band 20 mode
TM6	:	Operate in For E-UTRA Band 28 mode
TM7	:	Operate in For E-UTRA Band 38 mode
TM8	:	Operate in For E-UTRA Band 40 mode
TM9	:	Operate in For E-UTRA Band 41 mode
TM10	:	Idle mode
Note:All test modes were tested, but we only recorded the worst case in this report.		

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2. SUMMARY OF TEST RESULTS

Rule	Description of Test Items	Result
§7.1	Reference to clause 8.4 of ETSI EN 301 489-1 Conducted Emission (AC mains input/output port)	Compliant
§7.1	Reference to clause 8.3 of ETSI EN 301 489-1 Conducted Emission (DC power input/output port)	N/A*
§7.1	Reference to clause 8.7 of ETSI EN 301 489-1 Conducted Emission (Wired network port)	N/A*
§7.1	Reference to clause 8.2 of ETSI EN 301 489-1 Radiated Emission (Enclosure of ancillary equipment)	Compliant
§7.1	Reference to clause 8.5 of ETSI EN 301 489-1 Harmonic current emissions (AC mains input port)	Compliant
§7.1	Reference to clause 8.6 of ETSI EN 301 489-1 Voltage fluctuations and flicker (AC mains input port)	Compliant
§7.2	Reference to clause 9.3 of ETSI EN 301 489-1 Electrostatic discharge (Enclosure port) (EN 61000-4-2)	Compliant
§7.2	Reference to clause 9.2 of ETSI EN 301 489-1 RF electromagnetic field (80MHz to 6000MHz) (Enclosure port) (EN 61000-4-3)	Compliant
§7.2	Reference to clause 9.4 of ETSI EN 301 489-1 Fast transients common mode (signal, wired network and control ports, DC and AC power ports) (EN 61000-4-4)	Compliant
§7.2	Reference to clause 9.8 of ETSI EN 301 489-1 Surges, line to line and line to ground (AC mains power input ports, wired network ports) (EN 61000-4-5)	Compliant
§7.2	Reference to clause 9.5 of ETSI EN 301 489-1 RF common mode 0.15MHz to 80MHz (signal, wired network and control ports, DC and AC power ports) (EN 61000-4-6)	Compliant
§7.2	Reference to clause 9.6 of ETSI EN 301 489-1 Transients and surges in the vehicular environment (ISO 7637-2)	N/A*
§7.2	Reference to clause 9.7 of ETSI EN 301 489-1 Voltage dips and interruptions (AC mains power input ports) (EN 61000-4-11)	Compliant

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3. TEST RESULTS

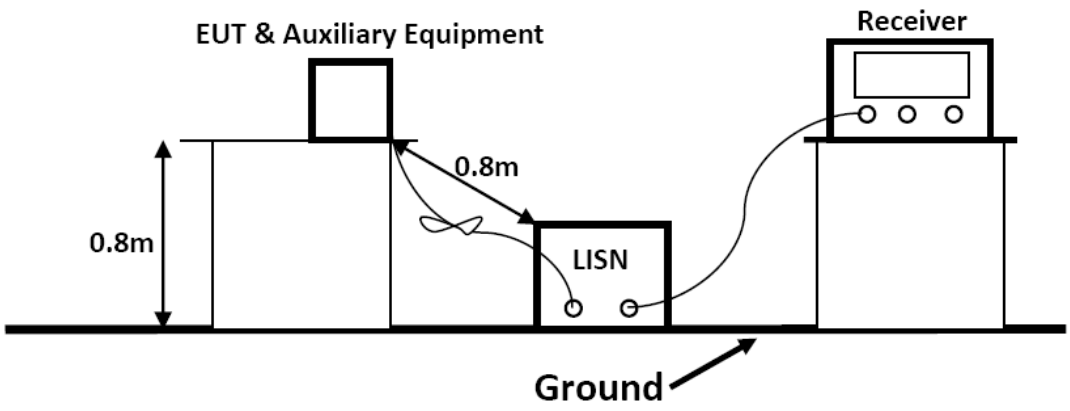
3.1. Line Conducted Emission

3.1.1 Conducted Emission Limit

Relevant Standard(s): ETSI EN 301 489-1 V2.2.3 (2019-11) / EN 55032:2015/A11:2020 Class B

Limits for Line Conducted Emission		
Frequency (MHz)	Limit (dBμV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66.0 ~ 56.0 *	56.0 ~ 46.0 *
0.50 ~ 5.00	56.0	46.0
5.00 ~ 30.00	60.0	50.0
NOTE1-The lower limit shall apply at the transition frequencies. NOTE2-The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.		

3.1.2 Test Configuration



The setup of EUT is according with per ETSI EN 301 489-1 measurement procedure. The specification used was with the ETSI EN 301 489-1 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.
The spacing between the peripherals was 10 cm.

The EUT received charging power from the charger which received power through a LISN supplying power of AC 230V/50Hz.

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3.1.3 EMI Test Receiver Setup

During the conducted emission test, the EMI test receiver was set with the following configurations:

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	150KHz ~ 30MHz
(IF)RBW	9kHz

All data was recorded in the Quasi-peak and average detection mode.

3.1.4 Test Procedure

Power on the EUT, the EUT begins to work. Make sure the EUT operates normally during the test.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

3.1.5 Test Results

PASS

Please refer to Appendix A.1 for Emission and Immunity test results.

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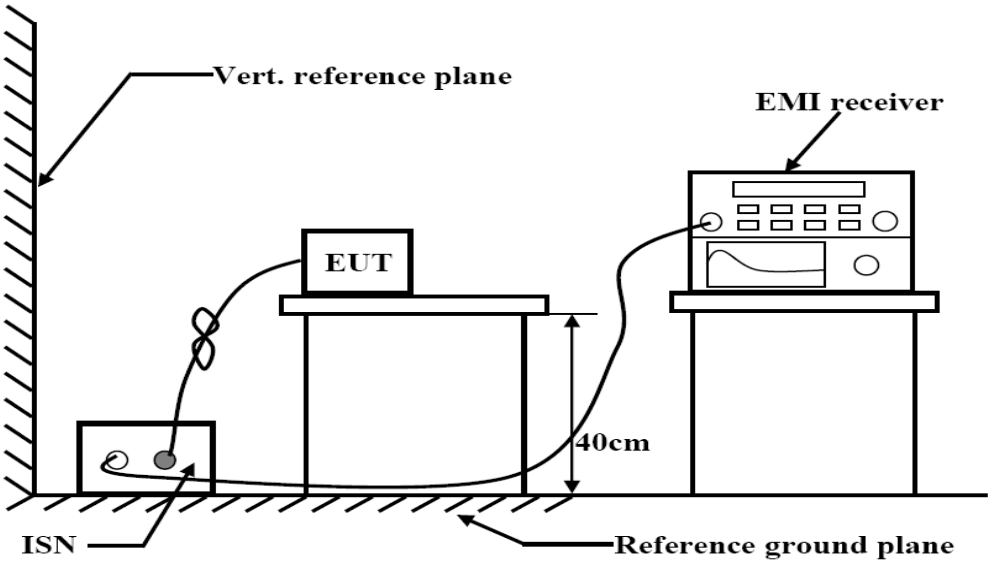
3.2. Conducted Emission (Wired Network Port)

3.2.1 Conducted Emission Limit(Wired Network Port)

Limits for asymmetric mode conducted emissions				
Frequency (MHz)	Class B voltage limits (dBμV)		Class B current limits (dBμA)	
	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
0.15 ~ 0.50	84.0~74.0	74.0~64.0	40.0~30.0	30.0~20.0
0.50 ~ 30.00	74.0	64.0	30.0	20.0
NOTE 1-The limits decrease linearly with the logarithm of the frequency in the range 0,15 MHz to 0,5 MHz. NOTE 2-The current and voltage disturbance limits are derived for use with an impedance stabilization network (ISN) which presents a common mode (asymmetric mode) impedance of 150Ω to the telecommunication port under test (conversion factor is 20 log10 150 / I = 44 dB).				

3.2.2 Test Configuration



3.2.3 EMI Test Receiver Setup

During the conducted emission test, the EMI test receiver was set with the following configurations:

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	150KHz ~ 30MHz
(IF)RBW	9kHz

All data was recorded in the Quasi-peak and average detection mode.

3.2.4 Test Procedure

Please refer to ETSI EN 301 489-1 Clause 8.7.2 and EN 55032 Clause 6 for the measurement methods.

3.2.5 Test Results

Not applicable.

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3.3. Radiated Disturbance

3.3.1 Radiated Emission Limit

Relevant Standard(s): ETSI EN 301 489-1 V2.2.3 (2019-11) / EN 55032:2015/A11:2020 Class B

Limits for Radiated Disturbance Below 1GHz			
Frequency (MHz)	Facility	Distance (Meters)	Field Strengths Limit (dBμV/m)
30 ~ 230	SAC	3	40
230 ~ 1000	SAC	3	47
***Note: (1) The smaller limit shall apply at the combination point between two frequency bands. (2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.			

Limits for Radiated Disturbance Above 1GHz			
Frequency (MHz)	Distance (Meters)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)
1000 ~ 3000	3	70	50
3000 ~ 6000	3	74	54
***Note: The lower limit applies at the transition frequency.			

Limits for Radiated Disturbance Below 1GHz (For FM Receivers)			
Frequency (MHz)	Distance (Meters)	Class B Limit (dBμV/m)	
		Fundamental	Harmonics
30 ~ 230	3	60	52
230 ~ 300	3		52
300 ~ 1000	3		56
***Note: These relaxed limits apply only to emissions at the fundamental and harmonic frequencies of the LO. Signals at all other frequencies shall be compliant with the limits given in above Table.			

Limits for Radiated Disturbance Above 1GHz (For FM Receivers)			
Frequency (MHz)	Distance (Meters)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)
1000 ~ 3000	3	70	50
3000 ~ 6000	3	74	54
***Note: The lower limit applies at the transition frequency.			

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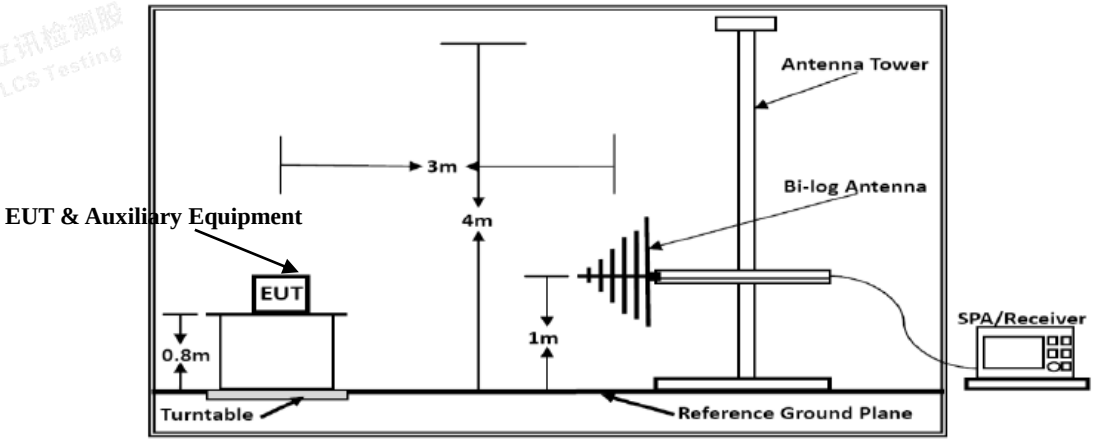
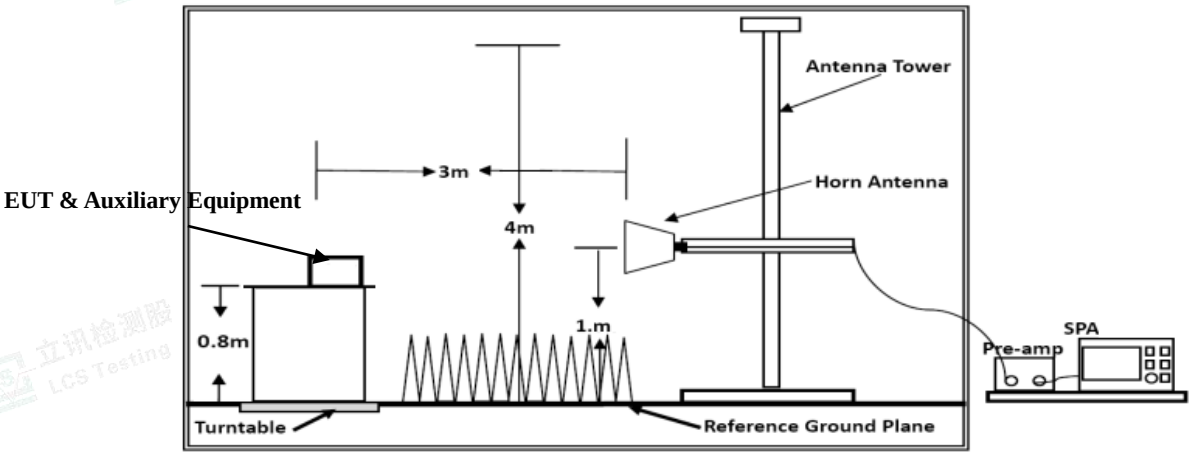
3.3.2 Test Configuration



Below 1GHz



Above 1GHz

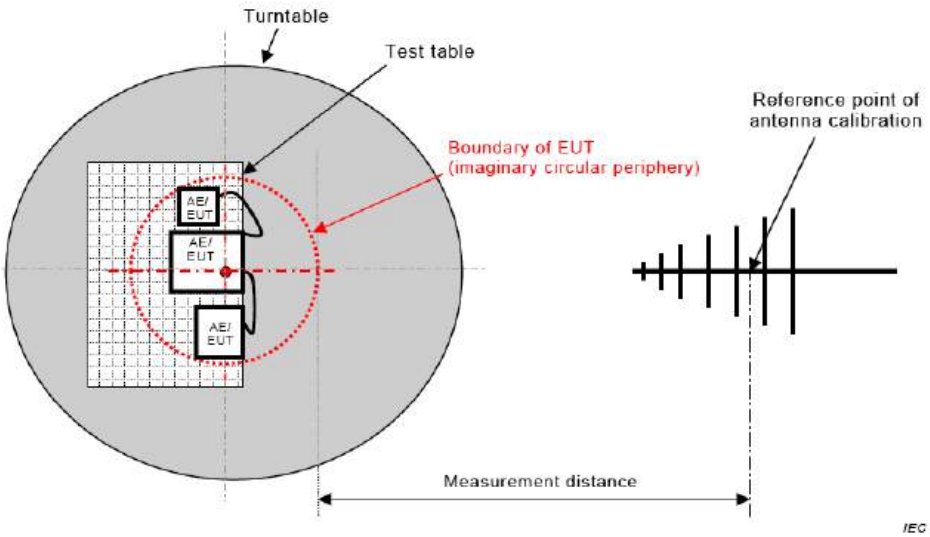


Figure C.1 – Measurement distance

Test Setup for FM Receiver

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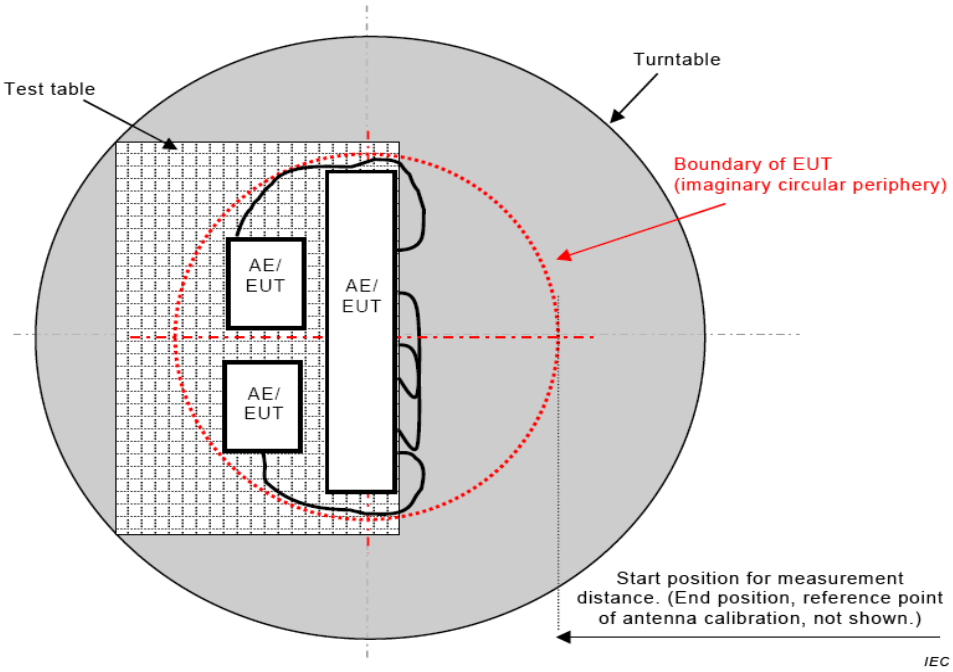

Figure C.2 – Boundary of EUT, Local AE and associated cabling

Test Setup for FM Receiver

3.3.3 Test Procedure

The test method shall be in accordance with CENELEC EN 55032 [1], annex A.3.

3.3.4 Test Results

PASS

Please refer to Appendix A.3 for Emission and Immunity test results.

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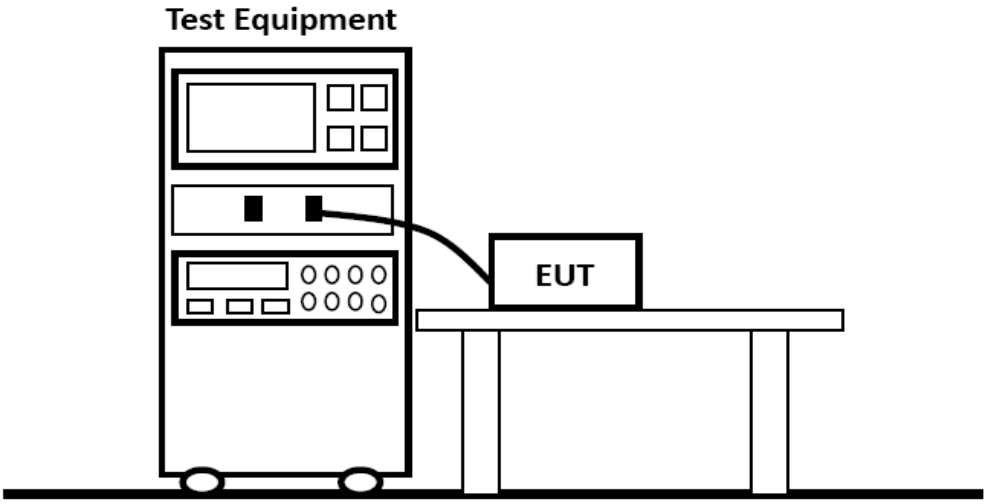
3.4. Harmonic Current Emissions

3.4.1 Test Configuration



3.4.2 Test Standard

According to ETSI EN 301 489-1 V2.2.3 (2019-11) & EN 61000-3-2:2014

3.4.3 Test Results

PASS

Please refer to Appendix A.4 for Emission and Immunity test results.

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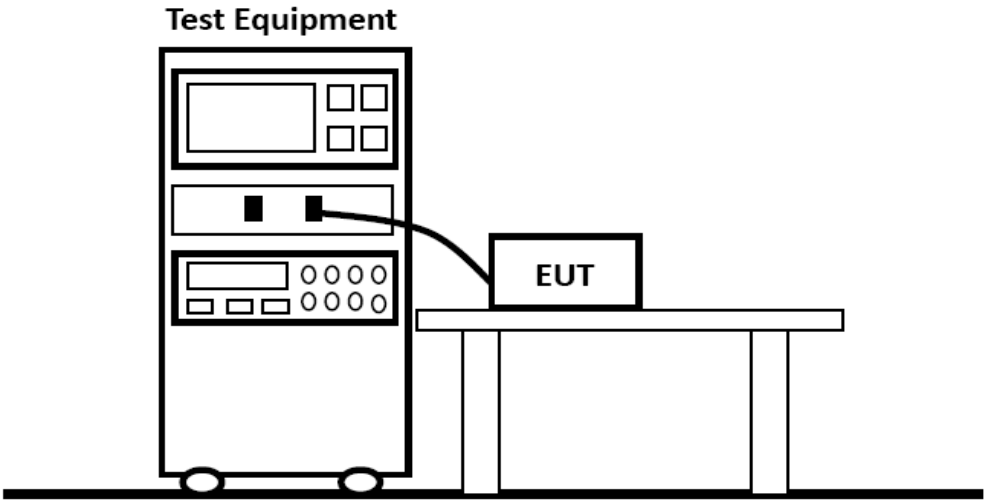
3.5. Voltage Fluctuation and Flicker

3.5.1 Test Configuration



3.5.2 Test Standard

According to ETSI EN 301 489-1 V2.2.3 (2019-11) & EN 61000-3-3:2013

3.5.3 Test Results

PASS

Please refer to Appendix A.5 for Emission and Immunity test results.

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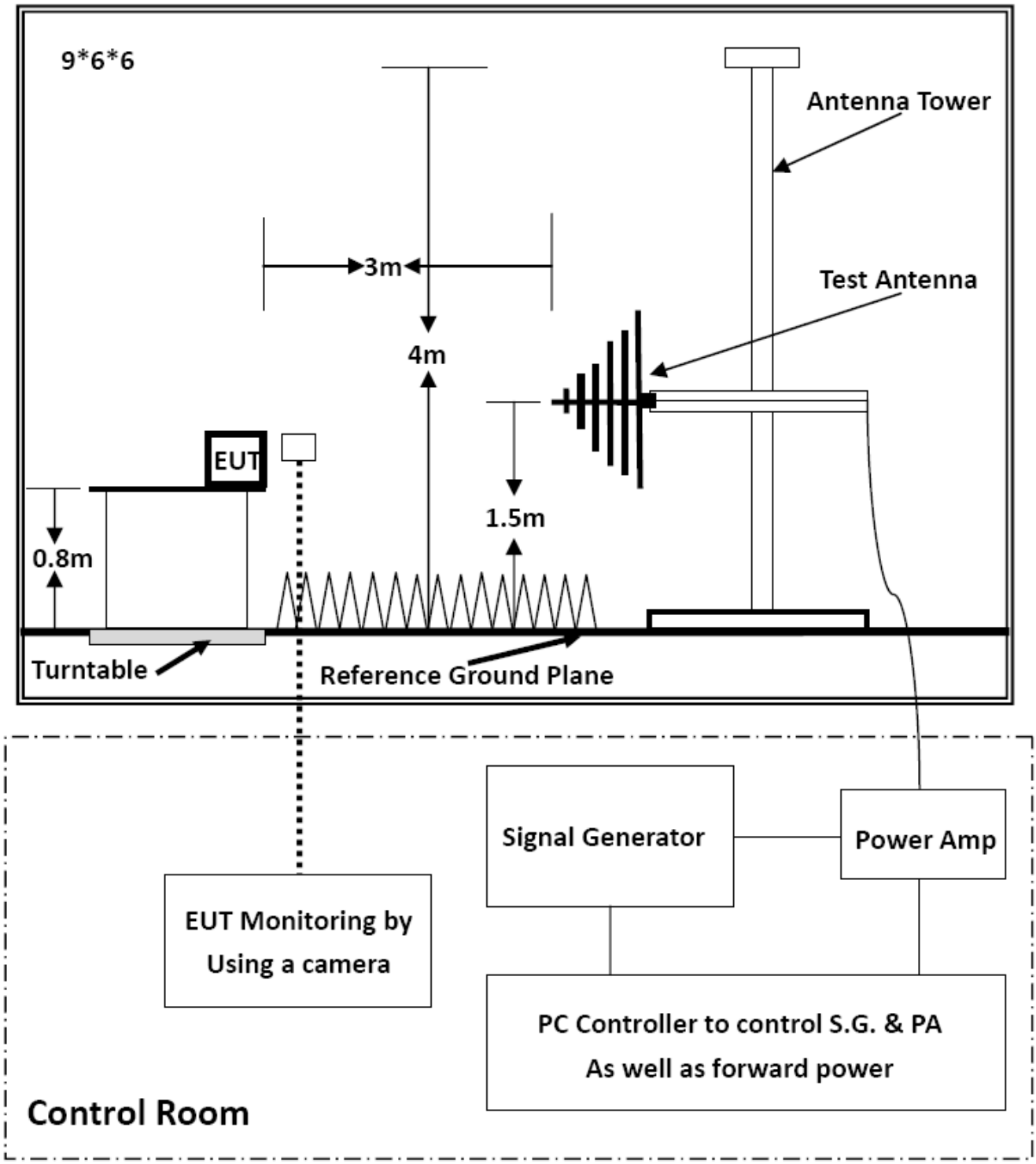
3.6. RF Electromagnetic Field (80 MHz - 6000 MHz)

3.6.1 Test Configuration



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3.6.2 Test Standard

ETSI EN 301 489-1, ETSI EN 301 489-52 (EN 61000-4-3: 2006+A2: 2010)

Test level 2 at 3V/m.

3.6.3 Severity Level

Level	Field Strength (V/m)
1	1
2	3
3	10
X	Special
Performance Criterion: **A**	

3.6.4 Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. EUT is set 3 meter away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna are set on test. Each of the four sides of EUT must be faced this transmitting antenna and measured individually. In order to judge the EUT performance, a CCD camera is used to monitor EUT screen. All the scanning conditions are as follows:

Condition of Test	Remark
Fielded Strength	3 V/m (Severity Level 2)
Radiated Signal	Unmodulated
Scanning Frequency	80-6000MHz
Dwell time of radiated	0.0015 decade/s
Waiting Time	3 Sec.

3.6.5 Test Results

PASS

Please refer to Appendix A.6 for Emission and Immunity test results.

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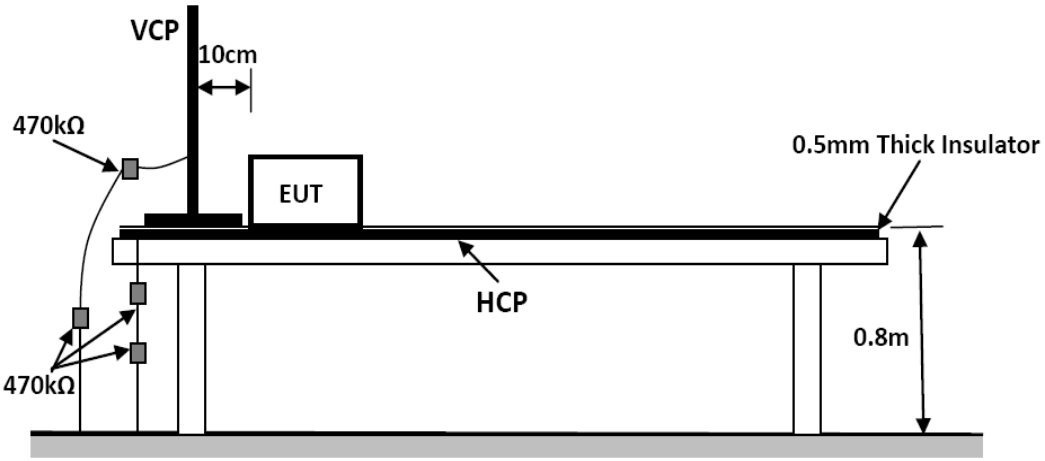
3.7. Electrostatic Discharge

3.7.1 Test Configuration



EN 61000-4-2 specifies that a tabletop EUT shall be placed on a non-conducting table which is 80 centimeters above a ground reference plane and that floor mounted equipment shall be placed on a insulating support approximately 10 centimeters above a ground plane. During the tests, the EUT is positioned over a ground reference plane in conformance with this requirement.

For tabletop equipment, a 1.5 by 1.0-meter metal sheet (HCP) is placed on the table and connected to the ground plane via a metal strap with two 470 k Ohms resistors in series. The EUT and attached cables are isolated from this metal sheet by 0.5-millimeter thick insulating material. A Vertical Coupling Plane (VCP) grounded on the ground plane through the same configuration as in the HCP is used.

3.7.2 Test Procedure

ETSI EN 301 489-1 V2.2.3 (2019-11) / EN 61000-4-2: 2009
Test level 3 for Air Discharge at ±8 kV
Test level 2 for Contact Discharge at ±4 kV

3.7.2.1 Air Discharge

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

3.7.2.2 Contact Discharge

All the procedure shall be same as Section 3.7.2.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

3.7.2.3 Indirect Discharge For Horizontal Coupling Plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

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3.7.2.4 Indirect Discharge For Vertical Coupling Plane

At least 10 single discharges (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

3.7.3 Test Results

PASS

Please refer to Appendix A.7 for Emission and Immunity test results.

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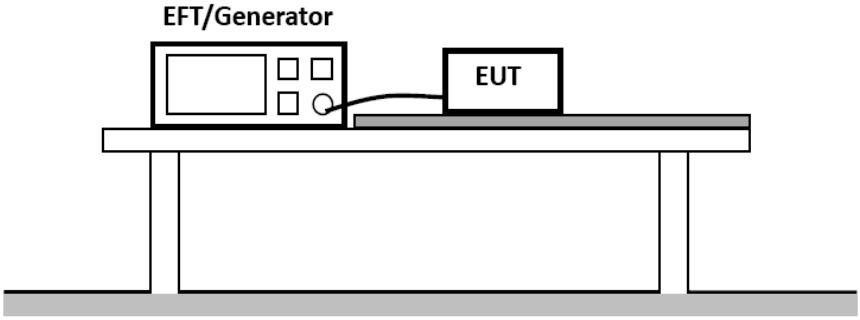
3.8. Electrical Fast Transient Immunity

3.8.1 Test Configuration



3.8.2 Test Standard

ETSI EN 301 489-1 V2.2.3 (2019-11)/ EN61000-4-4: 2012
Test level 2 at 1 kV

Test Level		
Open Circuit Output Test Voltage ±10 %		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1	0.5 kV	0.25 kV
2	1 kV	0.5 kV
3	2 kV	1 kV
4	4 kV	2 kV
X	Special	Special
Performance Criterion: B		

3.8.3 Test Procedure

The EUT is put on the table, which is 0.8 meter high above the ground. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

3.8.3.1 For input and output AC power ports:
The EUT is connected to the power mains by using a coupling device, which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 minutes.

3.8.3.2 For signal lines and control lines ports: No I/O ports. It's unnecessary to test.

3.8.3.3 For DC output line ports: It's unnecessary to test.

3.8.4 Test Results

PASS

Please refer to Appendix A.8 for Emission and Immunity test results.

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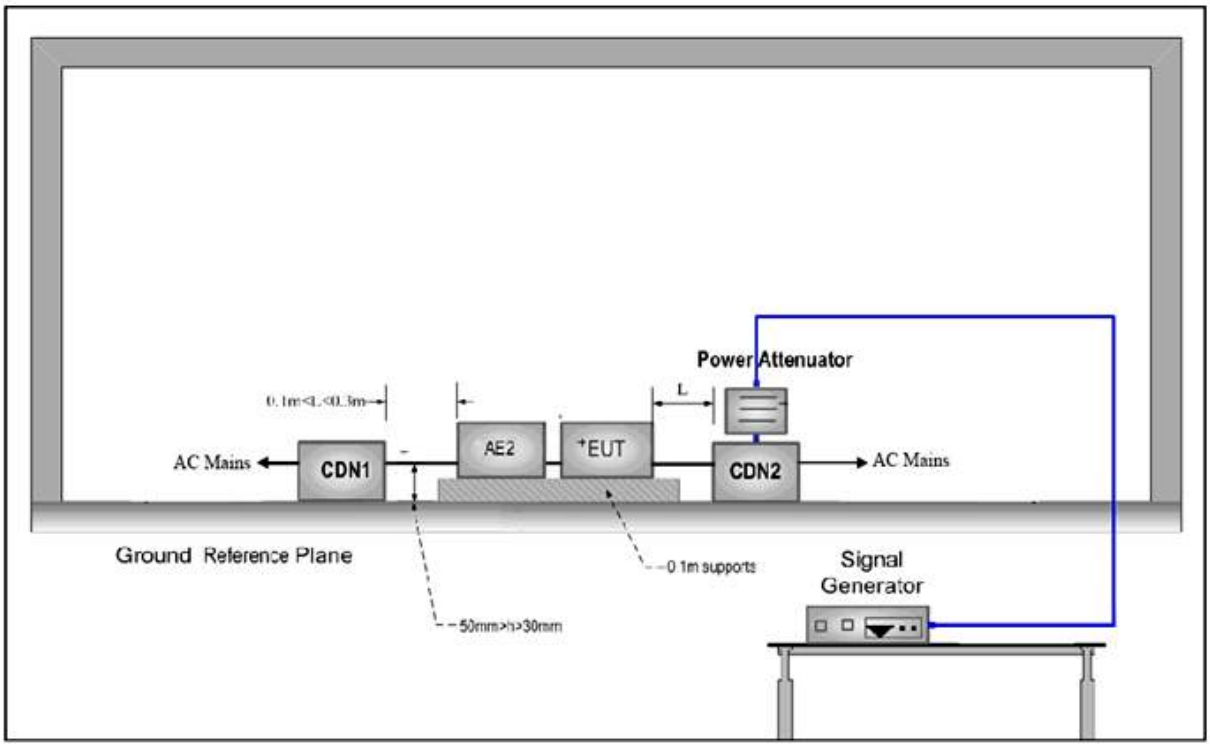
3.9. RF Common Mode

3.9.1 Test Configuration



3.9.2 Test Standard

ETSI EN 301 489-1 V2.2.3 (2019-11)/ EN 61000-4-6: 2014
Test level: 3V (r.m.s.) for 0.15MHz ~ 10MHz; 3V (r.m.s.) to 1V (r.m.s.) for 10MHz ~ 30MHz; 1V (r.m.s.) for 30MHz ~ 80MHz
Modulation type: AM
Modulation depth: 80%
Modulation signal: 1 kHz

Test Level	
Level	Voltage Level (r.m.s..) (V)
1	1
2	3
3	10
X	Special
Performance Criterion: A	

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3.9.3 Test Procedure

3.9.3.1 Let the EUT work in test mode and test it.

3.9.3.2 The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50mm (where possible).

3.9.3.3 The disturbance signal described below is injected to EUT through CDN.

3.9.3.4 The EUT operates within its operational mode(s) under intended climatic conditions after power on.

3.9.3.5 The frequency range is swept from 150kHz to 10MHz using 3V signal level, 10MHz to 30MHz using 3V to 1V signal level, 30MHz to 80MHz using 1V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.

3.9.3.6 The rate of sweep shall not exceed 1.5*10-3 decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.

3.9.3.7 Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

3.9.4 Test Results

PASS

Please refer to Appendix A.9 for Emission and Immunity test results.

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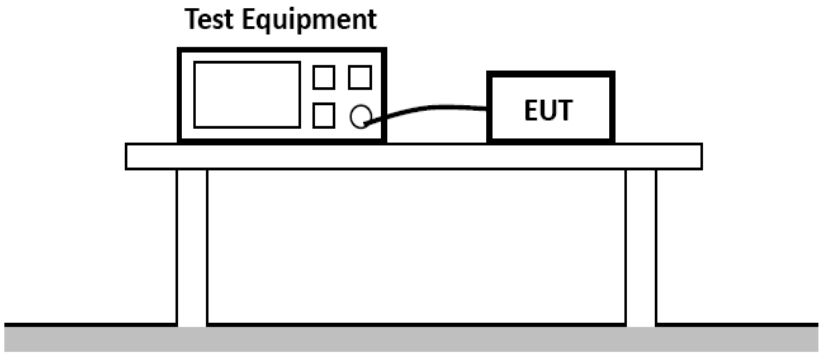
3.10. Surges, Line to Line and Line to Ground

3.10.1 Test Configuration



3.10.2 Test Standard

ETSI EN 301 489-1 V2.2.3 (2019-11) / EN 61000-4-5: 2014+A1:2017
L-N: Test level 2 at 1 kV
L-PE, N-PE Test Level 3 at 2kV

Test Level		
Open Circuit Output Test Voltage ±10 %		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1	0.5 kV	0.25 kV
2	1 kV	0.5 kV
3	2 kV	1 kV
4	4 kV	2 kV
X	Special	Special
Performance Criterion: B		

3.10.3 Test Procedure

Note:Vertification shall be performed on the generators and coupling/decoupling network prior to the test.This performance check can usually be limited to the existence of the surge pilse and its voltage and /or current

3.10.3.1 For line to line coupling mode, provide a 0.5 kV 1.2/50us voltage surge (at open-circuit condition).

3.10.3.2 At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.

3.10.3.3 Different phase angles are done individually.

3.10.3.4 Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

3.10.4 Test Results

PASS

Please refer to Appendix A.10 for Emission and Immunity test results.

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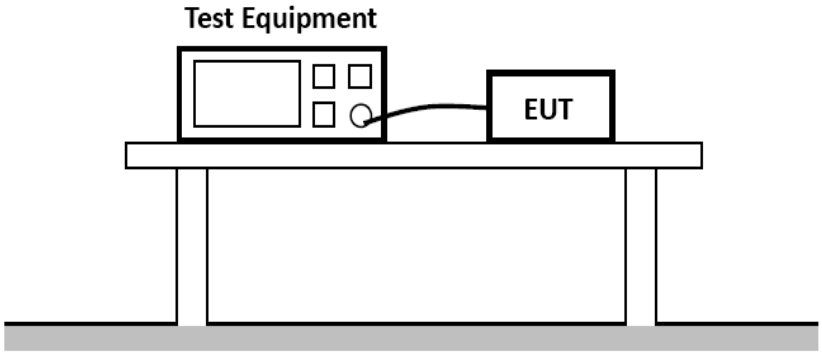
3.11. Voltage Dips/Interruptions Immunity Test

3.11.1 Test Configuration



3.11.2 Test Standard

ETSI EN 301 489-1 V2.2.3 (2019-11)/ EN 61000-4-11: 2004+A1:2017
Test levels and Performance Criterion

Test Level		
Voltage Reduction $\%U_T$	Voltage Dips $\%U_T$	Duration (in Period)
100	0	0.5
100	0	1
30	70	5
Voltage Reduction $\%U_T$	Voltage Dips $\%U_T$	Duration (in Period)
100	0	250
Performance Criterion: B&C		

3.11.3 Test Procedure

3.11.3.1 The interruption is introduced at selected phase angles with specified duration.

3.11.3.2 Record any degradation of performance.

3.11.4 Test Results

PASS

Please refer to Appendix A.11 for Emission and Immunity test results.

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4. GENERAL PERFORMANCE CRITERIA FOR IMMUNITY TEST

4.1. Performance criteria for Continuous phenomena applied to Transmitter (CT)

For equipment of type II or type III that requires a communication link that is maintained during the test, it shall be verified by appropriate means supplied by the manufacturer that the communication link is maintained during each individual exposure in the test sequence. Where the EUT is a transmitter, tests shall be repeated with the EUT in standby mode to ensure that any unintentional transmission does not occur.

4.2. Performance criteria for Transient phenomena applied to Transmitter (TT)

For equipment of type II or type III that requires a communication link that is maintained during the test, this shall be verified by appropriate means supplied by the manufacturer during each individual exposure in the test sequence. Where the EUT is a transmitter, tests shall be repeated with the EUT in standby mode to ensure that any unintentional transmission does not occur.

4.3. Performance criteria for Continuous phenomena applied to Receiver (CR)

For equipment of type II or III that requires a communication link that is maintained during the test, it shall be verified by appropriate means supplied by the manufacturer that the communication link is maintained during each individual exposure in the test sequence. Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

4.4. Performance criteria for Transient phenomena applied to Receiver (TR)

For equipment of type II or type III that requires a communication link that is maintained during the test, this shall be verified by appropriate means supplied by the manufacturer during each individual exposure in the test sequence. Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

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Performance criteria for ETSI EN 301 489-52 V1.3.1 (2024-11)

1) Performance criteria for Continuous phenomena applied to Transmitters (CT)

With a link established, during the test, the uplink speech output level shall be at least 35 dB less than the previously recorded reference levels, when measured through an audio band pass filter of width 200 Hz, centred on 1 kHz (audio breakthrough check).

NOTE: When there is a high-level background noise present, the filter bandwidth may be reduced down to a minimum of 40 Hz.

In idle mode, the transmitter shall not operate unintentionally.

At the conclusion of the test, the EUT shall operate as intended with no loss of user control functions or critical stored data, and the communication link shall have been maintained.

2) Performance criteria for Continuous phenomena applied to Receivers (CR)

During the test, the RXQUAL of the downlink shall not exceed the value of three, measured during each individual exposure in the test sequence.

In the case of narrow band responses, the procedure in clause 4.4.1 shall be followed.

During the test, the downlink speech output level shall be at least 35 dB less than the previously recorded reference levels, when measured through an audio band pass filter of width 200 Hz, centred on 1 kHz (audio breakthrough check).

NOTE: When there is a high-level background noise present, the filter bandwidth may be reduced down to a minimum of 40 Hz.

At the conclusion of the test, the EUT shall operate as intended with no loss of user control functions or critical stored data, and the communication link shall have been maintained.

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5. LIST OF MEASURING EQUIPMENT

LINE CONDUCTED EMISSION

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Software	Farad	EZ-EMC	Ver. EMC-CON 3A1.1+	N/A	N/A
2	EMI Test Receiver	R&S	ESR3	102312	2025-12-22	2026-12-21
3	Artificial Mains	R&S	ENV216	101479	2026-04-21	2027-04-20
4	Pulse Limiter	R&S	ESH3-Z2	102750	2026-04-21	2027-04-20
5	Impedance Stabilization Network	TESEQ	ISN T800	45130	2025-09-27	2026-09-26
6	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	166586	2025-09-27	2026-09-26

RADIATED DISTURBANCE

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Software	Farad	EZ-EMC	Ver. EMC-CON 3A1.1+	N/A	N/A
2	3m Semi Anechoic Chamber	MRDIANZI	966	MR009	2025-08-16	2028-08-15
3	Positioning Controller	Max-Full	MF7802BS	MF780208586	N/A	N/A
4	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2024-08-03	2027-08-02
5	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2024-07-13	2027-07-12
6	EMI Test Receiver	R&S	ESPI	101940	2026-04-21	2027-04-20
7	Low-frequency amplifier	SchwarzBECK	BBV9745	00253	2025-09-27	2026-09-26
8	High-frequency amplifier	JS Denki Pte	PA0118-43	JSPA21009	2025-09-27	2026-09-26
9	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2025-09-27	2026-09-26
10	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2026-04-21	2027-04-20
11	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	166586	2025-09-27	2026-09-26

VOLTAGE FLUCTUATION AND FLICKER/HARMONIC CURRENT EMISSIONS

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	HARMONICS&FLICKER MEASUREMENT SYSTEM	EVERFINE	HFM-3000	P630850CD1411116	2025-12-22	2026-12-21
2	HARMONICS&FLICKER TESTING POWER SOURCE	EVERFINE	HFS-4000	P624486CD1411124	2025-12-22	2026-12-21
3	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	166586	2025-09-27	2026-09-26

RF ELECTROMAGNETIC FIELD

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	RS Test Software	Tonscend	/	/	N/A	N/A
2	3m Semi Anechoic Chamber	MRDIANZI	966	MR009	2025-08-16	2028-08-15
3	MXG Vector Signal Generator	Agilent	N5182A	MY50144567(6G)	2025-12-05	2026-12-04
4	RF POWER AMPLIFIER	OPHIR	5225R	1052	2026-05-06	2027-05-05
5	RF POWER AMPLIFIER	YEAH TECH	YEAH TECH	25090001	2025-09-27	2026-09-26
6	Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-145	N/A	N/A
7	Stacked Mikrowellen Log.-Per Antenna	SCHWARZBECK	STLP 9149	9149-484	N/A	N/A
8	RS Electric field probe	narda	EP601	611WX80208	2025-10-31	2026-10-30
9	Sound Level meter	BK Precision	735	7350087310010020	2026-05-21	2027-05-20
10	Audio Analyzer	R&S	UPV	1146.2003K02-101721-UW	2025-09-27	2026-09-26

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Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
11	Mouse Simulation	Bruel & Kjaer	4227	A0304216	2026-05-21	2027-05-20
12	Ear Simulation and supply	Bruel & Kjaer	2669.4182.5935	A0305284	2026-05-21	2027-05-20
13	Acoustical Calibrators	Bruel & Kjaer	4231	A0304215	2026-05-21	2027-05-20
14	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	166586	2025-09-27	2026-09-26

ELECTROSTATIC DISCHARGE

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	ESD Simulator	emtest/AMETEK	esd NX30.1	111969	2026-05-19	2027-05-18
2	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	166586	2025-09-27	2026-09-26

ELECTRICAL FAST TRANSIENT IMMUNITY

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Immunity Simulative Generator	EM TEST	UCS500-M	0101-34	2026-05-06	2027-05-05
2	Capacitive coupling clamp	3CTEST	EFTC	EC0441098	2026-05-06	2027-05-05
3	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	166586	2025-09-27	2026-09-26

RF COMMON MODE

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Simulator	FRANKONIA	CIT-10/75	A126A1195	2026-05-06	2027-05-05
2	CDN	FRANKONIA	CDN-M2+M3	A2210177	2026-05-06	2027-05-05
3	6dB Attenuator	FRANKONIA	DAM25W	1172040	2026-05-06	2027-05-05
4	Electromagnetic coupling injection clamp	ZHINAN	ZN23203	14017	2026-05-06	2027-05-05
5	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	166586	2025-09-27	2026-09-26

SURGES, LINE TO LINE AND LINE TO GROUND

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Immunity Simulative Generator	EM TEST	UCS500-M	0101-34	2026-05-06	2027-05-05
2	Communication wave lightning generator	HTEC	HTSG 70	181701	2025-10-11	2026-10-10
3	Symmetrical data line coupling network	HTEC	HCN 8	182701	2025-10-11	2026-10-10
4	Data line decoupling network	HTEC	HDEC 8	182702	2025-10-11	2026-10-10
5	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	166586	2025-09-27	2026-09-26

VOLTAGE DIPS/INTERRUPTIONS IMMUNITY TEST

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Three phase power supply fault simulator	HTEC	HPFS 2003P	234711	2026-01-06	2027-01-05
2	Programmable AC fault power supply	HTEC	HV3P200T	234710	2026-01-06	2027-01-05
3	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	166586	2025-09-27	2026-09-26

Note: N/A means no calibration requirement

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6. PHOTOGRAPHS OF TEST SETUP

Please refer to separated files Appendix B for Photographs of Test Setup_EMC

7. PHOTOGRAPHS OF THE EUT

Please refer to separated files Appendix C for Photographs of The EUT.

----------THE END OF REPORT----------

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RADIO TEST REPORT

For

SHANGHAI MATIS ELECTRIC CO.,LTD.

Smart Metering RCBO/MCB

Test Model: MT61GR

Additional Model No.: Please Refer to Page 6

Prepared for	:	SHANGHAI MATIS ELECTRIC CO.,LTD.
Address	:	Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	Room 101/201, Building A, and Room 101/301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Tel	:	(+86)755-82591330
Fax	:	(+86)755-82591332
Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com
Date of receipt of test sample	:	August 19, 2026
Number of tested samples	:	2
Sample No.	:	A260817067-1, A260817067-2
Serial number	:	Prototype
Date of Test	:	August 19, 2026 ~ September 20, 2026
Date of Report	:	September 21, 2026

Shenzhen LCS Compliance Testing Laboratory Ltd.
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RADIO TEST REPORT ETSI EN 301 908-1 V15.2.1 (2023-01) & ETSI EN 301 908-13 V13.3.1 (2024-10)		
Report Reference No.	**:**	**LCSA08176105EB**
Date of Issue	:	September 21, 2026
Testing Laboratory Name	**:**	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	:	Room 101/201, Building A, and Room 101/301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure...	:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name	**:**	SHANGHAI MATIS ELECTRIC CO.,LTD.
Address	:	Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306
Test Specification		
Standard.....	:	ETSI EN 301 908-1 V15.2.1 (2023-01) ETSI EN 301 908-13 V13.3.1 (2024-10)
TRF Originator.....	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF.....	:	Dated 2017-06
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Test Item Description.	**:**	**Smart Metering RCBO/MCB**
Trade Mark	:	Matis/Matismart
Test Model.....	:	MT61GR
Ratings	:	Please Refer to Page 6
**Result ……..... **	**:**	**Pass**

Compiled by:	Supervised by:	Approved by:
Jack Liu	Kevin Huang	Gavin Liang
Jack Liu/ Administrator	Kevin Huang/ RF Manager	Gavin Liang/ Manager

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RADIO -- TEST REPORT

Test Report No. : LCSA08176105EB	September 21, 2026 Date of issue

Test Model.....	: MT61GR
EUT.....	: Smart Metering RCBO/MCB
Applicant.....	**: SHANGHAI MATIS ELECTRIC CO.,LTD.**
Address.....	: Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: SHANGHAI MATIS ELECTRIC CO.,LTD.**
Address.....	: Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306
Telephone.....	: /
Fax.....	: /
Factory.....	**: SHANGHAI MATIS ELECTRIC CO.,LTD.**
Address.....	: Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306
Telephone.....	: /
Fax.....	: /

Test Result	**Pass**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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Revision History

Report Version	Issue Date	Revision Content	Revised By
000	September 21, 2026	Initial Issue	---

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1. GENERAL INFORMATION

1.1. Product Description for Equipment Under Test (EUT)

EUT	: Smart Metering RCBO/MCB
Test Model	: MT61GR
Additional Model No.	: MT61GP
Model Declaration	: PCB board, structure and internal of these model(s) are the same, So no additional models were tested
Ratings	: Ue: 230/240VAC(2P); 400/415VAC(4P) 50/60Hz; In: 6/10/16/20/25/32/40/50/63A/80A/100A/125A (B/C/D-type); Icn=Ics=6,0kA IΔn= 30, 100, 300mA,500mA; Type -A & -AC; With time delay: type S Energy Accuracy: class 1
Hardware Version	: 1.0
Software Version	: 1.0
LTE	:
Support Band	: ☒E-UTRA Band 1(EU-Band) ☒E-UTRA Band 3(EU-Band) ☒E-UTRA Band 5(Non EU-Band) ☒E-UTRA Band 7(EU-Band) ☒E-UTRA Band 8(EU-Band) ☒E-UTRA Band 20(EU-Band) ☒E-UTRA Band 28(EU-Band) ☒E-UTRA Band 38(EU-Band) ☒E-UTRA Band 40(EU-Band) ☒E-UTRA Band 41(EU-Band)
LTE Release Version	: R8
FDD Band	: Uplink: E-UTRA Band 1: 1920MHz~1980MHz E-UTRA Band 3: 1710MHz~1785MHz E-UTRA Band 7: 2500MHz~2570MHz E-UTRA Band 8: 880MHz~915MHz E-UTRA Band 20: 832MHz~862MHz E-UTRA Band 28: 703MHz~748MHz Downlink: E-UTRA Band 1: 2110MHz~2170MHz E-UTRA Band 3: 1805MHz~1880MHz E-UTRA Band 7: 2620MHz~2690MHz E-UTRA Band 8: 925MHz~960MHz E-UTRA Band 20: 791MHz~821MHz E-UTRA Band 28: 758MHz~803MHz
TDD Band	: E-UTRA Band 38: 2570MHz~2620MHz E-UTRA Band 40: 2300MHz~2400MHz E-UTRA Band 41: 2496-2690MHz
Type Of Modulation	: QPSK/16QAM
Antenna Description	: External Antenna -0.93dBi (max.) For E-UTRA Band 1 -0.22dBi (max.) For E-UTRA Band 3

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-3.29dBi (max.) For E-UTRA Band 7
-1.41dBi (max.) For E-UTRA Band 8
-1.15dBi (max.) For E-UTRA Band 20
-4.31dBi (max.) For E-UTRA Band 28
-1.92dBi (max.) For E-UTRA Band 38
-1.73dBi (max.) For E-UTRA Band 40
0.31dBi (max.) For E-UTRA Band 41

Power Class : Class 3

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1.2. Support Equipment List

Manufacturer	Description	Model	Serial Number	Certificate
---	---	---	---	---

1.3. External I/O

I/O Port Description	Quantity	Cable
---	---	---

1.4. Objective

Standard Referenced	Standard Title	Standard Version
ETSI EN 301 908-1	IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 1: Introduction and common requirements; Release 15	V15.2.1 (2023-01)
ETSI EN 301 908-13	IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 13: Evolved Universal Terrestrial Radio Access (E-UTRA) User Equipment (UE)	V13.3.1 (2024-10)
ETSI TS 136 521-1	LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Conformance testing (3GPP TS 36.521-1 version 17.7.0 Release 17)	V17.7.0 (2023-07)

The objective is to determine compliance with ETSI EN 301 908-1 V15.2.1 (2023-01) & ETSI EN 301 908-13 V13.3.1 (2024-10).

1.5. Test Conditions

Conditions	Temperature	Voltage
Normal	21-25℃	AC 230V
Low extreme Temperature/Low extreme Voltage (TL/VL);	0℃	AC 207V
Low extreme Temperature/High extreme Voltage (TL/VH);	0℃	AC 240V
High extreme Temperature/Low extreme Voltage (TH/VL);	45℃	AC 207V
High extreme Temperature/High extreme Voltage (TH/VH).	45℃	AC 240V
Note1: For all conditions, the humidity range is: 40-75%, the pressure range is 86-106kPa. The High Voltage AC 240V and Low Voltage AC 207V was declared by manufacturer		

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1.6. Description Of Test Mode

The following operating modes were applied for the related test items. For radiated measurement, the test was performed with EUT in X, Y, Z position and the worse case was found when EUT in Y position. All test modes were tested, only the result of the worst case was recorded in the report.

Band	Bandwidth (MHz)						Modulation		RB #			Test Channel		
	1.4	3	5	10	15	20	QPSK	16QAM	1	Part	Full	L	M	H
1	N/A	N/A	Y	/	/	Y	Y	Y	Y	Y	Y	Y	Y	Y
3	Y	/	Y	/	/	Y	Y	Y	Y	Y	Y	Y	Y	Y
7	N/A	N/A	Y	/	/	Y	Y	Y	Y	Y	Y	Y	Y	Y
8	Y	/	Y	Y	N/A	N/A	Y	Y	Y	Y	Y	Y	Y	Y
20	N/A	N/A	Y	/	/	Y	Y	Y	Y	Y	Y	Y	Y	Y
28	N/A	Y	Y	/	/	Y	Y	Y	Y	Y	Y	Y	Y	Y
38	N/A	N/A	Y	/	/	Y	Y	Y	Y	Y	Y	Y	Y	Y
40	N/A	N/A	Y	/	/	Y	Y	Y	Y	Y	Y	Y	Y	Y
41	N/A	N/A	Y	/	/	Y	Y	Y	Y	Y	Y	Y	Y	Y

Note:
1)The mark "**Y**" means that this configuration is chosen for testing.
2)The mark "**/**" means that this bandwidth is supported but is not chosen for testing.
3)The mark "**N/A**" means that this bandwidth is not supported.

1.7. Measurement Uncertainty (95% confidence levels, k=2)

Test Item		Uncertainty
Radio Frequency	:	0.9×10^{-4}
Total RF Power, Conducted	:	1.0 dB
RF Power Density, Conducted	:	1.8 dB
Spurious Emissions, Conducted	:	1.8 dB
All Emissions, Radiated	:	3.1 dB
Temperature	:	0.5℃
Humidity	:	1 %
DC And Low Frequency Voltages	:	1 %

1.8. Description of Test Facility

NVLAP Accreditation Code is 600167-0.
FCC Designation Number is CN5024.
CAB identifier is CN0071.
CNAS Registration Number is L4595.

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2. SYSTEM TEST CONFIGURATION

2.1. Justification

N/A

2.2. EUT Exercise Software

N/A

2.3. Special Accessories

The special accessories were supplied by Shenzhen LCS Compliance Testing Laboratory Ltd.

2.4. Block Diagram/Schematics

Please refer to the related document.

2.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

2.6. Test Setup

Please refer to the test setup photo.

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3. SUMMARY OF TEST RESULTS

Test Engineer	:	Jerry Chu
Temperature/ Humidity:	:	24.1℃/ 52.2%

Reference Clause No. (ETSI EN 301 908-13)	Description of Test Items	Result					
		E-UTRA Band					
		Band 1	Band 3	Band 7	Band 8	Band 20	Band 28
4.2.2	Transmitter Maximum Output Power						
	Normal	Pass	Pass	Pass	Pass	Pass	Pass
	TL/VL	Pass	Pass	Pass	Pass	Pass	Pass
	TL/VH	Pass	Pass	Pass	Pass	Pass	Pass
	TH/VL	Pass	Pass	Pass	Pass	Pass	Pass
	TH/VH	Pass	Pass	Pass	Pass	Pass	Pass
4.2.5	Transmitter Minimum Output Power						
	Normal	Pass	Pass	Pass	Pass	Pass	Pass
	TL/VL	Pass	Pass	Pass	Pass	Pass	Pass
	TL/VH	Pass	Pass	Pass	Pass	Pass	Pass
	TH/VL	Pass	Pass	Pass	Pass	Pass	Pass
	TH/VH	Pass	Pass	Pass	Pass	Pass	Pass
4.2.3	Transmitter Spectrum Emission Mask						
	Normal	Pass	Pass	Pass	Pass	Pass	Pass
4.2.11	Transmitter Adjacent Channel Leakage Power Ratio						
	Normal	Pass	Pass	Pass	Pass	Pass	Pass
	TL/VL	Pass	Pass	Pass	Pass	Pass	Pass
	TL/VH	Pass	Pass	Pass	Pass	Pass	Pass
	TH/VL	Pass	Pass	Pass	Pass	Pass	Pass
	TH/VH	Pass	Pass	Pass	Pass	Pass	Pass
4.2.4	Transmitter Spurious Emissions						
	Normal	Pass	Pass	Pass	Pass	Pass	Pass
4.2.10	Receiver Spurious Emissions						
	Normal	Pass	Pass	Pass	Pass	Pass	Pass
4.2.6	Receiver Adjacent Channel Selectivity (ACS)						
	Normal	Pass	Pass	Pass	Pass	Pass	Pass
4.2.7	Receiver Blocking Characteristics						
	Normal	Pass	Pass	Pass	Pass	Pass	Pass
4.2.8	Receiver Spurious Response						
	Normal	Pass	Pass	Pass	Pass	Pass	Pass
4.2.9	Receiver Intermodulation Characteristics						
	Normal	Pass	Pass	Pass	Pass	Pass	Pass

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4.2.12	Receiver Reference Sensitivity Level						
	Normal	Pass	Pass	Pass	Pass	Pass	Pass
	TL/VL	Pass	Pass	Pass	Pass	Pass	Pass
	TL/VH	Pass	Pass	Pass	Pass	Pass	Pass
	TH/VL	Pass	Pass	Pass	Pass	Pass	Pass
	TH/VH	Pass	Pass	Pass	Pass	Pass	Pass

Reference Clause No. (ETSI EN 301 908-1)	Description of Test Items	Result					
		E-UTRA Band					
		Band 1	Band 3	Band 7	Band 8	Band 20	Band 28
4.2.2	Radiated emissions (UE)						
	Normal	Pass	Pass	Pass	Pass	Pass	Pass
4.2.4	Control and monitoring functions (UE)						
	Normal	Pass	Pass	Pass	Pass	Pass	Pass

Reference Clause No. (ETSI EN 301 908-13)	Description of Test Items	Result		
		E-UTRA Band		
		Band 38	Band 40	Band 41
4.2.2	Transmitter Maximum Output Power			
	Normal	Pass	Pass	Pass
	TL/VL	Pass	Pass	Pass
	TL/VH	Pass	Pass	Pass
	TH/VL	Pass	Pass	Pass
	TH/VH	Pass	Pass	Pass
4.2.5	Transmitter Minimum Output Power			
	Normal	Pass	Pass	Pass
	TL/VL	Pass	Pass	Pass
	TL/VH	Pass	Pass	Pass
	TH/VL	Pass	Pass	Pass
	TH/VH	Pass	Pass	Pass
4.2.3	Transmitter Spectrum Emission Mask			
	Normal	Pass	Pass	Pass
4.2.11	Transmitter Adjacent Channel Leakage Power Ratio			
	Normal	Pass	Pass	Pass
	TL/VL	Pass	Pass	Pass
	TL/VH	Pass	Pass	Pass
	TH/VL	Pass	Pass	Pass
	TH/VH	Pass	Pass	Pass
4.2.4	Transmitter Spurious Emissions			
	Normal	Pass	Pass	Pass

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4.2.10	Receiver Spurious Emissions			
	Normal	Pass	Pass	Pass
4.2.6	Receiver Adjacent Channel Selectivity (ACS)			
	Normal	Pass	Pass	Pass
4.2.7	Receiver Blocking Characteristics			
	Normal	Pass	Pass	Pass
4.2.8	Receiver Spurious Response			
	Normal	Pass	Pass	Pass
4.2.9	Receiver Intermodulation Characteristics			
	Normal	Pass	Pass	Pass
4.2.12	Receiver Reference Sensitivity Level			
	Normal	Pass	Pass	Pass
	TL/VL	Pass	Pass	Pass
	TL/VH	Pass	Pass	Pass
	TH/VL	Pass	Pass	Pass
	TH/VH	Pass	Pass	Pass
4.2.2	Radiated emissions (UE)			
	Normal	Pass	Pass	Pass
4.2.4	Control and monitoring functions (UE)			
	Normal	Pass	Pass	Pass

Reference Clause No. (ETSI EN 301 908-1)	**Description of Test Items**	**Result**		
		E-UTRA Band		
		Band 38	**Band 40**	**Band 41**
4.2.2	Radiated emissions (UE)			
	Normal	Pass	Pass	Pass
4.2.4	Control and monitoring functions (UE)			
	Normal	Pass	Pass	Pass

***Note:
Result: Describes test result of Test Case.
Pass: Test Case passed on specified conformance test platform.
Normal(TN/VN): Normal temperature – 25℃; Normal voltage. – AC 230V
TH: High extreme Temperature – +45℃
VH: High extreme Voltage – AC 240V
TL: Low extreme Temperature – 0℃
VL: Low extreme Voltage – AC 207V
N/A: Not applicable.
—: Not test.

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4. LIST OF MEASURING EQUIPMENT

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	LTE Test Software	Tonscend	JS1120-1	N/A	N/A	N/A
2	RF Control Unit	Tonscend	JS0806-1	158060009	2025-11-07	2026-11-06
3	MXA Signal Analyzer	Agilent	N9020A	MY23311067	2026-04-21	2027-04-20
4	DC Power Supply	Agilent	E3642A	N/A	2025-09-27	2026-09-26
5	MXG Vector Signal Generator	Agilent	N5182A	MY47071151	2026-04-21	2027-04-20
6	PSG Analog Signal Generator	Agilent	E8257D	MY46410184	2025-12-05	2026-12-04
7	Temperature & Humidity Chamber	Baro	/	/	2026-05-06	2027-05-05
8	EMI Test Software	Farad	EZ-EMC	Ver. EMC-CON 3A1.1+	N/A	N/A
9	3m Semi Anechoic Chamber	MRDIANZI	966	MR009	2025-08-16	2028-08-15
10	Positioning Controller	Max-Full	MF7802BS	MF780208586	N/A	N/A
11	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2024-07-13	2027-07-12
12	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2024-08-03	2027-08-02
13	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2024-07-13	2027-07-12
14	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2024-07-13	2027-07-12
15	Broadband Preamplifier	SCHWARZBECK	BBV9719	9719-025	2024-07-30	2027-07-29
16	EMI Test Receiver	R&S	ESR3	101181	2026-05-06	2027-05-05
17	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2026-04-21	2027-04-20
18	Low-frequency amplifier	SchwarzZBECK	BBV9745	00253	2025-09-27	2026-09-26
19	High-frequency amplifier	JS Denki Pte	PA0118-43	JSPA21009	2025-09-27	2026-09-26
20	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	166586	2025-09-27	2026-09-26
21	RF Filter	Micro-Tronics	BRC50718	017	2025-09-27	2026-09-26
22	RF Filter	Micro-Tronics	BRC50719	011	2025-09-28	2026-09-27
23	RF Filter	Micro-Tronics	BRC50720	011	2025-09-27	2026-09-26
24	RF Filter	Micro-Tronics	BRC50721	013	2025-09-27	2026-09-26
25	RF Filter	Micro-Tronics	BRM50702	S/N-195	2026-04-21	2027-04-20
26	6dB Attenuator	/	100W/6dB	1172040	2026-04-21	2027-04-20
27	3dB Attenuator	/	2N-3dB	/	2025-09-28	2026-09-27

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5. PHOTOGRAPHS OF TEST SETUP

Please refer to separated files Appendix D for Photographs of Test Setup_RF.

6. PHOTOGRAPHS OF THE EUT

Please refer to separated files Appendix C for Photographs of The EUT.

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Annex A

Transmitter maximum output power

The Conducted Power Measurement Result for LTE Band					
Test Result for LTE Band 1					
Channel Bandwidth	Channel	RB Allocation		Average Power (dBm, QPSK)	Limit (dBm)
		RB Size	RB Offset		
5MHz	Low Range	1	1RB#0	23.20	20.3~25.7
			8RB#0	23.26	20.3~25.7
	Mid Range	1	1RB#0	23.28	20.3~25.7
			8RB#0	23.15	20.3~25.7
	High Range	1	1RB#24	23.54	20.3~25.7
			8RB#17	23.39	20.3~25.7
20MHz	Low Range	1	1RB#0	23.16	20.3~25.7
			18RB#0	23.25	20.3~25.7
	Mid Range	1	1RB#0	23.19	20.3~25.7
			18RB#0	23.45	20.3~25.7
	High Range	1	1RB#99	23.36	20.3~25.7
			18RB#82	23.38	20.3~25.7

The Conducted Power Measurement Result for LTE Band					
Test Result for LTE Band 3					
Channel Bandwidth	Channel	RB Allocation		Average Power (dBm, QPSK)	Limit (dBm)
		RB Size	RB Offset		
1.4MHz	Low Range	1	1RB#0	23.77	20.3~25.7
	Mid Range	1	1RB#0	23.74	20.3~25.7
	High Range	1	1RB#0	23.72	20.3~25.7
			5RB#0	23.69	20.3~25.7
5MHz	Low Range	1	1RB#0	23.75	20.3~25.7
			1RB#24	23.62	20.3~25.7
	Mid Range	1	1RB#0	23.49	20.3~25.7
			1RB#24	23.48	20.3~25.7
	High Range	1	1RB#0	23.45	20.3~25.7
			1RB#24	22.95	20.3~25.7
			8RB#0	23.03	20.3~25.7
20MHz	Low Range	1	1RB#0	23.62	20.3~25.7
			1RB#99	23.11	20.3~25.7
	Mid Range	1	1RB#0	23.29	20.3~25.7
			1RB#99	23.18	20.3~25.7
	High Range	1	1RB#0	23.33	20.3~25.7
			1RB#99	22.98	20.3~25.7
			18RB#0	22.97	20.3~25.7

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The Conducted Power Measurement Result for LTE Band

Test Result for LTE Band 7

Channel Bandwidth	Channel	RB Allocation		Average Power (dBm, QPSK)	Limit (dBm)
		RB Size	RB Offset		
5MHz	Low Range	1	1RB#0	23.79	20.3~25.7
			1RB#24	23.84	20.3~25.7
	Mid Range	1	1RB#0	23.88	20.3~25.7
			1RB#24	23.82	20.3~25.7
	High Range	1	1RB#0	23.96	20.3~25.7
			1RB#24	23.74	20.3~25.7
			8RB#0	23.74	20.3~25.7
20MHz	Low Range	1	1RB#0	23.71	20.3~25.7
			1RB#99	23.67	20.3~25.7
	Mid Range	1	1RB#0	23.78	20.3~25.7
			1RB#99	23.75	20.3~25.7
	High Range	1	1RB#0	23.75	20.3~25.7
			1RB#99	23.60	20.3~25.7
			18RB#0	23.45	20.3~25.7

The Conducted Power Measurement Result for LTE Band

Test Result for LTE Band 8

Channel Bandwidth	Channel	RB Allocation		Average Power (dBm, QPSK)	Limit (dBm)
		RB Size	RB Offset		
1.4MHz	Low Range	1	1RB#0	24.30	20.3~25.7
	Mid Range	1	1RB#0	24.25	20.3~25.7
	High Range	1	1RB#0	24.29	20.3~25.7
			5RB#0	24.00	20.3~25.7
5MHz	Low Range	1	1RB#0	24.32	20.3~25.7
			1RB#24	24.26	20.3~25.7
	Mid Range	1	1RB#0	24.28	20.3~25.7
			1RB#24	24.17	20.3~25.7
	High Range	1	1RB#0	24.28	20.3~25.7
			1RB#24	24.06	20.3~25.7
			8RB#0	23.99	20.3~25.7
10MHz	Low Range	1	1RB#0	24.10	20.3~25.7
			1RB#49	24.04	20.3~25.7
	Mid Range	1	1RB#0	23.98	20.3~25.7
			1RB#49	23.94	20.3~25.7
	High Range	1	1RB#0	24.06	20.3~25.7
			1RB#49	23.90	20.3~25.7
			12RB#0	23.72	20.3~25.7

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The Conducted Power Measurement Result for LTE Band

Test Result for LTE Band 20

Channel Bandwidth	Channel	RB Allocation		Average Power (dBm, QPSK)	Limit (dBm)
		RB Size	RB Offset		
5MHz	Low Range	1	1RB#0	23.80	20.3~25.0
			1RB#24	23.79	20.3~25.0
	Mid Range	1	1RB#0	23.67	20.3~25.0
			1RB#24	23.60	20.3~25.0
	High Range	1	1RB#0	23.76	20.3~25.0
			1RB#24	23.52	20.3~25.0
			8RB#0	23.62	20.3~25.0
20MHz	Low Range	1	1RB#0	23.65	20.3~25.0
			1RB#99	23.86	20.3~25.0
	Mid Range	1	1RB#0	23.71	20.3~25.0
			1RB#99	23.49	20.3~25.0
	High Range	1	1RB#0	23.81	20.3~25.0
			1RB#99	23.51	20.3~25.0
			18RB#0	23.26	20.3~25.0

The Conducted Power Measurement Result for LTE Band

Test Result for LTE Band 28

Channel Bandwidth	Channel	RB Allocation		Average Power (dBm, QPSK)	Limit (dBm)
		RB Size	RB Offset		
3MHz	Low Range	1	1RB#0	24.52	19.8~25.0
			4RB#0	24.57	19.8~25.0
	Mid Range	1	1RB#0	24.58	19.8~25.0
			4RB#0	24.53	19.8~25.0
	High Range	1	1RB#14	24.60	19.8~25.0
			4RB#11	24.66	19.8~25.0
5MHz	Low Range	1	1RB#0	24.50	19.8~25.0
			8RB#0	24.59	19.8~25.0
	Mid Range	1	1RB#0	24.53	19.8~25.0
			8RB#0	24.45	19.8~25.0
	High Range	1	1RB#24	24.56	19.8~25.0
			8RB#17	24.64	19.8~25.0
20MHz	Low Range	1	1RB#0	24.44	19.8~25.0
			18RB#0	24.51	19.8~25.0
	Mid Range	1	1RB#0	24.26	19.8~25.0
			18RB#0	24.50	19.8~25.0
	High Range	1	1RB#99	24.50	19.8~25.0
			18RB#82	24.43	19.8~25.0

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The Conducted Power Measurement Result for LTE Band

Test Result for LTE Band 38

Channel Bandwidth	Channel	RB Allocation		Average Power (dBm, QPSK)	Limit (dBm)
		RB Size	RB Offset		
5MHz	Low Range	1	1RB#0	23.66	20.3~25.7
			8RB#0	23.75	20.3~25.7
	Mid Range	1	1RB#0	24.07	20.3~25.7
			8RB#0	24.07	20.3~25.7
	High Range	1	1RB#24	23.82	20.3~25.7
			8RB#17	23.87	20.3~25.7
20MHz	Low Range	1	1RB#0	23.69	20.3~25.7
			18RB#0	23.75	20.3~25.7
	Mid Range	1	1RB#0	23.98	20.3~25.7
			18RB#0	23.99	20.3~25.7
	High Range	1	1RB#99	23.61	20.3~25.7
			18RB#82	23.71	20.3~25.7

The Conducted Power Measurement Result for LTE Band

Test Result for LTE Band 40

Channel Bandwidth	Channel	RB Allocation		Average Power (dBm, QPSK)	Limit (dBm)
		RB Size	RB Offset		
5MHz	Low Range	1	1RB#0	22.42	20.3~25.0
			8RB#0	22.58	20.3~25.0
	Mid Range	1	1RB#0	22.14	20.3~25.0
			8RB#0	22.25	20.3~25.0
	High Range	1	1RB#24	22.23	20.3~25.0
			8RB#17	22.34	20.3~25.0
20MHz	Low Range	1	1RB#0	22.42	20.3~25.0
			18RB#0	22.70	20.3~25.0
	Mid Range	1	1RB#0	22.57	20.3~25.0
			18RB#0	22.56	20.3~25.0
	High Range	1	1RB#99	22.30	20.3~25.0
			18RB#82	22.58	20.3~25.0

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The Conducted Power Measurement Result for LTE Band

Test Result for LTE Band 41

Channel Bandwidth	Channel	RB Allocation		Average Power (dBm, QPSK)	Limit (dBm)
		RB Size	RB Offset		
5MHz	Low Range	1	1RB#0	23.44	20.3~25.7
			1RB#24	23.49	20.3~25.7
	Mid Range	1	1RB#0	24.07	20.3~25.7
			1RB#24	23.99	20.3~25.7
	High Range	1	1RB#0	24.11	20.3~25.7
			1RB#24	23.52	20.3~25.7
			12RB#0	23.41	20.3~25.7
20MHz	Low Range	1	1RB#0	23.47	20.3~25.7
			1RB#99	23.50	20.3~25.7
	Mid Range	1	1RB#0	23.91	20.3~25.7
			1RB#99	23.77	20.3~25.7
	High Range	1	1RB#0	23.97	20.3~25.7
			1RB#99	23.60	20.3~25.7
			50RB#0	23.28	20.3~25.7

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Annex of Radiated spurious emission

Radiated spurious emissions - MS allocated a channel(Worst Case)

LTE Band 1(5MHz, RB allocation=25): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
59.96	Horizontal	-74.48	-36.00	Pass
824.15	H	-80.37	-36.00	
3900.32	H	-63.62	-30.00	
5853.58	H	-59.01	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
57.92	Vertical	-78.12	-36.00	Pass
730.03	V	-71.58	-36.00	
3903.05	V	-70.33	-30.00	
5853.46	V	-53.95	-30.00	

LTE Band 1(5MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
54.68	Horizontal	-77.85	-36.00	Pass
948.15	H	-70.67	-36.00	
3903.91	H	-60.41	-30.00	
5851.25	H	-59.36	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
58.74	Vertical	-76.65	-36.00	Pass
733.38	V	-77.09	-36.00	
3902.39	V	-69.77	-30.00	
5855.76	V	-52.69	-30.00	

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LTE Band 1(20MHz, RB allocation=100): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
51.82	Horizontal	-73.32	-36.00	Pass
761.73	H	-72.74	-36.00	
3905.02	H	-69.68	-30.00	
5855.81	H	-53.64	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
51.94	Vertical	-75.12	-36.00	Pass
989.17	V	-73.17	-36.00	
3903.84	V	-65.64	-30.00	
5853.80	V	-52.14	-30.00	

LTE Band 1(20MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
55.80	Horizontal	-72.89	-36.00	Pass
926.09	H	-72.54	-36.00	
3904.17	H	-63.24	-30.00	
5851.07	H	-58.70	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
58.04	Vertical	-70.08	-36.00	Pass
703.19	V	-73.33	-36.00	
3901.23	V	-68.08	-30.00	
5851.14	V	-56.51	-30.00	

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LTE Band 3(1.4MHz, RB allocation=6): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
57.81	Horizontal	-78.21	-36.00	Pass
922.75	H	-78.05	-36.00	
3503.78	H	-62.80	-30.00	
5252.67	H	-56.42	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
55.74	Vertical	-78.30	-36.00	Pass
761.25	V	-76.97	-36.00	
3505.47	V	-67.98	-30.00	
5253.36	V	-53.30	-30.00	

LTE Band 3(1.4MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
57.60	Horizontal	-71.28	-36.00	Pass
879.65	H	-71.15	-36.00	
3502.85	H	-63.85	-30.00	
5250.36	H	-57.71	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
50.45	Vertical	-70.80	-36.00	Pass
890.72	V	-80.65	-36.00	
3504.70	V	-60.17	-30.00	
5251.36	V	-54.19	-30.00	

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LTE Band 3(5MHz, RB allocation=25): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
50.44	Horizontal	-70.94	-36.00	Pass
895.67	H	-72.48	-36.00	
3505.18	H	-63.23	-30.00	
5250.83	H	-51.87	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
55.25	Vertical	-76.41	-36.00	Pass
852.55	V	-77.61	-36.00	
3502.33	V	-60.45	-30.00	
5252.42	V	-60.67	-30.00	

LTE Band 3(5MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
59.05	Horizontal	-73.52	-36.00	Pass
909.02	H	-72.92	-36.00	
3503.93	H	-70.27	-30.00	
5252.84	H	-50.14	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
58.08	Vertical	-76.96	-36.00	Pass
996.78	V	-77.13	-36.00	
3500.25	V	-70.92	-30.00	
5251.09	V	-50.90	-30.00	

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LTE Band 3(20MHz, RB allocation=100): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
52.67	Horizontal	-80.87	-36.00	Pass
919.75	H	-77.50	-36.00	
3503.56	H	-62.72	-30.00	
5255.36	H	-51.19	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
55.29	Vertical	-74.03	-36.00	Pass
982.20	V	-73.93	-36.00	
3503.60	V	-68.76	-30.00	
5253.86	V	-53.53	-30.00	

LTE Band 3(20MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
60.66	Horizontal	-70.14	-36.00	Pass
912.72	H	-73.20	-36.00	
3503.30	H	-67.33	-30.00	
5254.41	H	-51.98	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
52.04	Vertical	-79.77	-36.00	Pass
719.42	V	-78.35	-36.00	
3501.71	V	-63.38	-30.00	
5250.78	V	-54.60	-30.00	

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LTE Band 7(5MHz, RB allocation=25): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
52.65	Horizontal	-78.32	-36.00	Pass
990.88	H	-76.65	-36.00	
5073.01	H	-63.25	-30.00	
7686.74	H	-52.91	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
58.45	Vertical	-74.17	-36.00	Pass
793.77	V	-72.69	-36.00	
5073.00	V	-68.42	-30.00	
7688.18	V	-50.55	-30.00	

LTE Band 7(5MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
51.73	Horizontal	-72.96	-36.00	Pass
853.89	H	-70.54	-36.00	
5072.45	H	-67.70	-30.00	
7686.64	H	-60.57	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
50.76	Vertical	-76.82	-36.00	Pass
735.14	V	-73.70	-36.00	
5075.09	V	-69.85	-30.00	
7686.70	V	-53.57	-30.00	

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LTE Band 7(20MHz, RB allocation=100): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
59.91	Horizontal	-72.01	-36.00	Pass
719.04	H	-73.33	-36.00	
5073.68	H	-65.65	-30.00	
7686.61	H	-51.68	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
55.58	Vertical	-78.20	-36.00	Pass
943.79	V	-75.60	-36.00	
5074.21	V	-64.28	-30.00	
7690.23	V	-51.95	-30.00	

LTE Band 7(20MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
53.63	Horizontal	-75.75	-36.00	Pass
926.30	H	-77.52	-36.00	
5075.72	H	-64.05	-30.00	
7687.24	H	-58.37	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
60.79	Vertical	-71.09	-36.00	Pass
778.10	V	-78.08	-36.00	
5070.45	V	-68.84	-30.00	
7688.67	V	-52.27	-30.00	

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LTE Band 8(1.4MHz, RB allocation=6): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
59.94	Horizontal	-80.32	-36.00	Pass
820.68	H	-70.14	-36.00	
1790.71	H	-66.22	-30.00	
2692.41	H	-59.10	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
51.29	Vertical	-74.77	-36.00	Pass
769.86	V	-70.08	-36.00	
1795.21	V	-65.19	-30.00	
2692.15	V	-50.90	-30.00	

LTE Band 8(1.4MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
51.94	Horizontal	-80.85	-36.00	Pass
726.10	H	-79.55	-36.00	
1797.19	H	-61.83	-30.00	
2695.74	H	-56.73	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
51.27	Vertical	-79.77	-36.00	Pass
808.60	V	-74.91	-36.00	
1796.72	V	-60.62	-30.00	
2694.67	V	-50.08	-30.00	

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LTE Band 8(5MHz, RB allocation=25): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
59.31	Horizontal	-70.14	-36.00	Pass
737.99	H	-78.90	-36.00	
1790.03	H	-63.83	-30.00	
2694.35	H	-59.38	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
54.87	Vertical	-74.13	-36.00	Pass
955.48	V	-76.96	-36.00	
1799.96	V	-65.96	-30.00	
2691.78	V	-53.21	-30.00	

LTE Band 8(5MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
53.81	Horizontal	-71.01	-36.00	Pass
814.28	H	-72.04	-36.00	
1792.63	H	-70.70	-30.00	
2690.30	H	-51.18	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
52.67	Vertical	-70.65	-36.00	Pass
785.32	V	-75.37	-36.00	
1797.05	V	-65.99	-30.00	
2694.26	V	-53.61	-30.00	

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LTE Band 8(10MHz, RB allocation=50): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
51.77	Horizontal	-78.62	-36.00	Pass
832.32	H	-75.31	-36.00	
1791.18	H	-63.13	-30.00	
2693.19	H	-54.20	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
57.35	Vertical	-75.78	-36.00	Pass
814.46	V	-75.91	-36.00	
1790.46	V	-68.53	-30.00	
2694.07	V	-54.54	-30.00	

LTE Band 8(10MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
51.88	Horizontal	-78.44	-36.00	Pass
873.17	H	-75.51	-36.00	
1791.29	H	-66.76	-30.00	
2694.28	H	-59.85	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
54.72	Vertical	-79.98	-36.00	Pass
852.99	V	-70.30	-36.00	
1793.71	V	-66.60	-30.00	
2695.63	V	-57.77	-30.00	

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LTE Band 20(5MHz, RB allocation=25): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
53.06	Horizontal	-73.86	-36.00	Pass
993.61	H	-72.61	-36.00	
1695.20	H	-67.41	-30.00	
2544.97	H	-50.57	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
53.30	Vertical	-76.81	-36.00	Pass
995.78	V	-78.88	-36.00	
1693.36	V	-62.81	-30.00	
2543.30	V	-55.20	-30.00	

LTE Band 20(5MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
53.49	Horizontal	-76.95	-36.00	Pass
751.18	H	-76.02	-36.00	
1694.96	H	-60.18	-30.00	
2545.86	H	-56.23	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
50.34	Vertical	-76.02	-36.00	Pass
950.49	V	-70.93	-36.00	
1699.89	V	-61.13	-30.00	
2541.83	V	-57.10	-30.00	

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LTE Band 20(20MHz, RB allocation=100): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
59.12	Horizontal	-79.98	-36.00	Pass
943.82	H	-70.89	-36.00	
1694.94	H	-63.10	-30.00	
2544.79	H	-56.02	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
59.01	Vertical	-75.48	-36.00	Pass
743.15	V	-74.53	-36.00	
1697.98	V	-62.89	-30.00	
2544.42	V	-57.08	-30.00	

LTE Band 20(20MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
59.89	Horizontal	-78.16	-36.00	Pass
874.78	H	-70.09	-36.00	
1698.01	H	-64.11	-30.00	
2541.93	H	-51.55	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
58.73	Vertical	-77.58	-36.00	Pass
906.24	V	-72.89	-36.00	
1690.67	V	-60.65	-30.00	
2544.60	V	-52.95	-30.00	

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LTE Band 28(3MHz, RB allocation=15): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
52.99	Horizontal	-77.90	-36.00	Pass
985.61	H	-80.88	-36.00	
1447.50	H	-62.73	-30.00	
2175.36	H	-59.67	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
50.03	Vertical	-77.90	-36.00	Pass
711.65	V	-77.91	-36.00	
1451.99	V	-65.64	-30.00	
2179.55	V	-60.04	-30.00	

LTE Band 28(3MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
52.32	Horizontal	-78.54	-36.00	Pass
744.64	H	-72.51	-36.00	
1448.54	H	-64.84	-30.00	
2174.26	H	-56.45	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
58.22	Vertical	-76.82	-36.00	Pass
725.50	V	-71.56	-36.00	
1454.39	V	-63.58	-30.00	
2178.84	V	-53.57	-30.00	

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LTE Band 28(5MHz, RB allocation=25): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
54.53	Horizontal	-77.84	-36.00	Pass
791.95	H	-74.78	-36.00	
1452.95	H	-64.27	-30.00	
2175.23	H	-51.24	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
58.84	Vertical	-73.00	-36.00	Pass
707.60	V	-78.89	-36.00	
1451.26	V	-66.58	-30.00	
2172.75	V	-60.44	-30.00	

LTE Band 28(5MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
53.94	Horizontal	-70.96	-36.00	Pass
974.83	H	-78.70	-36.00	
1448.55	H	-66.20	-30.00	
2171.63	H	-54.76	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
55.10	Vertical	-80.81	-36.00	Pass
845.85	V	-76.85	-36.00	
1450.67	V	-69.56	-30.00	
2180.53	V	-57.38	-30.00	

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LTE Band 28(20MHz, RB allocation=100): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
58.98	Horizontal	-74.49	-36.00	Pass
922.78	H	-74.47	-36.00	
1450.63	H	-67.50	-30.00	
2177.46	H	-55.33	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
57.76	Vertical	-70.58	-36.00	Pass
797.66	V	-70.39	-36.00	
1453.07	V	-65.74	-30.00	
2172.48	V	-54.04	-30.00	

LTE Band 28(20MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
58.09	Horizontal	-75.77	-36.00	Pass
875.90	H	-76.48	-36.00	
1449.52	H	-66.41	-30.00	
2178.39	H	-60.17	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
52.66	Vertical	-73.91	-36.00	Pass
838.03	V	-80.37	-36.00	
1451.38	V	-63.79	-30.00	
2171.33	V	-58.05	-30.00	

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LTE Band 38(5MHz, RB allocation=25): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
58.39	Horizontal	-80.61	-36.00	Pass
956.50	H	-79.61	-36.00	
5193.14	H	-64.85	-30.00	
7795.27	H	-52.82	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
58.77	Vertical	-79.88	-36.00	Pass
884.67	V	-72.02	-36.00	
5190.43	V	-66.95	-30.00	
7793.39	V	-52.35	-30.00	

LTE Band 38(5MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
59.44	Horizontal	-78.04	-36.00	Pass
738.55	H	-78.67	-36.00	
5191.46	H	-69.94	-30.00	
7793.68	H	-59.42	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
57.06	Vertical	-75.64	-36.00	Pass
1000.06	V	-71.62	-36.00	
5194.88	V	-63.77	-30.00	
7792.01	V	-60.57	-30.00	

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LTE Band 38(20MHz, RB allocation=100): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
51.34	Horizontal	-73.07	-36.00	Pass
757.65	H	-75.29	-36.00	
5191.40	H	-65.38	-30.00	
7794.46	H	-52.82	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
55.39	Vertical	-71.06	-36.00	Pass
831.59	V	-72.35	-36.00	
5194.45	V	-68.30	-30.00	
7792.97	V	-59.67	-30.00	

LTE Band 38(20MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
56.41	Horizontal	-79.58	-36.00	Pass
821.40	H	-79.50	-36.00	
5192.34	H	-61.87	-30.00	
7790.72	H	-58.85	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
57.69	Vertical	-72.13	-36.00	Pass
755.45	V	-79.04	-36.00	
5190.12	V	-61.49	-30.00	
7794.56	V	-59.30	-30.00	

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LTE Band 40(5MHz, RB allocation=25): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
55.69	Horizontal	-78.13	-36.00	Pass
734.17	H	-70.87	-36.00	
4705.49	H	-66.14	-30.00	
7050.12	H	-55.10	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
56.47	Vertical	-78.25	-36.00	Pass
702.66	V	-73.87	-36.00	
4703.69	V	-70.86	-30.00	
7052.81	V	-59.71	-30.00	

LTE Band 40(5MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
56.88	Horizontal	-70.11	-36.00	Pass
869.61	H	-78.62	-36.00	
4706.59	H	-62.20	-30.00	
7057.73	H	-58.00	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
55.21	Vertical	-75.48	-36.00	Pass
922.27	V	-79.93	-36.00	
4705.99	V	-61.72	-30.00	
7058.51	V	-54.05	-30.00	

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LTE Band 40(20MHz, RB allocation=100): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
53.08	Horizontal	-74.24	-36.00	Pass
895.63	H	-72.22	-36.00	
4703.28	H	-62.72	-30.00	
7052.76	H	-51.69	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
55.76	Vertical	-77.80	-36.00	Pass
855.37	V	-78.12	-36.00	
4705.41	V	-70.44	-30.00	
7051.59	V	-59.93	-30.00	

LTE Band 40(20MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
55.31	Horizontal	-76.14	-36.00	Pass
897.31	H	-76.50	-36.00	
4704.57	H	-64.97	-30.00	
7056.44	H	-58.18	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
52.84	Vertical	-74.00	-36.00	Pass
749.28	V	-76.71	-36.00	
4708.88	V	-61.55	-30.00	
7055.40	V	-52.99	-30.00	

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LTE Band 41(5MHz, RB allocation=25): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
55.85	Horizontal	-76.64	-36.00	Pass
949.21	H	-80.70	-36.00	
4800.08	H	-70.90	-30.00	
7255.99	H	-57.03	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
52.80	Vertical	-71.72	-36.00	Pass
824.61	V	-75.24	-36.00	
4801.10	V	-66.95	-30.00	
7253.85	V	-60.71	-30.00	

LTE Band 41(5MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
50.65	Horizontal	-78.50	-36.00	Pass
964.00	H	-72.29	-36.00	
4806.19	H	-64.07	-30.00	
7256.19	H	-59.24	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
50.83	Vertical	-79.14	-36.00	Pass
948.46	V	-71.90	-36.00	
4804.89	V	-61.83	-30.00	
7258.24	V	-57.40	-30.00	

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LTE Band 41(20MHz, RB allocation=100): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
51.78	Horizontal	-74.14	-36.00	Pass
971.27	H	-77.86	-36.00	
4802.63	H	-68.29	-30.00	
7251.21	H	-54.91	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
58.49	Vertical	-80.23	-36.00	Pass
720.51	V	-78.62	-36.00	
4804.85	V	-69.77	-30.00	
7250.18	V	-57.59	-30.00	

LTE Band 41(20MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
58.98	Horizontal	-71.74	-36.00	Pass
747.75	H	-72.73	-36.00	
4806.95	H	-66.79	-30.00	
7254.02	H	-53.20	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
57.47	Vertical	-74.40	-36.00	Pass
962.32	V	-79.38	-36.00	
4808.37	V	-67.01	-30.00	
7258.33	V	-50.88	-30.00	

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Radiated spurious emissions-MS in idle mode (Worst Case)

LTE Band 1: Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
54.38	Horizontal	-74.17	-57.00	Pass
708.54	H	-77.92	-57.00	
1791.06	H	-61.11	-47.00	
2706.75	H	-59.70	-47.00	
3615.04	H	-57.27	-47.00	
LTE Band 1: Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
50.48	Vertical	-78.53	-57.00	Pass
878.29	V	-72.06	-57.00	
1793.23	V	-69.43	-47.00	
2700.27	V	-60.49	-47.00	
3613.49	V	-52.36	-47.00	

LTE Band 8: Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
52.22	Horizontal	-80.13	-57.00	Pass
908.95	H	-71.23	-57.00	
1699.93	H	-65.65	-47.00	
2670.38	H	-50.33	-47.00	
3240.93	H	-55.51	-47.00	
LTE Band 8: Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
56.09	Vertical	-70.41	-57.00	Pass
865.52	V	-76.00	-57.00	
1691.61	V	-62.91	-47.00	
2678.02	V	-58.83	-47.00	
3250.48	V	-57.15	-47.00	

Note:The report only recorded the worst result.

----------THE END OF REPORT----------

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HEALTH TEST REPORT

For

SHANGHAI MATIS ELECTRIC CO.,LTD.

Smart Metering RCBO/MCB

Test Model: MT61GR

Additional Model No.: Please Refer to Page 5

Prepared for	:	SHANGHAI MATIS ELECTRIC CO.,LTD.
Address	:	Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	Room 101/201, Building A, and Room 101/301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Tel	:	(+86)755-82591330
Fax	:	(+86)755-82591332
Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com
Date of receipt of test sample	:	August 19, 2026
Number of tested samples	:	2
Sample No.	:	A260817067-1, A260817067-2
Serial number	:	Prototype
Date of Test	:	August 19, 2026 ~ September 20, 2026
Date of Report	:	September 21, 2026

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HEALTHTEST REPORT

EN IEC 62311:2020

Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)

Report Reference No.....	**:**	**LCSA08176105EC**
Date of Issue	:	September 21, 2026
Testing Laboratory Name	**:**	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	:	Room 101/201, Building A, and Room 101/301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Testing Location/Procedure	:	Full application of Harmonised standards ■ Partial application of Harmonised standards□ Other standard testing method□
Applicant's Name	**:**	**SHANGHAI MATIS ELECTRIC CO.,LTD.**
Address	:	Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306
Test Specification		
Standard.....	:	EN IEC 62311:2020
TRF Originator.....	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	:	Dated 2011-03

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Test Item Description.....	**:**	**Smart Metering RCBO/MCB**
Trade Mark	:	Matis/Matismart
Test Model	:	MT61GR
Ratings	:	Please Refer to Page 5
Result.....	**:**	**Pass**

Compiled by:	Reviewed by:	Approved by:
Jack Liu	Kevin Huang	Gavin Liang
Jack Liu/ Administrator	Kevin Huang/ RF Manager	Gavin Liang/ Manager

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HEALTH--TEST REPORT

Test Report No. : LCSA08176105EC	September 21, 2026 Date of issue

Test Model.....	:	MT61GR
EUT.....	:	Smart Metering RCBO/MCB
Applicant.....	**:**	**SHANGHAI MATIS ELECTRIC CO.,LTD.**
Address.....	:	Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306
Telephone.....	:	/
Fax.....	:	/
Manufacturer.....	**:**	**SHANGHAI MATIS ELECTRIC CO.,LTD.**
Address.....	:	Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306
Telephone.....	:	/
Fax.....	:	/
Factory.....	**:**	**SHANGHAI MATIS ELECTRIC CO.,LTD.**
Address.....	:	Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306
Telephone.....	:	/
Fax.....	:	/

Test Result	**Pass**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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Revision History

Report Version	Issue Date	Revision Content	Revised By
000	September 21, 2026	Initial Issue	---

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1. GENERAL INFORMATION

1.1. Product Description for Equipment Under Test (EUT)

EUT	: Smart Metering RCBO/MCB
Test Model	: MT61GR
Additional Model No.	: MT61GP
Model Declaration	: PCB board, structure and internal of these model(s) are the same, So no additional models were tested
Ratings	: Ue: 230/240VAC(2P); 400/415VAC(4P) 50/60Hz; In: 6/10/16/20/25/32/40/50/63A/80A/100A/125A (B/C/D-type); Icn=Ics=6,0kA IΔn= 30, 100, 300mA,500mA; Type -A & -AC; With time delay: type S Energy Accuracy: class 1
Hardware Version	: 1.0
Software Version	: 1.0
LTE	:
Support Band	: ☒E-UTRA Band 1(EU-Band) ☒E-UTRA Band 3(EU-Band) ☒E-UTRA Band 5(Non EU-Band) ☒E-UTRA Band 7(EU-Band) ☒E-UTRA Band 8(EU-Band) ☒E-UTRA Band 20(EU-Band) ☒E-UTRA Band 28(EU-Band) ☒E-UTRA Band 38(EU-Band) ☒E-UTRA Band 40(EU-Band) ☒E-UTRA Band 41(EU-Band)
LTE Release Version	: R8
FDD Band	: Uplink: E-UTRA Band 1: 1920MHz~1980MHz E-UTRA Band 3: 1710MHz~1785MHz E-UTRA Band 7: 2500MHz~2570MHz E-UTRA Band 8: 880MHz~915MHz E-UTRA Band 20: 832MHz~862MHz E-UTRA Band 28: 703MHz~748MHz Downlink: E-UTRA Band 1: 2110MHz~2170MHz E-UTRA Band 3: 1805MHz~1880MHz E-UTRA Band 7: 2620MHz~2690MHz E-UTRA Band 8: 925MHz~960MHz E-UTRA Band 20: 791MHz~821MHz E-UTRA Band 28: 758MHz~803MHz
TDD Band	: E-UTRA Band 38: 2570MHz~2620MHz E-UTRA Band 40: 2300MHz~2400MHz E-UTRA Band 41: 2496-2690MHz
Type Of Modulation	: QPSK/16QAM
Antenna Description	: External Antenna -0.93dBi (max.) For E-UTRA Band 1 -0.22dBi (max.) For E-UTRA Band 3 -3.29dBi (max.) For E-UTRA Band 7

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-1.41dBi (max.) For E-UTRA Band 8
-1.15dBi (max.) For E-UTRA Band 20
-4.31dBi (max.) For E-UTRA Band 28
-1.92dBi (max.) For E-UTRA Band 38
-1.73dBi (max.) For E-UTRA Band 40
0.31dBi (max.) For E-UTRA Band 41

Power Class : Class 3

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1.2. Objective

According to its specifications, the EUT must comply with the requirements of the following standards:
EN IEC 62311:2020–Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)

1.3. Test Methodology

All measurements contained in this report were conducted with EN IEC 62311:2020.

1.4. Facilities

All measurement facilities used to collect the measurement data are located at Room 101/201, Building A, and Room 101/301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 32.

1.5. Support Equipment List

Manufacturer	Description	Model	Serial Number	Certificate
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1.6. External I/O

I/O Port Description	Quantity	Cable
---	---	---

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1.7. Equipment

Radiated emissions are measured with one or more of the following types of linearly polarizedantennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrumanalyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.Conducted emissions are measured with Line Impedance Stabilization Networks and EMI TestReceivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for makingmeasurements.

All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference MeasuringApparatus and Measurement Methods.”

1.8. Laboratory Accreditations And Listings

Site Description

EMC Lab. : NVLAP Accreditation Code is 600167-0.
FCC Designation Number is CN5024.
CAB identifier is CN0071.
CNAS Registration Number is L4595.

Name of Firm : Shenzhen LCS Compliance Testing Laboratory Ltd.

Site Location : Room 101/201, Building A, and Room 101/301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Subdistrict, Bao’an District, Shenzhen, Guangdong, China

1.9. Measurement Uncertainty(95% confidence levels, k=2)

Test Item		Uncertainty
Radio Frequency	:	0.9×10^{-4}
Total RF Power, Conducted	:	1.0 dB
RF Power Density, Conducted	:	1.8 dB
Spurious Emissions, Conducted	:	1.8 dB
All Emissions, Radiated	:	3.1 dB
Temperature	:	0.5℃
Humidity	:	1 %
DC And Low Frequency Voltages	:	1 %

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2.HUMAN EXPOSURE TO THE ELECTROMAGNETIC FIELDS

2.1 Basic Restrictions Reference levels

Council Recommendation 1999/519/EC Annex II

Basic restrictions for electric, magnetic and electromagnetic fields (0Hz to 300GHz)

Frequency range	Magnetic flux density (mT)	Current density (Ma/m2) (rms)	Whole body average SAR (W/kg)	Localised SAR (head and trunk) (W/kg)	Localised SAR (limbs) (W/kg)	Power density (W/m2)
0Hz	40	-	-	-	-	-
>0-1Hz	-	8	-	-	-	-
1-4Hz	-	8/f	-	-	-	-
4-1000Hz	-	2	-	-	-	-
1000Hz-100kHz	-	f/500	-	-	-	-
100kHz-10MHz	-	f/500	0.08	2	4	-
10MHz-10GHz	-	-	0.08	2	4	-
10-300GHz	-	-	-	-	-	10

Note:

1. f is the frequency in Hz.

2. The basic restriction on the current density is intended to protect against acute exposure effects on central nervous system tissues in the head and trunk of the body and includes a safety factor. The basic restrictions for ELF fields are based on established adverse effects on the central nervous system. Such acute effects are essentially instantaneous and there is no scientific justification to modify the basic restrictions for exposure of short duration. However, since the basic restriction refers to adverse effects on the central nervous system, this basic restriction may permit higher current densities in body tissues other than the central nervous system under the same exposure conditions.

3. Because of electrical inhomogeneity of the body, current densities should be averaged over a cross section of 1cm2 perpendicular to the current direction.

4. For frequencies up to 100 kHz, peak current density values can be obtained by multiplying the rms value by √2(=1.414). For pulses of duration tp the equivalent frequency to apply in the basic restrictions should be calculated as=1/(2tp)

5. For frequencies up to 100kHz and for pulsed magnetic fields, the maximum current density associated with the pulses can be calculated from the rise/fall times and the maximum rate of change of magnetic flux density. The induced current density can then be compared with the appropriate basic restriction.

6. All SAR values are to be averaged over any six-minute period.

7. Localised SAR averaging mass is any 10g of contiguous tissue; the maximum SAR so obtained should be the value used for the estimation of exposure. These 10g of tissue are intended to be a mass of contiguous tissue with nearly homogeneous electrical properties. In specifying a contiguous mass of tissue, it is recognised that this concept can be used in computational dosimetry but may present difficulties for direct physical measurements. A simple geometry such as cubic tissue mass can be used provided that the calculated dosimetric quantities have conservation values relative to the exposure guidelines.

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8. For pulses of duration tp the equivalent frequency to apply in the basic restrictions should be calculated as=1/(2tp). Additionally, for pulsed exposures, in the frequency range 0,3 to 10GHz and for localised exposure of the head, in order to limit and avoid auditory effects caused by thermoelastic expansion, an additional basic restriction is recommended. This is that SA should not exceed 2mJ kg-1 averaged over 10g of tissue.

Council Recommendation 1999/519/EC Annex III

Basic restrictions for electric, magnetic and electromagnetic fields (0Hz to 300GHz)

Frequency range	Magnetic flux density (mT)	Current density (Ma/m2) (rms)	Whole body average SAR (W/kg)	Localised SAR (head and trunk) (W/kg)	Localised SAR (limbs) (W/kg)	Power density (W/m2)
0Hz	40	-	-	-	-	-
>0-1Hz	-	8	-	-	-	-
1-4Hz	-	8/f	-	-	-	-
4-1000Hz	-	2	-	-	-	-
1000Hz-100kHz	-	f/500	-	-	-	-
100kHz-10MHz	-	f/500	0.08	2	4	-
10MHz-10GHz	-	-	0.08	2	4	-
10-300GHz	-	-	-	-	-	10

Note:

1. f is the frequency in Hz.
2. The basic restriction on the current density is intended to protect against acute exposure effects on central nervous system tissues in the head and trunk of the body and includes a safety factor. The basic restrictions for ELF fields are based on established adverse effects on the central nervous system. Such acute effects are essentially instantaneous and there is no scientific justification to modify the basic restrictions for exposure of short duration. However, since the basic restriction refers to adverse effects on the central nervous system, this basic restriction may permit higher current densities in body tissues other than the central nervous system under the same exposure conditions.
3. Because of electrical inhomogeneity of the body, current densities should be averaged over a cross section of 1cm2 perpendicular to the current direction.
4. For frequencies up to 100 kHz, peak current density values can be obtained by multiplying the rms value by √2(=1.414). For pulses of duration tp the equivalent frequency to apply in the basic restrictions should be calculated as=1/(2tp)
5. For frequencies up to 100kHz and for pulsed magnetic fields, the maximum current density associated with the pulses can be calculated from the rise/fall times and the maximum rate of change of magnetic flux density. The induced current density can then be compared with the appropriate basic restriction.
6. All SAR values are to be averaged over any six-minute period.
7. Localised SAR averaging mass is any 10g of contiguous tissue; the maximum SAR so obtained should be the value used for the estimation of exposure. These 10g of tissue are intended to be a mass of contiguous tissue with nearly homogeneous electrical properties. In specifying a contiguous mass of tissue, it is recognised that this concept can be used in computational dosimetry but may present difficulties for direct physical measurements. A simple geometry such as cubic tissue mass can be used provided that the calculated dosimetric quantities have conservation values relative to the exposure guidelines.

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8. For pulses of duration tp the equivalent frequency to apply in the basic restrictions should be calculated as=1/(2tp). Additionally, for pulsed exposures, in the frequency range 0,3 to 10GHz and for localised exposure of the head, in order to limit and avoid auditory effects caused by thermoelastic expansion, an additional basic restriction is recommended. This is that SA should not exceed 2mJ kg-1 averaged over 10g of tissue.

2.2 Reference Levels

Council Recommendation 1999/519/EC Annex II

Basic restrictions for electric, magnetic and electromagnetic fields (0Hz to 300GHz)

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (μT)	Equivalent plane wave power density Seq (W/m2)
0-1Hz	-	$3,2\times10^{4}$	4×10^{4}	-
1-8Hz	1000	$3,2\times10^{4}/f^{2}$	$4\times10^{4}/f^{2}$	-
8-25Hz	1000	4000/f	5000/f	-
0.025Hz-0,8kHz	250/f	4/f	5/f6,25	-
0,8-3kHz	250/f	5	6,25	-
3-150kHz	87	5	6,25	-
0,15-1MHz	87	0.73/f	0,92/f	-
1-10MHz	$87/f^{1/2}$	0.73/f	0,92/f	-
10-400MHz	28	0.073	0,092	2
400-2000MHz	$1,375\ f^{1/2}$	$0,0037\ f^{1/2}$	$0,0046\ f^{1/2}$	f/200
2-300GHz	61	0,16	0,20	10

Note:

1. f is the frequency in Hz.
2. The basic restriction on the current density is intended to protect against acute exposure effects on central nervous system tissues in the head and trunk of the body and includes a safety factor. The basic restrictions for ELF fields are based on established adverse effects on the central nervous system. Such acute effects are essentially instantaneous and there is no scientific justification to modify the basic restrictions for exposure of short duration. However, since the basic restriction refers to adverse effects on the central nervous system, this basic restriction may permit higher current densities in body tissues other than the central nervous system under the same exposure conditions.
3. Because of electrical inhomogeneity of the body, current densities should be averaged over a cross section of 1cm2 perpendicular to the current direction.
4. For frequencies up to 100 kHz, peak current density values can be obtained by multiplying the rms value by √2(=1.414). For pulses of duration tp the equivalent frequency to apply in the basic restrictions should be calculated as=1/(2tp)
5. For frequencies up to 100kHz and for pulsed magnetic fields, the maximum current density associated with the pulses can be calculated from the rise/fall times and the maximum rate of change of magnetic flux density. The induced current density can then be compared with the appropriate basic restriction.
6. All SAR values are to be averaged over any six-minute period.
7. Localised SAR averaging mass is any 10g of contiguous tissue; the maximum SAR so obtained should be the value used for the estimation of exposure. These 10g of tissue are intended to be a mass of contiguous tissue with nearly homogeneous electrical properties. In specifying a contiguous mass of tissue, it is recognised that this concept can be used in

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computational dosimetry but may present difficulties for direct physical measurements. A simple geometry such as cubic tissue mass can be used provided that the calculated dosimetric quantities have conservation values relative to the exposure guidelines.

8. For pulses of duration tp the equivalent frequency to apply in the basic restrictions should be calculated as=1/(2tp). Additionally, for pulsed exposures, in the frequency range 0,3 to 10GHz and for localised exposure of the head, in order to limit and avoid auditory effects caused by thermoelastic expansion, an additional basic restriction is recommended. This is that SA should not exceed 2mJ kg-1 averaged over 10g of tissue.

Classification of the assessment methods
The antenna of the product, under normal use condition is at least 20cm away from the body of the user. Warning statement on the user for keeping 20cm separation distance and the prohibition of operating to a person has been printed on the user manual. So, this product under normal use is located on electromagnetic far field between the human body.
Far Field Calculation Formula
$E = \frac{\sqrt{30 \times G \times TP}}{D}$ *Where* *G: numerical gain of transmitting antenna;* *TP: Transmitted power in watt;* *D: distance from the transmitting antenna in meter.*

Council Recommendation 1999/519/EC Annex III

Reference levels for electric, magnetic and electromagnetic fields (0Hz to 300GHz)

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (μT)	Equivalent plane wave power density Seq (W/m2)
0-1Hz	-	$3{,}2\times10^{4}$	4×10^{4}	-
1-8Hz	1000	$3{,}2\times10^{4}/f^{2}$	$4\times10^{4}/f^{2}$	-
8-25Hz	1000	4000/f	5000/f	-
0.025Hz-0,8kHz	250/f	4/f	5/f6,25	-
0,8-3kHz	250/f	5	6,25	-
3-150kHz	87	5	6,25	-
0,15-1MHz	87	0.73/f	0,92/f	-
1-10MHz	$87/f^{1/2}$	0.73/f	0,92/f	-
10-400MHz	28	0.073	0,092	2
400-2000MHz	$1{,}375\ f^{1/2}$	$0{,}0037\ f^{1/2}$	$0{,}0046f^{1/2}$	f/200
2-300GHz	61	0,16	0,20	10

Note:

1. As indicated in the frequency range column.

2. For frequencies between 100kHz and 10GHz, Seq, E2, H2 and B2 are to be averaged over any six-minute period.

3. For frequencies exceeding 10GHz, Seq, E2, H2 and B2 are to be averaged over any 68/.1.05-minute period (.in GHz).

4. No E-field value is provided for frequencies <1Hz, which are effectively static electric fields. For most people the annoying perception of surface electric charges will not occur at field strengths less than 20kV/m. Spark discharges causing stress or annoyance should be avoided.

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3. RF EXPOSURE EVALUATION

3.1. Test Results

According to the radio test report (LCSA08176105EB):

Mode	Max RF Output Power (e.i.r.p.) (dBm)	Minimum Distance in Meter (m)	E-field Strength (V/m)	E-field Strength Limit (V/m)	Result
LTE Band 1	23.54	0.2	13.02	61.03	Pass
LTE Band 3	23.77	0.2	13.37	57.48	Pass
LTE Band 7	23.96	0.2	13.66	61.00	Pass
LTE Band 8	24.32	0.2	14.24	41.19	Pass
LTE Band 20	23.86	0.2	13.51	39.90	Pass
LTE Band 28	24.66	0.2	14.81	37.10	Pass
LTE Band 38	24.07	0.2	13.84	61.00	Pass
LTE Band 40	22.70	0.2	11.82	61.00	Pass
LTE Band 41	24.11	0.2	13.90	61.00	Pass

Note:

1. Only record worst case data.

2. All other emissions are too low to read.

This proves that the unit complies with the EN IEC 62311 for RF exposure requirement.

----------THE END OFREPORT----------

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EMC TEST REPORT

For

SHANGHAI MATIS ELECTRIC CO.,LTD.

Smart Metering RCBO/MCB

Test Model: MT61GR

Additional Model No.: Please Refer to Page 9

Prepared for	:	SHANGHAI MATIS ELECTRIC CO.,LTD.
Address	:	Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	Room 101/201, Building A, and Room 101/301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China
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Fax	:	+(86) 0755-82591332
Web	:	www.lcs-cert.com
Mail	:	webmaster@lcs-cert.com
Date of receipt of test sample	:	August 19, 2026
Number of tested samples	:	2
Sample No.	:	A260817067-1, A260817067-2
Serial number	:	Prototype
Date of Test	:	August 19, 2026 ~ September 20, 2026
Date of Report	:	September 21, 2026

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TEST REPORT

Report No.	:	**LCSA08176108E**
Date of Issue	:	September 21, 2026
Testing Laboratory Name	:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	:	Room 101/201, Building A, and Room 101/301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure	:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name	:	**SHANGHAI MATIS ELECTRIC CO.,LTD.**
Address	:	Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306
Test Specification		
Standard	:	EN IEC 61000-6-3:2021 EN IEC 61000-6-1:2019
TRF Originator	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	:	Dated 2011-03

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Test Item Description.	:	**Smart Metering RCBO/MCB**
Trade Mark	:	Matis/Matismart
Test Model	:	MT61GR
Result	:	**Pass**

Compiled by:	Supervised by:	Approved by:
Jack Liu	Kevin Huang	Gavin Liang
Jack Liu/ Administrator	Kevin Huang/ RF Manager	Gavin Liang/ Manager

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TEST REPORT

Test Report No.: LCSA08176108E	September 21, 2026 Date of issue

Test Model	:	**MT61GR**
EUT	:	Smart Metering RCBO/MCB
Applicant	:	**SHANGHAI MATIS ELECTRIC CO.,LTD.**
Address	:	Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306
Telephone	:	/
Fax	:	/
Manufacturer	:	**SHANGHAI MATIS ELECTRIC CO.,LTD.**
Address	:	Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306
Telephone	:	/
Fax	:	/
Factory	:	**SHANGHAI MATIS ELECTRIC CO.,LTD.**
Address	:	Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306
Telephone	:	/
Fax	:	/

Test Result	Pass

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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Revision History

Report Version	Issue Date	Revision Content	Revised By
000	September 21, 2026	Initial Issue	/

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1. TEST STANDARDS

EN IEC 61000-6-3:2021:Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for equipment in residential environments

EN IEC 61000-6-1:2019:Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity standard for residential, commercial and light-industrial environments

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2. SUMMARY OF STANDARDS AND RESULTS

2.1 Description of Standards and Results

EMISSION (EMI)			
Description of Test Item	**Standard**	**Result**	**Memo**
AC Power Port Conducted Emission	EN IEC 61000-6-3:2021	PASS	/
Radiated Emissions	EN IEC 61000-6-3:2021	PASS	/
Harmonic Current Emissions Test	EN IEC 61000-6-3:2021	PASS	For AC power port (≤16A), According to IEC 61000-3-2 Clause 7, this product belongs to exceptions of Clause 7 or Annex C. limits are not specified in this standard.
Voltage Fluctuations& Flicker Test	EN IEC 61000-6-3:2021	PASS	/
IMMUNITY(EMS)			
Description of Test Item	**Standard**	**Result**	**Memo**
Electrostatic Discharge Test	EN IEC 61000-6-1:2019	PASS	/
Continuous Radio Frequency Disturbances Test	EN IEC 61000-6-1:2019	PASS	/
Electrical Fast Transients(EFT) Test	EN IEC 61000-6-1:2019	PASS	/
Surge Test	EN IEC 61000-6-1:2019	PASS	/
Continuous Conducted Disturbances Test	EN IEC 61000-6-1:2019	PASS	/
Voltage Dips and Interruptions Test	EN IEC 61000-6-1:2019	PASS	/

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2.2 Description of Test Modes

No	Title	Description
Mode 1	Charging(Input AC 230V/50Hz)	/

2.3 Description of Performance Criteria

Performance Criteria

Performance criterion A

The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. Lf the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criterion B

The apparatus shall continue to operate as intended after the test, No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test. degradation of performance is however allowed. No change of actual operating state or stored data is allowed, lf the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criterion C

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

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3. GENERAL INFORMATION

3.1 Description of Device (EUT)

EUT	:	Smart Metering RCBO/MCB
Test Model	:	MT61GR
Additional Model No.	:	MT61GP
Model Declaration	:	PCB board, structure and internal of these model(s) are the same, So no additional models were tested
Ratings	:	Ue: 230/240VAC(2P); 400/415VAC(4P) 50/60Hz; In: 6/10/16/20/25/32/40/50/63A/80A/100A/125A (B/C/D-type); Icn=Ics=6,0kA IΔn= 30, 100, 300mA,500mA; Type -A & -AC; With time delay: type S Energy Accuracy: class 1
Highest Internal Frequency	:	≤108MHz

3.2 Support equipment List

Manufacturer	Description	Model	Serial Number	Certificate
--	--	--	--	--

3.3 External I/O Cable

I/O Port Description	Quantity	Cable
--	--	--

3.4 Description of Test Facility

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

NVLAP Accreditation Code is 600167-0.
FCC Designation Number is CN5024.
CAB identifier is CN0071.
CNAS Registration Number is L4595.

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3.5 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Emission (9kHz to 150kHz)	± 2.63 dB
Conducted Emission (150kHz to 30MHz)	± 2.35 dB
Power Disturbance (30MHz to 300MHz)	± 2.90dB
Voltage Fluctuations & Flicker	± 0.510%
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

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4. MEASURING DEVICES AND TEST EQUIPMENT

Test Item: Conducted Disturbance

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Software	Farad	EZ-EMC	Ver. EMC-CON 3A1.1+	N/A	N/A
2	EMI Test Receiver	R&S	ESR3	102312	2025-12-22	2026-12-21
3	Artificial Mains	R&S	ENV216	101479	2026-04-21	2027-04-20
4	Pulse Limiter	R&S	ESH3-Z2	102750	2026-04-21	2027-04-20
5	Impedance Stabilization Network	TESEQ	ISN T800	45130	2025-09-27	2026-09-26

Test Item: Radiated Disturbance (Electric Field)

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Software	Farad	EZ-EMC	Ver. EMC-CON 3A1.1+	N/A	N/A
2	3m Semi Anechoic Chamber	MRDIANZI	966	MR009	2025-08-16	2028-08-15
3	Positioning Controller	Max-Full	MF7802BS	MF780208586	N/A	N/A
4	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2024-08-03	2027-08-02
5	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2024-07-13	2027-07-12
6	EMI Test Receiver	R&S	ESPI	101940	2026-04-21	2027-04-20
7	Low-frequency amplifier	SchwarzZBECK	BBV9745	00253	2025-09-27	2026-09-26
8	High-frequency amplifier	JS Denki Pte	PA0118-43	JSPA21009	2025-09-27	2026-09-26
9	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2025-09-27	2026-09-26

Test Item: Harmonic Current

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	HARMONICS&FLICKER MEASUREMENT SYSTEM	EVERFINE	HFM-3000	P630850CD1411116	2025-12-22	2026-12-21
2	HARMONICS&FLICKER TESTING POWER SOURCE	EVERFINE	HFS-4000	P624486CD1411124	2025-12-22	2026-12-21

Test Item: Voltage fluctuation and Flicker

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	HARMONICS&FLICKER MEASUREMENT SYSTEM	EVERFINE	HFM-3000	P630850CD1411116	2025-12-22	2026-12-21
2	HARMONICS&FLICKER TESTING POWER SOURCE	EVERFINE	HFS-4000	P624486CD1411124	2025-12-22	2026-12-21

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Test Item: Electrostatic Discharge

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	ESD Simulator	emtest/AMETEK	esd NX30.1	111969	2026-05-19	2027-05-18

Test Item: RF Field Strength Susceptibility

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	RS Test Software	Tonscend	/	/	N/A	N/A
2	3m Semi Anechoic Chamber	MRDIANZI	966	MR009	2025-08-16	2028-08-15
3	MXG Vector Signal Generator	Agilent	N5182A	MY50144567(6G)	2025-12-05	2026-12-04
4	RF POWER AMPLIFIER	OPHIR	5225R	1052	2026-05-06	2027-05-05
5	RF POWER AMPLIFIER	YEAH TECH	YEAH TECH	25090001	2025-09-27	2026-09-26
6	Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-145	N/A	N/A
7	Stacked Mikrowellen Log.-Per Antenna	SCHWARZBECK	STLP 9149	9149-484	N/A	N/A
8	RS Electric field probe	narda	EP601	611WX80208	2025-10-31	2026-10-30

Test Item: Electrical Fast Transient/Burst

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Immunity Simulative Generator	EM TEST	UCS500-M	0101-34	2026-05-06	2027-05-05
2	Capacitive coupling clamp	3CTEST	EFTC	EC0441098	2026-05-06	2027-05-05

Test Item: Surge

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Immunity Simulative Generator	EM TEST	UCS500-M	0101-34	2026-05-06	2027-05-05
2	Communication wave lightning generator	HTEC	HTSG 70	181701	2025-10-11	2026-10-10
3	Symmetrical data line coupling network	HTEC	HCN 8	182701	2025-10-11	2026-10-10
4	Data line decoupling network	HTEC	HDEC 8	182702	2025-10-11	2026-10-10

Test Item: Conducted Susceptibility

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Simulator	FRANKONIA	CIT-10/75	A126A1195	2026-05-06	2027-05-05
2	CDN	FRANKONIA	CDN-M2+M3	A2210177	2026-05-06	2027-05-05
3	6dB Attenuator	FRANKONIA	DAM25W	1172040	2026-05-06	2027-05-05
4	Electromagnetic coupling injection clamp	ZHINAN	ZN23203	14017	2026-05-06	2027-05-05

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Test Item: Voltage Dips						
Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Three phase power supply fault simulator	HTEC	HPFS 2003P	234711	2026-01-06	2027-01-05
2	Programmable AC fault power supply	HTEC	HV3P200T	234710	2026-01-06	2027-01-05

Test Item: Voltage Short Interruptions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Three phase power supply fault simulator	HTEC	HPFS 2003P	234711	2026-01-06	2027-01-05
2	Programmable AC fault power supply	HTEC	HV3P200T	234710	2026-01-06	2027-01-05

Note: N/A means no calibration requirement

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5. EMISSION TEST RESULTS (EMI)

5.1 AC Power Port Conducted Emission

5.1.1 Limits

Frequency	Quasi-Peak Level dB(V)	Average Level dB(V)
150 kHz ~ 500 kHz	66 ~ 56*	56 ~ 46*
500 kHz ~ 5 MHz	56	46
5 MHz ~ 30 MHz	60	50
Notes: 1. * Decreasing linearly with logarithm of frequency. 2. The lower limit shall apply at the transition frequencies.		

5.1.2 Test procedure

(1) The EUT placement requires reference to the test block diagram and is placed on a non-metallic table.

(2) Setup the EUT and assistant equipment as shown above block diagram and equipment list.

(3) The EUT's power was connected to the power mains through a line impedance stabilization network (L.I.S.N). which this provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). Both sides of power line were checked for maximum conducted disturbance. In order to find the maximum emission, the relative positions of equipment and all of the interface cables were changed according to EN IEC 61000-6-3:2021 on conducted disturbance emission test.

(4) The bandwidth of test receiver is set at 9 kHz.

(5) The frequency range from 150 kHz to 30 MHz is checked.

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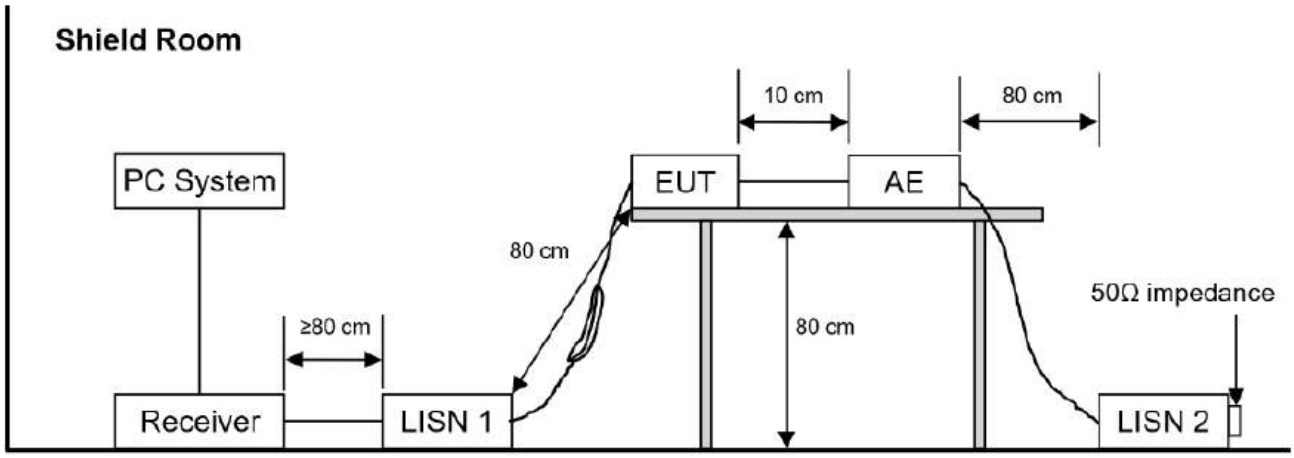
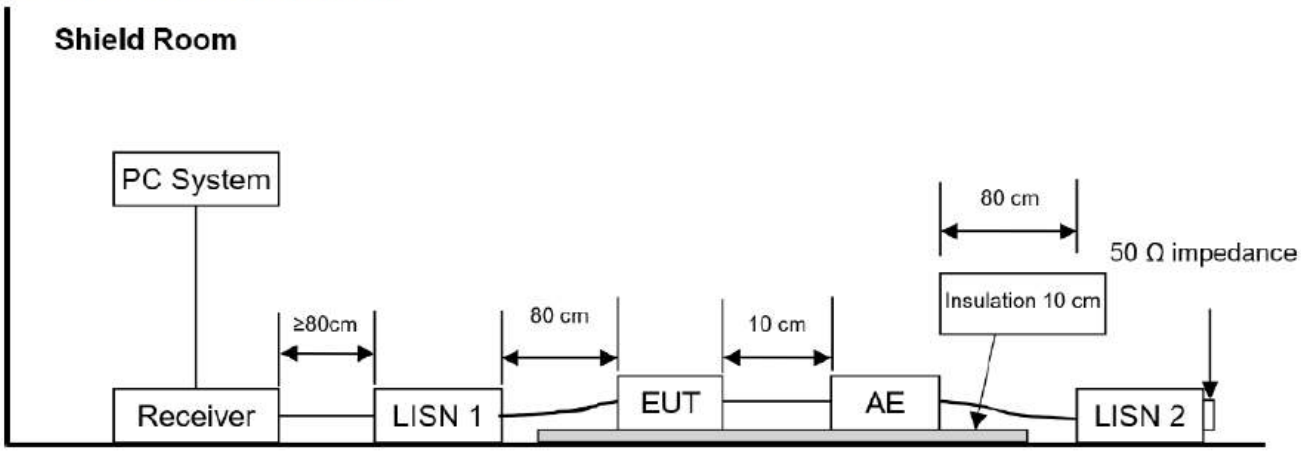
5.1.3 Test Setup Diagram

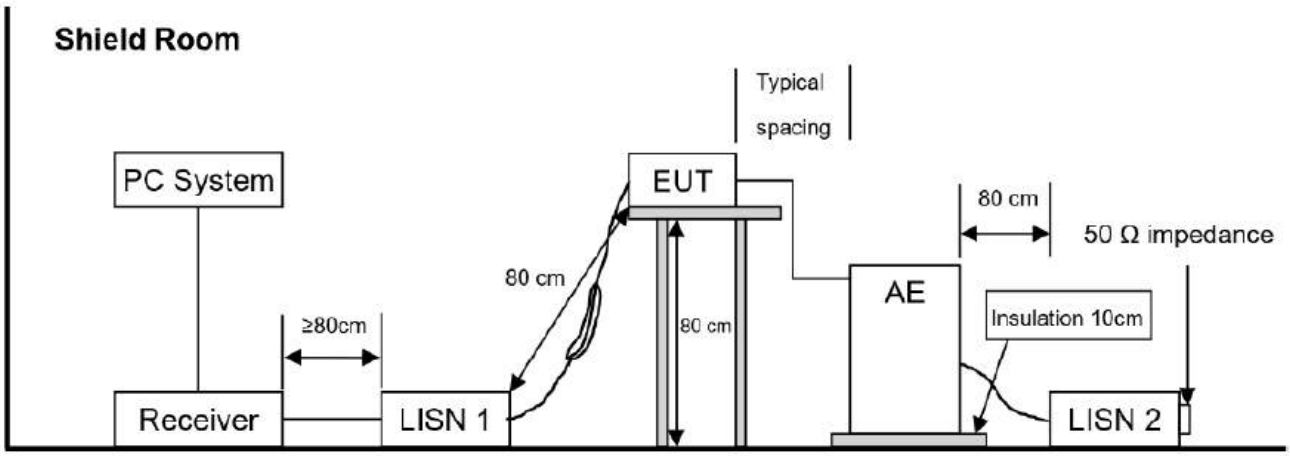
For table-top equipment



For floor standing equipment



For combinations equipment



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5.1.4 E.U.T. Operation

Operating Environment:			
Temperature:	24.6℃	Humidity:	56.8%RH
Test Engineer	Faith Li		
Mode 1	Charging	Voltage	Input AC 230V/50Hz

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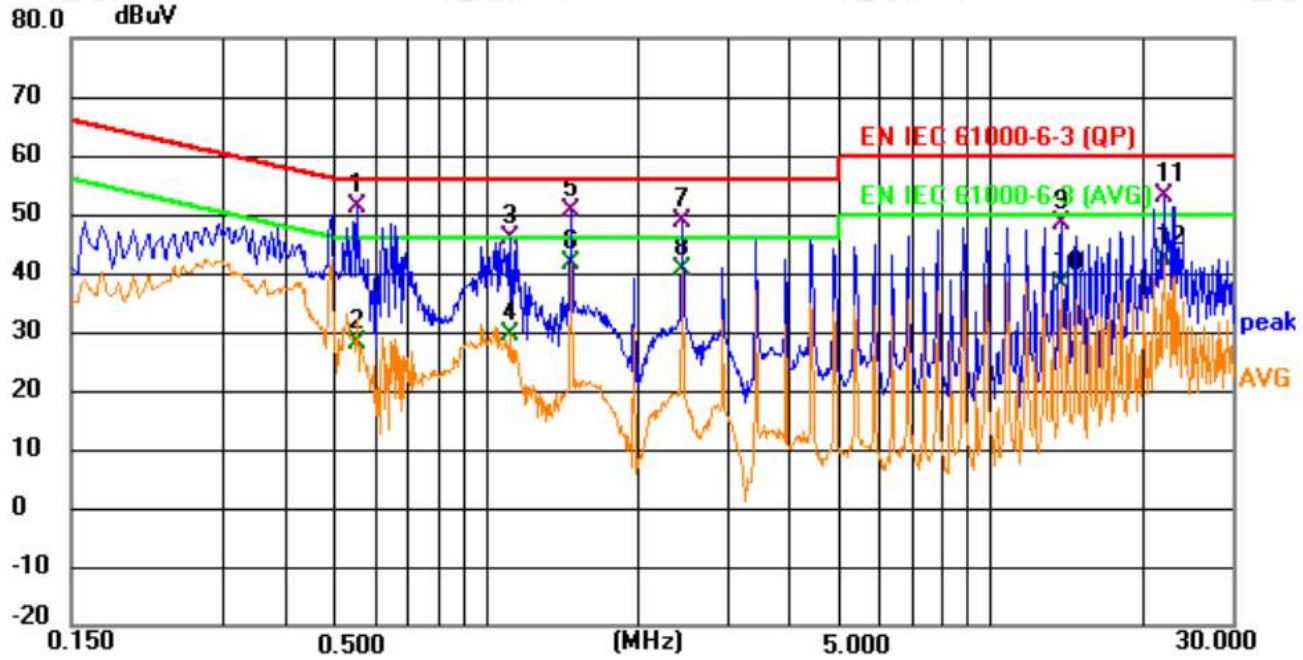
5.1.5 Test data

Mode 1 / Line: Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.555	31.15	20.19	51.34	56.00	-4.66	QP	
2		0.555	7.76	20.19	27.95	46.00	-18.05	AVG	
3		1.122	26.27	19.62	45.89	56.00	-10.11	QP	
4		1.122	9.95	19.62	29.57	46.00	-16.43	AVG	
5		1.468	30.96	19.65	50.61	56.00	-5.39	QP	
6	*	1.468	21.82	19.65	41.47	46.00	-4.53	AVG	
7		2.450	29.07	19.71	48.78	56.00	-7.22	QP	
8		2.450	20.69	19.71	40.40	46.00	-5.60	AVG	
9		13.713	28.14	20.23	48.37	60.00	-11.63	QP	
10		13.713	17.84	20.23	38.07	50.00	-11.93	AVG	
11		22.047	33.60	19.54	53.14	60.00	-6.86	QP	
12		22.047	22.75	19.54	42.29	50.00	-7.71	AVG	

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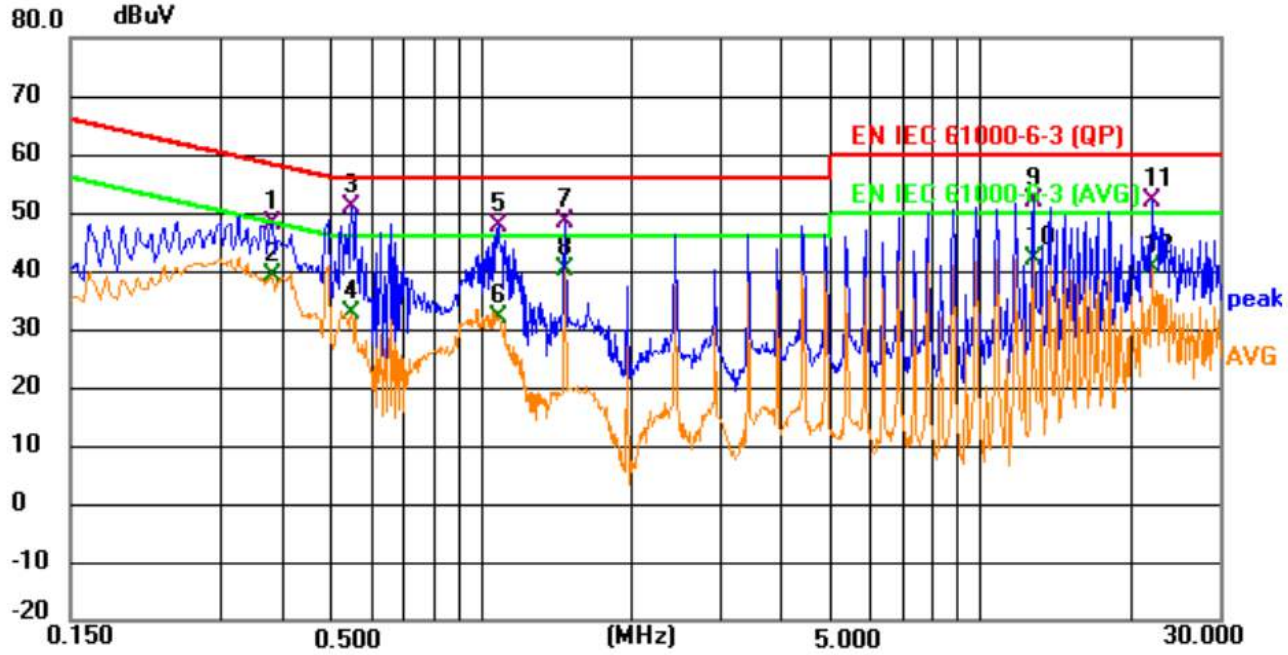
Mode 1 / Line: Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.380	27.85	20.35	48.20	58.28	-10.08	QP	
2		0.380	18.69	20.35	39.04	48.28	-9.24	AVG	
3	*	0.550	30.66	20.18	50.84	56.00	-5.16	QP	
4		0.550	12.53	20.18	32.71	46.00	-13.29	AVG	
5		1.077	28.04	19.63	47.67	56.00	-8.33	QP	
6		1.077	12.44	19.63	32.07	46.00	-13.93	AVG	
7		1.468	28.56	19.68	48.24	56.00	-7.76	QP	
8		1.468	20.67	19.68	40.35	46.00	-5.65	AVG	
9		12.732	31.61	20.22	51.83	60.00	-8.17	QP	
10		12.732	21.85	20.22	42.07	50.00	-7.93	AVG	
11		22.078	32.41	19.49	51.90	60.00	-8.10	QP	
12		22.078	21.06	19.49	40.55	50.00	-9.45	AVG	

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5.2 Radiated Emissions

5.2.1 Limits

Frequency	Field Strengths Limits at 10m measuring distance dB(μV)/m	Field Strengths Limits at 3m measuring distance dB(μV)/m
30 MHz to 230 MHz	30	40
230 MHz to 1 GHz	37	47
1 GHz to 3 GHz	/	Average:50; Peak:70
3 GHz to 6 GHz	/	Average:54; Peak:74
30 MHz to 1 GHz	Fundamental 50	Fundamental 60
30 MHz to 300 MHz	Harmonics 42	Harmonics 52
300 MHz to 1 GHz	Harmonics 46	Harmonics 56
Note: (1) The smaller limit shall apply at the cross point between two frequency bands. (2) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.		

5.2.2 Test procedure

(1) The EUT was placed on a non-metallic table (Refer to the 'Block diagram of test setup'). above the ground plane inside an anechoic chamber.

(2) Test antenna center was located 3m or 10m from the EUT and assistant equipment boundary (imaginary circular periphery) on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipment and all of the interface cables were changed according to EN 55032 on radiated emission test.

(3) Spectrum frequency from 30 MHz to ☐1 GHz/☒6 GHz was investigated.

(4) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipment and all of the interface cables were changed according to EN 55032 on Radiated Emission test.

(5) For emissions from 30 MHz to 1 GHz, Quasi-Peak values were measured with EMI Receiver and the bandwidth of Receiver is 120 kHz.

(6) For emissions above 1 GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1 MHz VBW is set at 3 MHz.

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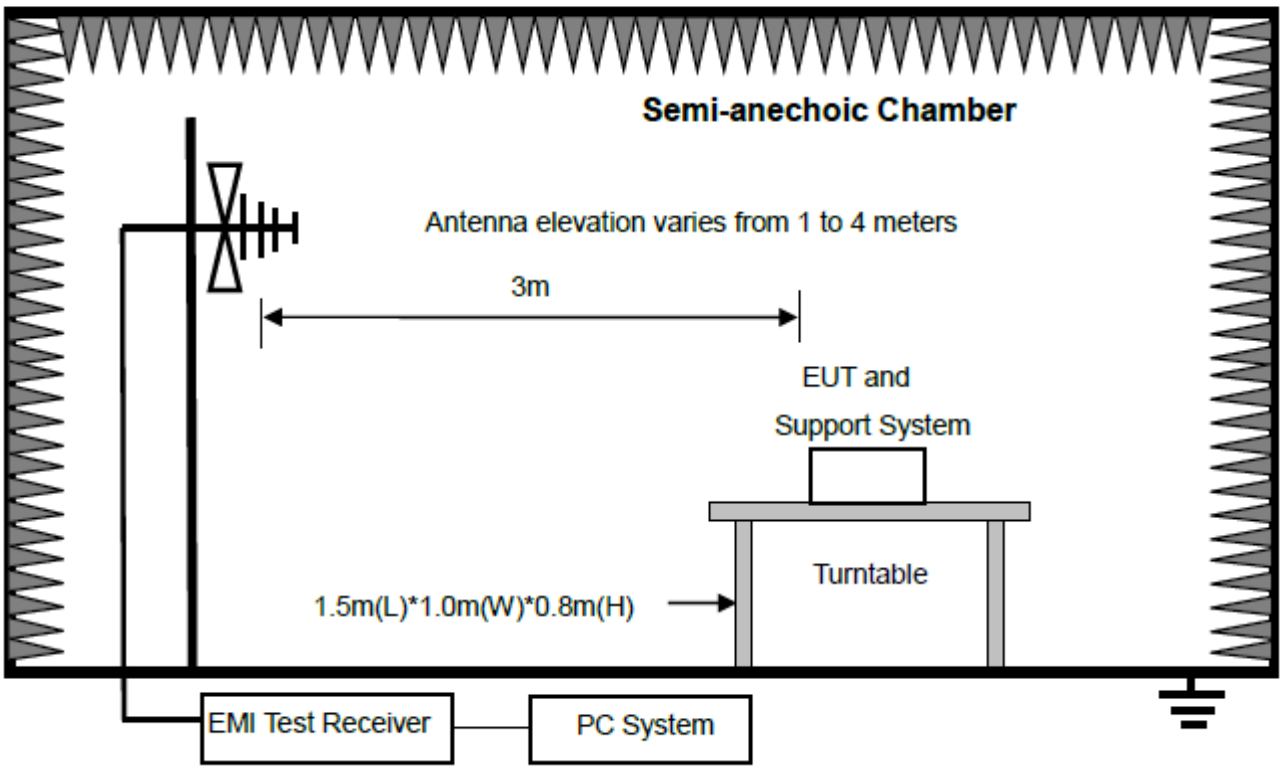
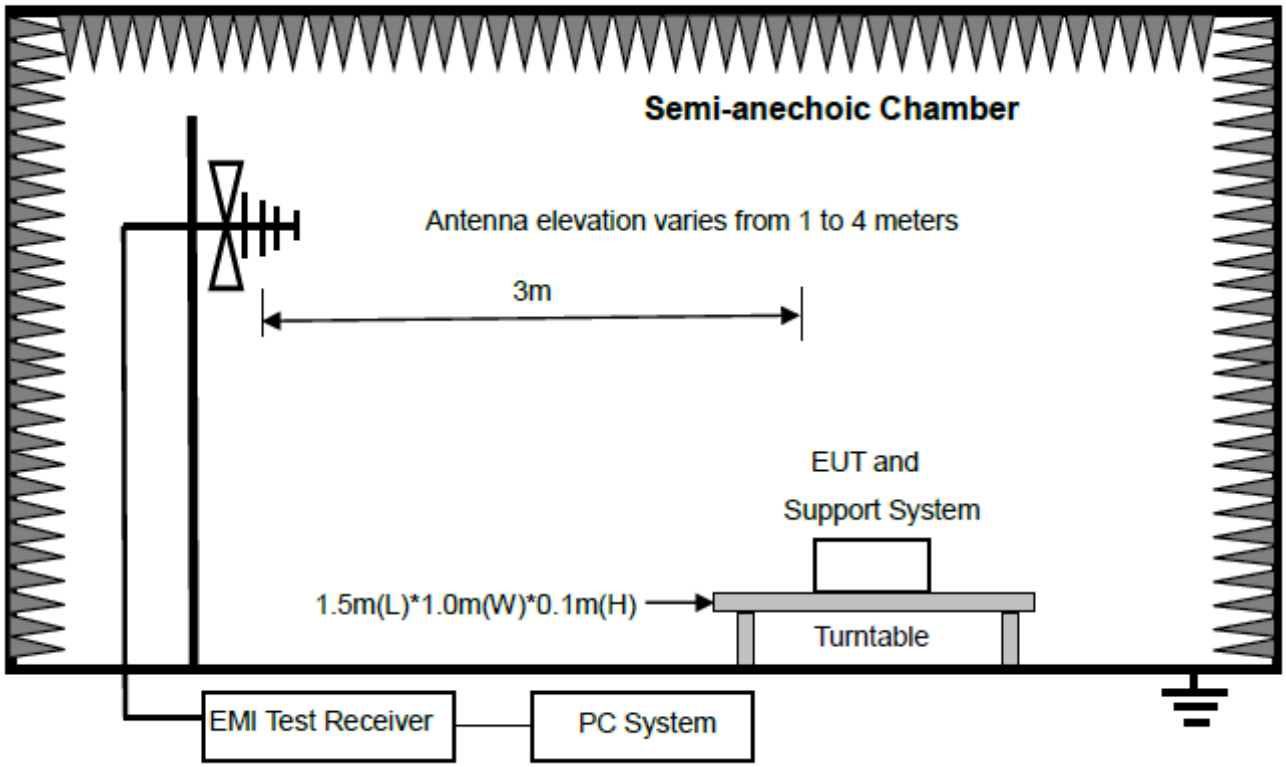
5.2.3 Test Setup Diagram

Below 1 GHz

For table-top equipment



For floor standing equipment



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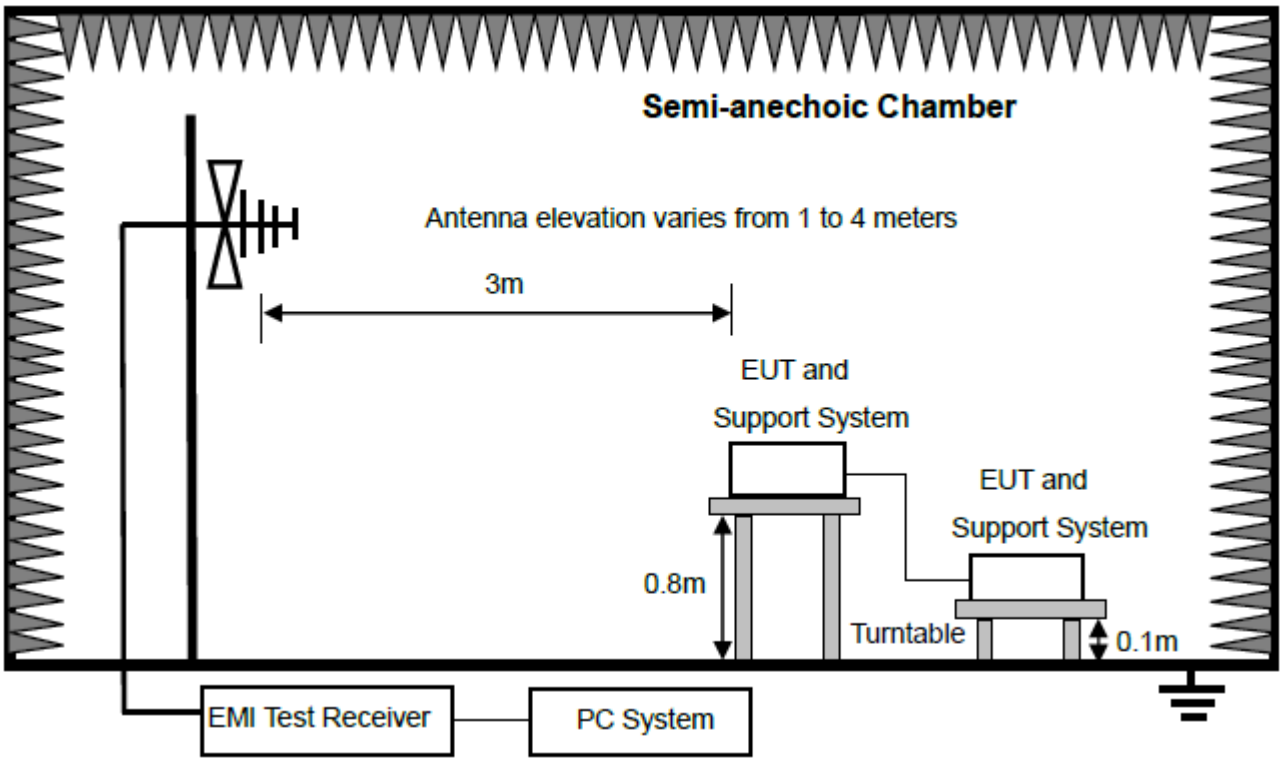
For combinations equipment



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5.2.4 E.U.T. Operation

Operating Environment:			
Temperature:	23.8℃	Humidity:	52.3%RH
Test Engineer	Faith Li		
Mode 1	Charging	Voltage	Input AC 230V/50Hz

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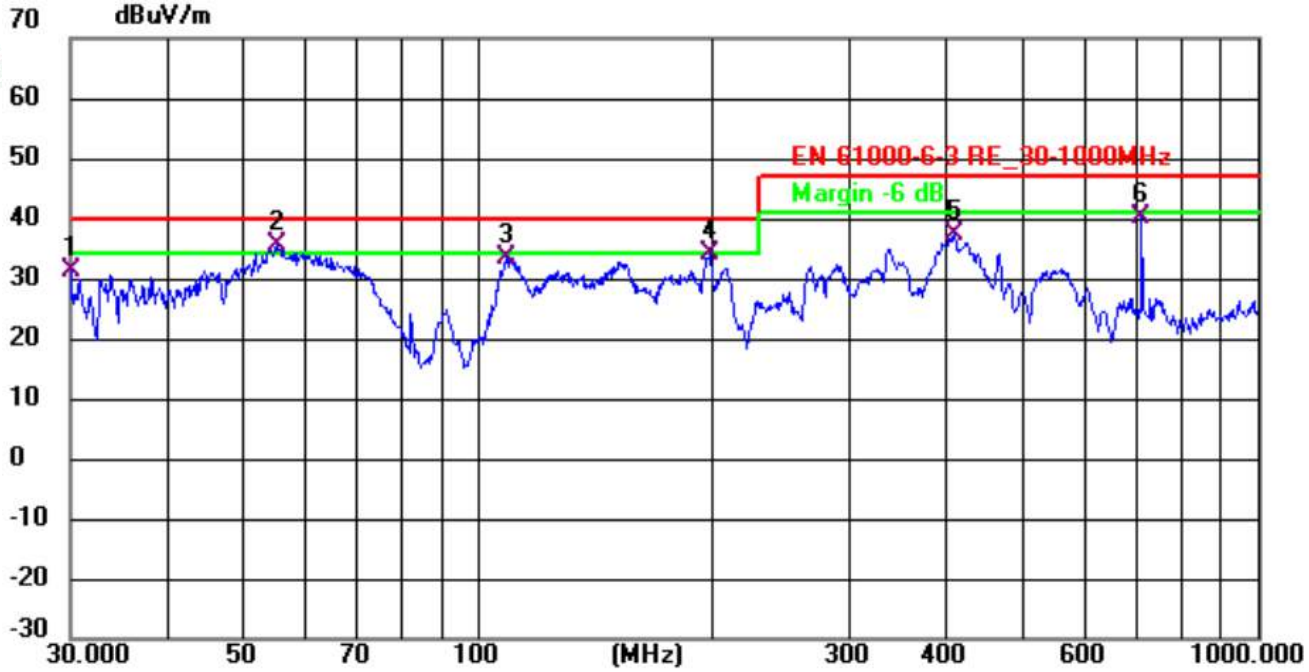
5.2.5 Test data

Mode 1 / Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		30.0000	50.91	-19.65	31.26	40.00	-8.74	QP	
2	*	55.2207	54.65	-19.22	35.43	40.00	-4.57	QP	
3		109.0286	53.77	-20.25	33.52	40.00	-6.48	QP	
4	!	198.5880	52.60	-18.53	34.07	40.00	-5.93	QP	
5		407.5144	51.57	-14.41	37.16	47.00	-9.84	QP	
6		709.1821	50.10	-9.75	40.35	47.00	-6.65	QP	

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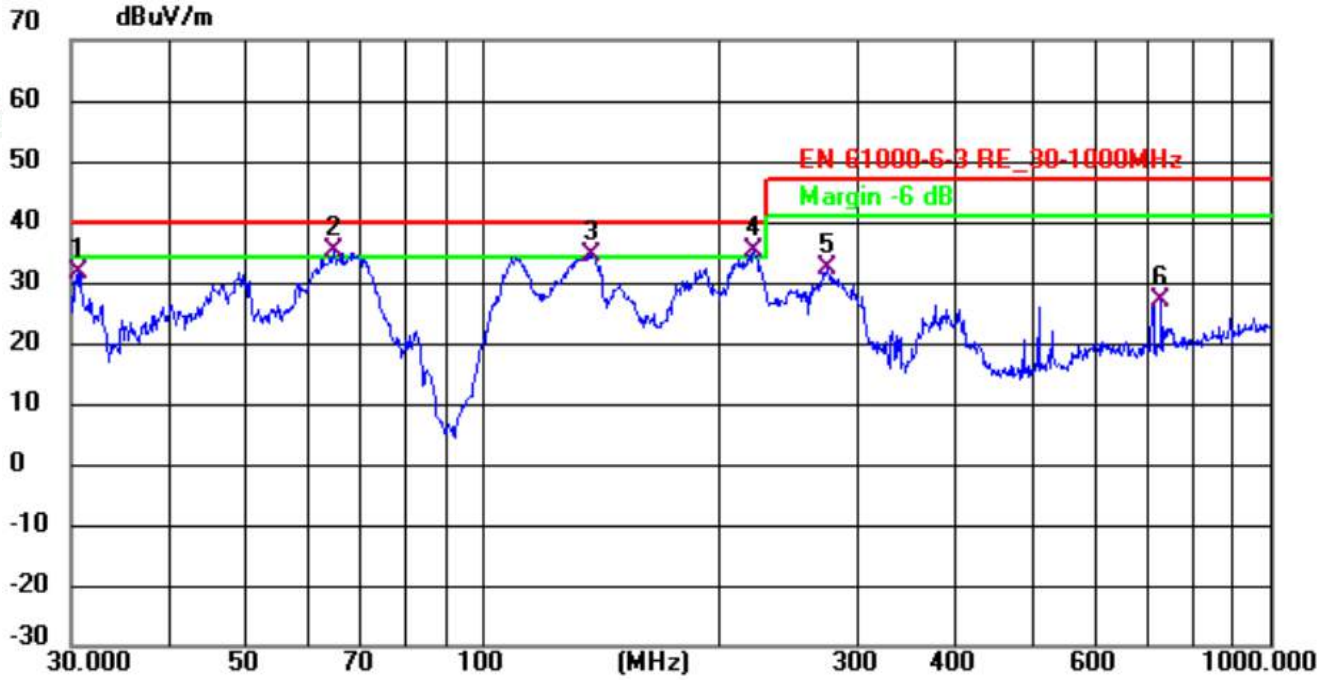
Mode 1 / Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		30.7454	51.39	-19.64	31.75	40.00	-8.25	QP	
2	!	64.8865	54.16	-19.03	35.13	40.00	-4.87	QP	
3	!	137.4202	55.99	-21.39	34.60	40.00	-5.40	QP	
4	*	220.6171	54.18	-18.90	35.28	40.00	-4.72	QP	
5		273.2340	49.46	-17.19	32.27	47.00	-14.73	QP	
6		726.8052	35.53	-8.55	26.98	47.00	-20.02	QP	

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5.3 Voltage Fluctuations& Flicker Test

5.3.1 Limits

Voltage fluctuations & flicker Limit

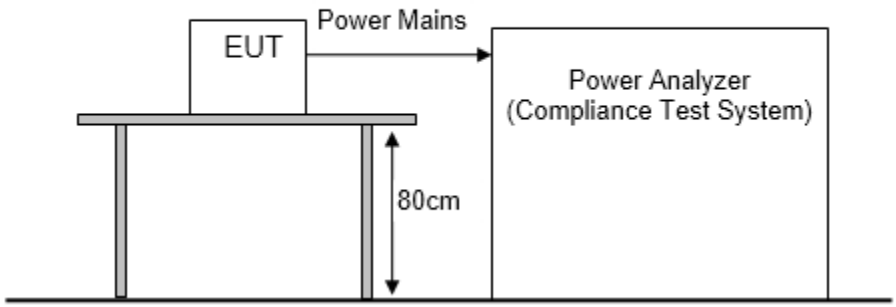
Test Item	Limit	Note
Pst	1.0	Pst means Short-term flicker indicator
Plt	0.65	Plt means long-term flicker indicator
Tdt	0.5	Tdt means maximum time that dt exceeds 3.3%
dmax (%)	4%	dmax means maximum relative voltage change.
dc (%)	3.3%	dc means relative steady-state voltage change.

5.3.2 Test procedure

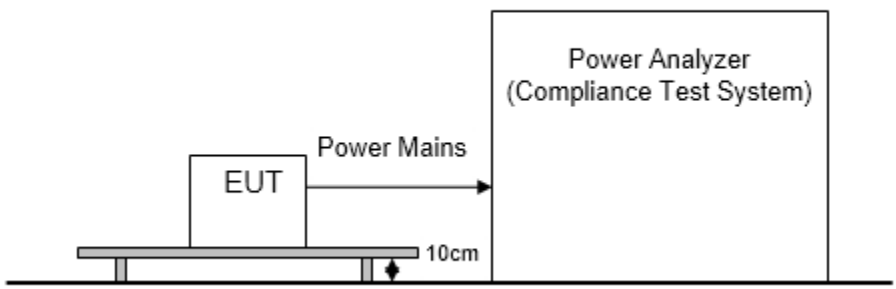
The EUT is placed on top of a wooden table (according to the standard height requirements, refer to the test layout), the most unfavorable sequence of voltage changes under normal conditions during the flick measurement; the measure time shall include that part of whole operation changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

5.3.3 Test Setup Diagram

Table-top device



Floor-standing device



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5.3.4 E.U.T. Operation

Operating Environment:			
Temperature:	24.8℃	Humidity:	55.7%RH
Test Engineer	Faith Li		
Mode 1	Charging	Voltage	Input AC 230V/50Hz

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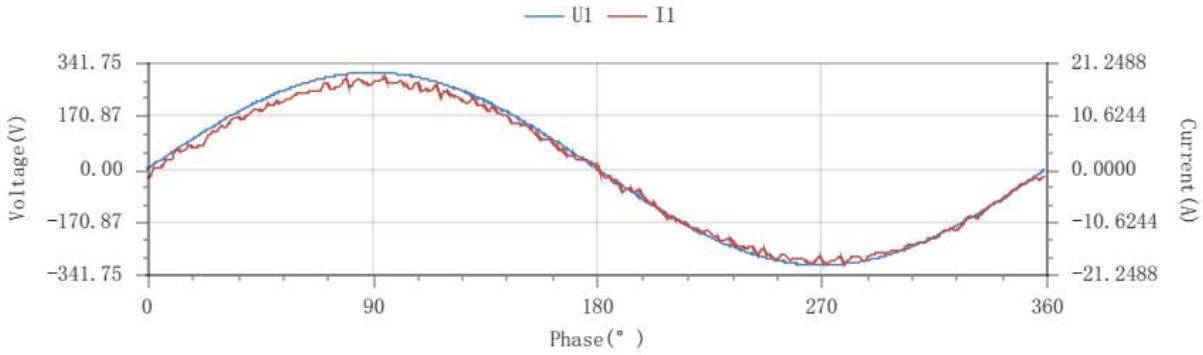
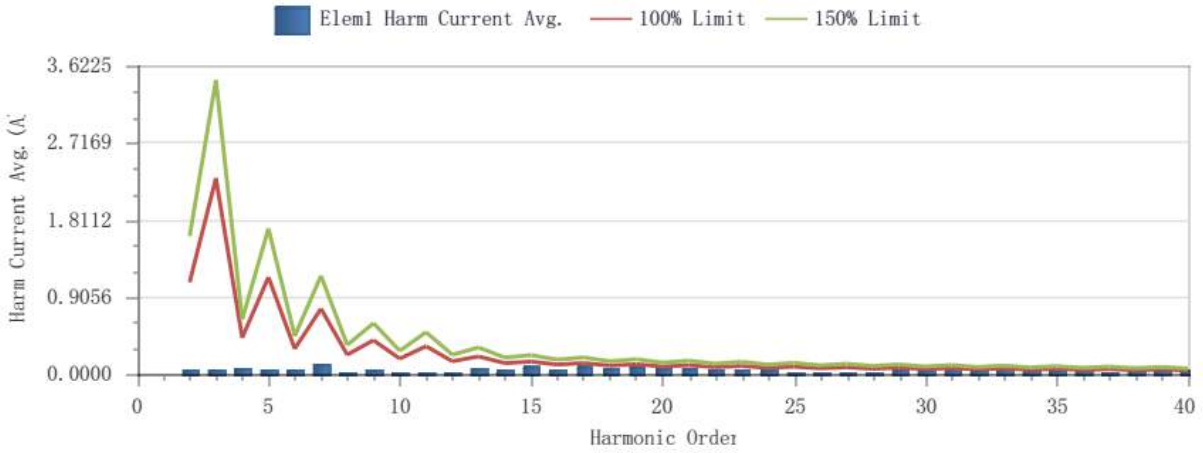
5.3.5 Test data

Mode 1

Customer : Result : Pass





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Customer : Result : Pass

Total Current Harmonic and Some Odd Harmonic Parameters

THC(A)	0.3432	THD(%)	2.71	POHC(A)	0.1476	POHC Limit(A)	0.2514

Maximum Value of Relevant Parameter During Test Period

Urms(V)	219.43	Freq(Hz)	49.999
Irms(A)	12.7072	Ipeak(A)	19.6352
I1(A)	12.6858	ICF	1.6075
P(W)	2784.6	λ	0.9982

Individual Harmonics and Limit Judgment

Order(n)	Harmonics Current Avg.(A)	100% Limit(A)	Limit Percent(%)	Harmonics Current Max.(A)	150% Limit(A)	Limit Percent(%)	Result
2	0.0442	1.0800	N/A	0.0518	1.6200	N/A	Pass
3	0.0385	2.3000	N/A	0.0414	3.4500	N/A	Pass
4	0.0634	0.4300	N/A	0.0680	0.6450	N/A	Pass
5	0.0361	1.1400	N/A	0.0394	1.7100	N/A	Pass
6	0.0391	0.3000	N/A	0.0424	0.4500	N/A	Pass
7	0.1228	0.7700	15.95	0.1252	1.1550	10.84	Pass
8	0.0252	0.2300	N/A	0.0280	0.3450	N/A	Pass
9	0.0495	0.4000	N/A	0.0515	0.6000	N/A	Pass
10	0.0142	0.1840	N/A	0.0160	0.2760	N/A	Pass
11	0.0222	0.3300	N/A	0.0244	0.4950	N/A	Pass
12	0.0245	0.1533	N/A	0.0266	0.2300	N/A	Pass
13	0.0676	0.2100	N/A	0.0701	0.3150	N/A	Pass
14	0.0435	0.1314	N/A	0.0466	0.1971	N/A	Pass
15	0.0941	0.1500	62.73	0.0967	0.2250	42.97	Pass
16	0.0581	0.1150	N/A	0.0612	0.1725	N/A	Pass
17	0.1022	0.1324	77.19	0.1048	0.1985	52.78	Pass
18	0.0643	0.1022	N/A	0.0678	0.1533	N/A	Pass
19	0.0892	0.1184	75.36	0.0925	0.1776	52.10	Pass
20	0.0669	0.0920	N/A	0.0738	0.1380	N/A	Pass
21	0.0666	0.1071	N/A	0.0732	0.1607	N/A	Pass
22	0.0493	0.0836	N/A	0.0539	0.1255	N/A	Pass
23	0.0384	0.0978	N/A	0.0418	0.1467	N/A	Pass
24	0.0357	0.0767	N/A	0.0402	0.1150	N/A	Pass
25	0.0253	0.0900	N/A	0.0288	0.1350	N/A	Pass
26	0.0281	0.0708	N/A	0.0317	0.1062	N/A	Pass
27	0.0276	0.0833	N/A	0.0316	0.1250	N/A	Pass
28	0.0342	0.0657	N/A	0.0384	0.0986	N/A	Pass
29	0.0396	0.0776	N/A	0.0448	0.1164	N/A	Pass
30	0.0445	0.0613	N/A	0.0502	0.0920	N/A	Pass
31	0.0691	0.0726	N/A	0.0786	0.1089	72.16	Pass
32	0.0532	0.0575	N/A	0.0709	0.0863	N/A	Pass
33	0.0608	0.0682	N/A	0.0681	0.1023	N/A	Pass
34	0.0460	0.0541	N/A	0.0597	0.0812	N/A	Pass
35	0.0423	0.0643	N/A	0.0461	0.0964	N/A	Pass
36	0.0355	0.0511	N/A	0.0427	0.0767	N/A	Pass
37	0.0334	0.0608	N/A	0.0372	0.0912	N/A	Pass
38	0.0377	0.0484	N/A	0.0421	0.0726	N/A	Pass
39	0.0387	0.0577	N/A	0.0438	0.0865	N/A	Pass
40	0.0506	0.0460	N/A	0.0565	0.0690	N/A	Pass

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Customer : Result : Pass

Voltage Relevant Parameter During Test Period and Judgment

Item	Nominal Value	Measured Value	Error Value	Allowable Error Value	Result
Urms(V)	220.00	219.40	0.60	±2.0%	Pass
Frequency(Hz)	50.000	49.995	0.005	±0.5%	Pass

Individual Harmonics Voltage and Limit Judgment

Order(n)	U[k](V)	Uhdf(%)	Limit(%)	Result
1	219.417	100.007	---	Pass
2	0.035	0.016	0.200	Pass
3	0.031	0.014	0.900	Pass
4	0.016	0.007	0.200	Pass
5	0.019	0.009	0.400	Pass
6	0.012	0.005	0.200	Pass
7	0.021	0.009	0.300	Pass
8	0.008	0.004	0.200	Pass
9	0.022	0.010	0.200	Pass
10	0.009	0.004	0.200	Pass
11	0.009	0.004	0.100	Pass
12	0.012	0.005	0.100	Pass
13	0.012	0.005	0.100	Pass
14	0.013	0.006	0.100	Pass
15	0.016	0.007	0.100	Pass
16	0.015	0.007	0.100	Pass
17	0.023	0.010	0.100	Pass
18	0.016	0.007	0.100	Pass
19	0.013	0.006	0.100	Pass
20	0.018	0.008	0.100	Pass
21	0.010	0.004	0.100	Pass
22	0.013	0.006	0.100	Pass
23	0.017	0.008	0.100	Pass
24	0.010	0.004	0.100	Pass
25	0.025	0.011	0.100	Pass
26	0.011	0.005	0.100	Pass
27	0.032	0.014	0.100	Pass
28	0.016	0.007	0.100	Pass
29	0.035	0.016	0.100	Pass
30	0.020	0.009	0.100	Pass
31	0.041	0.019	0.100	Pass
32	0.021	0.010	0.100	Pass
33	0.037	0.017	0.100	Pass
34	0.020	0.009	0.100	Pass
35	0.031	0.014	0.100	Pass
36	0.016	0.007	0.100	Pass
37	0.027	0.012	0.100	Pass
38	0.018	0.008	0.100	Pass
39	0.028	0.013	0.100	Pass
40	0.025	0.011	0.100	Pass

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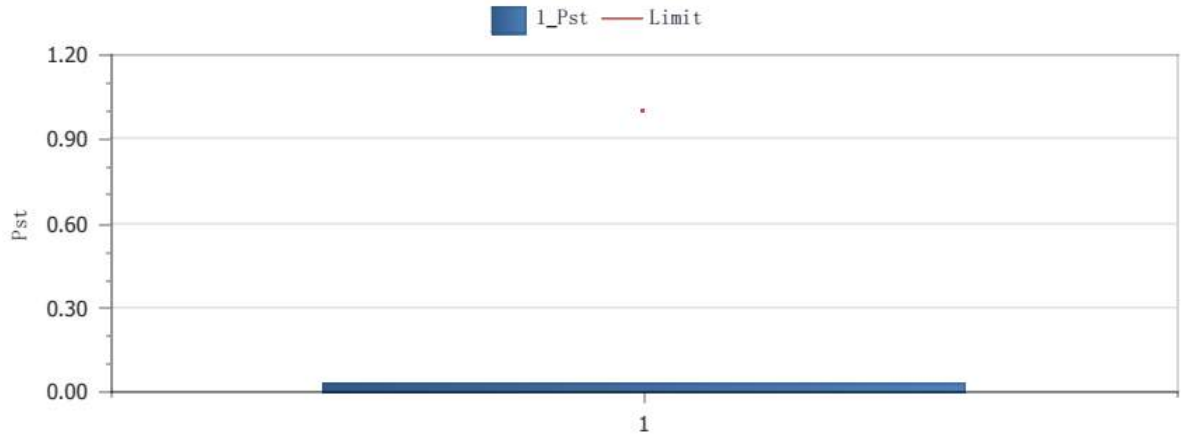
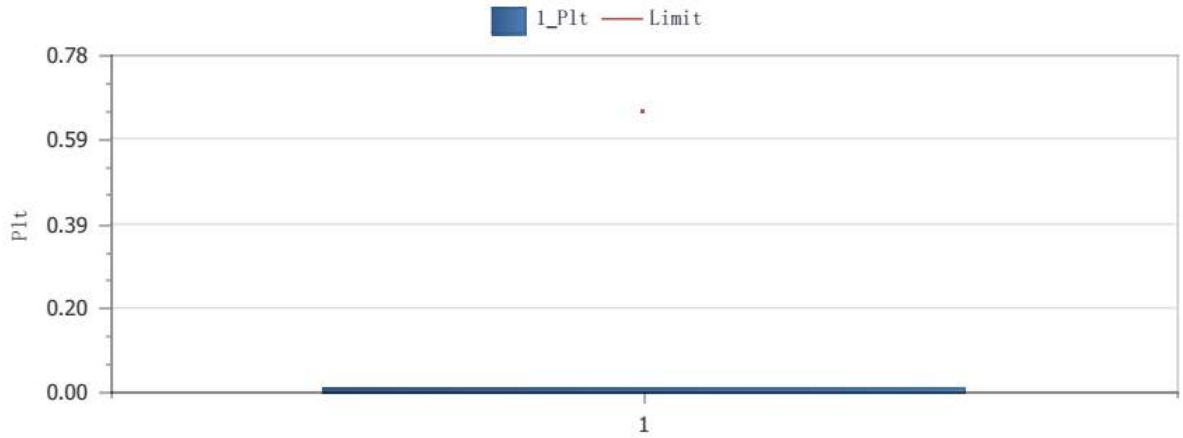
Pst and Limit



Plt and Limit



Relevant Parameter and Judgment During Test Period

Voltage at end of test	230.017V		
Voltage Fluctuation and Flicker	Test Value	Test Limit	Result
Tmax	0ms	500ms	Pass
dc	0.00%	3.30%	Pass
dmax	0.00%	4.00%	Pass
Pst	0.026	1.000	Pass
Plt	0.011	0.650	Pass

Elem1 Test Parameters

Count	dc(%)	dmax(%)	Tmax(ms)	Pst	Plt
1	0.00	0.00	0.00	0.026	0.011

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6. IMMUNITY TEST RESULTS (EMS)

6.1 Electrostatic Discharge Test

6.1.1 Limits

Test Level		Performance Criteria
Air Discharge	±2kV, ±4kV and ±8kV	B
Contact Discharge	±4kV	
Performance criteria B description: During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended.		

6.1.2 Test procedure

Air Discharge:

The test was applied on non-conductive surfaces of EUT. The round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT. After each discharge, the discharge electrode was removed from the EUT. The generator was re-triggered for a new single discharge and repeated 20 times for each pre-selected test point. This procedure was repeated until all the air discharge completed.

Contact Discharge:

All the procedure was same as air discharge. Except that the generator was re-triggered for a new single discharge. The tip of the discharge electrode was touching the EUT before the discharge switch was operated.

Indirect discharge for horizontal coupling plane:

At least 20 single discharges were applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

Indirect discharge for vertical coupling plane:

At least 20 single discharges were applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, was placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges were applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

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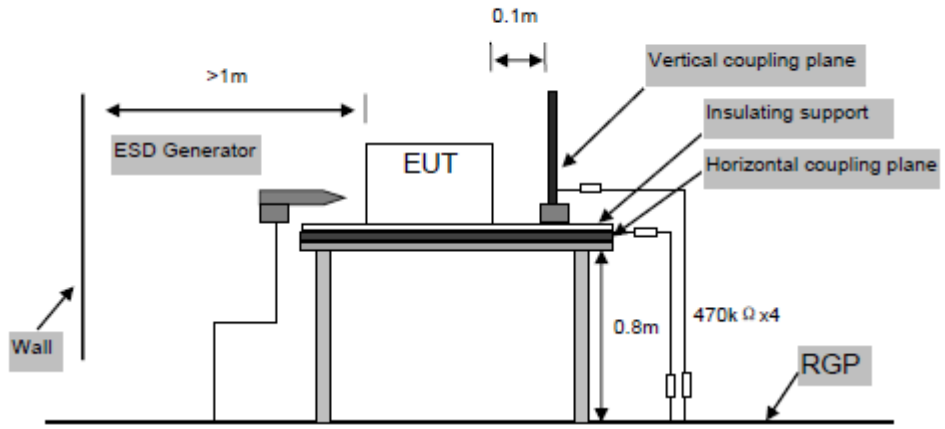
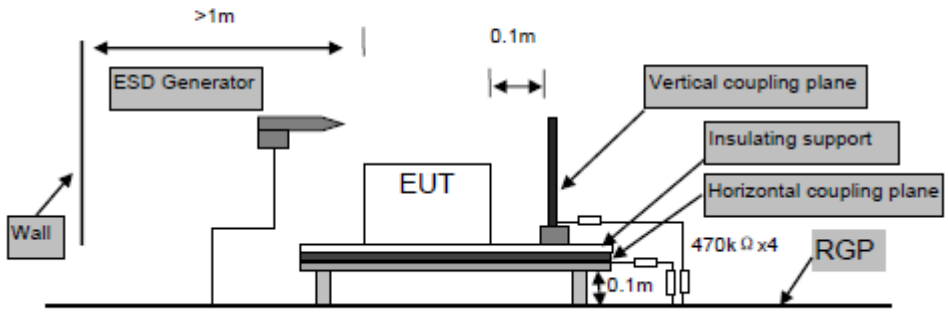
6.1.3 Test Setup Diagram

Table-top equipment



Floor-standing equipment



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6.1.4 Test data

Operating Environment:			
Test Site:	ELECTROSTATIC DISCHARG IMMUNITY TESE（0KV-30KV）	Test Engineer	Faith Li
Temperature:	24.3℃	Humidity:	56.0%RH
Memo:	/		

Sample No.: A260509065	Mode 1: Charging
Test voltage: Input AC 230V/50Hz	Memo:

Measure parameters: 20 times at each point for contact discharge; 20 times at each point for air discharge. 1 second interval for each discharge.

Type of discharge	Test level	Test point	Required	Observation	Result
Contact to EUT	±4kV		B	A	Pass
Contact to coupling planes	±4kV	Coupling planes	B	A	Pass
Air	±2 kV /±4 kV /±8kV		B	A	Pass

Observation description:
A: Normal performance within limits specified by the manufacturer requestor or purchaser.
B: Temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention.

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6.2 Continuous Radio Frequency Disturbances Test

6.2.1 Limits

Swept frequency test		Performance Criteria
Frequency (MHz)	80 to 1000, 1400 to 6000,	**A**
Field Strength	3V/m rms voltage level of the unmodulated signal	
Modulation	AM modulated to a depth of 80% by a sine wave of ☒1 kHz, ☐400 Hz (note 1)	
Step Size	1% increments	
Dwell time	≤5 Sec.	
Performance criteria A description for other devices: During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a minimum performance level specified by the manufacturer when the EUT is used as intended.		

6.2.2 Test procedure

The field sensor is placed on the EUT table (Ground clearance height reference "block diagram of test setup") which is 3 meters away from the transmitting antenna. Through the signal generator, power amplifier and transmitting antenna to produce a uniformity field strength around the EUT table from frequency range specified and records the signal generator ‘s output level at the same time for whole measured frequency range. Then, put EUT and its simulators on the EUT turn table and keep them 3 meters away from the transmitting antenna which is mounted on an antenna tower and fixes at 1 meter height above the ground. Using the recorded signal generator’s output level to measure the EUT from frequency range specified and both horizontal & vertical polarization of antenna must be set and measured. Each of the four sides of EUT must be faced this transmitting antenna and measures individually.

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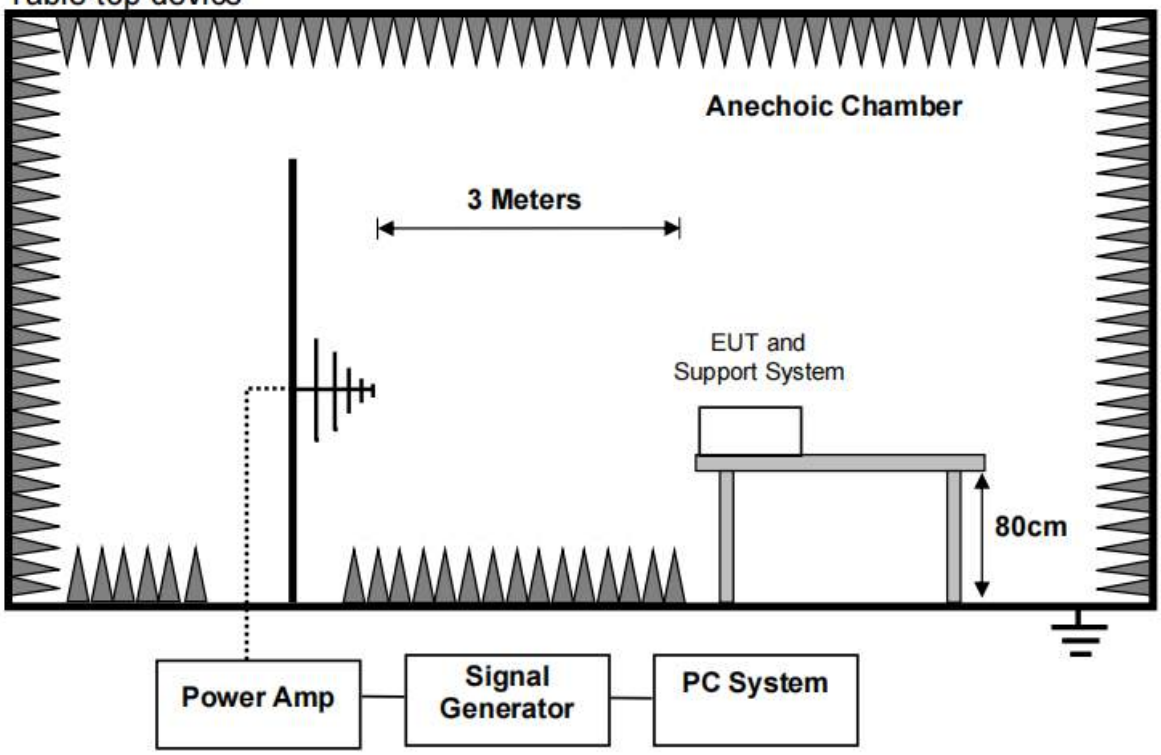
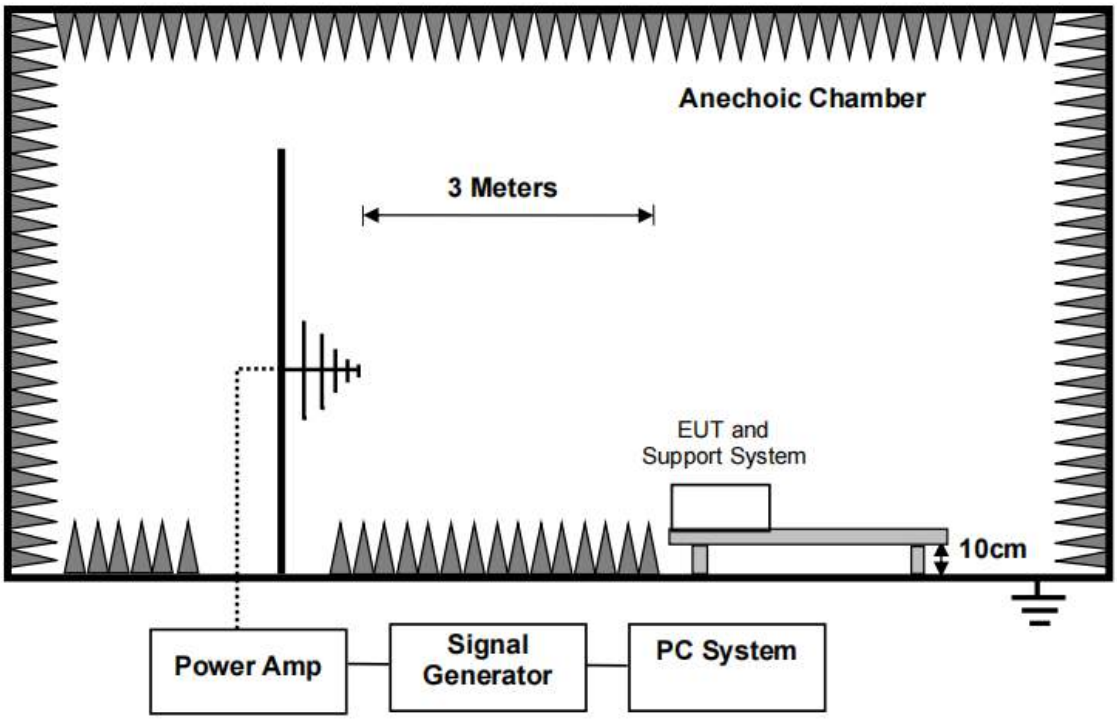
6.2.3 Test Setup Diagram

Table-top device



Floor-standing device



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6.2.4 Test data

Operating Environment:			
Test Site:	RF FIELD STRENGTH SUSCEPTIBILITY TEST（UP TO 10V/m)	Test Engineer	Faith Li
Temperature:	24.1℃	Humidity:	52.8%RH
Memo:	/		

Sample No.: A260509065	Mode 1: Charging
Test voltage: Input AC 230V/50Hz	Memo:

Steps: 1%, Dwell time 1s, 1kHz 80% AM modulation

Test frequency	Level	EUT position	Antenna polarization	Required	Observation	Result
80MHz to 1000MHz	3V/m	Front	H	A	A	Pass
			V	A	A	Pass
		Left	H	A	A	Pass
			V	A	A	Pass
		Rear	H	A	A	Pass
			V	A	A	Pass
		Right	H	A	A	Pass
			V	A	A	Pass
1800MHz 2600MHz 3500MHz 5000MHz	3V/m	Front	H	A	A	Pass
			V	A	A	Pass
		Left	H	A	A	Pass
			V	A	A	Pass
		Rear	H	A	A	Pass
			V	A	A	Pass
		Right	H	A	A	Pass
			V	A	A	Pass

Observation description:
A: Normal performance within limits specified by the manufacturer requestor or purchaser.

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6.3 Electrical Fast Transients(EFT) Test

6.3.1 Limits

Test Level			Performance Criteria
Test voltage	±1kVfor AC mains port	±0.5kV for dc input or signal port	B
Repetition Frequency	5kHz	5kHz	
Burst Duration	15ms	15ms	
Burst Period	300ms	300ms	
Inject Time(s)	120s	120s	
Inject Method	Direct for AC mains port	Capacitive coupling clamp or CDN	
Inject Line	AC mains	Analogue/digital data ports, and DC network power ports	
Note: This test shall be additionally performed on analogue/digital data ports, and DC network power ports, of radio equipment and associated ancillary equipment, if the cables may be longer than 3 m. Performance criteria B description: During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended.			

6.3.2 Test procedure

The EUT and its simulators were placed on the ground reference plane and were insulated from it by a wood support 0.1m ±0.01m thick. The ground reference plane was 1m*1m metallic sheet w ith 0.65mm minimum thickness. This reference ground plane was project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane was more than 0.5m. All cables to the EUT was placed on the wood support, cables not subject to EFT/B was routed as far as possible from the cable under test to minimize the coupling between the cables.

For DC input and AC power ports:

The EUT was connected to the power mains by using a coupling device that couples the EFT interference signal to AC or DC power lines. Both positive transients and negative transients of test voltage were applied during compliance test and the duration of the test can’t less than 2mins.

For analogue/digital data ports:

The capacitive coupling clamp was connected to the power by using a coupling device that couples the EFT interference signal to capacitive coupling clamp. Both positive transients and negative transients of test voltage were applied during compliance test and the duration of the test can’t less than 2mins.

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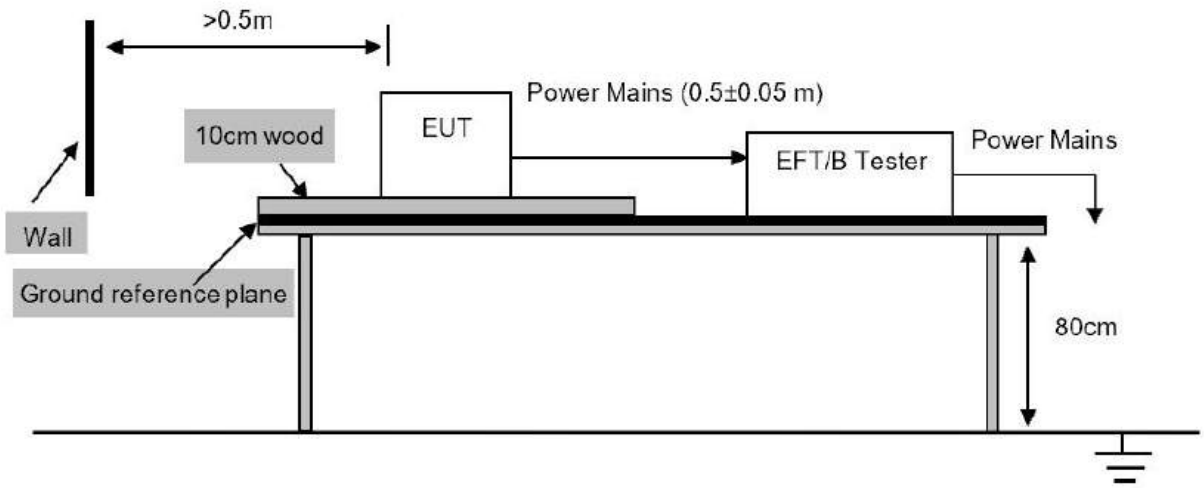
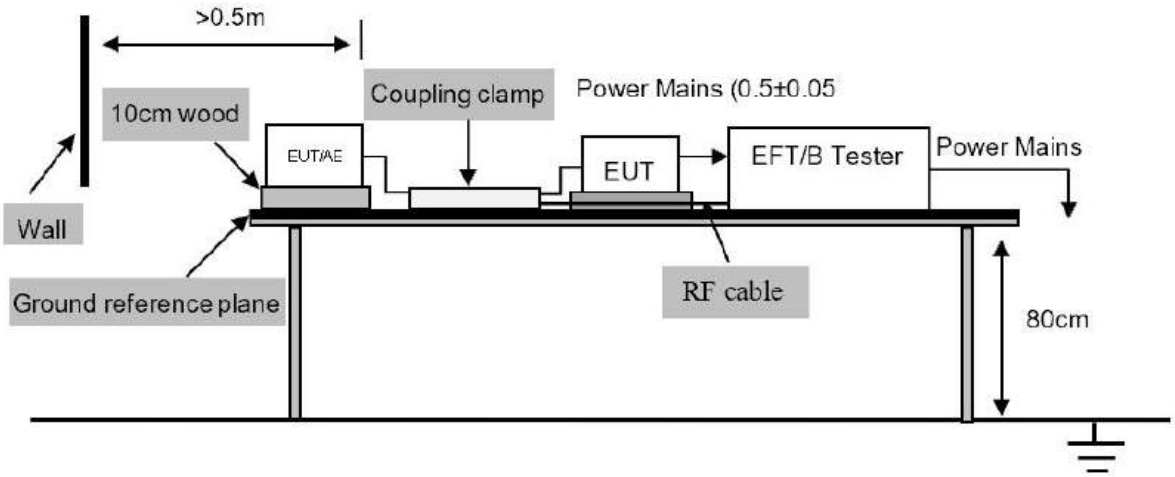
6.3.3 Test Setup Diagram

For power port (Note: if the DC network power cable may be lengths greater than 3 m, the requirement is applicable).



For analogue/digital data ports, if the cables may be longer than 3 m.



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6.3.4 Test data

Operating Environment:			
Test Site:	ELECTICAL FAST TRANSIENT/BURST IMMUNITY TEST（UP TO 4KV)	Test Engineer	Faith Li
Temperature:	24.3℃	Humidity:	52.1%RH
Memo:	/		

Sample No.: A260509065	Mode 1: Charging
Test voltage: Input AC 230V/50Hz	Memo:

Test burst parameters: Burst period 300ms, Durations 15ms, Repetition frequency 5kHz

Port/Coupling	Line	Test voltage	Test time(s)	Required	Observation	Result
AC Mains/ Direct	L	+1kV/+2kV	120	B	A	Pass
		-1kV/-2kV	120	B	A	Pass
	N	+1kV/+2kV	120	B	A	Pass
		-1kV/-2kV	120	B	A	Pass
	L-N	+1kV/+2kV	120	B	A	Pass
		-1kV/-2kV	120	B	A	Pass

Observation description:
A: Normal performance within limits specified by the manufacturer requestor or purchaser.
B: Temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention.

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6.4 Surge Test

6.4.1 Limits

Test level for AC mains ports		Performance Criterion
Line to Line	1 kV 1.2/50(8/20) μs	B
Line to Ground	2 kV 1.2/50(8/20) μs	B
Note: In telecommunications centre 1 kV line to ground and 0,5 kV line to line shall be used.		
Wired network port (outdoor)		Performance Criterion
Line to Ground	1 kV 10/700(5/320) μs (symmetrically)	B
Line to Ground or Shield to Ground	1 kV 1.2/50(8/20) μs (non-symmetrically)	B
Line to Line	0.5 kV 1.2/50(8/20) μs (non-symmetrically)	B
Wired network port (indoor)		Performance Criterion
Line to Ground or Shield to Ground	0.5 kV 1.2/50(8/20) μs (longer than 30m)	B
Performance criteria B description: During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended.		

6.4.2 Test procedure

For line-to- nature coupling mode, provide a 1 kV 1.2/50 us voltage surge (at pen-circuit condition) and 8/20 us current surge to EUT selected points.

For line-to- ground coupling mode, provide a 2 kV 1.2/50 us voltage surge (at pen-circuit condition) and 8/20 us current surge to EUT selected points.

At least 5 positive and 5 negative (polarity) tests with a maximum 1-minute repetition rate are applied during test.
Different phase angles are done individually.

For other surge test, each line of internet port to ground coupling mode, provide a combination wave specified above table.

At least 5 positive and 5 negative (polarity) tests with a maximum 1-minute repetition rate are applied during test.

Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

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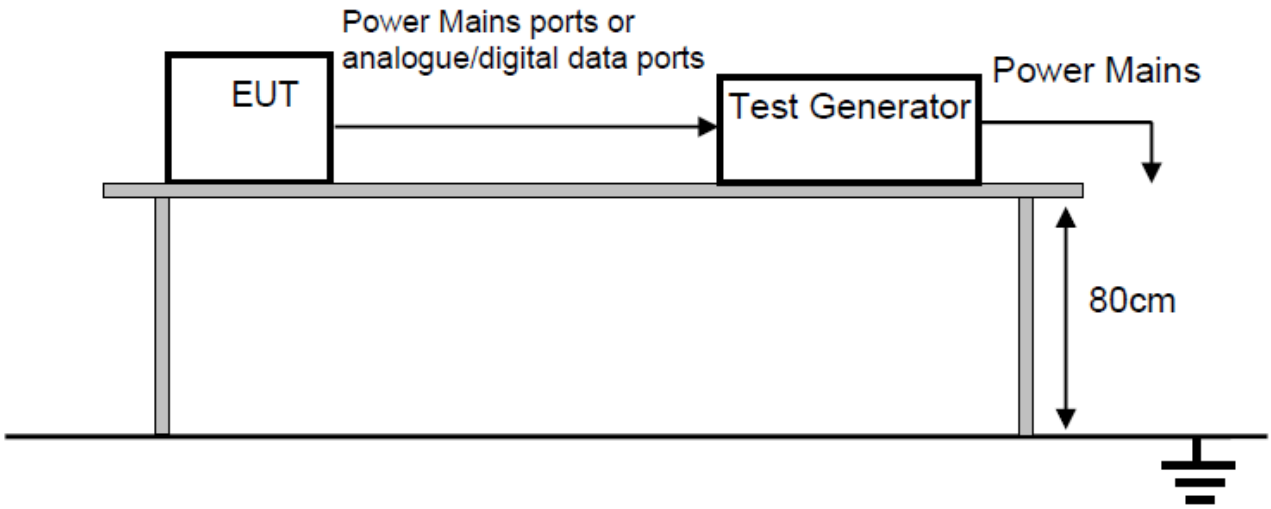
6.4.3 Test Setup Diagram



6.4.4 Test data

Operating Environment:			
Test Site:	Surges IMMUNITY TEST	Test Engineer	Faith Li
Temperature:	24.5℃	Humidity:	52.8%RH
Memo:	/		

Sample No.: A260509065	Mode 1: Charging
Test voltage: Input AC 230V/50Hz	Memo:

Test wave parameters: Wave type: 1.2/50us-8/20us; Voltage phase: 0°, 90°, 180°, 270°; Pulse times: 5 times at each polarity; Pulse interval: 60s

Line/Port	Internal impedance	Test voltage	Required	Observation	Result
L-N	2Ω	+0.5kV	B	A	Pass
	2Ω	-0.5kV	B	A	Pass
L-N	2Ω	+1kV	B	A	Pass
	2Ω	-1kV	B	A	Pass

Observation description:

A: Normal performance within limits specified by the manufacturer requestor or purchaser.

B: Temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention.

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6.5 Continuous Conducted Disturbances Test

6.5.1 Limits

Test Level		Performance Criteria
Frequency	0.15MHz to 80MHz	A
Field Strength	3V measured unmodulated	
Modulation	AM modulated to a depth of 80% by a sinusoidal audio signal of ☒1 kHz / ☐400 Hz (see note1)	
Step Size	1% increments	
Dwell time	>0.5 Sec.	

Note 1: If the wanted signal is modulated at 1 kHz, then the test signal of 400 Hz shall be used.
Note 2: This test shall be additionally performed on signal ports, wired network ports, control ports, and DC power ports, of radio equipment and associated ancillary equipment, if the cables may be longer than 3 m.
Note 3: Performance criteria A description: During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a minimum performance level specified by the manufacturer when the EUT is used as intended.

6.5.2 Test procedure

The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).

The disturbance signal described below is injected to EUT through CDN.

The EUT operates within its operational mode(s) under intended climatic conditions after power on.

Use the frequency range specified by the standard, interference signal level, and interference signal for testing.

The step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.

Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

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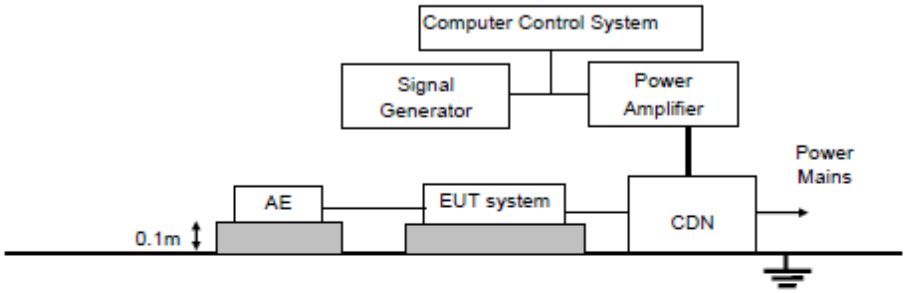
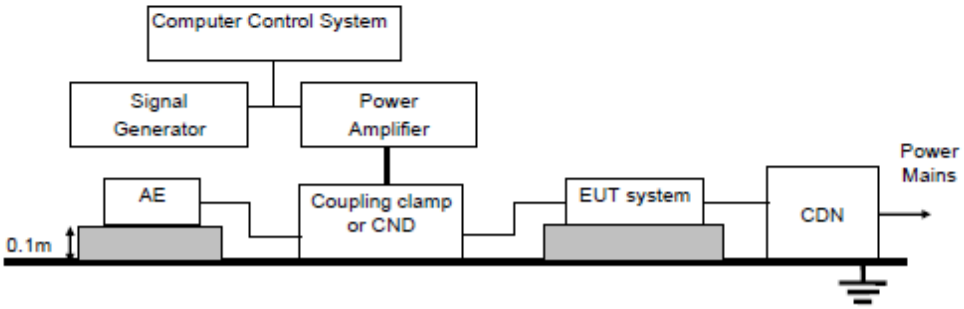
6.5.3 Test Setup Diagram

For power port (Note: if the DC network power cable may be lengths greater than 3 m, the requirement is applicable).



For analogue/digital data ports, if the cables may be longer than 3 m.



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6.5.4 Test data

Operating Environment:			
Test Site:	INJECTED CURRENTS SUSCEPTIBILITY TEST （150kHz-230MHz）	Test Engineer	Faith Li
Temperature:	24.8℃	Humidity:	52.2%RH
Memo:	/		

Sample No.: A260509065	Mode 1: Charging
Test voltage: Input AC 230V/50Hz	Memo:

Test steps: 1%, Dwell time 1s, 1kHz 80% AM modulation

Test frequency	Injected Position	Strength	Required	Observation	Result
0.15MHz to 80MHz	AC Port	3V	A	A	Pass

Observation Description:
A: Normal performance within limits specified by the manufacturer requestor or purchaser.

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6.6 Voltage Dips and Interruptions Test

6.6.1 Limits

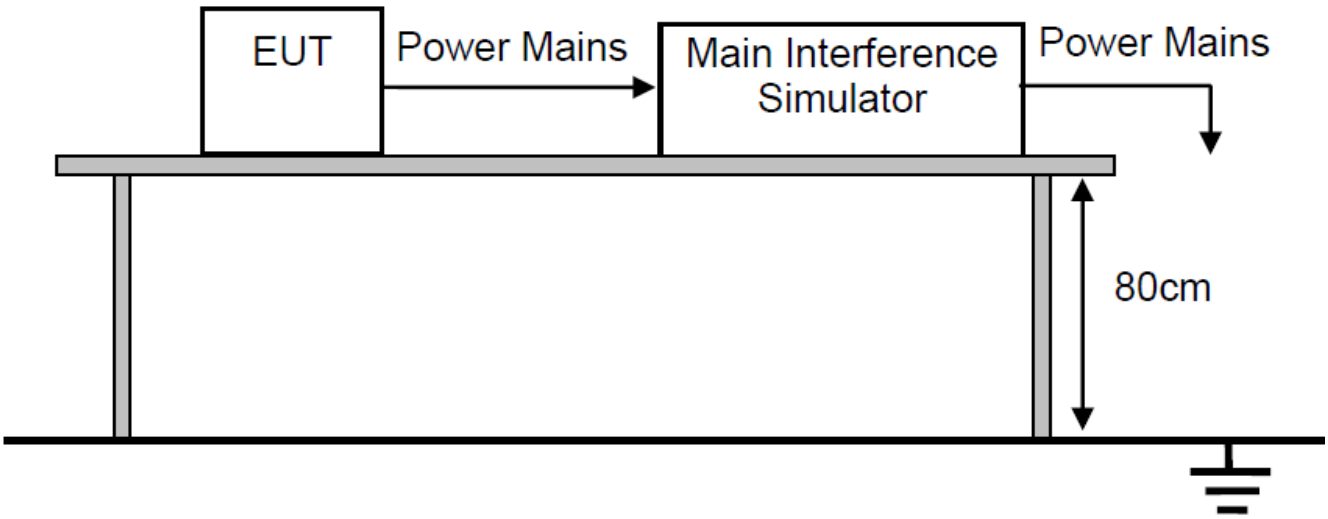
Test Level %UT	Duration (in period)	Performance Criterion
0	0.5	B
0	1	B
70	25 for 50Hz/30 for 60Hz	C
0	250 for 50Hz/300 for 60Hz	C

Performance criteria B description: During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended.
Performance criteria C description: During and after testing, a temporary loss of function is allowed, provided the function is self recoverable, or can be restored by the operation of the controls or cycling of the power to the EUT by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

6.6.2 Test procedure

The EUT and test generator were setup as shown. The interruptions are introduced at selected phase angles with specified duration. Record any degradation of performance.

6.6.3 Test Setup Diagram



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6.6.4 Test data

Operating Environment:			
Test Site:	VOLTAGE DIPS AND INTERRUPTIONS TEST	Test Engineer	Faith Li
Temperature:	24.2℃	Humidity:	52.3%RH
Memo:	/		

Sample No.: A260509065	Mode 1: Charging
Test voltage: Input AC 230V/50Hz	Memo:

Voltage Dips & Short Interruptions %U_T	Duration (in period)	Phase Angle	Required	Observation	Result
0	0.5P	0℃to 360°	B		Pass
0	1P	0℃to 360°	B		Pass
70	25P	0℃to 360°	C		Pass
0	250P	0℃to 360°	C		Pass
0	0.5P	0℃to 360°	B		Pass
0	1P	0℃to 360°	B		Pass
70	30P	0℃to 360°	C		Pass
0	300P	0℃to 360°	C		Pass

Observation description:
A: Normal performance within limits specified by the manufacturer requestor or purchaser.
B: Temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention.
C: Temporary loss of function or degradation of performance, the correction of which requires operator intervention.

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7. TEST SETUP PHOTOS

AC Power Port Conducted Emission



Radiated Emissions



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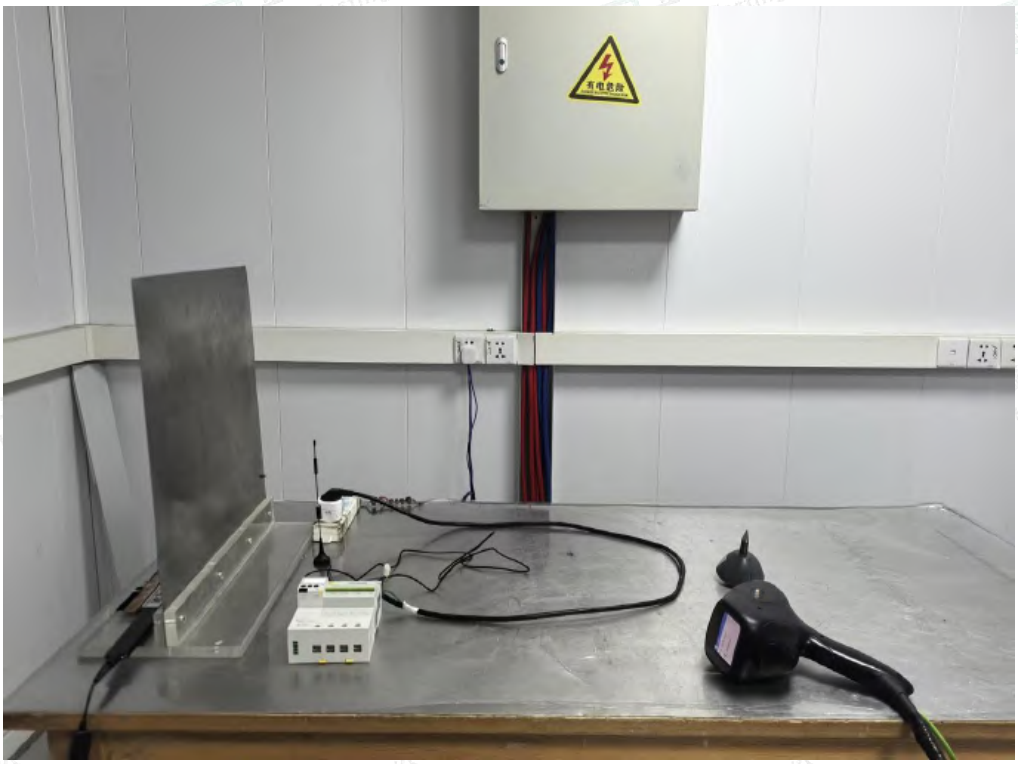
Voltage Fluctuations& Flicker Test



Electrostatic Discharge Test



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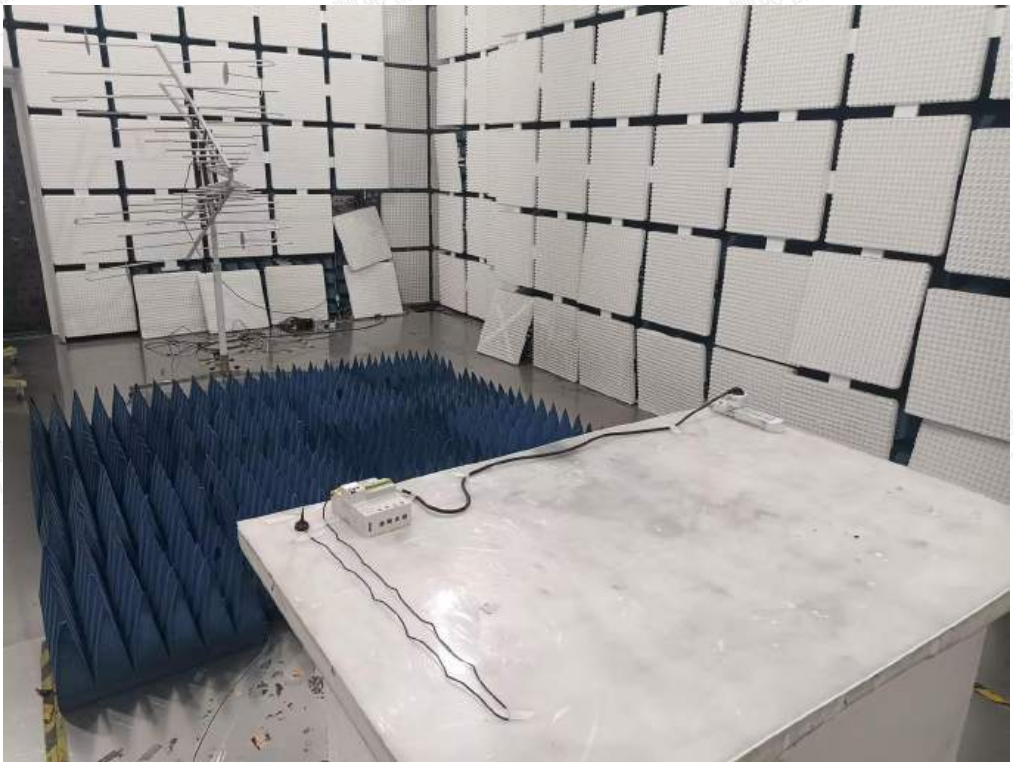
Continuous Radio Frequency Disturbances Test



(80MHz to 1000MHz)



(1000MHz to 6000MHz)

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Add: Room 101/201, Building A, and Room 101/301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com
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Electrical Fast Transients(EFT) Test



Surge Test



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Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com
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Continuous Conducted Disturbances Test



Voltage Dips and Interruptions Test



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8. EUT CONSTRUCTIONAL DETAILS (EUT PHOTOS)



Fig. 1



Fig. 2

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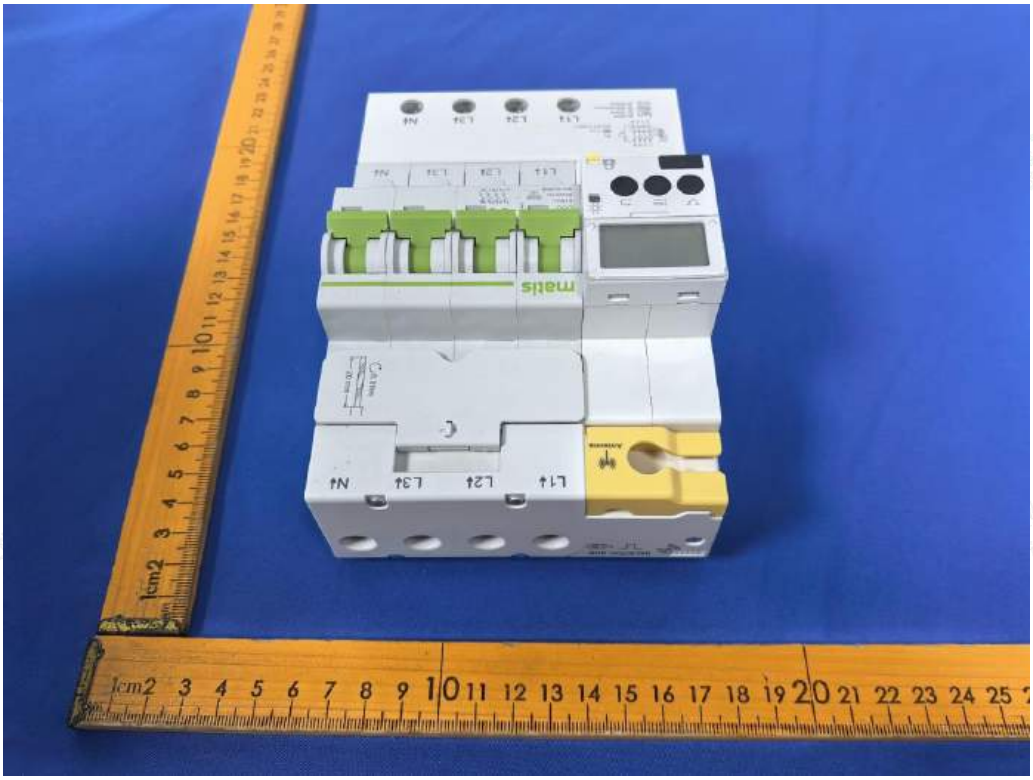

Fig. 3



Fig. 4

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Fig. 5



Fig. 6

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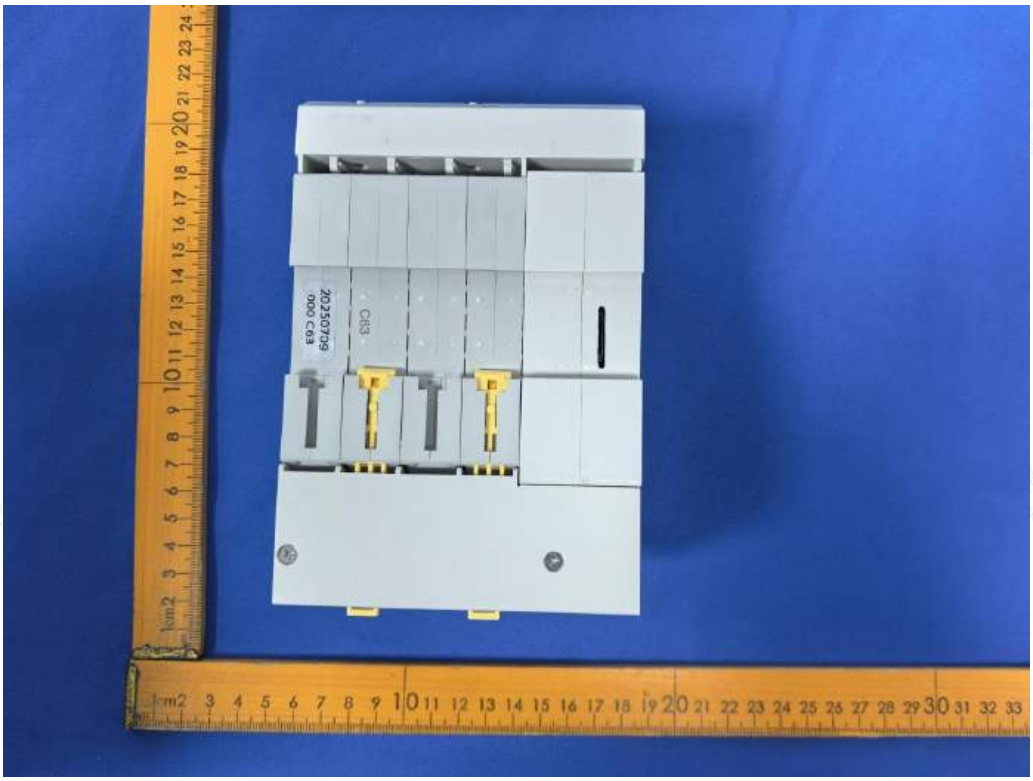

Fig. 7



Fig. 8

Shenzhen LCS Compliance Testing Laboratory Ltd.
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Fig. 9

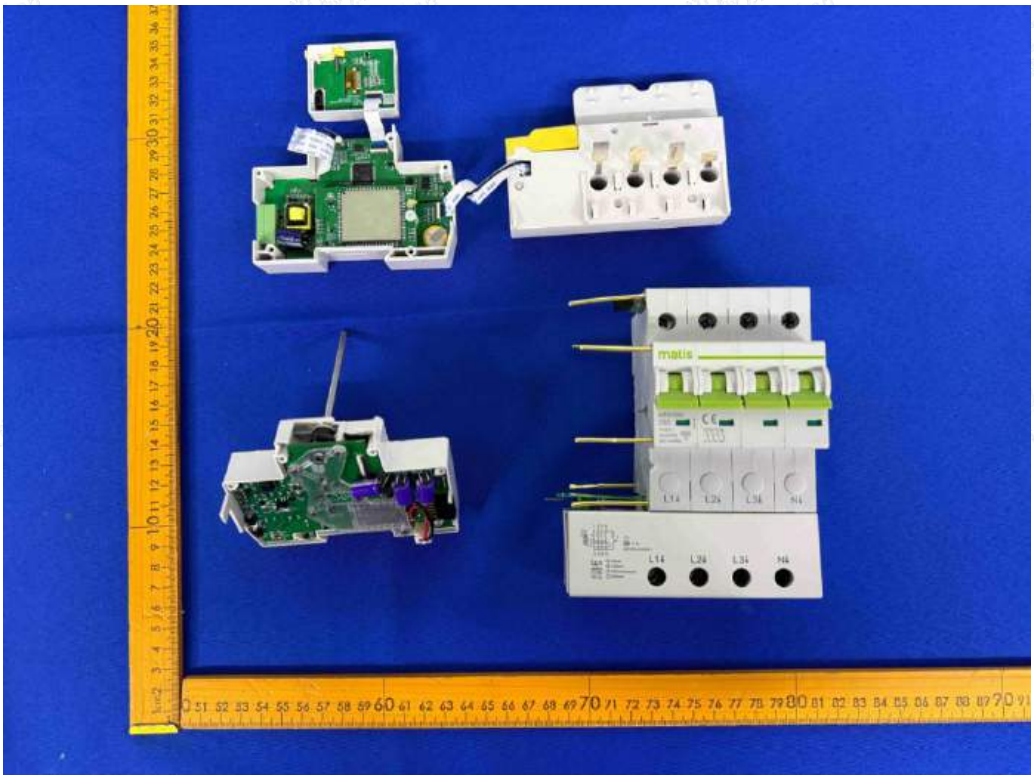

Fig. 10

Shenzhen LCS Compliance Testing Laboratory Ltd.
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Scan code to check authenticity

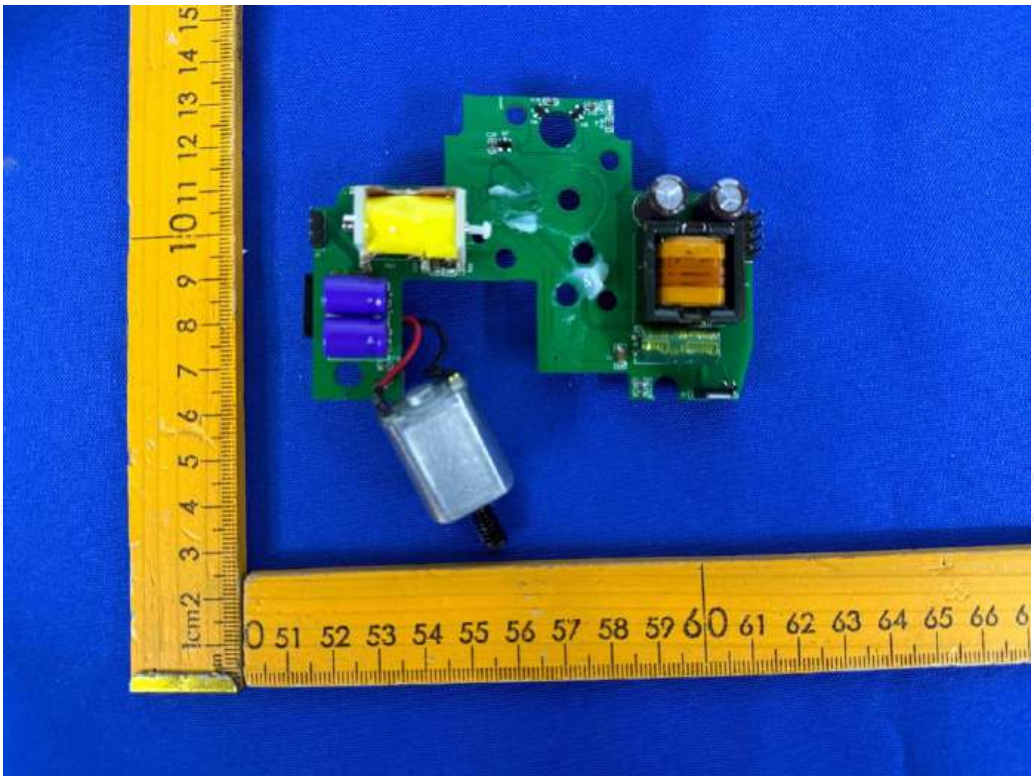

Fig. 11

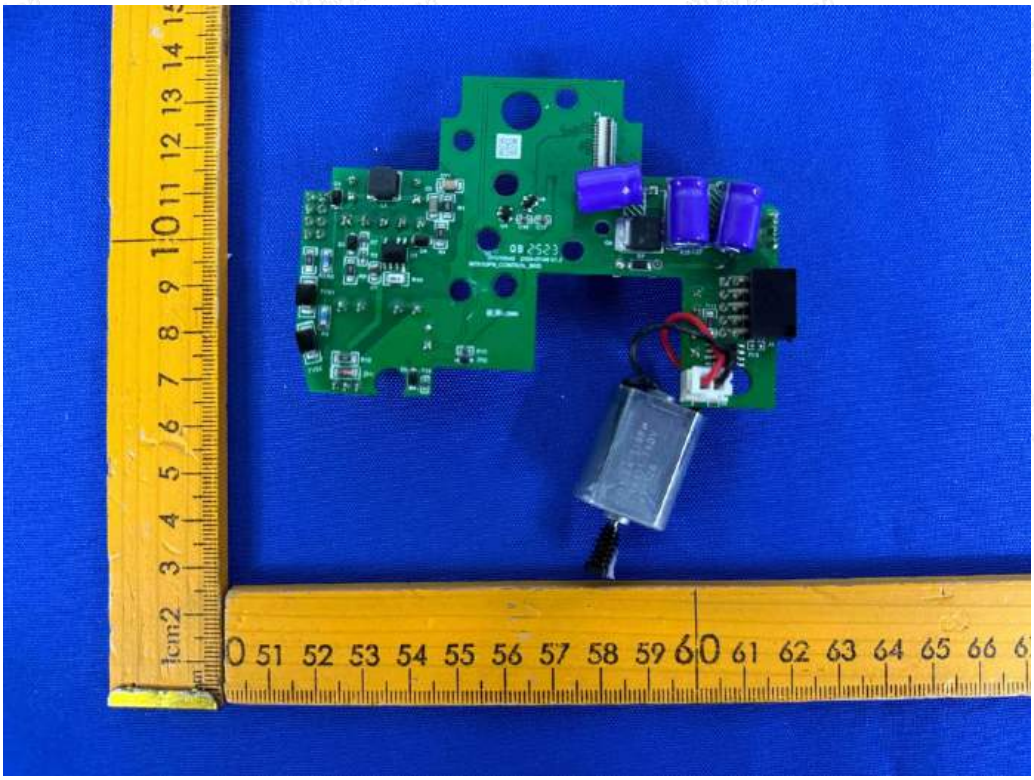

Fig. 12

Shenzhen LCS Compliance Testing Laboratory Ltd.
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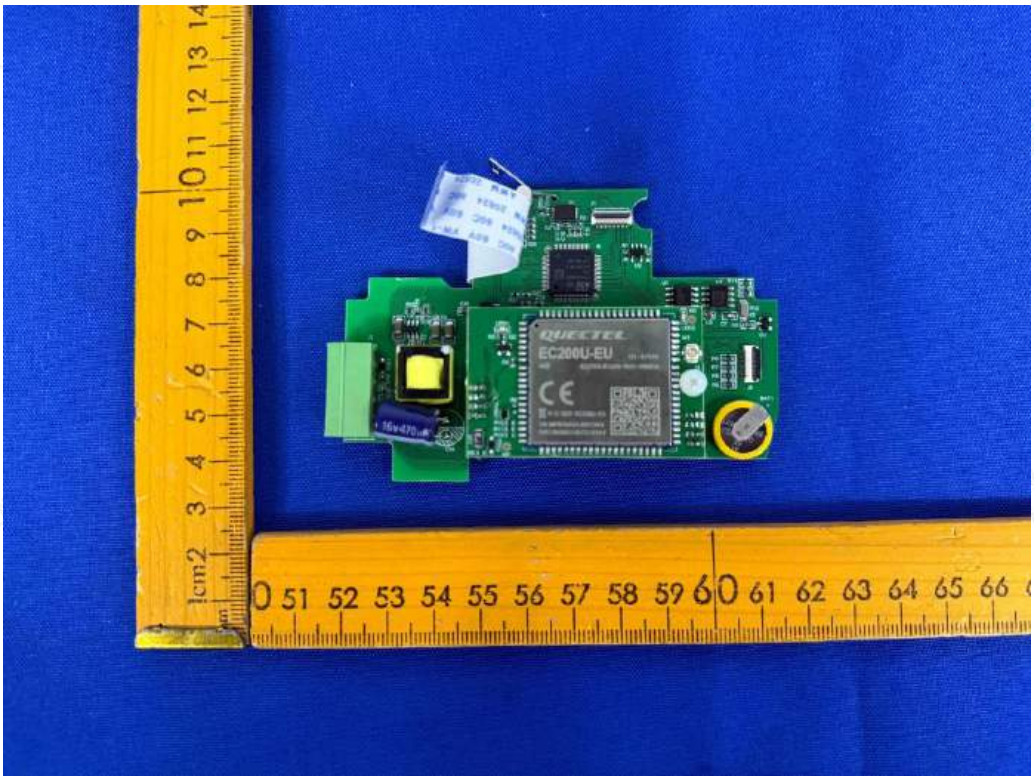

Fig. 13

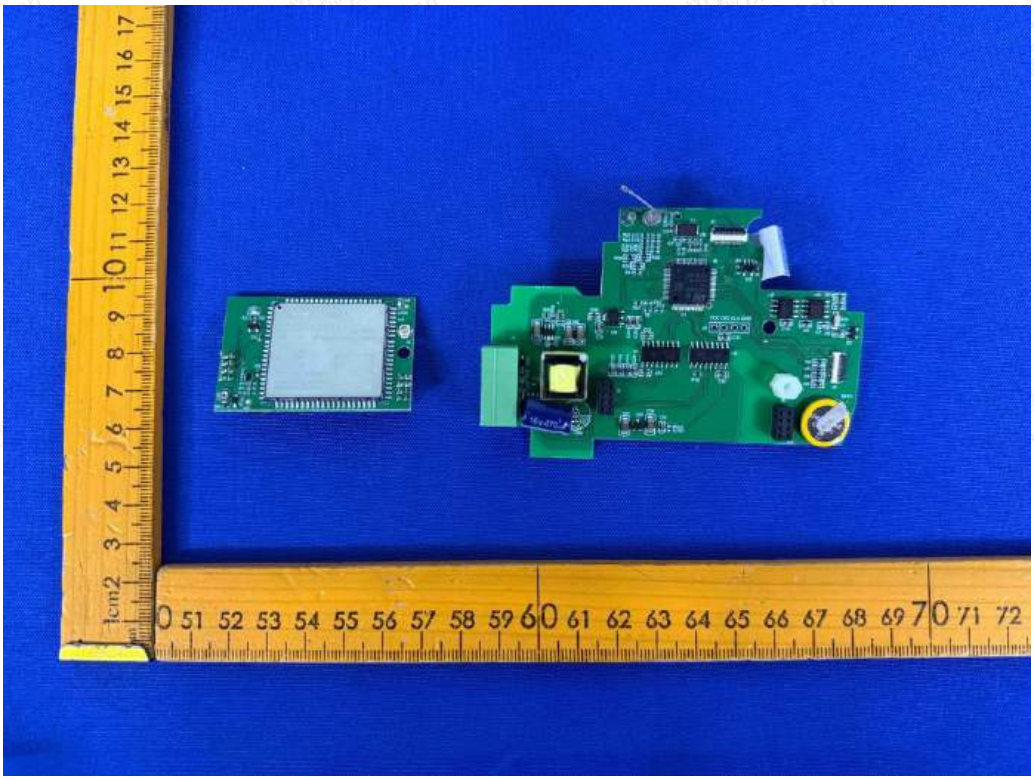

Fig. 14

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Scan code to check authenticity

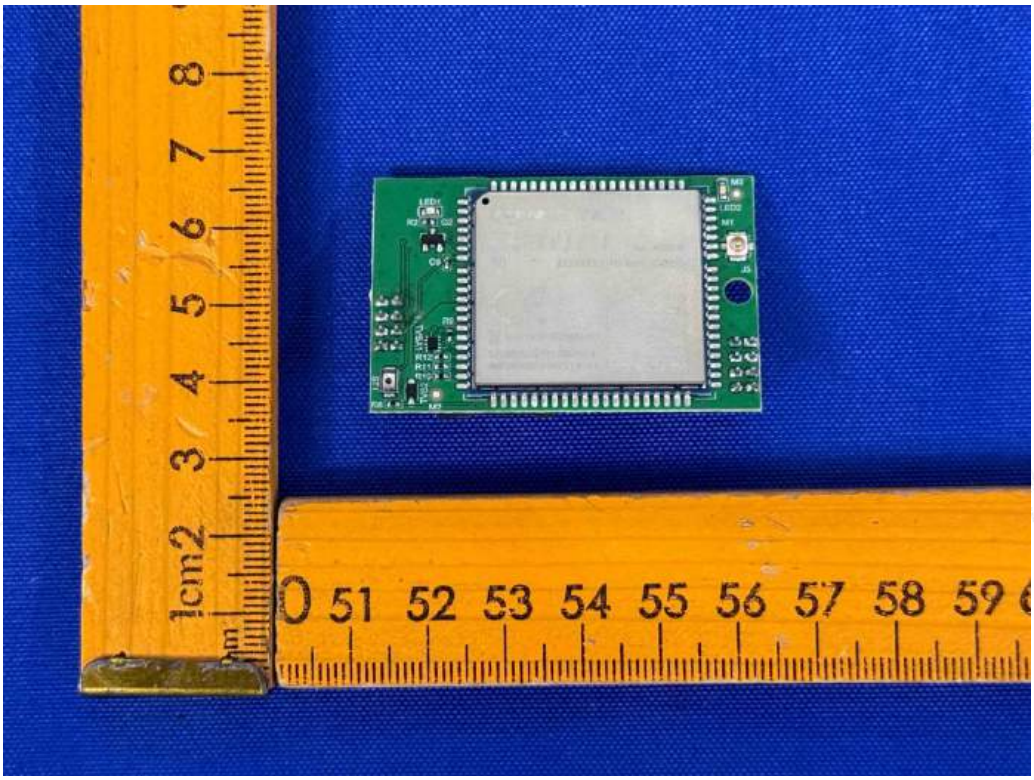

Fig. 15

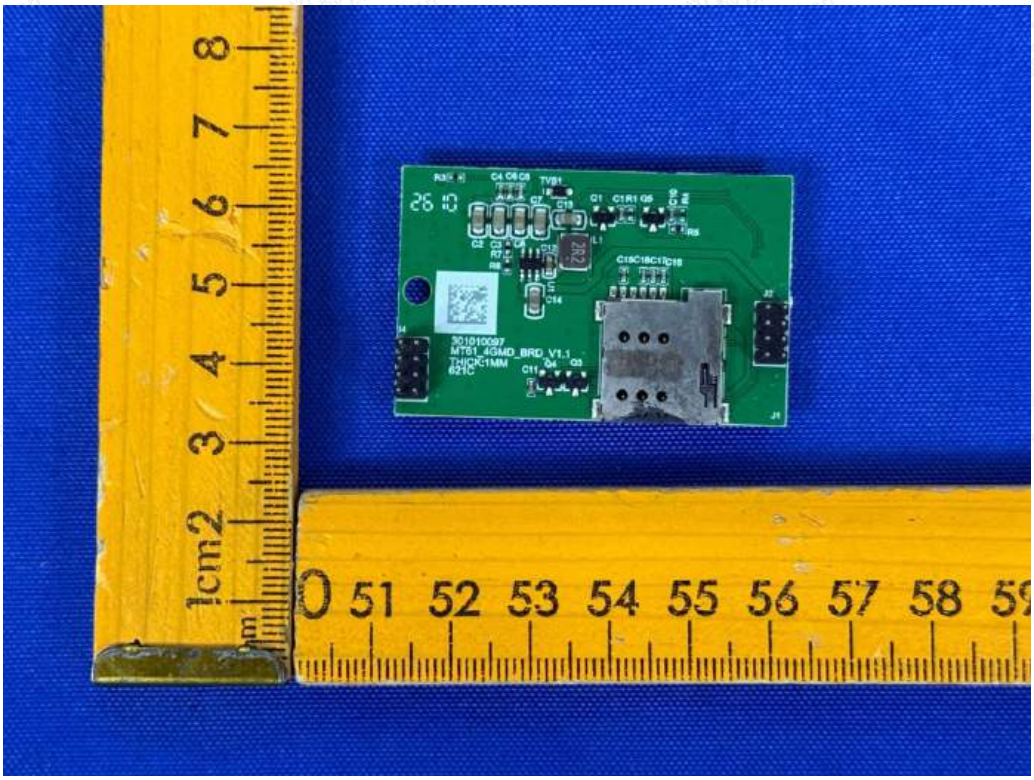

Fig. 16

Shenzhen LCS Compliance Testing Laboratory Ltd.
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Fig. 17

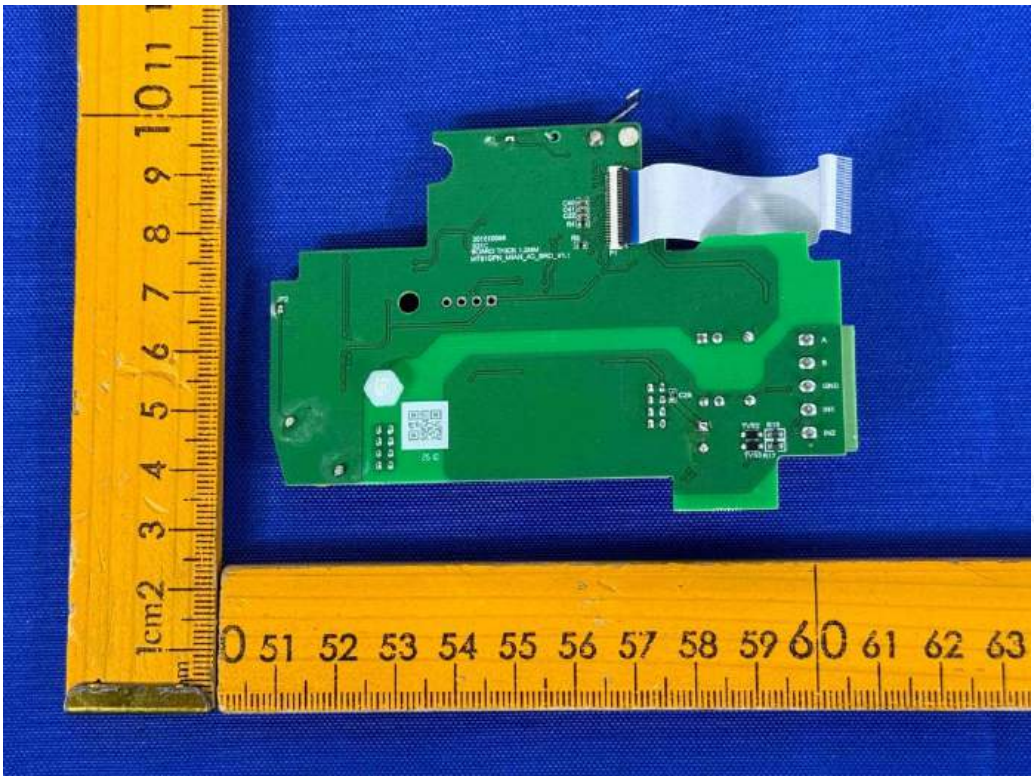

Fig. 18

Shenzhen LCS Compliance Testing Laboratory Ltd.
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Scan code to check authenticity

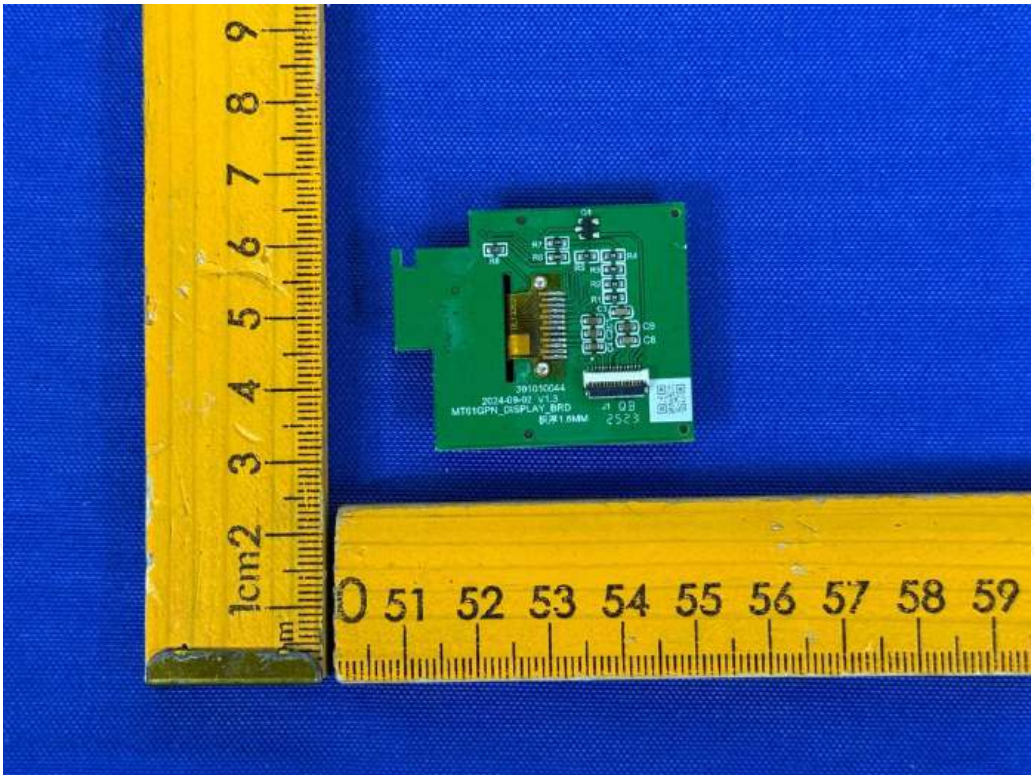

Fig. 19

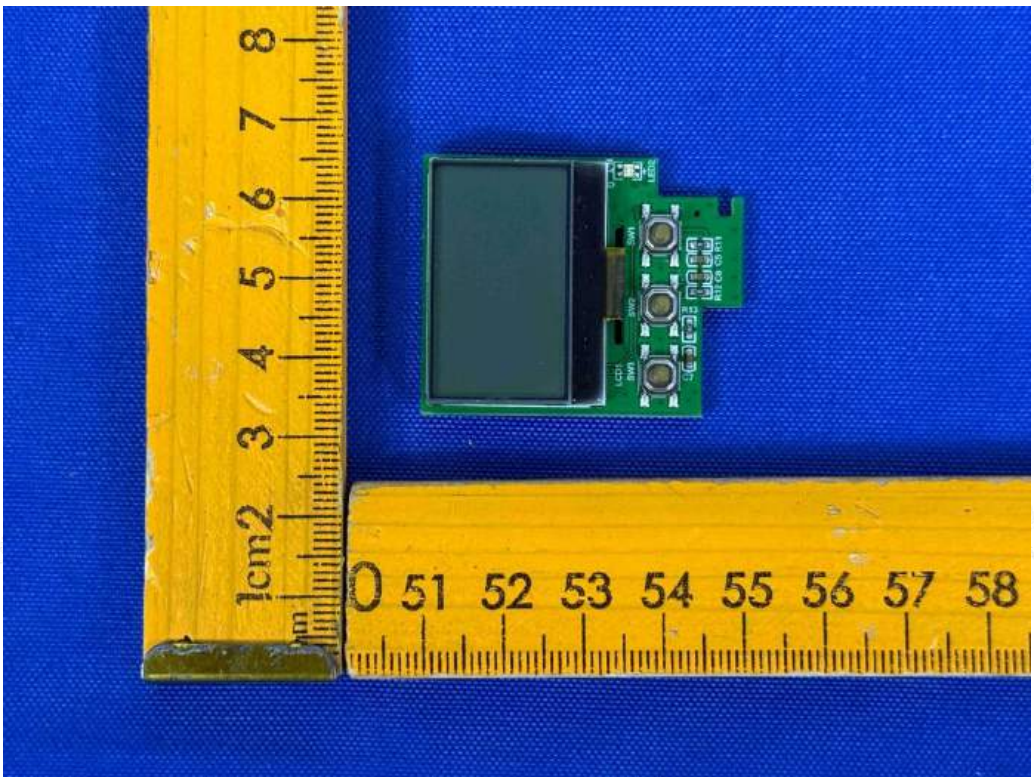

Fig. 20

Shenzhen LCS Compliance Testing Laboratory Ltd.
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Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com
Scan code to check authenticity

----------End Report----------

Shenzhen LCS Compliance Testing Laboratory Ltd.
Add: Room 101/201, Building A, and Room 101/301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com
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Vojenský technický ústav, s.p.
odštěpný závod VTÚPV
Víta Nejedlého 691, 682 01 Vyškov, Czech Republic

CERTIFICATE
No VTÚPV – 032 / 2026 / ZAHR

Applicant: **Shanghai Matis Electric Co., Ltd.**
上海麦豆电气有限公司
Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306

Product: **Smart Metering RCBO**

Tested Model: MT61GR
Derived Models: MT61SR

Manufacturer: **Shanghai Matis Electric Co., Ltd.**
Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306

Rating and principal characteristics:
Ue: 230/240 V AC (2P); 400/415 V AC (4P);
Frequency: 50/60 Hz;
In: 6/10/16/20/25/32/40/50/63A/80A/100A/125A (B/C/D-type);
Icn=Ics= 6.0 kA;
IΔn= 100, 300 mA; Type -A & -AC;
With time delay: Type S

Test results are described in the Test Reports No.:
STE03092666S (tests made by STE Testing Laboratory Co., Ltd)

The sample of tested product conforms with the requirements of the following standards harmonized with the LVD Directive No. 2014/35/EU

- EN 61009-1: 2012 + A1: 2014 + A2: 2014 + A11: 2015 + A12: 2016 + A13: 2021

This certificate is valid until: **13. 04. 2031**

After preparation of the necessary technical documentation as well as the conformity declaration, the required CE marking can be affixed on the product. Other relevant directives have to be observed.
The CE mark shall appear according to this sample:

CE

odštěpný závod VTÚPV VTÚPV VOJENSKÝ TECHNICKÝ ÚSTAV, s.p.

Vyškov 13. 04. 2026

Tel./Fax: +420 910 105 580
e-mail: milan.bezdek@vtusp.cz
http://www.vtusp.cz

Milan Bezděk
Certification Head

EU DECLARATION OF CONFORMITY

This Is Hereby Declared That Following Designated Product Complied With The Essential

Manufacturer **Name: Shanghai Matis Electric Co., Ltd** **Address: Room318-320, No.83,West Huanghu Road, Pudong, Shanghai, China 201306**
Authorized Representative Established Within The Eu: **Company Name:Shanghai Matis Electric Co., Ltd** **Company Address:Room318-320, No.83,West Huanghu Road, Pudong, Shanghai, China 201306**
Product Name：Smart Metering RCBO
Model：MT61GR，MT61SR
Trademark: Matis/Matismart
Meets All Relevant Requirements Of The Following European Directives： **2014/35/EU Low Voltage Directive**
Applicable Standards： **EN 61009-1:2012/A13:2021**

THIS DECLARATION APPLIES TO ALL SPECIMENS MANUFACTURED IDENTICAL TO THE MODELSUBMITTED FOR TESTING / EVALUATION. ASSESSMENT OF COMPLIANCE OF THE PRODUCT WITHTHE REOUIREMENTS RELATING TO SAFETY STANDARDS LISTED ABOVE WAS PERFORMED BYMANUFACTURE.

SIGNED ON BEHALF OF Shanghai Matis Electric Co., Ltd

CE

Title and Signature: Timmy Bao

Date and place: 2026.3.24, Shanghai

Seal:

TEST REPORT

Report No.:	**STE03092666S**
Product:	Smart Metering RCBO
Model No.:	MT61GR
Prepared for:	**Shanghai Matis Electric Co., Ltd**
Address:	Room 318-320, No. 83, West Huanghu Road, Pudong, Shanghai, China 201306
Prepared by:	**Shenzhen STE Testing Laboratory Co., Ltd.**
Lab Location:	3/F, Building 9, Hongde Factory, No. 63 Yuchang Road, Niuhu Community, Guanlan Street, Longhua District, Shenzhen, China
Tel. :	+86-755-2373 0717
Fax. :	+86-755-2373 0717
Website:	http://www.stecert.com

This test report may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The test results in the report only apply to the tested sample. Any objections must be raised to STE within 15 days since the date.

TEST REPORT

EN 61009-1

Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs)
Part 1: General rules

Report Number:	STE03092666S
Tested by (name + signature):	Plum Xiao / Test engineer
Approved by (name + signature):	Allen Huang / Project manager
Date of issue:	March 25, 2026
Total number of pages:	81
Testing Laboratory:	**Shenzhen STE Testing Laboratory Co., Ltd.**
Address:	3/F, Building 9, Hongde Factory, No. 63 Yuchang Road, Niuhu Community, Guanlan Street, Longhua District, Shenzhen, China
Applicant's name:	**Shanghai Matis Electric Co., Ltd**
Address:	Room 318-320, No. 83, West Huanghu Road, Pudong, Shanghai, China 201306
Manufacturer's name:	**Shanghai Matis Electric Co., Ltd**
Address:	Room 318-320, No. 83, West Huanghu Road, Pudong, Shanghai, China 201306
Test specification:	
Standard:	EN 61009-1: 2012 +A1: 2014 +A2: 2014 +A11: 2015 +A12: 2016 +A13: 2021
Test procedure:	CE-LVD
Non-standard test method:	N/A
Test Report Form No:	IEC61009-1G
Test Report Form(s) Originator:	STE
Master TRF:	Dated 2023-05

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Test item description:	Smart Metering RCBO
Model/Type reference:	**MT61GR**, MT61SR
Trade Mark:	Matis
Ratings:	Ue: 230/240 V AC (2P); 400/415 V AC (4P); Frequency: 50/60 Hz; In:10/16/20/25/32/40/50/63A/80A/100A/125A (B/C/D-type); Icn=Ics= 6.0 kA I Δ n= 100, 300mA; Type -A & -AC With time delay: Type S

Summary of testing:

Testing location:

Shenzhen STE Testing Laboratory Co., Ltd.

3/F, Building 9, Hongde Factory, No. 63 Yuchang Road, Niuhu Community, Guanlan Street, Longhua District, Shenzhen, China

Tests performed (name of test and test clause):

The submitted samples were found to comply with the requirements of:

- EN 61009-1: 2012 +A1: 2014 +A13: 2021

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

Matis

Smart Metering RCBO

Model: MT61GR

Ue: 230/240 V AC (2P); 400/415 V AC (4P);

Frequency: 50/60 Hz;

In:10/16/20/25/32/40/50/63A/80A/100A/125A (B/C/D-type);

Icn=Ics= 6.0 kA

I Δ n= 100, 300mA; Type -A & -AC

With time delay: Type S



Shanghai Matis Electric Co., Ltd

Room 318-320, No. 83, West Huanghu Road, Pudong, Shanghai, China 201306

Importer: xxxx

Address: xxxx

Made in China

Remarks:

1. Name and address of the Importer and Manufacturer must be affixed on the product when the product placed on the EU market.
2. Minimum height of CE mark is 5mm, minimum height of WEEE mark is 7mm.

Test item particulars.....:	
Type of RCBO .....:	Type -A & -AC
Time delay .....:	Type S
Method of operating .....:	independent of / ~~dependent on the line voltage~~
Type of installation .....:	fixed / ~~mobile installation~~
Number of poles .....:	~~single~~ / two / ~~three~~ / four pole
Protection against external influences .....:	~~enclosed~~ / unenclosed
Method of mounting .....:	Din rail mounting
Method of connection .....:	Terminal with stirrup
Instantaneous tripping current .....:	B / C / D
Rated current (I_N).....:	10/16/20/25/32/40/50/63A/80A/100A/125A
Rated residual operating current ($I\Delta_N$).....:	100, 300mA
Rated voltage (U_N).....:	400V
Rated impulse withstand voltage (U_{imp}).....:	4 kV
Rated frequency (Hz).....:	50/60Hz
Rated short-circuit capacity (I_{CN}) .....:	6000A
Rated residual making and breaking capacity ($I_{\Delta M}$) .....:	630A
Nature of supply .....:	~
Type of terminal .....:	Screw in
Classification of RCBOs functionally dependent on the line voltage:.....:	~~Yes~~ / No
Opening automatically in case of failure of the line voltage.....:	Yes / ~~No~~
- reclosing automatically when the line voltage is restored .....:	Yes / ~~No~~
- not reclosing automatically when the line voltage is restored .....:	~~Yes~~ / No
Not opening automatically in case of failure of the line voltage.....:	~~Yes~~ / No
-able to trip in a hazardous situation arising on failure of line voltage .....:	Yes / ~~No~~
-not able to trip in a hazardous situation arising on failure of line voltage .....:	~~Yes~~ / No

POSSIBLE TEST CASE VERDICTS:

- test case does not apply to the test object..... : N or N/A (Not Applicable)
- test object does meet the requirement..... : P (Pass)
- test object does not meet the requirement..... : F (Fail)

TESTING:

Date of receipt of test item..... : February 26, 2026

Date (s) of performance of tests..... : February 26, 2026 to March 25, 2026

General remarks:

The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

Clause numbers between brackets refer to clauses in IEC 61347-1.

"(see Enclosure #)" refers to additional information appended to the report.

"(see appended table)" refers to a table appended to the report.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

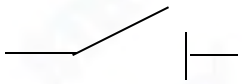
General product information

1, The evaluation of electric shock depended on the end product.

2, All models are same except the appearance.

3, The laboratory tests and evaluates the main model.
Adding models based on the guarantee letter provided by the Applicant.
STE takes no responsibility for any mistakes and the problems of product consistency caused by inaccurate and/or invalid information submitted by the Applicant.

EN 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
	TEST SEQUENCE "A1"		--
6	**MARKING AND OTHER INFORMATION**		--
	Circuit-breaker marked with:		--
	a) Manufacturer's name or trade mark.....:	Matis	P
	b) Type designation, catalogue number or other serial number.....:	MT61GR	P
	c) Rated voltage (V).....:	400/ 415V	P
	d) Rated current without symbol "A", preceded by the symbol of instantaneous tripping.....:	6,10,16,20,25,32,40,50,63,80, 100, 125	P
	e) Rated frequency (Hz).....:	50/60Hz	P
	f) Rated residual operating current.....:	10, 30, 100, 300	P
	g) Settings of residual operating current.....:	Adjustable	P
	h) Rated short-circuit capacity, in amperes.....:	6000A	P
	j) Reference calibration temperature, if different from 30°C.....:	°C	P
	k) Degree of protection.....:	IP 20	P
	l) Position of use.....:		N
	m) Rated residual making and breaking capacity, if different from rated short-circuit capacity.....:	630A	P
	n) Symbol S for type S.....:		N
	p) Operating means of test device by letter T.....:	T	P
	q) Wiring diagram.....:		P
	r) Operating characteristic in presence of residual currents with d.c. components		P
	- RCBOs of type AC with the symbol.....		P
	- RCBOs of type A with the symbol.....		P
	s) type D RCBOs, the max. instantaneous tripping current, if higher than 20 I_N.....:		N
	Marking on the RCBO itself or on nameplate or nameplates attached to the RCBO and located so that for small devices at least d), f), n), p) and r) (only for type A) is legible when the RCBO is installed		P
	The information under a), b), c), h), l), r) (only for type AC) and s) may be marked on the side or the back of the device and be visible only before the device is installed		P
	The information under q) may be on the inside of any cover which has to be removed in order to connect the supply wires		P

EN 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Any remaining information not marked shall be given in the manufacturer's catalogues.		P
	The suitability for isolation, which is provided by all circuit-breakers of this standard, may be indicated by the symbol on the device		P
	If a degree of protection higher than IP20 is marked on the device, it shall comply with it, whichever the method of installation. If the higher degree of protection is obtained only by a specific method of installation and/or with the use of specific accessories this shall be specified in the manufacturers literature		P
	Open position indicated by "**0**" and closed position by "|"		P
	For push-buttons the OFF push-button shall either be red and/or marked with "**0**"		P
	If necessary to distinguish between supply and load terminals they shall be clearly marked		P
	Terminals for neutral conductor N		P
	Terminal for protective conductor		P
	Marking indelible, easy legible and not on removable parts		P
	Labels not easy to remove and no curling. Test acc. to cl. 9.3: 15 s with water and 15 s with hexane		P
	For universal terminals (rigid-solid, rigid-stranded and flexible conductors:	**I ON – O OFF**	P
	- no markings		P
	For non-universal terminals:		--
	- terminals for rigid-solid conductors only, marked by the letters "s" or "sol"		P
	- terminals for rigid (solid and stranded) conductors only, marked by the letter "r"		P
	marking on the RCBO or if the space available is not sufficient, on the smallest package unit or in technical information		P

8.	**REQUIREMENTS FOR CONSTRUCTION AND OPERATION**	--
8.1.1	**General**	--

EN 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Not possible to alter the operating characteristics by means of external interventions other than those specifically intended for changing the setting of the residual operating current.		P
	Changing from one setting to another shall not be possible without a tool. It shall not be possible to disable or inhibit the RCBO function by any means. NOTE In Australia, Germany, Denmark, Italy, the UK and Switzerland, multiple settings are not allowed.		P
	In case of an RCBO having multiple settings of residual operating current, the rating refers to the highest setting.		P
8.1.2	**Mechanism**		--
	Moving contacts of all poles so mechanically coupled that all poles except switched neutral make and break substantially together		P
	Switched neutral of four-pole RCBOs shall not close after and shall not open before the other poles		P
	Neutral pole having adequate making and breaking capacity and RCBO with independent manual operation:		P
	- all poles operate together including neutral pole		P
	Trip-free mechanism		P
	Possible to switch on and off by hand		P
	No intermediate position of the contacts		P
	RCBOs shall provide in the open position an isolating distance in accordance with the requirements necessary to satisfy the isolating function (see 8.3)		P
	Indication of the open and closed position of the main contacts shall be provided by one or both of the following means:		P
	- the position of the actuator (this being preferred)		P
	- a separate mechanical indicator		N
	If a separate mechanical indicator is used to indicate the position of the main contacts, this shall show the colour:		N
	- red for the closed position (ON)		P
	- green for the opened position (OFF)		P

EN 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
	The means of indication of the contact position shall be reliable (Compliance is checked by inspection and by the test of 9.9.2.2		P
	RCBOs shall be designed so that the actuator, front plate or cover can only be correctly fitted in a manner which ensures correct indication of the contact position (Compliance is checked by inspection and by the tests of 9.12.12.1 and 9.12.12.2)		N
	When means are provided or specified by the manufacturer to lock the operating means in the open position, locking in that position shall only be possible when the main contacts are in the open position. (Compliance is checked by inspection , taking into account the instructions of the manufacturer)		N
	If operating means is used for indication it shall, when released, automatically take up the position to that of the moving contacts; operating means shall have two rest positions except that for automatic opening a third distinct position may be provided, when necessary to reset before reclosing		N
	When an indicator light is used this shall be lit when the RCBO is in the closed position		P
	The indicator light shall not be the only means to indicate the closed position.		P
	The action of the mechanism shall not be influenced by the position of enclosures or covers and shall be independent of any removable part.		P
	If the cover is used as a guiding means for push-buttons, it shall not possible to remove the buttons from the outside		P
	Operating means securely fixed, not possible to remove them without a tool.		P
	For "up-down" operating means the contacts are closed by the up movement.		P
9.11	**Test:**		P
	- The RCBO is mounted and wired as in normal use.		P
	- Test circuit according to figure 4.		P

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Clause	Requirement + Test	Result - Remark	Verdict
9.11.2	A residual current equal to 1,5 $I_{\Delta N}$ is passed by closing S_2, the RCBO having been closed and the operating means being held in the closed position. The RCBO shall trip.		P
	Test repeated by moving the operating means slowly (1 s) to a position where the current starts to flow. Tripping shall occur without further movement.		P
8.1.3	Clearances and creepage distances (external parts) --> see “Clearances and creepage distances internal and external parts”		P
8.1.4	**Screws, current-carrying parts and connections**		--
8.1.4.1	Connections withstand mechanical stresses occurring in normal use.		P
	Screws for mounting the RCBO are not of thread-cutting type.		N
	Screws and nuts which are operated when mounting and connecting		P
	Test according to cl. 9.4:		P
	- 10 times (screw Ø / torque Nm)	Ø mm Nm	N
	- 5 times (screw Ø / torque Nm)	Ø4.82 mm 2.0 Nm	P
8.1.4.2	Screws with a thread of insulating material operated when mounting the RCBO; correct introduction ensured.		N
8.1.4.3	Electrical connections contact pressure not transmitted through insulating material unless there is sufficient resilience in the metallic parts.		P
8.1.4.4	Current-carrying parts including parts intended for protective conductors, if any, shall be made of a metal having, under the conditions occurring in the equipment, mechanical strength, electrical conductivity and resistance to corrosion adequate for their intended use. Examples below:		N
	- copper		N
	- alloy 58% copper for worked cold parts		N
	- alloy 50% copper for other parts		N
	- other metal		N
	In case of using ferrous alloys or suitably coated ferrous alloys, compliance to resistance to corrosion is checked by a test of resistance to rusting (see 9.25).		N

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Clause	Requirement + Test		Result - Remark	Verdict
	The requirements of this subclause do not apply to contacts, magnetic circuits, heater elements, bimetals, shunts, electronic components, including printed circuit board or to screws, nuts, washers, clamping plates, similar parts of terminals and parts of the test circuit			N
8.1.5	Terminals for external conductors			--
	Compliance is checked by inspection and by the tests as relevant for the type of connection:			P
	9.5 for screw-type terminals			P
	by specific tests for plug-in or bolt-on RCBOs included in the standard			P
	by the tests of Annexes J, K or L			P
8.1.5.1	Terminals ensure the necessary contact pressure			--
	Test see cl. 9.5 Torque			--
	Ø mm	Nm		N
	Ø mm	Nm		N
	Ø mm	Nm		N
	Max. cross-sect.:_____ mm²			N
9.5	**Test of reliability of screw-type terminals for external copper conductors**			N
9.5.1	Pull test:			N
	Terminal shall be suitable for all types of conductors: rigid (solid or stranded) and flexible, unless otherwise specified by the manufacturer.			N
	Min. cross-section solid /stranded / flexible (mm²):		mm²	--
	Max. cross-section solid /stranded / flexible (mm²).		mm²	--
	Torque $^{2}/_{3}$ (Nm)..... :		Nm	--
	Pull for 1 min solid / stranded / flexible (N)..:		N	--
	During the test no noticeable move of conductor			P
9.5.2	Min. cross-section (mm²).....		mm²	--
	Max. cross-section (mm²).....		mm²	--
	Torque $^{2}/_{3}$ (Nm).....		Nm	--
	The conductor shows no damage			P
	Terminals not worked loose and no damage			P

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Clause	Requirement + Test	Result - Remark	Verdict
9.5.3	Terminals fitted with the largest cross-section area specified in Table 8, for stranded and/or flexible copper conductor.		--
	Max. cross-section stranded (mm²).....		N
	Max. cross-section flexible (mm²).....		N
	Torque $^2/_3$ (Nm).....	Nm	--
	After the test no strand of conductor escaped outside		P

8.1.5.2	Circuit breakers shall be provided with:		N
Table 8	Rated current (A) / Range of nominal cross sections to be clamped* (mm²) — Rigid (solid or stranded) conductors / Flexible conductors ≤ 13: 1 to 2,5 / 1 to 2,5 > 13 ≤ 16: 1 to 4 / 1 to 4 > 16 ≤ 25: 1,5 to 6 / 1,5 to 6 > 25 ≤ 32: 2,5 to 10 / 2,5 to 6 > 32 ≤ 50: 4 to 16 / 4 to 10 > 50 ≤ 80: 10 to 25 / 10 to 16 > 80 ≤ 100: 16 to 35 / 16 to 25 > 100 ≤ 125: 24 to 50 / 25 to 35	to mm²	N
	*It is required that, for current ratings up to and including 50 A, terminals be designed to clamp solid conductors as well as rigid stranded conductors. Nevertheless, it is permitted that terminals for conductors having cross-sections from 1 mm² up to 6 mm² be designed to clamp solid conductors only.		N
	– or terminals for external untreated aluminium conductors and with aluminium screw-type terminals for use with copper or with aluminium conductors according to Annex L.		N
8.1.5.3	Means for clamping the conductors in the terminals not serve to fix any other component (See test sub-clause 9.5)		N
8.1.5.4	Terminals for $I_N \leq 32$ A allow the connection of conductors without special preparation.		N
8.1.5.5	Terminals have adequate mechanical strength and metric ISO thread or equivalent. (See tests of sub-clauses 9.4 and 9.5.1)		N
8.1.5.6	Clamping of conductor without undue damage to conductor. (See tests of sub-clause 9.5.2)		N

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Clause	Requirement + Test	Result - Remark	Verdict
8.1.5.7	Clamping of conductor reliably and between metal surfaces. (See tests of sub-clauses 9.4 and 9.5.1)		P
8.1.5.8	Terminals so designed or positioned that no conductor can slip out while the clamping screws or nuts are tightened. (See tests of sub-clause 9.5.3)		P
8.1.5.9	Terminals so fixed or located that they do not work loose when the clamping screws or nuts are tightened or loosened. (See tests of sub-clause 9.4)		P
8.1.5.10	Clamping screws or nuts of terminals for the protective conductors adequately secured against accidental loosening and not possible to unclamp without a tool.		P
8.1.5.11	Screws and nuts of terminals for external conductors shall be in engagement with a metal thread and not be of the tapping screw type.		P
8.1.5.12	Screws and nuts of terminals for external conductors shall be in engagement with a metal thread, and the screws shall not be the thread cutting type		P
8.1.6	**Non-interchangeability**		P
	Plug-in or screw-in RCBOs must not be replace-able, without aid of a tool, by another of the same make, but having a higher rated current.		P
8.2	**Protection against electric shock**		--
	Live parts not accessible in normal use		P
	For RCBOs other than plug-in type, external parts, other than screws or other means for fixing covers, which are accessible in normal use shall be of insulating material or be lined throughout with insulating material.		P
	Linings		--
	- reliably fixed		N
	- adequate thickness and		N
	- mechanical strength		N
	Inlet openings for cables or conduits shall be of insulating material or be provided with bushings or similar devices of insulating material.		N
	Such devices		--
	- reliably fixed		N
	- adequate mechanical strength		N

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Clause	Requirement + Test	Result - Remark	Verdict
	For plug-in RCBOs external parts other than screws or other means for fixing covers, which are accessible, shall be of insulating material.		N
	Metallic operating means insulated from live parts.		N
	Metal parts of mechanism not accessible, insulated from accessible metal parts, from metal frames (for flush-type), from screws or other means for fixing the base and from metal plates.		N
	Possible to replace plug-in RCBOs easily with-out touching live parts.		N
	Lacquer or enamel not considered to provide adequate insulation.		N
9.6	**Test: Standard test finger**		--
	Straight test finger with a force of 75 N for 1 min at 35°C ± 2°C		N
	Enclosures or covers not deformed to such an extent that live parts can be touched.		N
8.9	**Resistance to heat**		--
	RCBO sufficiently resistant to heat		P
9.14.1	Test:		N
	- without removable covers..... 1 h (100 ± 2) °C		N
	- removable covers..... 1 h (70 ± 2) °C		N
	No change impairing further use and no flow of sealing compound that live parts are exposed		N
	No access to live parts even with test finger with a force not exceeding 5 N.		N
	The RCBO shall trip with a test current of 1,25 $I_{\Delta N}$ - break time not exceeding the value for $I_{\Delta N}$ in table 2	[ms]	N
	Marking still legible after test		N
9.14.2	Ball pressure test for external parts of insulating material necessary to retain current-carrying parts or parts of the protective circuit in position:		N
	- T = 125 ± 2°C	Enclosure,125 °C Contact support parts,125 °C Lock,125 °C	P
	After 1 h Ø of impression ≤ 2 mm	1.3 mm,1.1 mm,1.2 mm	P

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Clause	Requirement + Test	Result - Remark	Verdict
9.14.3	Ball pressure test for external parts of insulating material not necessary to retain current-carrying parts or parts of the protective circuit in position:	The material of handle is same as enclosure	P
	☐ T = 70 ± 2°C		P
	☐ T = _____ ± 2°C (40°C + max. temperature rise of sub-clause 9.8)		P
	Ø of impression ≤ 2 mm		P
8.1.3	Clearances and creepage distances (internal and external parts)		P
	The minimum required clearances and creepage distances are based on the RCBO being designed for operating in an environment with pollution degree 2		P
	Compliance for item 1 in is checked by measurement and by the test of 9.7.7.4.1 and 9.7.7.4.2. The test is carried out with samples not submitted to the humidity treatment described in 9.7.1.		P
	The clearances of items 2 and 4 (except accessible surface after installation) may be reduced provided that the measured clearances are not shorter than the minimum allowed in IEC 60664-1 for homogenous field conditions.		P
	In this case, after the humidity treatment in 9.7.1, compliance for item 2 and 4 and arrangements of 9.7.2 items b), c), d) and e) is checked:		P
	- Tests according to 9.7.2 to 9.7.6 as applicable		P
	- Test according to 9.7.7.2 with test voltages acc. Table 19 with test arrangements of 9.7.2 items b), c), d), e)		P
	If measurement does not show any reduced clearance, test 9.7.7.2 is not applied		P
	Compliance for item 3, checked by measurement		P
	Parts of PCBs connected to the live parts protected against pollution by the use of a type 2 protection according to IEC 60664-3 are exempt from this verification		P
	The insulating materials are classified into Material Groups on the basis of their comparative tracking index (CTI) acc. to IEC 60664-1 and measured according to IEC 60112		P
	Clearances [mm] U_{imp}		N

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Clause	Requirement + Test	Result - Remark	Verdict
	4kV (see table 5) **2,5kV(see table 5)**	☐ ☐	N
		minimum clearances [mm]	N
	1. between live parts which are separated when the main contacts are in the open position		P
	2. between live parts of different polarity		P
	3. between circuits supplied from different sources, one of which being PELV or SELV		N
	4. between live parts and:		N
	- accessible surfaces of operating means		N
	- screws or other means for fixing covers which have to be removed when mounting the RCBO		N
	- surface on which the RCBO is mounted		N
	- screws or other means for fixing the RCBO		N
	- metal covers or boxes		N
	- other accessible metal parts		N
	- metal frames supporting flush-type RCBOs		N
	Creepage distances [mm] (see table 5)		N
	Material group	IIIb ☐ IIIa ☐ II ☐ **I** ☐	N
		minimum clearances [mm]	N
	1. between live parts which are separated when the main contacts are in the open position		P
	2. between live parts of different polarity		P
	3. between circuits supplied from different sources, one of which being PELV or SELV		P
	4. between live parts and:		--
	- accessible surfaces of operating means		P
	- screws or other means for fixing covers which have to be removed when mounting the RCBO		P
	- surface on which the RCBO is mounted		P
	- screws or other means for fixing the RCBO		P
	- metal covers or boxes		P
	- other accessible metal parts		P

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Clause	Requirement + Test	Result - Remark	Verdict
	- metal frames supporting flush-type RCBOs		P
9.25	Test of resistance to rusting:		--
	- 10 min immersed in a cold chemical degreaser such as methyl-chloroform or refined petrol		P
	- 10 min immersed in a 10% solution of chloride in water at 20°C±5°C		P
	- 10 min in a box containing air saturated with moisture at 20°C±5°C		P
	- 10 min at 100°C		P
	No sign of rust		P

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Clause	Requirement + Test	Result - Remark	Verdict

	TEST SEQUENCE "A_2"	**A_2 1 A_2 2 A_2 3**	--
8.10	**Resistance to abnormal heat and to fire**		P
	External parts of insulating material are not liable to ignite and to spread fire under fault or overload conditions.		P
9.15	**Glow-wire test**		P
	Test performed on a complete RCBO		P
	Test made on three samples, points of application being different from one sample to another		P
	- External parts of insulating material necessary to retain current-carrying parts or parts of the protective circuit in position.....:	T = 960 ± 15 °C	P
	- All other external parts of insulating material.....:	T = 650 ± 10 °C	P
	No visible flame and no sustained glowing		P
	Flames and glowing extinguish within 30 s after removal		P
	No ignition of tissue paper or scorching of the pinewood board		P

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Clause	Requirement + Test	Result - Remark	Verdict

	TEST SEQUENCE "B"	**B1 B2 B3**	--
8	**Requirements for construction and operation**		--
8.3	Dielectric properties and isolating capability		--
	RCBOs have adequate dielectric properties		P
9.7	**Test of dielectric properties and isolating capability**		--
9.7.7.4	Verification of resistance of the insulation of open contact and basic insulation against an impulse voltage in normal conditions		N
	These tests are not preceded by the humidity treatment described in 9.7.1.		N
	The test is carried out on an RCBO fixed on a metal support		N
	The impulses are given by a generator producing positive and negative impulses having a front time of 1,2μs, and a time to half-value of 50μs		N
	The shape of the impulses is adjusted with the RCBO under test connected to the impulse generator.		N
	For RCBOs with incorporated surge arresters that cannot be disconnected, the shape of the impulses is adjusted without connection of the RCBO to the impulse generator.		N
	rated impulse withstand voltage [kV]:		--
	see level of test laboratory [m]		--
	test voltage (acc. Table 28) [kV]:		--
9.7.7.4.2	RCBO in open position (contacts in open position)		N
	The impulses are applied between:		N
	the line terminals connected together and the load terminals connected together		N
9.7.7.4.3	RCBO in closed position		--
	All components bridging the basic insulation disconnected		N
	A first series of tests is made applying the impulse voltage between the phase pole(s) and the neutral pole (or path) connected together and the metal support connected to the terminal(s) intended for the protective conductor(s), if any		N

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Clause	Requirement + Test	Result - Remark			Verdict
	A second series of tests is made applying the impulse voltage between the phase pole(s), connected together, and the neutral pole (or path) of the RCBO				N
	Five positive impulses and five negative impulses are applied, the interval between consecutive impulses being at least 1 s for impulses of the same polarity and being at least 10 s for impulses of the opposite polarity.				N
	no disruptive discharges during the test				N
9.7.7.5	Verification of the behaviour of components bridging the basic insulation				--
	A new RCBO sample is tested				N
	Test only performed on RCBOs, where components bridging the basic insulation have been disconnected during the impulse voltage test of 9.7.7.4.3				N
	test voltage 1200V+U0	V			N
	The voltage is applied during 5s between the phase pole(s) and the neutral pole (or path) connected together and the metal support connected to the terminal(s) intended for the prospective conductor(s), if any				N
	after test, no component bridging the basic insulation should show a visible alteration.				N
	Then, the equipment is connected to the mains acc. manufacturer's instruction				N
	The RCBO shall trip with a test current of 1,25 $I_{\Delta N}$	[ms]			--
	Test switch S2 and RCBO in the closed position, test voltage established by closing the test switch S1.				N
9.7.1	Resistance to humidity				--
9.7.1.1	Parts which can be removed without a tool are removed, spring lids kept open, inlet openings are left open and if knock-outs one is opened.				P
9.7.1.2	Test conditions: 48 h in humidity cabinet RH = 91% to 95% T = 20 to 30°C ± 1°C	93%...94% 28°C…29°C			--
9.7.1.4	The samples show no damage				P
9.7.2	Insulation resistance of the main circuit measured between 30 and 60 min after this treatment with 500 V DC after 5 s:	B1 [MΩ]	B2 [MΩ]	B3 [MΩ]	--

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Clause	Requirement + Test	Result - Remark			Verdict
	a) between the terminals which are electrically connected together when the RCBO is in the closed position.....≥ 2 MΩ	> 500	> 500	> 500	P
	b) between each pole and the others connected together (electronic components, connected between current path being disconnected)≥ 2 MΩ	> 500	> 500	> 500	P
	c) between all poles connected together and the frame.....≥ 5 MΩ	> 500	> 500	> 500	P
	d) between metal parts of the mechanism and the frame.....≥ 5 MΩ				N
	e) between the frame and a metal foil in contact with the inner surface of the lining of insulating material.....≥ 5 MΩ				N
9.7.3	Dielectric strength of the main circuit measured with an AC voltage (45-65Hz) for 1 min:				--
	a) electronic components disconnected.....2000 V				P
	b) electronic components disconnected.....2000 V				P
	c) electronic components disconnected.....2000 V				P
	d) electronic components disconnected.....2000 V				N
	e) electronic components disconnected.....2500 V				N
	No flashover or breakdown				P
9.7.4	Insulation resistance of auxiliary circuits measured with 500 V DC after 1 min:				--
	1) between all auxiliary circuits and the frame.....≥ 2 MΩ	B1 [MΩ]	B2 [MΩ]	B3 [MΩ]	--
	2) between each part of the auxiliary circuits which might be isolated from the other parts and the whole of the other parts connected together.....≥ 2 MΩ				P
	Dielectric strength of auxiliary circuits measured with an AC voltage at rated frequency for 1 min:				P
	Rated voltage of..... Test voltage (V) auxiliary circuits (a.c. or d.c.) ≤ 30.....600 > 30 ≤ 50.....1000 > 50 ≤ 110.....1500 > 110 ≤ 250.....2000 > 250 ≤ 500.....2500	V			P
	1) between all auxiliary circuits and the frame				P

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Clause	Requirement + Test	Result - Remark	Verdict
	2) between each part of the auxiliary circuits which might be isolated from the other parts and the whole of the other parts connected together		P
	No flashover or breakdown		P
9.7.7.2	Verification of clearances with the impulse withstand voltage		P
	If the measurement of clearances of items 2 and 4 in Table 7 shows a reduction of the required length, this test applies.		P
	The test is carried out on an RCBO fixed on a metal support and being in the closed position		P
	The impulses are given by a generator producing positive and negative impulses having a front time of 1,2μs, and a time to half-value of 50μs		P
	The shape of the impulses is adjusted with the RCBO under test connected to the impulse generator.		P
	For RCBOs with incorporated surge arresters that cannot be disconnected, the shape of the impulses is adjusted without connection of the RCBO to the impulse generator.		N
	test performed with:		--
	- surge impedance of the test apparatus ≤500Ω and surge protective devices disconnected before testing or		N
	- hybrid generator with an surge impedance of 2 Ω and surge protective devices not disconnected before testing		N
	rated impulse withstand voltage [kV]:	4	--
	see level of test laboratory [m]	<100	--
	test voltage (acc. Table 19) [kV]:	4.9	--
	A first series of tests is made applying the impulse voltage between the phase pole(s) and the neutral pole (or path) connected together and the metal support connected to the terminal(s) intended for the protective conductor(s), if any		N
	A second series of tests is made applying the impulse voltage between the phase pole(s), connected together, and the neutral pole (or path) of the RCBO		N

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Clause	Requirement + Test						Result - Remark				Verdict
	A third series of tests is made applying the impulse voltage between (and not tested during the two first sequences described here above):										N
	b) between each pole and the others connected together (electronic components, connected between current path being disconnected)										N
	c) between all poles connected together and the frame										N
	d) between metal parts of the mechanism and the frame										N
	e) between the frame and a metal foil in contact with the inner surface of the lining of insulating material										N
	Five positive impulses and five negative impulses are applied, the interval between consecutive impulses being at least 1 s for impulses of the same polarity and being at least 10 s for impulses of the opposite polarity.										N
	no disruptive discharges during the test										P
9.7.5	Secondary circuit of detection transformers										--
	No insulation test, provided that no connection with accessible metal parts or with protective conductor or live parts exists.										N
9.7.6	Capability of control circuits connected to the main circuit of withstanding high DC voltages due to insulation measurements										--
	RCBO fixed on metal support in closed position with all control circuits connected as in service.										P
	Open test voltage 600 V +25 / -0 V Maximum ripple 5% Short-circuit current 12 mA +2 / -0 mA Applied for 1 min between each pole and the other poles connected together to the frame.										P
	Type	I_N A	$I_{\Delta N}$ A	Standard values of break time and non-actuating time at a residual current equal to							--
				$I_{\Delta N}$	2 $I_{\Delta N}$	5 $I_{\Delta N}$	5 $I_{\Delta N}$ or 0,25A a)	5A-200A, 500A b)	$I_{\Delta t}$ c)		--
	General	Any value	<0,03	0,3	0,15	--	0,04	0,04	0,04	Max. break times	--
			0,03	0,3	0,15	--	0,04	0,04	0,04		--
			>0,03	0,3	0,15	0,04	--	0,04	0,04		--

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Clause	Requirement + Test							Result - Remark			Verdict
	S	≥ 25	>0,03	0,5	0,2	0,15	--	0,15	0,15	Max. break times	--
				0,13	0,06	0,05	--	0,04	0,04	Min. non-actuating times	--
	a) value to be decided by the manufacturer for this test										--
	b) The test are only made during verification of the correct operation as mentioned in 9.9.1.2 d) but in any case values exceeding the lower limit of the overcurrent instantaneous tripping range are not tested.										--
	c) The test is made with a current IΔt equal to the lower limit of the overcurrent instantaneous tripping range according to type B, C or D, as applicable. For the tests of 9.9.1.3 and 9.9.1.4 b), the current $I_{\Delta t}$ is established so that the vector sum $I_{\Delta t}$ + In is equal to the lower limit of the overcurrent instantaneous tripping range, according to type B, C or D, as applicable.										--
9.9.1.2.c)	Verification of the correct operation in case of sudden appearance of residual current by closing S1, (S2 and RCBO in closed position):										P
	Maximum break times at:							[ms]	[ms]	[ms]	--
	- $I_{\Delta N}$							24	35	24	P
	- 2 $I_{\Delta N}$							25	26	23	P
	- 5 $I_{\Delta N}$ or							20	22	19	P
	- 0,25 A										N
	- $I_{\Delta t}$ 315 A							20	22	18	P
	No value exceeds the relevant specified limiting value										N
	Additional test for type S:										--
	Minimum non-actuating time at:							[ms]	[ms]	[ms]	--
	- $I_{\Delta N}$ ..... 0,13 s										N
	- 2 $I_{\Delta N}$ ..... 0,06 s										N
	- 5 $I_{\Delta N}$ ..... 0,05 s										N
	- $I_{\Delta t}$ ..... 0,04 s										N
	The test switch S1 and the RCBO being in the closed position, the test voltage is suddenly established by closing the test switch S2 for min. non-operating times acc. table 2										N

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Clause	Requirement + Test	Result - Remark			Verdict
	No tripping during tests				N
8.4	Temperature rise				--
	Temperature rises do not exceed the limiting values stated in table 7.				P
	Cross-section (mm²)	16 mm²			--
9.8.1	Ambient air temperature (°C)	23.4°C			--
9.8.2	Test current IN (A) until steady state values are reached.	63A			--
	Four pole RCBOs:				P
	Current passing through				P
	- 3 phase poles (1)				P
	- neutral and adjacent pole (2)				P
	Parts ..... Temperature rise K	[K]	[K]	[K]	--
	Terminals for external connections..... 65	56.3	58.2	57.9	P
	External parts liable to be touched during manual operation of the RCBO, including operating means of insulating material and metallic means for coupling insulated operating means of several poles	9.8	9.9	9.7	P
	External metallic parts of operating means..... 25				N
	Other external parts, including that face of the RCBO in direct contact with the mounting surface 60	17.8	22.6	18.6	P

8.16	**Reliability**				--
	RCBOs operate reliably even after long service.				P
9.22.2	Test with 28 cycles at 40 ± 2°C				--
	Cross-section (mm²)..... :	mm²			--
	Torque 2/3 (Nm)..... :	Nm			--
	Test current IN (A)..... :	A			--
	- with current passing .....21 h				P
	- without current..... 3 h				P
	For 4 pole RCBOs with 3 overcurrent protected poles only 3 poles loaded				N
	At the end of the last period of 21 h with current passing the temperature rise of the terminals shall not exceed 65K	[K]	[K]	[K]	--
		58.1	58.6	58.9	P

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Clause	Requirement + Test	Result - Remark			Verdict
	After cool down the RCBO shall trip with a test current of 1,25 $I_{\Delta N}$ – break time not exceeding the value for $I_{\Delta N}$ in table 2	[ms]	[ms]	[ms]	--
		21	19	23	P
	Test switch S2 and RCBO in the closed position, test voltage established by closing the test switch S1.				P
9.23	Verification of ageing of electronic components				--
	168 h at 40 ± 2°C.....:	40°C			--
	Test current I_N (A).....:	63A			--
	Cross-section (mm²).....:	16mm²			--
	Electronic parts at 1,1 U_N.....:	264V			--
	After cool down:				P
	- electronic parts show no damage				P
	The RCBO shall trip with a test current of 1,25 I∆N - break time not exceeding the value for I∆N in table 2	[ms]	[ms]	[ms]	--
					N
	Test switch S2 and RCBO in the closed position, test voltage established by closing the test switch S1				N

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Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "C"	C1 1C1 2C1 3			--
	Tests C1				--
8	**Requirements for construction and operation**				--
8.6	Mechanical and electrical endurance				--
	RCBOs shall be capable of performing an adequate number of mechanical and electrical operations.				P
9.10	**Verification of Mechanical and electrical endurance**				--
	Test:				--
	- IN ≤ 25 A2s ON / 13s OFF				P
	- IN > 25 A2s ON / 28s OFF				P
	2000 operating cycles				--
	Test voltage UN (V):	242V			--
	Test current IN (A):	64A			--
	Cos phi = 0,85 - 0,9:	0.86			--
	Cross-section (mm²):	16mm²			--
9.10.2	Test procedure				--
	$I_{\Delta N}$ > 0,01 A:				P
	- 1000 cycles manual operation				P
	- 500 cycles test device				P
	- 500 cycles $I_{\Delta N}$				P
	$I_{\Delta N}$ ≤ 0,01 A:				--
	- 500 cycles manual operation				N
	- 750 cycles test device				N
	- 750 cycles IΔN				N
	Without load - manual operation				--
	- IN ≤ 25 A.....2000 cycle				N
	- IN > 25 A.....1000 cycle				P
9.10.3	After test:				--
	No undue wear, no damage, no loosening of connections, no seepage of sealing compound				P
	The RCBO shall trip with a test current of 1,25 IΔN - break time not exceeding the value for IΔN in table 2	[ms]	[ms]	[ms]	--
		24	19	19	P

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Clause	Requirement + Test	Result - Remark			Verdict
	Test switch S2 and RCBO in the closed position, test voltage established by closing the test switch S1.				P
	Dielectric strength test with 900 V AC for 1 min:				--
	a)				P
	b)				P
	c)				P
	d)				N
	e)				N
	2,55 I_N through all poles:	161A			P
		[s]	[s]	[s]	--
	- Opening time ≥ 1s but ≤ 60 s for IN ≤ 32 A				N
	- Opening time ≥ 1s but ≤ 120 s for IN > 32 A	32.7	43.2	35.2	P
9.12.11.2.1	Test at reduced short-circuit current.....:	Figure 7			--
	Test current:				--
	- 500 A				N
	- 10 I_N	643A			P
	Power factor 0,93 - 0,98.....	0.95			--
	Each overcurrent protected pole:				--
		[KA²s]	[KA²s]	[KA²s]	--
	Sequence: 6-0 and 3-CO..... I²t max.	3.45	2.98	4.55	P
	Ipeak (A) max. value..... :	895A			--
	No permanent arcing				N
	No flash-over between poles or between poles and frame				P
	No blowing of the fuse F				P
	No damage, polyethylene sheet shows no hole				P
9.12.12	The RCBO shall show no damage impairing their further use an shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The RCBO is in the open position	[mA]	[mA]	[mA]	--
	The leakage current shall not exceed 2 mA	<0.01	<0.01	<0.01	P
9.12.12.1.b)	Dielectric strength test:				--

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Clause	Requirement + Test	Result - Remark			Verdict
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N
	e) 2000 V				N
	During these test, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
	Tests C2: 2P C63; 30mA; Type A	C_2 1 C_2 2 C_2 3			P
9.12.11.2.2	short circuit test on rcbos for verifying their suitability for use in it systems				P
	figure.....:	Figure 8			--
	Test current:				--
	- 500A	A			N
	- 1,2 times the upper limit of the standard range of instantaneous tripping (not exceeding 2500 A)	756A			P
	Power factor 0,93-0,98:	0.94			P
	test voltage 105% of the rated phase to phase voltage	421V			P
	test voltage 105% of U0 for the pole marked N, if any	V			N
	Each pole of RCBO is subjected individually to a test in a circuit, the connection of which is shown in Figure 7.				P
		[KA²s]	[KA²s]	[KA²s]	--
	Sequence: O-t-CO..... I²t max.	4.62	4.61	4.58	P
	Ipeak (A) max. value.....:	1080A			--
	Sequence.....:	O-t-CO			--
	Point of initiation of the O operation (protected poles): 0 ± 5° for the first tested pole, shifted by 30° for the other poles				P
	Point of initiation of the O operation (neutral pole): 60 ± 5°				N
	No flash-over between poles or between poles and frame				P

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Clause	Requirement + Test	Result - Remark			Verdict
	No blowing of the fuse F				P
	No damage, polyethylene sheet shows no hole				P
	The RCBO shall show no damage impairing their further use an shall be capable without maintenance to withstand the following tests:				P
9.12.12.1 .a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The RCBO is in the open position	[mA]	[mA]	[mA]	--
	The leakage current shall not exceed 2 mA	<0.01	<0.01	<0.01	P
9.12.12.1 .b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N
	e) 2000 V				N
	During these test, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P

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Clause	Requirement + Test	Result - Remark	Verdict

	TEST SEQUENCE "D"						**D1 D2 D3**				--
	TEST D_0										--
8	**Requirements for construction and operation**										--
8.5	Operating characteristics										--
9.9	**Verification of the operating characteristic**										--
9.9.1	RCBO installed as for normal use, test circuit according to figure 4										P
	For multiple settings of I∆N tests are made for each setting										N
	RCBOs with more than one rated frequency, tests at the lowest and highest frequency, except for test in 9.9.1.2 e),test at only one frequency.										N
	Tests performed with no load at 20 ± 5°C										N
9.9.1.4	For RCBOs functionally dependent on line voltage each test is made at:										N
	- 1,1 UN (V) and						V				--
	- 0,85 UN (V)						V				--
Table 2	Type	I_N A	$I_{\Delta N}$ A	Limiting values of break time and non-actuating time (s) for type AC and A RCBOs in event of alternating residual currents (r.m.s. values) equal to							--
				$I_{\Delta N}$	2 $I_{\Delta N}$	5 $I_{\Delta N}$	5 $I_{\Delta N}$ or 0,25A a)	5A-200A, 500A b)	$I_{\Delta t}$ c)		--
	General	Any value	<0,03	0,3	0,15	--	0,04	0,04	0,04	Max. break times	--
		Any value	0,03	0,3	0,15	--	0,04	0,04	0,04		--
		Any value	>0,03	0,3	0,15	0,04	--	0,04	0,04		--
	S	≥ 25	>0,03	0,5	0,2	0,15	--	0,15	0,15	Max. break times	--
				0,13	0,06	0,05	--	0,04	0,04	Min. non-actuating times	--
	a) value to be decided by the manufacturer for this test										--
	b) The test are only made during verification of the correct operation as mentioned in 9.9.1.2 d) but in any case values exceeding the lower limit of the overcurrent instantaneous tripping range are not tested.										--

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Clause	Requirement + Test	Result - Remark			Verdict
	c) The test is made with a current IΔt equal to the lower limit of the overcurrent instantaneous tripping range according to type B, C or D, as applicable. For the tests of 9.9.1.3 and 9.9.1.4 b), the current $I_{\Delta t}$ is established so that the vector sum $I_{\Delta t}$ + In is equal to the lower limit of the overcurrent instantaneous tripping range, according to type B, C or D, as applicable.				--
9.9.1.2	Tests for all RCBOs				N
a)	Verification of the correct operation in case of a steady increase of residual current:	[mA]	[mA]	[mA]	--
	- Steady increase from 0,2 IΔN to IΔN within 30s Tripping current between IΔN0 and IΔN	22.8 23.5	23.6 24.2	21.8 22.8	P
b)	Verification of the correct operation at closing on residual current (S1 and S2 closed) :	[ms]	[ms]	[ms]	--
	- The RCBO closes on IΔN, no value exceeds the specified limiting value	19	22	18	P
c)	Verification of the correct operation in case of sudden appearance of residual current by closing S1, (S2 and RCBO in closed position):				
	Maximum break times at:	[ms]	[ms]	[ms]	--
	- $I_{\Delta N}$	26	35	24	P
	- 2 $I_{\Delta N}$	27	26	23	P
	- 5 $I_{\Delta N}$ or	20	22	18	P
	- 0,25 A				N
	- $I_{\Delta t}$ 315 A	21	22	19	P
	No value exceeds the relevant specified limiting value				P
	Additional test for type S:				N
	Minimum non-actuating time at:				--
	- $I_{\Delta N}$ .....0,13 s				N
	- 2 $I_{\Delta N}$ ..... 0,06 s				N
	- 5 $I_{\Delta N}$ ..... 0,05 s				N
	- $I_{\Delta t}$ .....0,04 s				N
	The test switch S1 and the RCBO being in the closed position, the test voltage is suddenly established by closing the test switch S2 for min. non-operating times acc. table 2				N
	No tripping during tests				N

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Clause	Requirement + Test	Result - Remark			Verdict
d)	Verification of the correct operation in case of sudden appearance of residual current between 5 I∆N and 500A among the following list: 5A - 10A - 20A - 50A - 100A - 200A by closing S2, (S1 and RCBO in closed position):				N
	- A (value 1 between 5A and 200A)				N
	- A (value 1 between 5A and 200A)				N
	No value exceeds the relevant specified limiting value				N
f) 1)	Tests repeated at -5°C:				N
	Verification of the correct operation in case of sudden appearance of residual current by closing S1, (S2 and RCBO in closed position):				--
	Maximum break times at:	[ms]	[ms]	[ms]	--
	- $I_{\Delta N}$	18	14	19	P
	- 2 $I_{\Delta N}$	21	20	22	P
	- 5 $I_{\Delta N}$	18	17	19	P
	- 0,25 A				N
	- $I_{\Delta t}$ 315 A	17	16	19	P
	No value exceeds the relevant specified limiting value				P
	Additional test for type S:				N
	Minimum non-actuating time at:				--
	- $I_{\Delta N}$ .....0,13 s				N
	- 2 $I_{\Delta N}$ ..... 0,06 s				N
	- 5 $I_{\Delta N}$ ..... 0,05 s				N
	- $I_{\Delta t}$ .....0,04 s				N
	The test switch S1 and the RCBO being in the closed position, the test voltage is suddenly established by closing the test switch S2 for min. non-operating times acc. table 2				N
	No tripping during tests				N
e)	Tests repeated, with the pole under test and one other pole of the RCBO loaded with rated current, current being established shortly before the test.	I_N = A			N
	Cross-section (mm²).....:	mm²			--
	Verification of the correct operation at closing on residual current (S1 and S2 closed) :	[ms]	[ms]	[ms]	--
	-no value exceeds the specified limiting value				N

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Clause	Requirement + Test	Result - Remark			Verdict
	Verification of the correct operation in case of sudden appearance of residual current by closing S2, (S1 and RCBO in closed position):				N
	Maximum break times at:				--
	- $I_{\Delta N}$				N
	- 2 $I_{\Delta N}$				N
	- 5 $I_{\Delta N}$				N
	- 0,25 A				N
	- $I_{\Delta t}$ A				N
	No value exceeds the relevant specified limiting value				N
	Additional test for type S:				N
	Minimum non-actuating time at:				--
	- $I_{\Delta N}$ .....0,13 s				N
	- 2 $I_{\Delta N}$ ..... 0,06 s				N
	- 5 $I_{\Delta N}$ ..... 0,05 s				N
	- $I_{\Delta t}$ .....0,04 s				N
	The test switch S1 and the RCBO being in the closed position, the test voltage is suddenly established by closing the test switch S2 for min. non-operating times acc. table 2				N
	No tripping during tests				N
f) 2)	Tests repeated with the RCBO loaded with rated current IN at +40°C until steady-state conditions are reached	I_N = A			N
	Cross-section (mm²).....:	mm²			--
	Verification of the correct operation in case of sudden appearance of residual current by closing S1, (S2 and RCBO in closed position):				
	Maximum break times at:	[ms]	[ms]	[ms]	--
	- $I_{\Delta N}$				N
	- 2 $I_{\Delta N}$				N
	- 5 $I_{\Delta N}$				N
	- 0,25 A				N
	- $I_{\Delta t}$ A				N
	No value exceeds the relevant specified limiting value				N
	Additional test for type S:				N

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Clause	Requirement + Test	Result - Remark	Verdict
	Minimum non-actuating time at:		--
	- $I_{\Delta N}$ .....0,13 s		N
	- 2 $I_{\Delta N}$ ..... 0,06 s		N
	- 5 $I_{\Delta N}$ ..... 0,05 s		N
	- $I_{\Delta t}$ .....0,04 s		N
	The test switch S1 and the RCBO being in the closed position, the test voltage is suddenly established by closing the test switch S2 for min. non-operating times acc. table 2		N
	No tripping during tests		N

8.15	**Behaviour of RCBOs in case of earth fault currents comprising a DC component**					--
9.9.1.3	Verification of the correct operation at residual currents with DC components					--
	Type A residual current devices					--
	RCBO installed as for normal use, test circuits according to figures 5 and 6					N
	RCBOs with more than one rated frequency, tests at the lowest and highest frequency, except for test in 9.9.1.2 e),test at only one frequency.					N
	For RCBOs functionally dependent on line voltage each test is made at					N
	- 1,1 U_N.....:	V				--
	- 0,85 U_N ..... :	V				--
a)	Verification of the correct operation in case of a continuous rise of the residual pulsating direct current (S1, S2 and RCBO closed)					N
	Test acc. figure 5					--
	Angle α	Tripping current (A)				--
		Lower limit	Upper limit			--
	0°	0,35 $I_{\Delta N}$	1,4 $I_{\Delta N}$ or 2 $I_{\Delta N}$ (sub-clause 5.3.8)			--
	90°	0,25 $I_{\Delta N}$				--
	135°	0,11 $I_{\Delta N}$				--
	Steady increase from zero to:			[mA]	[mA]	[mA] --
	- 1,4 $I_{\Delta N}$ for $I_{\Delta N}$ > 0,01A with 1,4 $I_{\Delta N}$ /30 A/s					N
	- 2 $I_{\Delta N}$ for $I_{\Delta N} \leq$ 0,01 A with 2 $I_{\Delta N}$ /30 A/s					N
	α = 0° +/-					N

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Clause	Requirement + Test							Result - Remark			Verdict
	α = 90° +/-										N
	α = 135° +/-										N
	No value exceeds the relevant specified limiting values										N
b)	Verification of the correct operation in case of suddenly appearing residual pulsating direct currents by closing S2 (S1 and RCBO in closed position)										N
Table 3	Type	I_N A	$I_{\Delta N}$ A	Maximum values of break time and non-actuating time (s) for type A RCBOs in the event of half-wave pulsating residual currents (r.m.s. values) equal to							--
				1,4 $I_{\Delta N}$	2 $I_{\Delta N}$	2,8 $I_{\Delta N}$	4 $I_{\Delta N}$	7 $I_{\Delta N}$	0,35 A	0,5 A	350A a)	--
	General	Any value	<0,03		0,3		0,15			0,05	0,04	--
		Any value	0,03	0,3		0,15			0,04		0,04	--
		Any value	>0,03	0,3		0,15		0,04			0,04	--
	S	≥ 25	>0,03	0,5		0,2		0,15			0,15	--
	a)This value shall be limited to the lower limit of the overcurrent instantaneous tripping ranges according to type B, C or D, as applicable.											--
	Test acc. figure 5											--
	Angle α.....:							α = 0°				--
	RCBOs with $I_{\Delta N}$ < 0,03 A											N
	Maximum break times at:							[ms]	[ms]	[ms]		--
	- 2 $I_{\Delta N}$ +/-											N
	- 4 $I_{\Delta N}$ +/-											N
	- 0,5 A +/-											N
	- 350A or +/-											N
	- IΔt A +/-											N
	RCBOs with $I_{\Delta N}$ = 0,03 A											N
	Maximum break times at:							[ms]	[ms]	[ms]		--
	- 1,4 $I_{\Delta N}$ +/-											N
	- 2,8 $I_{\Delta N}$ +/-											N
	- 0,35 A +/-											N
	- 350A or +/-											N
	- $I_{\Delta t}$ A +/-											N

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Clause	Requirement + Test	Result - Remark			Verdict
	RCBOs with $I_{\Delta N}$ > 0,03 A				
	Maximum break times at:	[ms]	[ms]	[ms]	--
	- 1,4 $I_{\Delta N}$ +/-				N
	- 2,8 $I_{\Delta N}$ +/-				N
	- 7 $I_{\Delta N}$ +/-				N
	- 350A or +/-				N
	- $I_{\Delta t}$ A +/-				N
	No value exceeds the specified limiting values				N
c)	Verification of the correct operation with the pole under test and one other pole loaded with rated current IN	I_N = A			N
	Test acc. 9.9.1.3 a) repeated, pole under test an one other pole loaded with rated current				--
	Steady increase from zero to:	[mA]	[mA]	[mA]	--
	- 1,4 $I_{\Delta N}$ for $I_{\Delta N}$ > 0,01A with 1,4 $I_{\Delta N}$ /30 A/s				N
	- 2 $I_{\Delta N}$ for $I_{\Delta N} \leq$ 0,01 A with 2 $I_{\Delta N}$ /30 A/s				N
	α = 0° +/-				N
	α = 90° +/-				N
	α = 135° +/-				N
	No value exceeds the relevant specified limiting values				N
d)	Verification of the correct operation in case of residual pulsating direct currents with α = 0° superimposed by smooth direct current of 0,006 A				N
	Test acc. figure 6				--
	Steady increase of pulsating DC current from zero to:	[mA]	[mA]	[mA]	--
	- 1,4 $I_{\Delta N}$ for $I_{\Delta N}$ > 0,01A with 1,4 $I_{\Delta N}$ /30 A/s				N
	- 2 $I_{\Delta N}$ for $I_{\Delta N} \leq$ 0,01 A with 2 $I_{\Delta N}$ /30 A/s				N
	(I1) α = 0° +/- (I0) 6mA DC +/-				N
	No value exceeds the relevant specified limiting values				N

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Clause	Requirement + Test	Result - Remark	Verdict

	Tests D1				--
8	**Requirements for construction and operation**				--
8.12	RCBOs functionally dependent on line voltage				--
	RCBOs functionally dependent on the line voltage operate correctly between 0,85 and 1,1 U_N				--
9.17	**Verification of the behaviour of RCBOs opening automatically in case of failure of the line voltage**				--
9.17.1	Limiting value of the line voltage Ux				--
	UN applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs	[V]	[V]	[V]	--
	All values less than 0,85 U_N				N
	Tripping test:				N
	Test voltage (V)..... :	V			--
	Residual current $I_{\Delta N}$.....:	$I_{\Delta N}$ =A			--
	Time corresponding to value for IΔN in table 2	[ms]	[ms]	[ms]	--
	No value exceeds the specified limiting values				N
	Not possible to close the apparatus by manual operating means below Ux				N
9.17.2	Verification of automatic opening in case of failure of the line voltage				--
	RCBO supplied with UN and line voltage, then switched off				N
	Time interval between switching off and opening of the main contacts:	[ms]	[ms]	[ms]	--
a)	RCBOs opening without delay				N
	- no value exceeds 0,5 s				N
b)	RCBOs opening with delay				N
	Values within the range indicated by manufacturer	toms			N
9.17.3	Verification of the correct operation, in presence of a residual current, for RCBOs opening with delay in case of failure of the line voltage				--
	RCBO connected according to figure 4 at UN				N
	All phases but one switched off by means of S3				N
9.9.1.2	During the delay: Off-load tests at 20 $\pm$ 5°C				--
a)	Verification of the correct operation in case of a steady increase of residual current:	[mA]	[mA]	[mA]	--

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Clause	Requirement + Test	Result - Remark			Verdict
	- Steady increase from 0,2 $I_{\Delta N}$ to $I_{\Delta N}$ within 30s Tripping current between $I_{\Delta N}$ 0 and $I_{\Delta N}$ (only if delay > 30s)				N
b)	Verification of the correct operation at closing on residual current (S1 and S2 closed) :	[ms]	[ms]	[ms]	--
	- The RCBO closes on $I_{\Delta N}$, no value exceeds the specified limiting value				N
c)	Verification of the correct operation in case of sudden appearance of residual current by closing S1, (S2 and RCBO in closed position):				N
	Maximum break times at:	[ms]	[ms]	[ms]	--
	- $I_{\Delta N}$				N
	- 2 $I_{\Delta N}$				N
	- 5 $I_{\Delta N}$ or				N
	- 0,25 A				N
	- $I_{\Delta t}$ A				N
	No value exceeds the relevant specified limiting value				N
d)	Verification of the correct operation in case of sudden appearance of residual current between 5 IΔN and 500A by closing S2, (S1 and RCBO in closed position):				N
	- A (value 1 between 5A and 200A)				N
	- A (value 1 between 5A and 200A)				N
	No value exceeds the relevant specified limiting value				N
	Additional test for type S:				--
	Minimum non-actuating time at:				--
	- $I_{\Delta N}$ ..... 0,13 s				N
	- 2 $I_{\Delta N}$ .....0,06 s				N
	- 5 $I_{\Delta N}$ .....0,05 s				N
	- $I_{\Delta t}$ ..... 0,04 s				N
	The test switch S1 and the RCBO being in the closed position, the test voltage is suddenly established by closing the test switch S2 for min. non-operating times acc. table 2				N
	No tripping during tests				N
9.17.4	Verification of the correct operation of RCBOs with 3 or 4 current paths, neutral and one line terminal only being energized in turn				--

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Clause	Requirement + Test	Result - Remark			Verdict
	RCBO connected according to figure 4				N
9.9.1.2.c)	Verification of the correct operation in case of sudden appearance of residual current by closing S1, (S2 and RCBO in closed position):				
	Maximum break times at:	[ms]	[ms]	[ms]	--
	- $I_{\Delta N}$				N
	- 2 $I_{\Delta N}$				N
	- 5 $I_{\Delta N}$ or				N
	- 0,25 A				N
	- $I_{\Delta t}$ A				N
	No value exceeds the relevant specified limiting value				N
	Additional test for type S:				--
	Minimum non-actuating time at:				--
	- $I_{\Delta N}$ ..... 0,13 s				N
	- 2 $I_{\Delta N}$ .....0,06 s				N
	- 5 $I_{\Delta N}$ .....0,05 s				N
	- $I_{\Delta t}$ ..... 0,04 s				N
	The test switch S1 and the RCBO being in the closed position, the test voltage is suddenly established by closing the test switch S2 for min. non-operating times acc. table 2				N
	No tripping during tests				N

8.14	**Behaviour of RCBOs in case of current surges caused by impulse voltages**				--
9.19.1	Current surge test for all RCBOs (0,5µs/100kHz ring wave test)				--
	One pole of the RCBO submitted to 10 surge current applications, polarity inverted after every two applications				N
	Peak value.....:	200A +10/-0% or (25A +10/-0% for I∆N≤10mA)			--
	Virtual front time..... :	0,5µs ± 30%			--
	Period of following oscillatory wave..... :	10µs ±20%			--
	Each successive reverse peak..... :	60% of preceding peak			--
	No tripping during tests	No trip			P
	After the test the RCBO shall trip with a test current of I∆N	[ms]	[ms]	[ms]	--

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Clause	Requirement + Test	Result - Remark			Verdict
		18	21	19	P
	Test switch S2 and RCBO in the closed position, test voltage established by closing the test switch S1				P
	No value exceed the relevant specified limiting value				P
9.19.2	Verification of behaviour at surge currents up to 3000A (8/20μs surge current test)				--
	One pole of the RCBO chosen at random, submitted to 10 surge current applications, polarity inverted after every two applications				P
	Peak value.....:	3000A +10/-0%			--
	Virtual front time..... :	0,8μs ± 20%			--
	Virtual time of half value.....:	20μs ± 20%			--
	Peak of reverse current.....:	less than 30 % of peak value			--
9.19.2.2	Test results for S-type RCBOs: No tripping during tests				P
9.19.2.3	Test results for RCBOs of the general type: During the test the RCBO may trip. After any tripping, the RCBO shall be re-closed				P
	No tripping during tests				
	After the test the RCBO shall trip with a test current of $I_{\Delta N}$	[ms]	[ms]	[ms]	--
					P
	Test switch S2 and RCBO in the closed position, test voltage established by closing the test switch S1				P
	No value exceed the relevant specified limiting value				P
9.12.13	Verification of the rated residual making and breaking capacity $I_{\Delta m}$				P
	$I_{\Delta m}$ (A)..... :	630A			--
	Test circuit according to figure..... :	8			--
	Cross-section (mm²)..... :	25mm²			--
	Grid distance a (mm)..... :	35mm			--
	Prospective current (A)..... :	630A			--
	Prospective current obtained (A)..... :	643A			--
	Power factor..... :	0.93 ~ 0.98			--
	Power factor obtained..... :	0.95			--
	I²t max sequence O-t-CO-t-CO	[KA²s]	[KA²s]	[KA²s]	--

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Clause	Requirement + Test	Result - Remark			Verdict
		3.04	3.88	2.85	P
	Phases which do not carry the short circuit current during this test shall be connected to the supply voltage at the line terminals				P
	On each pole in turn excluding the switched neutral pole				P
	RCBOs functionally dependent on the line voltage supplied with rated voltage.				P
	No permanent arcing				P
	No flashover				P
	No blowing of fuse F				P
	No damage, polyethylene sheet shows no holes				P
9.12.13.2	The RCBO shall show no damage impairing their further use an shall be capable without maintenance to withstand the following tests:				P
9.7.3	Dielectric strength test of the main circuit:				--
	2 UN (V) for 1 min..... :	2 U_N = V			--
	a)				P
	b)				P
	c)				P
	d)				N
	e)				N
	No flashover or breakdown				P
	Making and breaking IN at UN				P
	The RCBO shall trip with a test current of 1,25 $I_{\Delta N}$ - break time not exceeding the value for $I_{\Delta N}$ in table 2	[ms]	[ms]	[ms]	--
		22	27	23	P
	Test switch S2 and RCBO in the closed position, test voltage established by closing the test switch S1.				P
	Additional tests for RCBOs functionally depending on line voltage if applicable:				N
9.17	**VERIFICATION OF THE BEHAVIOUR OF RCBOS OPENING AUTOMATICALLY IN CASE OF FAILURE OF THE LINE VOLTAGE**				--
9.17.1	Limiting value of the line voltage Ux				N
	UN applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs	[V]	[V]	[V]	--

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Clause	Requirement + Test	Result - Remark			Verdict
	All values less than 0,85 U_N				N
	Tripping test:				N
	Test voltage (V).....:	V			--
	Residual current IΔN.....	IΔN = A			--
	Time corresponding to value for IΔN in table 2	[ms]	[ms]	[ms]	--
	No value exceeds the specified limiting values				N
	Not possible to close the apparatus by manual operating means below UX				N
9.17.2	Verification of automatic opening in case of failure of the line voltage				--
	RCBO supplied with UN and line voltage then switched off				P
	Time interval between switching off and opening of the main contacts:				P
	a) RCBOs opening without delay				P
	- no value exceeds 0,5 s				N
	b) RCBOs opening with delay				P
	values within the range indicated by manufacturer:	to ms			N
9.17.3	Verification of the correct operation, in presence of a residual current, for RCBOs opening with delay in case of failure of the line voltage				--
	RCBO connected according to figure 4 at UN				P
	All phases but one switched off by means of S3				P
9.9.1.2	During the delay: Off-load tests at 20 ± 5°C				P
a)	Verification of the correct operation in case of a steady increase of residual current:	[mA]	[mA]	[mA]	--
	- Steady increase from 0,2 IΔN to IΔN within 30s Tripping current between IΔN0 and IΔN (only if delay > 30s)	17.3 18.6	27.2 28.7	20.6 20.9	P
b)	Verification of the correct operation at closing on residual current (S1 and S2 closed) :	[ms]	[ms]	[ms]	--
	- The RCBO closes on IΔN, no value exceeds the specified limiting value	21	20	20	P
c)	Verification of the correct operation in case of sudden appearance of residual current by closing S1, (S2 and RCBO in closed position):				P
	Maximum break times at:	[ms]	[ms]	[ms]	--
	- $I_{\Delta N}$	22	20	24	P
	- 2 $I_{\Delta N}$	21	22	26	P

EN 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	- 5 $I_{\Delta N}$ or	21	20	1	P
	- 0,25A				N
	- $I_{\Delta t}$ 315 A	18	21	21	P
	No value exceeds the relevant specified limiting value				N
d)	Verification of the correct operation in case of sudden appearance of residual current between 5 IΔN and 500A by closing S2, (S1 and RCBO in closed position):				N
	- 50 A (value 1 between 5A and 200A)	16	10	17	P
	- 200 A (value 1 between 5A and 200A)	12	21	18	P
	No value exceeds the relevant specified limiting value				P
	Additional test for type S:				--
	Minimum non-actuating time at:	[ms]	[ms]	[ms]	--
	- $I_{\Delta N}$ ..... 0,13 s				N
	- 2 $I_{\Delta N}$ ..... 0,06 s				N
	- 5 $I_{\Delta N}$ ..... 0,05 s				N
	- $I_{\Delta t}$ ..... 0,04 s				N
	The test switch S1 and the RCBO being in the closed position, the test voltage is suddenly established by closing the test switch S2 for min. non-operating times acc. table 2				N
	No tripping during tests				N
9.17.4	Verification of the correct operation of RCBOs with 3 or 4 current paths, neutral and one line terminal only being energized in turn				N
	RCBO connected according to figure 4				N
9.9.1.2.c)	Maximum break times at:	[ms]	[ms]	[ms]	--
	- $I_{\Delta N}$				N
	- 2 $I_{\Delta N}$				N
	- 5 $I_{\Delta N}$ or				N
	- 0,25A				N
	- IΔt A				N
	No value exceeds the relevant specified limiting value				N
	Additional test for type S:				N
	Minimum non-actuating time at:	[ms]	[ms]	[ms]	--

EN 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	- $I_{\Delta N}$ ..... 0,13 s				N
	- 2 $I_{\Delta N}$ ..... 0,06 s				N
	- 5 $I_{\Delta N}$ ..... 0,05 s				N
	- $I_{\Delta t}$ ..... 0,04 s				N
	The test switch S1 and the RCBO being in the closed position, the test voltage is suddenly established by closing the test switch S2 for min. non-operating times acc. table 2				N
	No tripping during tests				N

8.11	**Test device**		--
	RCBOs provided with a test device		P
	Ampere-turns produced when operating the test device do not exceed 2,5 times the ampere turns produced by I∆N		P
	Not possible to energize the circuit on the load side by operating the test device when the RCBO is in the open position		P
9.16	**Verification of the operation of the test device at the limits of rated voltage**		--
	a) RCBO at 0,85 UN, test device actuated 25 times at intervals of 5s	204V	P
	b) Test a) repeated at 1,1 UN	264V	P
	c) Test b) repeated, but only once, the operating means of the test device being held in the closed position for 30s		P
	RCBO operated at each test		P
	No change impairing further use		P

EN 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict

	TEST SEQUENCE "E"	E1 E2 E3			--
	Tests E_0				--
9.9	**verification of the Operating characteristics**				--
9.9.2	Verification of the Operating characteristics under overcurrent conditions				--
	I_N (A).....:	A			--
	Cross-section (mm²)..... :	mm²			--
	Instantaneous tripping current (B / C / D).....:				--
9.9.2.1	Test of time-current characteristic				N
a)	Test current 1,13 IN starting from cold for..... :	1,13 I_N = 71.2A			--
	- 1 h (IN ≤ 63 A)				P
	- 2 h (IN > 63 A)				N
	No tripping				P
	Then steadily increased within 5 s to 1,45 I_N.....:	1,45 I_N =91.35 A			--
	Tripping within	[min]	[min]	[min]	--
	- 1h (< 63 A)	1min16s	6min51s	32s	P
	- 2h (> 63 A)				N
b)	Test current 2,55 IN starting from cold..... :	2,55 I_N = A			--
	Opening time not less than 1 s or more than	[s]	[s]	[s]	--
	- 60 s (≤ 32 A)				N
	- 120 s (> 32 A)	22.4	28.6	40.3	P
9.9.2.2	Test of instantaneous tripping:				--
a)	General test conditions				P
	For the lower values of the test current of 9.9.2.2.b), 9.9.2.2.c) and 9.9.2.2.d) respectively the test is made once, at any convenient voltage				P
	For the upper value of the test current, the two following tests are carried out:				P
	- At any convenient voltage, one opening operation on each combination of two poles connected in series . The tripping time is measured and shall be within the limits of Table 10. test results see b) or c) or d)				P
	- At rated voltage U0 (phase to neutral) with a power factor between 0,95 and 1 separately on each protected pole of the RCBO The sequence of operation is: O-t-CO-t-CO-t-CO Interval time: > 3 min.				P

EN 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	The tripping time of the O operation is measured	[s]	[s]	[s]	--
					N
	After each operation the indication means shall show the open position of the contacts				N
b)	☐ B				N
	Test current 3 I_N starting from cold.....:	3 I_N =A			--
		[s]	[s]	[s]	--
	- Opening time not less than 0,1 s				N
	Test current 5 I_N starting from cold.....:	5 I_N =A			--
		[s]	[s]	[s]	--
	- Tripping time less than 0,1 s				N
c)	☒ C				P
	Test current 5 I_N starting from cold.....:	5 I_N =316 A			--
		[s]	[s]	[s]	--
	- Opening time not less than 0,1 s				P
	Test current 10 I_N starting from cold..... :	10 I_N =635 A			--
		[s]	[s]	[s]	--
	- Tripping time less than 0,1 s				P
d)	☒ D				P
	Test current 10 I_N starting from cold..... :	10 I_N =630A			--
		[s]	[s]	[s]	--
	- Opening time not less than 0,1 s	9.3	8.9	10.1	P
	Test current 20 I_N starting from cold..... :	20 I_N =1280A			
		[s]	[s]	[s]	--
	- Tripping time less than 0,1 s	12.2	9.9	10.1	P
9.9.2.3	Test of effect of ambient temperature on the tripping characteristics:				P
a)	Ambient temperature of (- 5 ± 2)°C.....:	-5°C			--
	Test current 1,13 I_N.....:	1,13 I_N = 71.2A			--
	- passed for 1 h				P
	- passed for 2 h				N
	Current is then steadily increased within 5s to 1,9 I_N	1,9 I_N = A			--
	Tripping:	[min]	[min]	[min]	--
	- 1 h	1min18s	1mn09s	3min01s	P

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Clause	Requirement + Test	Result - Remark			Verdict
	- 2 h				N
b)	Ambient temperature of (40 ± 2)°C.....:	40°C			--
	Test current IN	I_N =A			--
	No tripping within				--
	- 1 h				P
	- 2 h				N

EN 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Tests E1		--
8	**requirements for construction and operation**		--
8.8	Resistance to mechanical shock and impact		--
	RCBO' shall have adequate mechanical behaviour so as to withstand stresses imposed during installation and use		P
9.13	**Verification to resistance to mechanical shock and impact**		--
9.13.1	Mechanical shock		--
9.13.1.2	Test procedure:		--
	- 50 falls of 40 mm on one side		P
	- 50 falls on opposite side		P
	C turned through 90°		P
	- 50 falls on one side		P
	- 50 falls on opposite side		P
	No opening of RCBO during test		P
9.13.2	Mechanical impact		--
	- 9.13.2.2 for RCBOs intended to be mounted on a rail		P
	- 9.13.2.3 for plug-in type RCBOs		P
9.13.2.1	Impact test:		P
	10 blows from a height of 10 cm		--
	No damage		P
9.13.2.2	RCBOs for rail mounting:		P
	- downward vertical force of 50 N for 1 min		P
	- upward vertical force of 50 N for 1 min		P
	RCBO shall not become loose during test and shall not show any damage impairing its further use		P
9.13.2.3	RCBOs of plug-in type		N
	Under consideration		--
9.12.11.3	Test at 1500 A:		--
	Prospective current of 1500 A		--
	Cross-section (mm²).....:	25mm²	--
	Grid distance a (mm).....:	a = 35 mm	--
	Power factor 0,93 – 0,98.....:	0.96	--

EN 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	Prospective current obtained..... :	1540A			--
	Power factor.....:	0.96			--
	Test circuit:.....:	Figure			--
	I_{peak} (A) max. value..... :	1920A			--
	Sequence: 6-O and 3-COI²t max	[KA²s]	[KA²s]	[KA²s]	--
		12.3	11.1	12.8	P
	RCBOs functionally dependent on the line voltage supplied with rated voltage				P
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P
9.12.12	The RCBO shall show no damage impairing their further use an shall be capable without maintenance to withstand the following tests:				N
9.12.12.1 .a)	leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The RCBO is in the open position	[mA]	[mA]	[mA]	--
	The leakage current shall not exceed 2 mA	<0.01	<0.01	<0.01	P
9.12.12.1 .b)	The RCBO shall show no damage impairing their further use an shall be capable without maintenance to withstand the following tests:				--
	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N
	e) 2000 V				N
	During these test, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
9.12.12.1	Test current equal to 0,85 times the conventional non-tripping current for:	60.8A			--
	- 1h starting from cold				P

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Clause	Requirement + Test	Result - Remark			Verdict
	- 2h				N
	Increasing the current within 5s to 1,1 times the conventional tripping current	100A			--
	- tripping within	[min]	[min]	[min]	--
	- 1h (< 63 A)	39s	4min01s	1min27s	P
	- 2h (> 63 A)				N

EN 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F"	**F1**	**F2**	**F3**	--
	Tests F_0				--
9.12	**Short-circuits test**				--
9.12.11.4	Test above 1500 A				P
b)	Test at service short-circuit capacity Ics				P
	Service short-circuit capacity (A)..... :	A			--
	Figure..... :				--
	Cross-section (mm²)..... :	mm²			--
	Grid distance a (mm)..... :	mm			--
	Prospective current (A)..... :	A			--
	Prospective current obtained (A)..... :	A			--
	Power factor..... :				--
	Power factor obtained..... :				--
	Sequence..... :				--
	Ipeak (A) max. value..... :	A			--
	I²t max..... :	[KA²s]	[KA²s]	[KA²s]	--
					P
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				N
	No damage, polyethylene sheet shows no holes				P
9.12.12	The RCBO shall show no damage impairing their further use an shall be capable without maintenance to withstand the following tests:				P
9.12.12.1 .a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The RCBO is in the open position	[mA]	[mA]	[mA]	--
	The leakage current shall not exceed 2 mA	<0.01	<0.01	<0.01	P
9.12.12.1 .b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P

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Clause	Requirement + Test	Result - Remark			Verdict
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N
	e) 2000 V				N
	During these test, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
	Test current equal to 0,85 times the conventional non-tripping current for:	60.8A			--
	- 1h starting from cold				P
	- 2h				P
	Increasing the current within 5s to 1,1 times the conventional tripping current	A			--
	- tripping within	[min]	[min]	[min]	--
	- 1h (< 63 A)				N
	- 2h (> 63 A)				N

EN 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	Tests F1				--
9.12	**Short-circuits test**				--
9.12.11.4	Test above 1500 A				P
c)	Test at rated short-circuit capacity Icn				P
	Rated short-circuit capacity (A)..... :	6000A			--
	Figure..... :	8			--
	Cross-section (mm²)..... :	25mm²			--
	Grid distance a (mm)..... :	40mm			--
	Prospective current (A)..... :	6000A			--
	Prospective current obtained (A)..... :	6130A			--
	Power factor..... :	0.65…0.70			--
	Power factor obtained..... :	0.68			--
	Sequence..... :	O-t-CO			--
	I_{peak} (A) max. value..... :	4560A			--
	I²t max..... :	[KA²s]	[KA²s]	[KA²s]	--
		44.4	56.9	34.8	P
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N
	No permanent arcing				N
	No flash-over between poles or between poles and frame				N
	No blowing of fuse				N
	No damage, polyethylene sheet shows no holes				N
9.12.12	The RCBO shall show no damage impairing their further use an shall be capable without maintenance to withstand the following tests:				P
9.12.12.2 .a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The RCBO is in the open position	[mA]	[mA]	[mA]	--
	The leakage current shall not exceed 2 mA	<0.01	<0.01	<0.01	P
9.12.12.2 .b)	Dielectric strength test:				--
	Test voltage:				--
	a) 900 V				P
	b) 900 V				N

EN 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	c) 900 V				N
	d) 900 V				P
	e) 900 V				N
	During these test, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
9.12.12.2 .c)	Test current 2,8 I_N.....:	2,8 I_N = A			--
	Tripping within > 0,1 s up to	[s]	[s]	[s]	--
	- 60 s				N
	- 120 s				N

EN 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "G"	**G1**	**G2**	**G3**	--
9.22	**Verification of reliability**				--
9.22.1	Climatic test				--
	Based on IEC 60068-2-30 taking into account IEC 60068-3-4				P
	28 cycles				P
	Upper temperature 55°C ± 2°C				P
	Initial verification:	[ms]	[ms]	[ms]	--
	Maximum break time at IΔN	23	30	26	P
	Test switch S2 and RCBO in the closed position, test voltage established by closing the test switch S1.				P
	No value exceeds the specified limiting value				P
	Additional test for type S:				N
	Maximum non-actuating time at IΔN				N
	No tripping				N
	The test switch S1 and the RCBO being in the closed position, the test voltage is suddenly established by closing the test switch S2 for min. non-operating times acc. table 2				N
	Climatic test:				--
	No tripping during 28 cycles				P
9.22.1.5	Final verification:				
	The RCBO shall trip with a test current of 1,25 IΔN in the test chamber - break time not exceeding the value for IΔN in table 2	[ms]	[ms]	[ms]	--
		21	25	18	P
	Test switch S2 and RCBO in the closed position, test voltage established by closing the test switch S1.				

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Clause	Requirement + Test	Result - Remark	Verdict
	TEST SEQUENCE "H"	H1 H2 H3	--
IEC 61543:			P
Table 4-T1.1	Harmonics, interharmonics		P
Table 4-T1.2	Signalling voltage		P
Table 5-T2.3	Conducted unidirectional transients of the ms and μs time scale		N
	Test results of test sequence H:		--
	see test report No.		N
	Testing location / address.....		P

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Clause	Requirement + Test	Result - Remark	Verdict

	TEST SEQUENCE "I"	I1 I2 I3	--
IEC 61543:			P
Table 5-T2.1	Conducted sine-wave voltages or currents		N
Table 5-T2.5	Radiated high-frequency phenomena		P
Table 5-T2.2	Fast transients (burst)		N
	Test results of test sequence I:		--
	see test report No.		P
	Testing location / address.....		N

EN 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
	TEST SEQUENCE "J"	J1 J2 J3	--
IEC 61543:			P
Table 5-T2.6	Conducted common mode disturbances in the frequency range lower than 150 kHz		N
Table 6-T3.1	Electrostatic discharges		N
	Test results of test sequence J:		--
	see test report No.		N
	Testing location / address.....		P

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Clause	Requirement + Test	Result - Remark	Verdict

ANNEX A (NORMATIVE)

Test sequence and number of samples to be submitted for certification purposes
Table A.1 - Test sequences

Test sequence		Clause or subclause	Test (or inspection)
A	A_1	6 8.1.1 8.1.2 9.3 8.1.3 8.1.6 9.11 9.4 9.5 9.6 9.14 8.1.3 9.25	Marking General Mechanism Indelibility of marking Clearance and creepage distances (external parts only) Non-interchangeability Trip free mechanism Reliability of screws, current-carrying parts and connections Reliability of terminals for external conductors Protection against electric shock Resistance to heat Clearances and creepage distances (internal parts) Resistance to rusting
	A_2	9.15	Resistance to abnormal heat and fire
B		9.7.7.4 9.7.7.5 a) 9.7.1 9.7.2 9.7.3 9.7.4 9.7.7.2 9.7.5 9.7.6 9.8 9.22.2 9.23	Resistance of the insulation of open contacts and basic insulation against an impulse voltage in normal conditions Verification of the behaviour of components bridging the basic insulation Resistance to humidity Insulation resistance of the main circuit Dielectric strength of the main circuit Insulation resistance an dielectric strength of auxiliary circuits Verification of clearances with the impulse withstand voltage Secondary circuit of detection transformers Capability of control circuits connected to the main circuits Temperature-rise Reliability at 40°C Ageing of electronic components
C	C_1	9.10 9.12.11.2.1 (and 9.12.12)	Mechanical and electrical endurance Performance at reduced short-circuit currents (Verification of the RCBO after short-circuit tests)
	C_2	9.12.11.2.2 (and 9.12.12)	Short-circuit test for verifying the suitability of RCBOs for use in IT systems (Verification of the RCBO after short-circuit tests)
D	D_0	9.9.1	Operating characteristics under residual current conditions
	D_1	9.17 9.19 9.12.13 9.16	Behaviour in case of failure of the line voltage Behaviour in case of surge currents Performance at $I_{\Delta m}$ Test device
E	E_0	9.9.2	Overcurrent operating characteristics
	E_1	9.13 9.12.11.3 (and 9.12.12)	Resistance to mechanical shock and impact Short-circuit performance at 1500 A
F	F_0	9.12.11.4 b) (and 9.12.12)	Performance at service short-circuit capacity
	F_1	9.12.11.4 c) (and 9.12.12.2)	Performance at rated short-circuit capacity
G		9.22.1	Reliability (climatic tests)
H a) b)		IEC 61543 Table 4-T1.1 IEC 61543 Table 4-T1.2 IEC 61543 Table 5-T2.3	Harmonics, inter harmonics Signalling voltages Conducted unidirectional transients of the ms and µs time scale
I		IEC 61543 Table 5-T2.1 IEC 61543 Table 5-T2.5 IEC 61543 Table 5-T2.2	Conducted sine-wave voltages or currents Radiated electromagnetic field Fast transients (burst)
J		IEC 61543 Table 5-T2.6 IEC 61543 Table 6-T3.1	Conducted common mode disturbances in the frequency range lower than 150 kHz Electrostatic discharges

a) This test may be done on separate samples.

b) For devices containing a continuously operating oscillator, the test of CISPR 14-1 shall be carried out on the samples prior to the tests of this sequence.

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Clause	Requirement + Test	Result - Remark	Verdict

Table A.2 - Number of samples for full test procedure

Test sequence	Number of samples	Minimum number of accepted samples (a) (b)	number of samples for repeated tests (c)
A_1	1	1	--
A_2	3	2	3
B	3	2	3
C_1	3	2 (d)	3
C_2	3	2 (d)	3
D	3	2 (d)	3
E	3	2 (d)	3
F_0	3	2 (d)	3
F_1	3	2 (d)	3
G	3	2	3
H (e)	3	2	3
I (e)	3	2	3
J (e)	3	2	3

a)In total a maximum of three test sequences may be repeated.

b)It is assumed that a sample which has not passed a test has not met the requirements due to workmanship or assembly defects which are not representative of the design.

c)In the case of repeated tests, all test results must be acceptable.

d) Except for test of 9.12.10, 9.12.11.2, 9.12.11.3, 9.12.11.4, 9.12.13 as appropriate, which all samples shall pass.

e)At the manufacturer's request, the same set of samples may be subjected to more than one of these test sequences.

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Clause	Requirement + Test	Result - Remark	Verdict

Table A.3 - Number of samples for simplified test procedure

Test sequence	Number of samples according to the number of poles [a) g)]		
	2-poles [b) c)]	3-poles [d) f) j)]	4-poles [e)]
A_1	1 max. rating I_N min. rating $I_{\Delta N}$	1 max. rating I_N min. rating $I_{\Delta N}$	1 max. rating I_N min. rating $I_{\Delta N}$
A_2	3 max. rating I_N min. rating $I_{\Delta N}$	3 max. rating I_N min. rating $I_{\Delta N}$	3 max. rating I_N min. rating $I_{\Delta N}$
B	3 max. rating I_N min. rating $I_{\Delta N}$	3 max. rating I_N min. rating $I_{\Delta N}$	3 max. rating I_N min. rating $I_{\Delta N}$
C	3 max. rating I_N min. rating $I_{\Delta N}$	3 max. rating I_N min. rating $I_{\Delta N}$	3 max. rating I_N min. rating $I_{\Delta N}$
$D_0 + D_1$	3 max. rating I_N min. rating $I_{\Delta N}$	3 max. rating I_N min. rating $I_{\Delta N}$	3 max. rating I_N min. rating $I_{\Delta N}$
D_0	1 for all other ratings of $I_{\Delta N}$ with max. I_N		
$E_0 + E_1$	3 max. rating I_N min. rating $I_{\Delta N}$	3 max. rating I_N min. rating $I_{\Delta N}$	3 max. rating I_N min. rating $I_{\Delta N}$
E_0	1 [i)] for all other ratings of I_N with min. $I_{\Delta N}$		
F_0	3 max. rating I_N min. rating $I_{\Delta N}$ 3 min. rating I_N max. rating $I_{\Delta N}$	3 max. rating I_N min. rating $I_{\Delta N}$ 3 min. rating I_N max. rating $I_{\Delta N}$	3 max. rating I_N min. rating $I_{\Delta N}$ 3 min. rating I_N max. rating $I_{\Delta N}$
F_1	3 max. rating I_N min. rating $I_{\Delta N}$ 3 min. rating I_N max. rating $I_{\Delta N}$	3 max. rating I_N min. rating $I_{\Delta N}$ 3 min. rating I_N max. rating $I_{\Delta N}$	3 max. rating I_N min. rating $I_{\Delta N}$ 3 min. rating I_N max. rating $I_{\Delta N}$
G	3 max. rating I_N min. rating $I_{\Delta N}$	3 max. rating I_N min. rating $I_{\Delta N}$	3 max. rating I_N min. rating $I_{\Delta N}$
H [k)]			3 [h)] samples of the same rating I_N chosen at random min. rating $I_{\Delta N}$
I			3 [h)] samples of the same rating I_N chosen at random min. rating $I_{\Delta N}$
J			3 [h)] samples of the same rating I_N chosen at random min. rating $I_{\Delta N}$

a)If a test is to be repeated according to the minimum performance criteria of clause A.2, a new set of samples is used for the relevant test. In the repeated test all test results must be acceptable.
b)If only 3-pole or 4-pole RCBOs are submitted, this column shall also apply to a set of samples with the smallest number of poles.
c)Also applicable to 1-pole RCBOs with uninterrupted neutral and 2-pole RCBOs with 1 protected pole.
d)Also applicable to 3-pole RCBOs with two protected poles
e)Also applicable to 3-pole RCBOs with uninterrupted neutral and 4-pole RCBOs with 3 protected poles.
f)This column is omitted when 4-pole RCBOs have been tested.
g)If only one value of $I_{\Delta N}$ is submitted, min. rating $I_{\Delta N}$ and max. rating $I_{\Delta N}$ are replaced by $I_{\Delta N}$.
h)Only the highest number of current paths.
i)For this sequence only the test of 9.9.2 is required.
j)If a 3-pole RCBO with 4 current paths and a 4-pole RCBO are submitted, then only the 4-pole RCBO is tested, with exception of the test of 9.8 of test sequence B for which both types are submitted to the test.
k)If the requirement to test max. rating I_N and minimum rating $I_{\Delta N}$ does not cover all the possible range of RCBOs, the minimum $I_{\Delta N}$ shall in any case be chosen for the test.

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Clause	Requirement + Test	Result - Remark	Verdict

Table A.4 - Test sequences for RCBOs having different instantaneous tripping currents

RCBO type tested first	Test sequences for other RCBO types		
	B-type	C-type	D-type
B-type	---	$(E_0 + E_1) + F$	$(E_0 + E_1) + F$
C-type	E_0 a) + B a)	---	$(E_0 + E_1) + F$
D-type	E_0 a) + B a)	E_0 a) + B a) b)	---

a) For this sequence only the tests of 9.8 and 9.9.2.2 are required.

b) When certification is requested at the same time for B-type, C-type and D-type RCBOs having the same rated short-circuit capacity, only test sequence E0 is required if B-type and D-type samples have been tested.

Table A.5 - Test sequences for RCBOs of different classification according to 4.6

Test sequence	Number of samples according to the number of poles a)		
	2-pole b) c)	3-pole d) f)	4-pole e)
$D_0 + D_1$	1 max. rating I_N min. rating $I_{\Delta N}$	1 max. rating I_N min. rating $I_{\Delta N}$	1 max. rating I_N min. rating $I_{\Delta N}$
D_0	1 for all other ratings of $I_{\Delta N}$ with max. $I_{\Delta N}$		

a)If a test is to be repeated according to the minimum performance criteria of clause A.2, a new set of samples is used for the relevant test. In the repeated test all test results must be acceptable.

b)If only 3-pole or 4-pole RCBOs are submitted, this column shall also apply to a set of samples with the smallest number of poles.

c)Also applicable to 1-pole RCBOs with uninterrupted neutral and to 2-pole RCBOs with 1 protected pole.

d)Also applicable to 3-pole RCBOs with 2 protected poles

e)Also applicable to 3-pole RCBOs with uninterrupted neutral and to 4-pole RCBOs with 3 protected poles.

f)This column is omitted when 4-pole RCBOs have been tested.

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Clause	Requirement + Test	Result - Remark	Verdict

ANNEX B	**DETERMINATION OF CLEARANCES AND CREEPAGE DISTANCES**	--
B.1	General	--
	In determining clearances and creepage distances, it is recommended that the following points should be considered.	P
B.2	Orientation and location of a creepage distance	--
	If necessary, the manufacturer shall indicate the intended orientation of the equipment or component in order that creepage distances be not adversely affected by the accumulation of pollution for which they were not designed.	P
B.3	Creepage distances where more than one material is used	--
	A creepage distance may be split in several portions of different materials and/or have different pollution degrees if one of the creepage distances is dimensioned to withstand the total voltage or if the total distance is dimensioned according to the material having the lowest CTI.	P
B.4	Creepage distances split by floating conductive part	--
	A creepage distance may be split into several parts, made with insulation material having the same CTI, including or separated by floating conductors as long as the sum of the distances across each individual part is equal or greater than the creepage distance required if the floating part did not exist. The minimum distance X for each individual part of the creepage distance is given in IEC 60664-1:2007, 6.2 (see also Example 11 in Figure B.1).	P
B.5	Measurement of creepage distances and clearances	--
	In determining creepage distances according to IEC 60664-1, the dimension *X*, specified in the following examples, has a minimum value of 1,0 mm for pollution degree 2.	P
	If the associated clearance is less than 3 mm, the minimum dimension *X* may be reduced to one third of this clearance.	P
	The methods of measuring creepage distances and clearances are indicated in Figure B.1. These cases do not differentiate between gaps and grooves or between types of insulation.	P
	The following assumptions are made:	P
	- any recess is assumed to be bridged with an insulating link having a length equal to the specified width *X* and being placed in the most unfavourable position (see Example 3);	P
	- where the distance across a groove is equal to or larger than the specified width *X*, the creepage distance is measured along the contours of the groove (see Example 2);	P
	- creepage distances and clearances measured between parts which can assume different positions in relation to each other, are measured when these parts are in their most unfavourable position.	N

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Clause	Requirement + Test	Result - Remark	Verdict

ANNEX C	**ARRANGEMENT FOR THE DETECTION OF THE EMISSION OF IONIZED GASES DURING SHORT-CIRCUIT TESTS**	--
	The device under test is mounted as shown in figure C.1, which may require adapting to the specific design of the device, and in accordance with the manufacturer's instructions.	N
	When required (i.e. during "O" operations), a clear polyethylene sheet (0,05 ± 0,01) mm thick, of a size at least 50 mm larger, in each direction, than the overall dimensions of the front face of the device but not less than 200 mm × 200 mm, is fixed and reasonably stretched in a frame, placed at a distance of 10 mm from	N
	– either the maximum projection of the operating means of a device without recess for the operating means;	P
	– or the rim of a recess for the operating means of a device with recess for the operating means.	P
	The sheet should have the following physical properties: Density at 23 °C: 0,92 ± 0,05 g/cm³ Melting-point: 110 °C – 120 °C.	N
	When required, a barrier of insulating material, at least 2 mm thick, is placed, as shown in figure C.1, between the arc vent and the polyethylene sheet to prevent damage of the sheet due to hot particles emitted from the arc vent.	P
	When required, a grid (or grids) according to figure C.2 is (are) placed at a distance of "a" mm from each arc vent side of the device.	P
	The grid circuit (see figure C.3) shall be connected to the points B and C (see figures 7 or 8, as applicable).	N
	The parameters for the grid circuit are as follows:	P
	Resistor R': 1,5 Ω	N
	Copper wire F': length 50 mm, and diameter as required in 9.12.9.1.	P

ANNEX D	**ROUTINE TESTS**				--
D.1	General				--
	The tests specified in this standard are intended to reveal, as far as safety is concerned, unacceptable variations in material or manufacture.				P
	In general, further tests have to be made to ensure that every RCBO conforms with the samples that withstood the tests of this standard, according to the experience gained by the manufacturer.				N
D.2	Tripping test				--
	A residual current is passed through each pole of the RCBO in turn. The RCBO shall not trip at a current less than or equal to 0,5 $I_{\Delta N}$, but it shall trip at $I_{\Delta N}$ within a specified time (see Table 2).	[ms]	[ms]	[ms]	P

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Clause	Requirement + Test	Result - Remark	Verdict
			N
	The test current shall be applied at least five times to each RCBO and shall be applied at least twice to each pole.		N
D.3	Electric strength test		--
	A voltage of substantially sine-wave form of 1 500 V having a frequency of 50 Hz/60 Hz is applied for 1 s as follows:		P
	a) with the RCBO in the open position, between the terminals which are electrically connected together, when the RCBO is in the closed position		N
	b) for RCBOs not incorporating electronic components, with the RCBO in the closed position, between each pole in turn and the others connected together		P
	c) for RCBOs incorporating electronic components, with the RCBO in the open position, either between all incoming terminals of poles in turn or between all outgoing terminals of poles in turn, depending on the position of the electronic components.		P
	No flashover or breakdown shall occur		P
D.4	Performance of the test device		--
	With the RCBO in the closed position, and connected to a supply at the appropriate voltage, the test device, when operated, shall open the RCBO.		P
	Where the test device is intended to operate at more than one value of rated voltage, the test shall be made at the lowest value of rated voltage.		P

ANNEX E	**SPECIAL REQUIREMENTS FOR AUXILIARY CIRCUITS FOR SAFETY EXTRA-LOW VOLTAGE**		--
8.1.3	Clearances and creepage distances		--
	Live parts separated from circuits of higher voltage in accordance with IEC 60364-4-41 subclause 414.4.3		P
9.7.4	Insulation resistance and dielectric strength of auxiliary circuits		--
	Under consideration		--

ANNEX F	**COORDINATION BETWEEN RCBOS AND SEPARATE FUSES ASSOCIATED IN THE SAME CIRCUIT**	--

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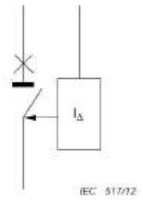
Clause	Requirement + Test	Result - Remark	Verdict
	The information given in Annex D of IEC 60898-1:2002 to ensure coordination between circuit-breakers and separate fuses associated in the same circuit may also be applicable to ensure coordination between RCBOs and separate fuses associated in the same circuit.		P

ANNEX G	**Additional requirements and tests for RCBOs consisting of a circuit-breaker and a residual current unit designed for assembly on site**		
G.4	**Marking and other product information**		--
G.4.1	**Manufacturers name or trademark**		--
	Circuit-breaker and r.c.-unit bear the same manufacturers name or trade mark		P
G.4.2	**Marking**		--
G.4.2.1	Marking of the circuit-breaker:		--
	Circuit-breakers comply with IEC 60898		P
G.4.2.2	Marking of the r.c.-unit:		--
	R.c.-unit marked with items a), b), c), e), f), g), k), m), n), q) and if necessary l) according to clause 6		N
	Addition:		--
	- max. rated current of circuit-breaker for assembling		P
	- Symbol		P
G.4.2.3	Marking of assembled circuit-breaker and r.c.-unit:		--
	Not visible after assembly on r.c unit:		N
	- c)		N
	- max. rated current of circuit-breaker for assembling		P
	visible after assembly:		P
	- l) if applicable		N
G.4.3	**Instructions for assembly and operation**		--
	Adequate instructions with the r.c. -unit provided		P
	Instructions shall cover at least:		P

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Clause	Requirement + Test	Result - Remark	Verdict
	- reference to type(s) and catalogue-no, covering current and voltage ratings, number of poles, of circuit breakers for assembling		N
	- derating factors, if any		P
	- checking of operation		P
	- verification of tripping operation by use of test button		P
G.5	**CONSTRUCTIONAL REQUIREMENTS**		--
G.5.1	**General**		--
	possible to assemble the RCBO on site only		P
	device may be disassembled on site in accordance with the manufacturer's instructions		P
	For devices declared not suitable for disassembling, the disassembly shall leave permanent visible damage.		N
	Compliance is checked according to G.6.4		P
G.5.2	**Degree of protection**		--
	Degree of protection of r.c.-unit not less than of circuit-breaker for assembling		N
G.5.3	**Mechanical requirements**		--
	Design is such as to prevent incorrect assembly		P
	No loose parts for coupling the tripping mechanisms		N
	Fixing means are captive		P
G.5.4	**Electrical compatibility**		--
	Not possible to assemble a circuit-breaker with a r.c.-unit		N
	- of lower rated voltage		P
	- of lower max. current		N
	Terminals of r.c.-unit able to clamp nominal cross-sections acc. to table IV of IEC 898 for rated currents of circuit-breakers to be assembled		P
	I_N (A).....:	A	N
	Cross section (mm²).....:	to mm²	P
	Electrical interconnections form part of the r.c.-unit		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Not possible to assemble a circuit-breaker with given rated short circuit capacity with a r.c.-unit such as to result in a lower short circuit performance		N
	Compliance is checked by inspection and manual test.		N
G.6	**TYPE TESTS AND VERIFICATIONS**		--
G.6.2	**Test on r.c.-units**		--
	According to table 10:		P
	- 9.3 / 9.4 / 9.5/		P
	- 9.11 if applicable		P
	- 9.14 / 9.15		P
G.6.3	**Tests on assembled circuit-breaker and r.c.-unit (rcbo)**		--
	According to table 10 except:		P
	- 9.3 / 9.5 / 9.9.2.3 / 9.14 / 9.15 do not apply		P
	- 9.4 made on interconnections		N
	- 9.12 applies except of 9.12.11.3 unless I_{cn} = 1500 A and of 9.12.11.4 b)		P
	- Conventional non-tripping current 1,13 I_n replaced everywhere by I_n		P
G.6.4	VERIFICATION OF MARKING AND CONSTRUCTIONAL REQUIREMENTS OF RCBOS		--
	Compliance with the requirements of G.4.1, G.4.2, G.4.3, G.5.1, G.5.2, G.5.3 and G.5.4 shall be checked by inspection and manual test, as applicable.		P
	For devices declared suitable to be disassembled, compliance with the requirements of G.5.1 is checked by the following test to be performed at the beginning of test sequence D0 in Table A.1.		N
	number of samples acc. D0+D1 in Table A.3.		N
	The r.c. unit and compatible circuit-breakers as declared by the manufacturer have to be assembled and disassembled five times. The r.c. unit and the compatible circuit breaker are then reassembled and used for the test of test sequence D0. After each assembly the correct operation of the combination shall be verified by using the test button. The RCBO shall trip each time.		P

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Clause	Requirement + Test	Result - Remark	Verdict
ANNEX J	**Particular requirements for RCBOs with screwless type terminals for external copper conductors**		P
J.1	**THIS ANNEX APPLIES TO RCBOS WITHIN THE SCOPE OF CLAUSE 1, EQUIPPED WITH SCREWLESS TERMINALS, FOR CURRENT NOT EXCEEDING 20 A PRIMARILY SUITABLE FOR CONNECTING UNPREPARED (SEE J.3.6) COPPER CONDUCTORS OF CROSS-SECTION UP TO 4 MM^2.**		--
J.6	**Marking and other product information**		--
	in addition to clause 6:		P
	universal terminals:		N
	no markings		P
	non-universal terminals:		P
	terminals for rigid-solid conductors marked by “sol”		N
	terminals for rigid (solid and stranded) conductors marked by “r”		N
	terminals for flexible conductors marked by “f”		P
	Marking on the RCBO or		N
	if the space available is not sufficient on the smallest package unit or in technical information		N
	Marking indicating the length of insulation to be removed before insertion of the conductor into the terminal shown on the RCBO		P
	Manufacturer shall provide information in his literature, on the maximum number of conductors which may be clamped.		N
J.8	**Standard conditions for operating in service and for installation**		--
	clause 8 applies with the following modifications: in 8.1.5, only 8.1.5.1, 8.1.5.2, 8.1.5.3, 8.1.5.6 and 8.1.5.7 apply		N
	Compliance is checked by inspection and by the tests of J.9.1 and J.9.2 of this annex, instead of 9.4 and 9.5.		P
J.8.1	Connection or disconnection of conductors		--
	The connection or disconnection of conductors shall be made:		P
	- by the use of a general purpose tool or by a convenient device integral with the terminal to open it and to assist the insertion or the withdrawal of the conductors (e.g. for universal terminals)		P

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Clause	Requirement + Test	Result - Remark	Verdict
	- or, for rigid conductors by simple insertion. For the disconnection of the conductors an operation other than a pull on the conductor shall be necessary (e.g. for push-wire terminals).		P
	Universal terminals shall accept rigid (solid or stranded) and flexible unprepared conductors.		P
	Non-universal terminals shall accept the types of conductors declared by the manufacturer.		P
	Compliance is checked by inspection and by the tests of J.9.1 and J.9.2.		P
J.8.2	Dimensions of connectable conductors		--
	The dimensions of connectable conductors are given in Table J.1.		P
	The ability to connect these conductors shall be checked by inspection and by the tests of J.9.1 and J.9.2.		P
J.8.3	Connectable cross-sectional areas		--
	nominal cross-sections to be clamped acc. table J.2		N
	compliance checked by inspection and tests of J.9.1 and J.9.2.		N
J.8.5	Design and construction of terminals		P
	terminals so designed and constructed that:		--
	- each conductor clamped individually		P
	- during operation of connection or disconnection the conductors can be connected or disconnected either at the same time or separately		N
	- inadequate insertion of the conductor is avoided		N
	It shall be possible to clamp securely any number of conductors up to the maximum provided for		P
	compliance checked by inspection and tests of J.9.1 and J.9.2.		N
J.8.6	Resistance to ageing		--
	compliance checked by the test of J.9.3.		N
J.9	**Tests**		--
	Clause 9 applies, by replacing 9.4 and 9.5 by the following tests		N
J.9.1	Test of reliability of screwless terminals		--
J.9.1.1	Reliability of screwless system		N

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Clause	Requirement + Test	Result - Remark	Verdict
	three terminals of poles of new samples, with copper conductors of the rated cross sectional area in accordance with Table J.2, types of conductors in accordance with J.8.1.		N
	The connection and subsequent disconnection shall be made five times with:		N
	Min. cross-section (mm²).....:	mm²	N
	Max. cross-section (mm²).....:	mm²	N
	new conductors used each time, except for the fifth time, when the conductor used for the fourth insertion is clamped at the same place. Before insertion into the terminal, wires of stranded rigid conductors re-shaped and wires of flexible conductors twisted to consolidate the ends.		N
	After each insertion, the conductor being inserted rotated 90 ° along its axis at the level of the clamped section and subsequently disconnected.		N
	After tests, the terminal not damaged in such a way as to impair its further use.		N
J.9.1.2	Test of reliability of connection		--
	three terminals of poles of new samples, with copper conductors of the rated cross sectional area in accordance with Table J.2, types of conductors in accordance with J.8.1.		N
	Before insertion into the terminal, wires of stranded rigid conductors and flexible conductors reshaped and wires of flexible conductors twisted to consolidate the ends.		N
	possible to fit the conductor into the terminal without undue force in the case of universal terminals and with the force necessary by hand in the case of push-wire terminals.		N
	conductor pushed as far as possible into the terminal or inserted so that adequate connection is obvious.		N
	Min. cross-section (mm²).....:	mm²	N
	Max. cross-section (mm²).....:	mm²	N
	After the test, no wire of the conductor shall have escaped outside the terminal.		N
J.9.2	Tests of reliability of terminals for external conductors: mechanical strength		--

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Clause	Requirement + Test	Result - Remark			Verdict
	three terminals of poles of new samples fitted with new conductors of the type and of the minimum and maximum cross-sectional areas acc. Table J.2.				N
	Min. cross-section (mm²).....:	mm²			N
	Max. cross-section (mm²).....:	mm²			N
	wires of stranded rigid conductors and flexible conductors reshaped and wires of flexible conductors twisted to consolidate the ends.				N
	Pull for 1 min, min. cross-section (N).....	N			N
	Pull for 1 min, max. cross-section (N).....	N			N
	During the test no noticeable move of conductor				N
J.9.3	Cycling test				--
	Universal, rigid conductors - 3 samples Universal, flexible conductors - 3 samples				N
	Non-universal, solid conductors - 3 samples				N
	Non-universal, rigid (solid) stranded conductors - 3 samples Non-universal, rigid (stranded) stranded conductors - 3 samples				N
	Non-universal, flexible conductors - 3 samples				N
	Cross-section (mm²).....	mm²			N
	Test current I_N (A).....:	A			N
	samples subjected to 192 temperature cycles				N
	Voltage drop after 192 cycles:				--
	voltage drop, measured at each terminal, at the end of the 192nd cycle, exceeded not the smaller of the two following values:				N
	– 22,5 mV				N
	– 1,5 times the value measured after the 24th cycle				N
		sample 1	sample 2	sample 3	--
		[mV]	[mV]	[mV]	--
	- rigid solid conductors.....:				N
	- rigid stranded conductors..... :				N
	- flexible conductors.....:				N
	Voltage drop after 24th cycle:				--

EN 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
		sample 1	sample 2	sample 3	--
		[mV]	[mV]	[mV]	--
	- rigid solid conductors.....:				N
	- rigid stranded conductors..... :				N
	- flexible conductors.....:				N
	after this test: no changes evidently impairing further use, such as cracks, deformations or the like.				N

ANNEX K	**Particular requirements for RCBOs with flat quick-connect terminations**		P
K.1	**This annex applies to RCBOs within the scope of clause 1, equipped with flat quick-connect terminations consisting of a male tab (see k.3.2) with nominal width 6.3 mm and thickness 0.8 mm, to be used with a mating female connector for connecting electrical copper conductors according to the manufacturer's instructions, for rated currents up to and including 16 a.**		--
K.6	**Marking and other product information**		--
	in addition to clause 6, addition after the lettered item k):		--
	Information regarding the female connector acc. to IEC 61210 and type of conductor to be used shall be given in the manufacturers' instructions:		P
	l) manufacturer´s name or trade mark		P
	m) type reference		P
	n) information on cross-sections of conductors and colour code of insulated female connectors (see Table K.1)		P
	o) the use of only silver or tin-plated copper alloys		P
K.8	**Requirements for construction and operation**		--
	Clause 8 applies, with the following exceptions:		P
	subclause 8.1.3 applies, the female connectors being fitted to the male tabs of the RCBO		P
	replace the contents of 8.1.5 by the following:		P
K.8.2	Terminals for external conductors		--
K.8.2.1	Male tabs and female connectors shall be of a metal having mechanical strength, electrical conductivity and resistance to corrosion adequate for their intended use.		P
K.8.2.2	The nominal width of the male tab is 6,3 mm and the thickness 0,8 mm, applicable to rated currents		P

EN 61009-1							
Clause	Requirement + Test			Result - Remark			Verdict
	up to and including 16 A. NOTE 1:The use for rated currents up to and including 20 A is accepted in BE, FR, IT, PT, ES and US						
	The dimensions of the male tab shall comply with those specified in Table K.3 and in figures K.2, K.3, K.4 and K.5						P
Dimensions of tabs according Table K.3				Measured in mm			--
		Minimum [mm]	Maximum [mm]				--
A	Dimple	0,7	1,0				P
	Hole	0,5	1,0				P
B	Dimple	7,8 min					P
	Hole	7,8 min					P
C	Dimple	0,77	0,84				P
	Hole	0,77	0,84				P
D	Dimple	6,20	6,40				P
	Hole	6,20	6,40				P
E	Dimple	3,6	4,1				P
	Hole	4,3	4,7				P
F	Dimple	1,6	2,0				P
	Hole	1,6	2,0				P
J	Dimple	8°	12°				P
	Hole	8°	12°				P
M	Dimple	2,2	2,5				P
	Hole	---	---				--
N	Dimple	1,8	2,0				P
	Hole	---	---				--
P	Dimple	0,7	1,8				P
	Hole	0,7	1,8				P
Q	Dimple	8,9 min	---				--
	Hole	8,9 min	---				--
Dimensions of the female connector which may be fitted-on are given in Figure K.6 and in Table K.4.							P
				--	request acc. table K.3	measured value	--
				B_3 max	7,8mm		P

EN 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
		L_2 max 3,5mm	P
K.9	**Tests**		--
	clause 9 applies with the following modifications:		P
	replace the contents of 9.5 by the following text:		P
K.9.1	Mechanical overload-force		--
	Test done on 10 terminals of RCBOs, mounted as in normal use when wiring takes place.		P
	Axial push force, and successively the axial pull force gradually applied to the male tab integrated in the RCBO		P
	Push 96N		P
	Pull 88N		P
	No damage occurred to the tab or to the RCBO in which the tab is integrated.		P
	addition to 9.8.3:		P
	Fine -wire thermocouples shall be placed in such a way as not to influence the contact or the connection area. An example of placement is shown in fig K.1		P

ANNEX L	**Specific requirements for RCBOs with screw-type terminals for external untreated aluminium conductors and with aluminium screw-type terminals for use with copper or with aluminium conductors**		
L.6	Marking and other product information		--
	In addition to clause 6 the following apply:		P
	Terminal marking according table L.1, on the RCBO, near the terminals		P
	Conductor types accepted:		P
	Copper only	☐ None	P
	Aluminium only	☐ “Al”	P
	Aluminium and copper	☐ “Al/Cu”	P
	Other information concerning the number of conductors, screw torque (if different from table 10) and cross-section shall be indicated on the RCBO	Nm mm²	P
L.7	**Standard conditions for operation in service**		--
	Clause 7 applies		P
L.8	**Constructional requirements**		--
	Clause 8 applies with the following exceptions:		P

EN 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
8.1.5.2	add the following text at the end of 8.1.5.2:		--
	For connection of aluminium conductors, RCBOs shall be provided with screw-type terminals allowing the connection of conductors having nominal cross-sections as shown in table L.2		P
	Terminals for the connection of aluminium conductors and terminals of aluminium for the connection of copper or aluminium conductors shall have mechanical strength adequate to withstand the tests of 9.4, with the test conductors tightened with the torque indicated in table 14, or with the torque specified by the manufacturer, which shall never be lower than that specified in table 14.		P
	Compliance is checked by inspection, by measurement and by fitting in turn one conductor of the smallest and one of the largest cross-section areas as specified		P
8.1.5.4	replace the text of 8.1.5.4 by the following:		--
	Terminals shall allow the conductors to be connected without special preparation		P
	Compliance is checked by inspection and by the tests of L.9		P
L.9	**Tests**		--
	Clause 9 applies with the following modifications/additions:		P
	For the tests which are influenced by the material of the terminal and the type of conductor that can be connected, the test conditions of table L.3 are applied		P
	Additionally the test of L.9.2 is carried out on terminals separated from the RCBO		P
L.9.2	Current cycling test		--
	This test is carried out on separate terminals		P
L.9.2.3	Test arrangement		--
	The general arrangement of the samples shall be as shown in figure L.1		P
	90 % of torque stated by the manufacturer or selected in table 10 used for the specimens	torque: Nm	P
	The test is carried out with conductors according to table L.5. The length of the test conductor from the point of entry to the screw-type terminal specimens to the equalizer shall be as in table L.6	cross-section: mm^2 minimum conductor length: mm	P
	Cross section of equalizer not greater than that	max. cross-section: mm^2	N

EN 61009-1				
Clause	Requirement + Test	Result - Remark		Verdict
	given in table L.7			
L.9.2.5	Test method and acceptance criteria			--
	Test loop subjected to 500 cycles of 1h current-on and 1h current-off, starting at an a.c. current value of 1,12 times the test current value determined in table L.8	test current: A		N
	Near the end of each current-on period of the first 24 cycles, the current shall subsequently be adjusted to raise the temperature of the reference conductor to 75°C			P
	At the end of the 25th cycle the test current shall be adjusted the last time and the stable temperature shall be recorded as the first measurement. No further adjustment of test current for the remainder of the test			N
	Temperatures recorded for at least one cycle of each working day, and after approximately 25, 50, 75, 100, 125, 175, 225, 275, 350, 425 and 500 cycles			P
	For each screw-type terminal:			P
	- the temperature rise shall not exceed 110 K			P
	- the stability factor Sf shall not exceed ± 10 °C			P
	ambient air temperature: °C	25.0		P
		max. temperature rise [K]	max. stability factor Sf [°C]	--
	Terminal 1	43.3	85	P
	Internal wire	42.3	105	P
	PCB	77.9	130	P
	Enclosure outside	35.6	65	P
	Ambient	25.0	--	--

EN 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE: Critical components information				P
Object / part No.	**Manufacturer/ trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity[1)]**
Enclosure	Suzhou Banleantone International Logistics CO,.Ltd	PA66	V-0	UL 94	UL
Enameled copper wire	JIANGSU DARTONG M&E CO.,LTD	Q (ZY/XY) BP-2/200	Class E, 120℃	UL1446	UL E237377
Terminal block material	Foshan Huaru Copper Industry Co., Ltd	COPPER	COPPER	--	Test with appliance
Inside plastic parts	Interchangeable	Interchangeable	V-0	UL 94	UL
Supplementary information: 1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

Product Photos

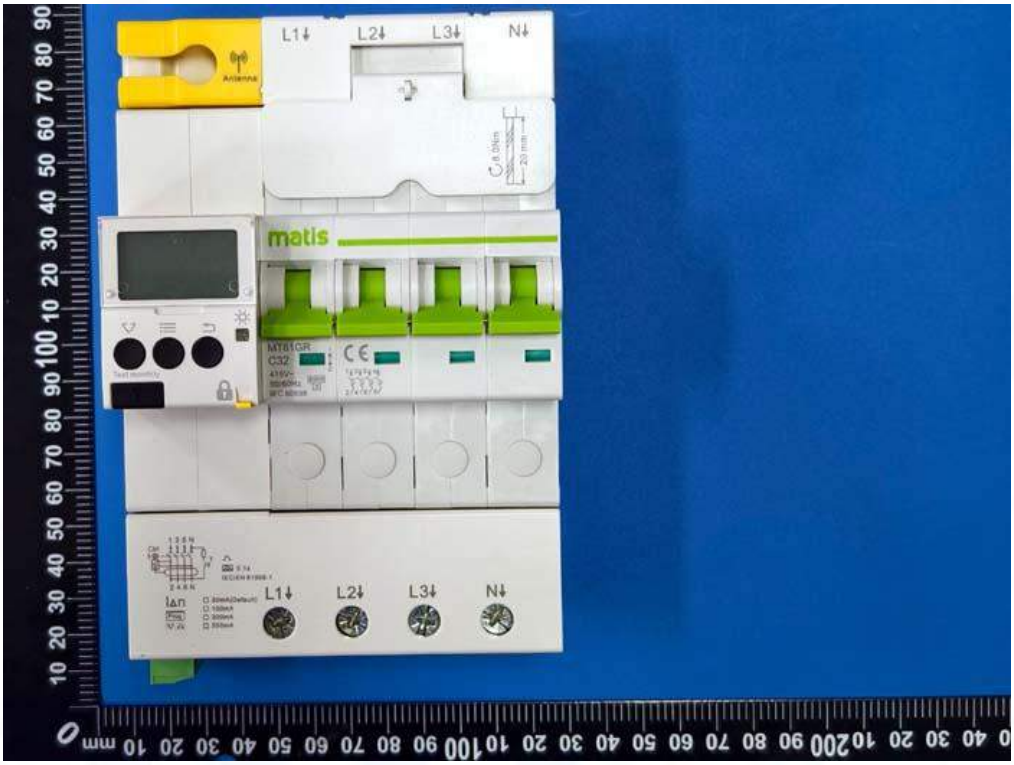

Fig. 1

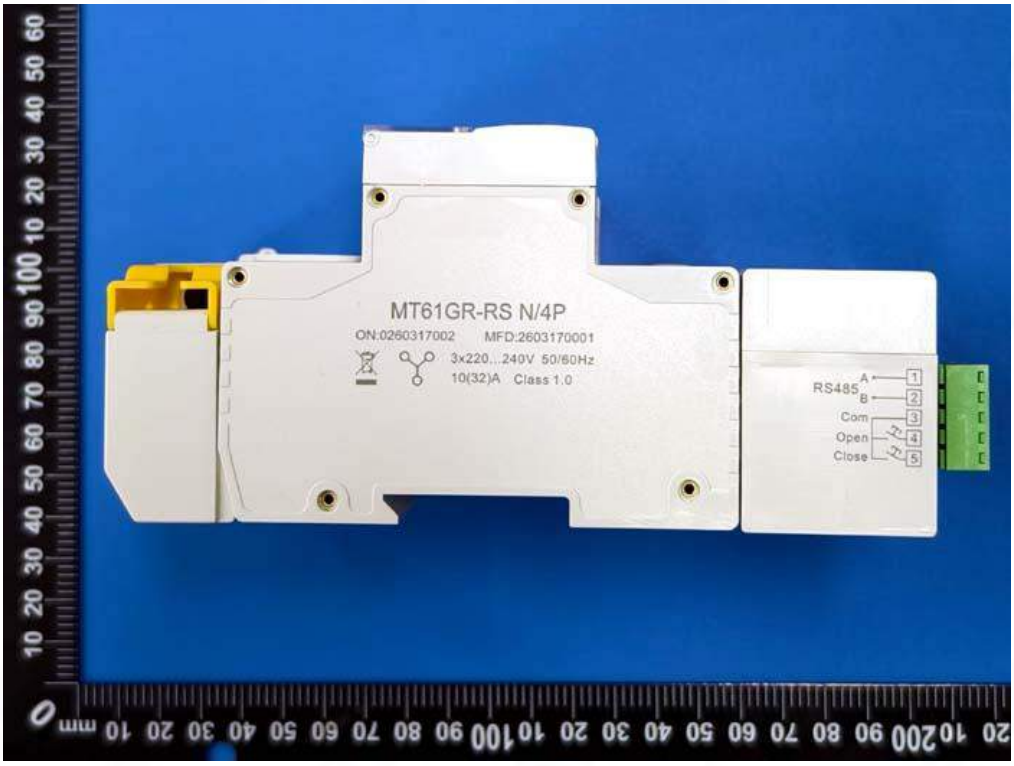

Fig. 2

Product Photos



Fig. 3

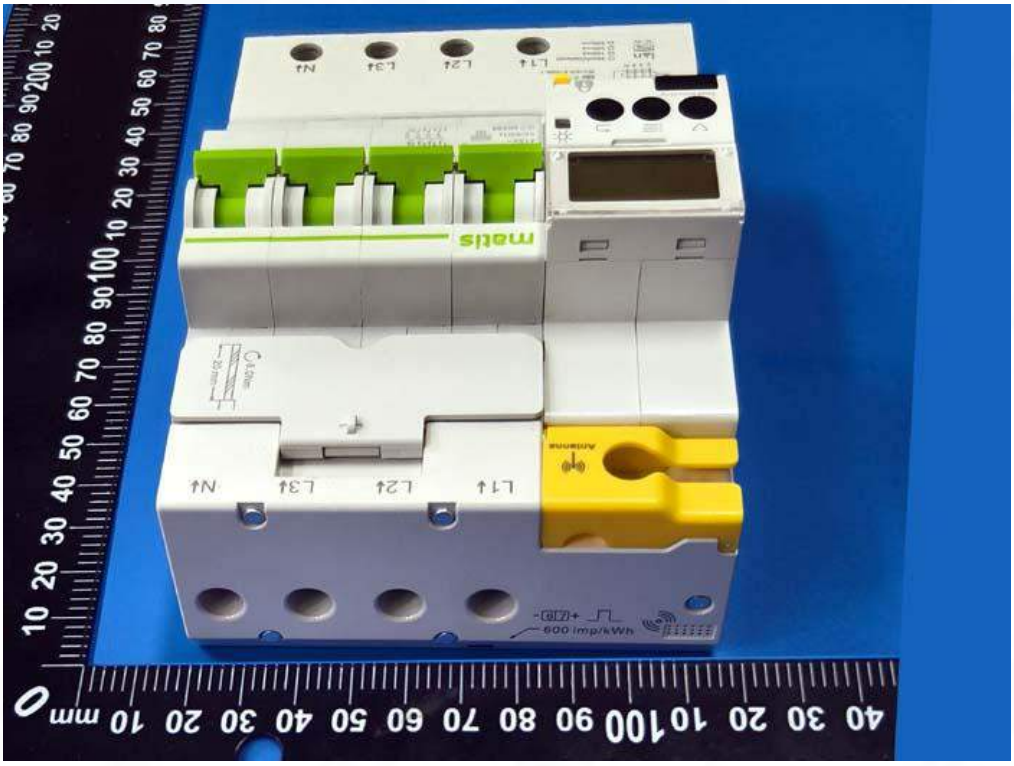

Fig. 4

---------- END OF REPORT ----------

EU-TYPE EXAMINATION (MODULE B) CERTIFICATE

Radio Equipment Directive (RED) 2014/53/EU

NMi TESTLAB

Notified Body Number 0700

Recognised by Bundesnetzagentur

BNetzA-bS-02/51-55

This is to certify that:
NMi TESTLAB did undertake the relevant type examination procedures for the radio equipment identified below which was found to be in compliance with the essential requirements of Radio Equipment Directive (RED) 2014/53/EU subject to any conditions in the annex attached hereto.

Certificate No.	26-210699 - 26-220699
Manufacturer	SHANGHAI MATIS ELECTRIC CO.,LTD.
Address	Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China 201306
Product Description	Smart Metering RCBO/MCB; with LTE
Brand Name / Model Name	Matis/Matismart / MT61GR, MT61GP

The radio equipment meets the following essential requirements

Article 3.1 a): Health and Safety	**Conform**
Article 3.1 b): Electromagnetic Compatibility	**Conform**
Article 3.2: Effective and Efficient Use of Radio Spectrum	**Conform**
Article 3.3: Additional Essential Requirements: Article 3.3 (d) Network protection Article 3.3 (e) Protection of personal data and privacy Article 3.3 (f) Protection from fraud Article 3.3 (g) Access to emergency services	**Not assessed**

Date of issue: **2026-11-02** Expiry date: **2031-11-01**

This certificate remains valid unless cancelled or revoked, provided the conditions in the attached annex are complied with. The conditions for the validity of this certificate are listed in the Annex.

Wayne Hsu, 11/2/2026

The attached Annex forms part of this certificate. This certificate consists of 3 pages.

Signed by Wayne Hsu
Notified Body

Phone: +49(0)5235-9500-0
notifiedbody@nmi-testlab.de
www.nmi-testlab.de

NMi TESTLAB GmbH
Königswinkel 10
32825 Blomberg, Germany

Annex

Technical description

Frequency Range	E-UTRA FDD Band 1/3/5/7/8/20/28 E-UTRA TDD Band 38/40/41
Transmit Power	E-UTRA FDD Band 1/3/7/8: 25.7 dBm E-UTRA FDD Band 20/28: 25 dBm E-UTRA TDD Band 38/41: 25.7 dBm E-UTRA TDD Band 40: 25 dBm
Hardware Version	1.0
Software Version	1.0

System Components

--	--

Optional Components

--	--

Approval documentation	Technical Documentation including Matis_MT61GR External / Internal Photos, User Manual, Label, Block Diagram, Circuit Diagram, Operational Description, PCB Layout, Parts Placement, Parts List
EU Declaration of Conformity	Provided
Explanation of compliance Article 10(2) and Article 10(10)	Description in the User Manual
Further Documents	Risk Assessment Declaration Letter of Model Difference

Applied Standards and Test Reports

Specification	Laboratory	Test Report Number / Version
ETSI EN 301 908-1 V15.2.1 ETSI EN 301 908-13 V13.3.1	Shenzhen LCS Compliance Testing Laboratory Ltd.	LCSA08176105EB

Limitations / Restrictions

- This device also contains frequency bands that are not operational in EU member states. Only the frequency bands used in European Union have been assessed for this EU-TYPE EXAMINATION (MODULE B) CERTIFICATE.
- Operating Temperature range is 0 - +45 degree Celsius.

Notes

1. This certificate will not be valid if the manufacturer makes any changes or modifications to the approved equipment, which have not been notified to, and agreed with NMi TESTLAB.

2. Should the specified regulations or standards be amended during the validity of this certificate, the product(s) is/are to be re-approved prior to it/them being placed on the market.

3. The manufacturer shall take all measures necessary so that the manufacturing process and its monitoring ensure conformity of the manufactured radio equipment with the approved type described in the EU-type examination certificate and with the requirements of Directive 2014/53/EU that apply to it.

4. CE The manufacturer shall affix the CE marking to each item of radio equipment that is in conformity with the type described in the EU-type examination certificate and satisfies the applicable requirements of the Directive.

5. The manufacturer shall draw up a written EU declaration of conformity for each radio equipment type and keep it at the disposal of the national authorities for 10 years after the radio equipment has been placed on the market. The EU declaration of conformity shall identify the radio equipment type for which it has been drawn up. A copy of the EU declaration of conformity shall be made available to the relevant authorities upon request.

Phone: +49(0)5235-9500-0
notifiedbody@nmi-testlab.de
www.nmi-testlab.de

NMi TESTLAB GmbH
Königswinkel 10
32825 Blomberg, Germany

Kenya Power

Page 1 of 2

METER CENTRAL LABORATORY
P.O.BOX 30099 – 00100, NAIROBI
ACCREDITATION CERTIFICATE No. CL/021

CALIBRATION CERTIFICATE

Certificate Number:

KP1/13B.1/4/5/2025/006

APPROVED BY:

☑ Patricia Ngaanga .....Date 2025-02-28

☐ John Kenyanya .....Date.....

INSTRUMENT DETAILS:

Customer Name: SONIC ISTT LTD **Tel:** 0745469280

Description: SINGLEPHASE ENERGY METER Job Card Number: N/A

Manufacturer: MATIS Location: METER CENTRAL LABORATORY

Model: MT61GP Date Received: 24.02.2025

Serial Number: 2408270025 Last Certificate No.: N/A

Rated Accuracy Class: 1 Last Calibration Date: N/A

Ratings: 220-240V; 20(80) A; 600imp/kwh

Method: as per IEC 62052-11 and IEC 62058-31

ENVIRONMENTAL CONDITIONS:

Temperature: 24.3°C Relative Humidity 42..4 %

Supply Voltage: 230V@50HZ

STATEMENT OF CONFORMITY: The basis of testing was IEC 62052-11: Electricity metering equipment (AC) – General requirements, tests and test conditions – Part 11 – Metering equipment *and* IEC 62058-31: Electri1city metering equipment (AC) – Acceptance inspection – Part 31: Particular requirements for static meters for active energy (classes 0,2 S, 0,5 S, 1 and 2)metering equipment (AC) – Acceptance inspection – Part 31: Particular requirements for static meters for active energy (classes 0,2 S, 0,5 S, 1 and 2)

TRACEABILITY: Measurement are metrologically traceable through certificate no: 2023F14-10-4608166002

Instrument Description	Serial No:	Cert No	Calibration Date	Calibration Due
KAIPU KP-S3000E	C221107	2023F14-10-4608166002	2023 – 05– 31	2025 – 05– 30

Accuracy Class 0.02

Calibrated by: BRIAN LIMO Date of Calibration: 28.02.2025 Calibration Due: N/A

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Kenya Power

Page 2 of 2

METER CENTRAL LABORATORY
P.O.BOX 30099 – 00100, NAIROBI
ACCREDITATION CERTIFICATE No. CL/021

CALIBRATION CERTIFICATE

Certificate Number:

KP1/13B.1/4/5/2025/006

Checked by: SYLVESTER WASIKE Sign.

TEST TITLE	APPLIED VALUE Ib=BASE CURRENT 20A		ERROR VALUE (%)	RELATIVE UNCERTAINITY	PASS/FAIL
0.05 Ib ; 1.0 PF	0.05Ib(1A);1PF;220V;50HZ		0.373	0.016144487	PASS
Ib ; 1PF	Ib(20A);1PF;220V;50HZ		-0.0804	0.016339319	PASS
Ib; 0.5 LAG PF	Ib(20A);0.5lagPF;220V;50HZ		-0.0515	0.016350331	PASS
IMAX ;1.0PF	IMAX(80A);1PF;220V;50HZ		-0.1066	0.016339319	PASS
REGISTER TEST 1.0PF;230V;50HZ	START READING (KWh)	STOP READING (KWh)	0.0035	N/A	PASS
	1.098	2.098			

COMMENTS:

- The Uncertainty of Measurement is calculated at a Confidence Level of 95%.
- The results relate only to the meter tested and apply to the sample as received.

End of Report

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Kenya Power

METER CENTRAL LABORATORY
P.O.BOX 30099 – 00100, NAIROBI
ACCREDITATION CERTIFICATE No. CL/021

CALIBRATION CERTIFICATE

Certificate Number:

KP1/13B.1/4/5/2025/007

APPROVED BY:

☑ Patricia Ngaanga ..... Date 2025-02-28

☐ John Kenyanya ..... Date.....

INSTRUMENT DETAILS:

Customer Name: SONIC ISTT.LTD Tel: 0745469280

Description: THREE PHASEPHASE ENERGY METER Job Card Number: N/A

Manufacturer: MATIS Location: METER CENTRAL LABORATORY

Model: MT61GP N/4P Date Received: 24.02.2025

Serial Number: 2408270001 Last Certificate No.: N/A

Rated Accuracy Class: 1 Last Calibration Date: N/A

Ratings: 220-240V; 20(80) A; 600imp/kwh

Method: as per IEC 62052-11 and IEC 62058-31

ENVIRONMENTAL CONDITIONS:

Temperature: 24.3°C Relative Humidity 42..4 %

Supply Voltage: 230V@50HZ

STATEMENT OF CONFORMITY: The basis of testing was IEC 62052-11: Electricity metering equipment (AC) – General requirements, tests and test conditions – Part 11 – Metering equipment *and* IEC 62058-31: Electri1city metering equipment (AC) – Acceptance inspection – Part 31: Particular requirements for static meters for active energy (classes 0,2 S, 0,5 S, 1 and 2)metering equipment (AC) – Acceptance inspection – Part 31: Particular requirements for static meters for active energy (classes 0,2 S, 0,5 S, 1 and 2)

TRACEABILITY: Measurement are metrologically traceable through certificate no: 2023F14-10-4608166002

Instrument Description	Serial No:	Cert No	Calibration Date	Calibration Due
KAIPU KP-S3000E	C221107	2023F14-10-4608166002	2023 – 05– 31	2025 – 05– 30

Accuracy Class 0.02

Calibrated by: BRIAN LIMO Date of Calibration: 28.02.2025 Calibration Due: N/A

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Kenya Power

METER CENTRAL LABORATORY
P.O.BOX 30099 – 00100, NAIROBI
ACCREDITATION CERTIFICATE No. CL/021

CALIBRATION CERTIFICATE

Certificate Number:

KP1/13B.1/4/5/2025/007

Checked by: SYLVESTER WASIKE Sign.

TEST TITLE	APPLIED VALUE Ib=BASE CURRENT 20A		ERROR VALUE (%)	RELATIVE UNCERTAINITY	PASS/FAIL
0.05 Ib ; 1.0 PF	0.05Ib(1A);1PF;220V;50HZ		0.153	0.0151	PASS
Ib ; 1PF	Ib(20A);1PF;220V;50HZ		-0.051	0.0156	PASS
Ib; 0.5 LAG PF	Ib(20A);0.5lagPF;220V;50HZ		0.013	0.01536	PASS
IMAX ;1.0PF	IMAX(80A);1PF;220V;50HZ		-0.0459	0.0154	PASS
REGISTER TEST 1.0PF;220V;50HZ	START READING (KWh)	STOP READING (KWh)	0.07	N/A	PASS
	37.380	38.380			

COMMENTS:

- The Uncertainty of Measurement is calculated at a Confidence Level of 95%.
- The results relate only to the meter tested and apply to the sample as received.

End of Report

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TEST REPORT
EN 61010-1
Safety requirements for electrical equipment for measurement, control, and laboratory use
Part 1: General requirements

Report Number.....:	LCSA08176109S
Date of issue.....:	2026-11-02
Total number of pages.....:	89
Applicant's name.....:	SHANGHAI MATIS ELECTRIC CO.,LTD.
Address.....:	Room318-320, No.83,West Huanghu Road, Pudong, Shanghai, China 201306
Test specification:	
Standard.....:	EN 61010-1: 2010+A1: 2019
Test procedure.....:	Type test
Non-standard test method.....:	N/A
TRF template used.....:	IECEE OD-2020-F1:2020, Ed.1.3
Test Report Form No.....:	IEC61010_1P
Test Report Form(s) Originator.....:	VDE Prüf- und Zertifizierungsinstitut GmbH
Master TRF.....:	2021-04-12

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General disclaimer:

The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Shenzhen LCS Compliance Testing Laboratory Ltd.
Add: Room 101/201, Building A, and Room 101/301, Building C, Juji industrial Park, Yabianxueziwei, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com
Scan code to check authenticity

Test item description.....:	Smart Metering RCBO/MCB
Trade Mark.....:	Matis/Matismart
Manufacturer.....:	Same as applicant
Model/Type reference.....:	MT61GR, MT61GP
Ratings.....:	Input: 230Vac, 50/60Hz, 10A

Testing procedure and testing location:

Testing Laboratory:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Testing location/ address.....:	Room 101/201, Building A, and Room 101/301, Building C, Juji industrial Park, Yabianxueziwei, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Tested by.....	Sky Yuan Project Handler
Checked by.....	Terry Zhu Reviewer
Approved by.....	Hart Qiu Technical Director

List of Attachments (including a total number of pages in each attachment):

Document No.	Documents included / attached to this report (description)	Pages No.
Attachment No.1	EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES	1
Attachment No.2	Photo documentation	9

Documents referenced by this report (available on request):

Document Name or No.	Documents description	Page No.
--	--	--

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
The submitted samples were found to comply with the requirements of: EN 61010-1: 2010+A1:2019	Shenzhen LCS Compliance Testing Laboratory Ltd. Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China

Summary of compliance with National Differences (List of countries addressed):

☒ The product fulfils the requirements of EN 61010-1: 2010+A1:2019

Shenzhen LCS Compliance Testing Laboratory Ltd.
Add: Room 101/201, Building A, and Room 101/301, Building C, Juji industrial Park, Yabianxueziwei, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com
Scan code to check authenticity

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

Matis/Matismart
Smart Metering RCBO/MCB
Model: MT61GR
Input: 230Vac, 50/60Hz, 10A



SHANGHAI MATIS ELECTRIC CO.,LTD.

Note:

1. For the final production samples, the additional markings which do not give rise to misunderstanding may be added.
2. The height of CE symbol ≥ 5.0mm, the height of WEEE symbol ≥ 7.0mm.

Shenzhen LCS Compliance Testing Laboratory Ltd.
Add: Room 101/201, Building A, and Room 101/301, Building C, Juji industrial Park, Yabianxueziwei, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com
Scan code to check authenticity

Test item particulars:

Type of item .....: Measurement

Description of equipment function.....: Fixed equipment

Connection to MAINS supply..... : Two-phase ac supply

Overvoltage category.....: II ~~/ III / IV~~

Pollution degree.....: 2

Environmental conditions.....: Normal ~~/ Extended (Specify):~~

For use in wet locations..... : ~~Yes /~~ No

Equipment mobility..... : Fixed equipment

Operating conditions..... : Continuous ~~/ Short-time / Intermittent~~

Mass of equipment (kg).....: 1.03

Marked degree of protection to IEC 60529.....: IP20

Possible test case verdicts:

- Test case does not apply to the test object.....: N/A (Not Applicable)

- Test object does meet the requirement.....: P (Pass)

- Test object does not meet the requirement.....: F (Fail)

Testing:

Date of receipt of test item..... : 2026-09-13

Date (s) of performance of tests..... : 2026-09-13 to 2026-09-15

General remarks:

The test results presented in this report relate only to the object tested.

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"(see ENCLOSURE #)" refers to additional information appended to the report.

"(see Form A.xx)" refers to a table appended to the report.

Bottom lines for measurement tables Form A. xx are optional if used as record.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided.....:

☐ **Yes**

☒ **Not applicable**

When differences exist; they shall be identified in the general product information section.

Name and address of factory (ies)..... : Same as applicant

General product information and other remarks:

1. The product is class I Fiber Laser intended to use for Measure equipment.
2. The maximum ambient temperature is 25ºC.
3. This equipment is intended to operate in an area which has an elevation of maximum 2000m.
4. All models are identical except for the model names.

Unit Mass: 1.03kg.

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
4	TESTS		P
4.4	Testing in SINGLE FAULT CONDITIONS		P
4.4.1	Fault tests	(see Form A.1)	P
4.4.2	Application of SINGLE FAULT CONDITIONS		P
4.4.2.1	SINGLE FAULT CONDITIONS not covered by 4.4.2.2 to 4.4.2.14	No such test	—
4.4.2.2	PROTECTIVE IMPEDANCE		N/A
4.4.2.3	PROTECTIVE CONDUCTOR	(see Form A.6)	P
4.4.2.4	Equipment or parts for short-term or intermittent operation	No such equipment or parts.	N/A
4.4.2.5	Motors		—
	– stopped while fully energized		P
	– prevented from starting		N/A
	– one phase interrupted (multi-phase)		N/A
4.4.2.6	Capacitors		P
4.4.2.7	MAINS transformers		N/A
4.4.2.7.2	Short circuit	(see Form A.39)	N/A
4.4.2.7.3	Overload	(see Form A.40)	N/A
4.4.2.8	Outputs		N/A
4.4.2.9	Equipment for more than one supply		N/A
4.4.2.10	Cooling	(see Form A.26A)	—
	– air holes closed		N/A
	– fans stopped		N/A
	– coolant stopped		N/A
	– loss of cooling liquid		N/A
4.4.2.11	Heating devices		N/A
	– timer overridden		N/A
	– temperature controller overridden		N/A
4.4.2.12	Insulation between circuits and parts		P
4.4.2.13	Interlocks		N/A
4.4.2.14	Voltage selectors		N/A
4.4.3	Duration of tests		—
4.4.4	Conformity after application of fault conditions	(see Form A.1; A.6, A.18)	P
5	MARKING AND DOCUMENTATION		P

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.1.1	Required equipment markings		—
	- Visible from the exterior; or		P
	- Visible after removing cover or opening door		N/A
	- Visible after removal from a rack or panel		N/A
	Not put on parts which can be removed by an operator		P
	Letter symbols (IEC 60027) used		P
	Graphic symbols (IEC 61010-1: Table 1) used		P
5.1.2	Identification		P
	Equipment is identified by:		—
	a) Manufacturer's or supplier's name or trademark	See page 2	P
	b) Model number, name or other means	See page 2	P
	Manufacturing location identified	Only one manufacturing location	N/A
5.1.3	MAINS supply		P
	Equipment is marked as follows:		—
	a) Nature of supply:		—
	1) a.c. RATED MAINS frequency or range of 2) frequencies.....:	See page 2	P
	3) d.c. with symbol 1		—
	b) RATED supply voltage(s) or range.....:	See page 2	—
	c) Max. RATED power (W or VA) or input current....:	See page 2	—
	The marked value not less than 90 % of the maximum value	(see Form A.2)	P
	If more than one voltage range:		—
	Separate values marked; or		N/A
	Values differ by less than 20 %	(see Form A.2)	N/A
	d) OPERATOR-set for different RATED supply voltages:		—
	Indicates the equipment set voltage		N/A
	Portable equipment indication is visible from the exterior		N/A
	Changing the setting change the indication		N/A
	e) Accessory MAINS socket-outlets accepting standard MAINS plugs are marked:		P
	With the voltage if it is different from the MAINS supply voltage.....:		—

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	For use only with specific equipment		N/A
	If not marked for specific equipment it is marked with:		—
	The maximum rated current or power; or		N/A
	Symbol 14 with full details in the documentation		N/A
5.1.4	Fuses		N/A
	Operator replaceable fuse marking (see also 5.4.5).....:		—
5.1.5	TERMINALS, connections and operating devices		N/A
5.1.5.1	General		P
	Where necessary for safety, indication of purpose of TERMINALS, connectors, controls and indicators marked		P
	If insufficient space, symbol 14 used		P
	Push-buttons and actuators of emergency stop devices and:	No such emergency stop devices and indicators	—
	indicators used only to indicate a warning of danger or		N/A
	the need for urgent action		N/A
	coloured red		N/A
	coded as specified in IEC 60073		N/A
	Supplementary means of coding provided, if meaning of colour relates (see IEC 60073):		—
	to safety of persons; or		N/A
	safety of the environment		N/A
5.1.5.2	TERMINALS		P
	MAINS supply TERMINAL identified		P
	Other TERMINAL marking:		—
	a) FUNCTIONAL EARTH TERMINALS (symbol 5 used)		N/A
	b) PROTECTIVE CONDUCTOR TERMINALS:		—
	Symbol 6 is placed close to or on the TERMINAL; or		P
	Part of appliance inlet		N/A
	c) TERMINALS of control circuits (symbol 7 used)	No such terminals	N/A
	d) HAZARDOUS LIVE TERMINALS supplied from the interior		P
	Standard MAINS socket outlet; or		P
	RATINGS marked; or		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Symbol 14 used		N/A
5.1.6	Switches and circuit breakers		N/A
	If disconnecting device, off position clearly marked		N/A
	If push-button used as power supply switch:		—
	Symbol 9 and 15 used for on-position		N/A
	Symbol 10 and 16 used for off-position		N/A
	Pair of symbols 9, 15 and 10, 16 close together		N/A
5.1.7	Equipment protected by DOUBLE INSULATION or REINFORCED INSULATION		P
	Protected throughout (symbol 11 used)		N/A
	Only partially protected (symbol 11 not used)		P
5.1.8	Field-wiring TERMINAL boxes	No field-wiring terminal box	N/A
	If TERMINAL or ENCLOSURE exceeds 60 °C:	(see Form A.26A)	—
	Cable temperature RATING marked.....:		—
	Marking visible before and during connection or beside TERMINAL		N/A
5.2	Warning markings		P
	Visible when ready for NORMAL USE		P
	Are near or on applicable parts		P
	Symbols and text correct dimensions and colour:		—
	a) symbols min 2,75 mm and text 1,5 mm high and contrasting in colour with background		P
	b) symbols and text moulded, stamped or engraved in material min. 2,0 mm high and		N/A
	0,5 mm depth or raised if not contrasting in colour		N/A
	If necessary marked with symbol 14		N/A
	Statement to isolate or disconnect if access by using a tool to HAZARDOUS LIVE parts is permitted		N/A
5.3	Durability of markings		P
	The required markings remain clear and legible in NORMAL USE	(see Form A.3)	P
5.4	Documentation	English manual provided	P
5.4.1	General		P
	Equipment is accompanied by documentation for safety purposes for OPERATOR or RESPONSIBLE BODY		P

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Safety documentation for service personnel authorized by the manufacturer	User manual provided	P
	Documentation necessary for safe operation is provided in printed media or		P
	in electronic media if available at any time		N/A
	Documentation includes:		—
	a) intended use		P
	b) technical specification		P
	c) name and address of manufacturer or supplier		P
	d) information specified in 5.4.2 to 5.4.6		P
	e) information to mitigate residual RISK (see also subclause 17)		N/A
	f) accessories for safe operation of the equipment specified		N/A
	g) guidance provided to check correct function of the equipment, if incorrect reading may cause a HAZARD from harmful or corrosive substances of HAZARDOUS live parts		N/A
	h) instructions for lifting and carrying	Relevant instructions are provided in the manual.	P
	Warning statements and a clear explanation of warning symbols:		N/A
	Provided in the documentation; or		N/A
	Information is marked on the equipment		N/A
5.4.2	Equipment ratings		P
	Documentation includes:		—
	a) Supply voltage or voltage range.....:	See page 2	—
	Frequency or frequency range.....:	See page 2	—
	Power or current rating.....:	See page 2	—
	b) Description of all input and output connections in accordance to 6.6.1 a)		N/A
	c) RATING of insulation of external circuits in accordance to 6.6.1 b)		N/A
	d) Statement of the range of environmental conditions (see 1.4)		—
	e) Degree of protection (IEC 60529)		P
	f) If impact rating less than 5 J:		—
	IK code in accordance to IEC 62262 marked or		N/A
	symbol 14 of table 1 marked, with		N/A

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	RATED energy level and test method stated		N/A
5.4.3	Equipment installation		P
	Documentation includes instructions for:		—
	a) assembly, location and mounting requirements		P
	b) protective earthing		P
	c) connections to supply		P
	d) PERMANENTLY CONNECTED EQUIPMENT:		—
	1) Supply wiring requirements		N/A
	2) If external switch or circuit-breaker, requirements and location recommendation		N/A
	e) ventilation requirements		N/A
	f) special services (e. g. air, cooling liquid)		N/A
	g) instructions relating to sound level		N/A
5.4.4	Equipment operation		P
	Instructions for use include:		—
	a) identification and description of operating controls		P
	b) positioning for disconnection		P
	c) instructions for interconnection		P
	d) specification of intermittent operation limits		N/A
	e) explanation of symbols used		P
	f) replacement of consumable materials		N/A
	g) cleaning and decontamination		P
	h) listing of any poisonous or injurious gases and quantities		N/A
	i) RISK reduction procedures relating to flammable liquids (see 9.5)		N/A
	j) RISK reduction procedures relating burn from surfaces permitted to exceed limits of 10.1		N/A
	Additional precautions for IEC 60950 conforming equipment in regard to moistures and liquids		N/A
	A statement about protection impairment if used in a manner not specified by the manufacturer		P
5.4.5	Equipment maintenance and Service		P
	Instructions for RESPONSIBLE BODY include:		—
	Instructions sufficient in detail permitting safe maintenance and inspection and continued safety:		—

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Instruction against the use of detachable MAINS supply cord with inadequate rating		N/A
	Specific battery type of user replaceable batteries		N/A
	Any manufacturer specified parts		P
	Rating and characteristics of fuses		N/A
	Instructions include following subjects permitting safe servicing and continued safety:		—
	a) product specific RISKS may affect service personnel		P
	b) protective measures for these RISKS		P
	c) verification of the safe state after repair		P
5.4.6	Integration into systems or effects resulting from special conditions		N/A
	Aspects described in documentation		N/A
6	PROTECTION AGAINST ELECTRIC SHOCK		P
6.1	General	(see Form A.14 and A.15)	P
6.1.1	Requirements		P
	Protection against electric shock maintained in NORMAL CONDITION and SINGLE FAULT CONDITION		P
	ACCESSIBLE parts not HAZARDOUS LIVE		P
	Voltage, current, charge or energy below the limits in NORMAL CONDITION and in SINGLE FAULT CONDITION between:		—
	ACCESSIBLE parts and earth		P
	two ACCESSIBLE parts on same piece of the equipment within a distance of 1,8 m		P
	Conformity is checked by the determination of 6.2 and 6.3 followed by the tests of 6.4 to 6.11		P
6.1.2	Exceptions		N/A
	Following HAZARDOUS LIVE parts may be ACCESSIBLE to an OPERATOR:		—
	a) parts of lamps and lamp sockets after lamp removal		N/A
	b) parts to be replaced by OPERATOR only by the use of tool and warning marking		N/A
	Those parts not HAZARDOUS LIVE 10 s after interruption of supply	(see Form A.5)	N/A
	Capacitance test if charge is received from internal capacitor	(see Form A.4 and A.5)	N/A

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
6.2	Determination of ACCESSIBLE parts	(see Form A.4)	P
6.2.1	General		P
	Unless obviously determination of ACCESSIBLE parts as specified in 6.2.2 to 6.2.4		P
6.2.2	Examination		P
	- with jointed test finger (as specified B.2)		P
	- with rigid test finger (as specified B.1) and a force of 10 N		N/A
6.2.3	Openings above parts that are HAZARDOUS LIVE	No top openings	N/A
	- test pin with length of 100 mm and 4 mm in diameter applied		N/A
6.2.4	Openings for pre-set controls	No such openings	N/A
	- test pin with length of 100 mm and 3 mm in diameter applied		N/A
6.3	Limit values for ACCESSIBLE parts		P
6.3.1	Levels in NORMAL CONDITION	(see Form A.5)	P
	a) Voltage limits less than 33 V r.m.s. and 46,7 V peak or 70 V d.c.		P
	for WET LOCATIONS voltage limits less than 16 V r.m.s. and 22,6 V peak or 35 V d.c.		N/A
	Voltages are not HAZARDOUS LIVE the levels of:		—
	b) Current less than 0,5 mA r.m.s. for sinusoidal, 0,7 mA peak non sinusoidal or mixed frequencies or 2 mA d.c. when measured with measuring circuit A.1 or A.2 if less than 100 Hz	A.1	P
	for WET LOCATIONS measuring circuit A.4 used		N/A
	70 mA r.m.s. when measured with circuit A.3 for higher frequencies		N/A
	or		—
	c) Levels of capacitive charge or energy less:		—
	1) 45 µC for voltages up to 15 kV peak or d.c. or line A of Figure 3		N/A
	2) 350 mJ stored energy for voltages above 15 kV peak or d.c.		N/A
6.3.2	Levels in SINGLE FAULT CONDITION	(see Form A.6)	P
	a) Voltage limits less than 55 V r.m.s. and b) 78 V peak or 140 V d.c.		P
	for WET LOCATIONS voltage limits less than 33 V r.m.s. and 46,7 V peak or 70 V d.c.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Voltages are not HAZARDOUS LIVE the levels of:		—
	c) Current less than 3,5 mA r.m.s. for sinusoidal, d) 5 mA peak non sinusoidal or mixed frequencies or 15 mA d.c. when measured with measuring circuit A.1 or A.2 if less than 100 Hz		N/A
	for WET LOCATIONS measuring circuit A.4 used		N/A
	500 mA r.m.s. when measured with circuit A.3 for higher frequencies		N/A
	or		—
	e) Levels of capacitive charge or energy less line B of Figure 3		N/A
6.4	Primary means of protection		P
6.4.1	ACCESSIBLE parts prevented from being HAZARDOUS LIVE by one or more of following means:		P
	a) ENCLOSURES or PROTECTIVE BARRIERS (see 6.4.2)		P
	b) BASIC INSULATION (see 6.4.3)		P
	c) Impedance (see 6.4.4)		N/A
6.4.2	ENCLOSURES or PROTECTIVE BARRIERS	(see Form A.15 and A.16)	P
	- meet rigidity requirements of 8.1		P
	- meet requirements for BASIC INSULATION, if protection is provided by insulation		P
	- meet requirements of 6.7 for CREEPAGE and CLEARANCES between ACCESSIBLE parts and HAZARDOUS live parts, if protection is provided by limited access		P
6.4.3	BASIC INSULATION	(see Form A.15 and A.16)	P
	- meet CLEARANCE, CREEPAGE DISTANCE and solid insulation requirements of 6.7		P
6.4.4	Impedance	(see Form A.12 and A.15)	N/A
	Impedance used as primary means of protection meets all of following requirements:		—
	a) limits current or voltage to level of 6.3.2	(see Form A.6)	N/A
	b) RATED for maximum WORKING VOLTAGE and the amount of power it will dissipate		N/A
	c) CLEARANCE, CREEPAGE DISTANCE between terminations of the impedance meet requirements of BASIC INSULATION of 6.7	(see Form A.15)	N/A
6.5	Additional means of protection in case of SINGLE FAULT CONDITION		P

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Clause	Requirement + Test	Result - Remark	Verdict
6.5.1	ACCESSIBLE parts are prevented from becoming HAZARDOUS live by the primary means of protection and supplemented by one of:		P
	a) PROTECTIVE BONDING (see 6.5.2)		P
	b) SUPPLEMENTARY INSULATION (see 6.5.3)		N/A
	c) automatic disconnection of the supply (see 6.5.5)		N/A
	d) current- or voltage-limiting device (see 6.5.6)		N/A
	Alternatively, one of the single means of protection is used:		—
	e) REINFORCED INSULATION (see 6.5.3)		P
	f) PROTECTIVE IMPEDANCE (see 6.5.4)		N/A
6.5.2	PROTECTIVE BONDING	(see Forms A.7, A.8, A.9, A.10 or A.11)	P
6.5.2.1	ACCESSIBLE conductive parts, may become HAZARDOUS LIVE in SINGLE FAULT CONDITION:		P
	Bonded to the PROTECTIVE CONDUCTOR TERMINAL; or		P
	Separated by conductive screen or barrier bonded to PROTECTIVE CONDUCTOR TERMINAL		N/A
6.5.2.2	Integrity of PROTECTIVE BONDING		—
	A) PROTECTIVE BONDING consists of directly connected structural parts or discrete conductors or both; and withstands thermal and dynamic stresses		P
	b) Soldered connections:		—
	Independently secured against loosening		P
	Not used for other purposes		P
	c) Screw connections are secured		N/A
	D) PROTECTIVE BONDING not interrupted; or		P
	exempted as removable part carries MAINS SUPPLY input connection		N/A
	e) Any movable PROTECTIVE BONDING connection specifically designed, and meets 6.5.2.4		N/A
	f) No external metal braid of cables used g) (not regarded as PROTECTIVE BONDING)		N/A
	H) IF MAINS SUPPLY passes through:		—
	Means provided for passing protective conductor;		P
	Impedance meets 6.5.2.4		P

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	I) Protective conductors bare or insulated, J) if insulated, green/yellow		N/A
	Exceptions:		—
	1) earthing braids;		N/A
	2) internal protective conductors etc.;		N/A
	Green/yellow not used for other purposes		N/A
	TERMINAL suitable for connection of a PROTECTIVE CONDUCTOR, and meets 6.5.2.3		P
6.5.2.3	PROTECTIVE CONDUCTOR TERMINAL		—
	a) Contact surfaces are metal		P
	b) Appliance inlet used		N/A
	c) For rewirable cords and PERMANENTLY CONNECTED EQUIPMENT, PROTECTIVE CONDUCTOR TERMINAL is close to MAINS supply TERMINALS		N/A
	d) If no MAINS supply is required, any PROTECTIVE CONDUCTOR TERMINAL:		—
	Is near terminals of circuit for which protective earthing is necessary		N/A
	External if other terminals external		N/A
	e) Equivalent current-carrying capacity to MAINS supply TERMINALS	(see Form A.7)	P
	f) If plug-in, makes first and breaks last		P
	g) If also used for other bonding purposes, PROTECTIVE CONDUCTOR:		—
	Applied first;		P
	Secured independently;		P
	Unlikely to be removed by servicing		P
	h) PROTECTIVE CONDUCTOR of measuring circuit:		—
	1) Current RATING equivalent to measuring circuit TERMINAL;		P
	2) PROTECTIVE BONDING: not interrupted by any 3) switch or interrupting device		P
	i) FUNCTIONAL EARTH TERMINALS allow independent connection	No functional earth terminals	N/A
	j) If a binding screw used for PROTECTIVE CONDUCTOR TERMINAL:	No binding screw used for protective conductor terminal	—
	Suitable size for bond wire		N/A
	Not smaller than M 4		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	At least 3 turns of screw engaged		N/A
	Passes tightening torque test	(see Form A.8)	N/A
	k) Contact pressure not capable being reduced by deformation of materials		P
6.5.2.4	Impedance of PROTECTIVE BONDING of plug-connected equipment	(see Form A.9)	N/A
	Impedance between PROTECTIVE CONDUCTOR TERMINAL and each ACCESSIBLE part where PROTECTIVE BONDING is specified, is:		—
	less than 0,1 Ohm; or		N/A
	less than 0,2 Ohm if equipment is provided with non-detachable cord		N/A
6.5.2.5	Bonding impedance of PERMANENTLY CONNECTED EQUIPMENT	(see Form A.10)	N/A
6.5.2.6	Transformer PROTECTIVE BONDING screen	(see Form A.11)	N/A
	Transformer provided with screen for PROTECTIVE BONDING:		—
	screen bonding consists of directly connected structural parts or discrete conductors or both; and withstands thermal and dynamic stresses (see 6.5.2.2 a)		N/A
	screen bonding with soldered connection (see 6.5.2.2 b) is:		—
	- Independently secured against loosening		N/A
	- Not used for other purposes		N/A
6.5.3	SUPPLEMENTARY and REINFORCED INSULATION		P
	Meet CLEARANCE, CREEPAGE DISTANCE and solid insulation requirements of 6.7		P
6.5.4	PROTECTIVE IMPEDANCE	(see Form A.12)	N/A
	Limits current or voltage to level of 6.3.1 in NORMAL and to level of 6.3.2 in SINGLE FAULT CONDITION		N/A
	CLEARANCE, CREEPAGE DISTANCE between terminations of the impedance meet requirements of DOUBLE or REINFORCED INSULATION of 6.7	(see Form A.15)	N/A
	The PROTECTIVE IMPEDANCE consists of one or more of the following:	(see TABLE 1.A and Form A.12)	—
	a) appropriate single component suitable for safety and reliability for protection, it is:		—
	1) RATED twice the maximum WORKING VOLTAGE		N/A
	2) resistor RATED for twice the power dissipation for maximum WORKING VOLTAGE		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	b) combination of components		N/A
	Single electronic device not used as PROTECTIVE IMPEDANCE		N/A
6.5.5	Automatic disconnection of the supply		N/A
	a) RATED to disconnect the load within time specified in Figure 2		N/A
	b) RATED for the maximum load conditions of the equipment		N/A
6.5.6	Current- or voltage-limiting devices	(see Form A.13)	N/A
	Device complies with all of:		—
	a) RATED to limit the current or voltage to the level of 6.3.2	(see Form A.6)	N/A
	b) RATED for the maximum WORKING VOLTAGE; and		N/A
	RATED for the maximum operational current if applicable		N/A
	c) CLEARANCE, CREEPAGE DISTANCE between terminations of the impedance meet requirements of SUPPLEMENTARY INSULATION of 6.7	(see Form A.14, A.15)	N/A
6.6	Connections to external circuits		N/A
6.6.1	Connections do not cause ACCESSIBLE parts of the following to become HAZARDOUS LIVE in NORMAL CONDITION or SINGLE FAULT CONDITION:		—
	- the external circuits		N/A
	- the equipment		N/A
	Protection achieved by separation of circuits; or		N/A
	short circuit of separation does not cause a HAZARD		N/A
	Instructions or markings for each terminal include:		—
	A) RATED conditions for TERMINAL		N/A
	B) Required RATING of external circuit insulation		N/A
6.6.2	TERMINALS for external circuits		N/A
	TERMINALS which receive a charge from an internal capacitor are not HAZARDOUS LIVE after 10 s of interrupting supply connection		N/A
6.6.3	Circuits with terminals which are HAZARDOUS LIVE		N/A
	These circuits are:		—
	Not connected to ACCESSIBLE conductive parts; or		N/A
	Connected to ACCESSIBLE conductive parts, but are not MAINS CIRCUITS and have one TERMINAL contact at earth potential		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	No ACCESSIBLE conductive parts are HAZARDOUS LIVE		N/A
6.6.4	Terminals for stranded conductors		N/A
	No RISK of accidental contact because:		—
	Located or shielded		N/A
	Self-evident or marked whether or not connected to ACCESSIBLE conductive parts		N/A
	Conductors will not work loose		N/A
6.7	Insulation requirements	(see Form A.14)	P
6.7.1	The nature of insulation		P
6.7.1.1	Insulation between ACCESSIBLE parts or between separate circuits consist of CLEARANCES, CREEPAGE DISTANCES and solid insulation if provided as protection against a HAZARD	P	P
6.7.1.2	CLEARANCES		P
	Required CLEARANCES reflecting factors of 6.7.1.1	(see Form A.14 and A.15)	P
	Equipment rated for operating altitude greater than 2000 m correction factor of Table 3 of 61010-1 applied	≤2000m	P
6.7.1.3	CREEPAGE DISTANCES		P
	Required CREEPAGE DISTANCES reflecting factors of 6.7.1.1 a) to d)	(see Form A.14 and A.15)	P
	CTI material group reflected by requirements		P
	CTI test performed		N/A
6.7.1.4	Solid insulation		P
	Required solid insulation reflecting factors of 6.7.1.1 a) to d)	(see Form A.14 and A.15)	P
6.7.1.5	Requirements for insulation according to type of circuit	(see Form A.14 and A.15)	P
	A) 6.7.2 MAINS circuits of OVERVOLTAGE CATEGORY II up to nominal supply voltage of 300 V		P
	B) 6.7.3 secondary circuits separated from circuits defined in a) by transformer		N/A
	C) K.1 MAINS circuits of OVERVOLTAGE CATEGORY III and IV or OVERVOLTAGE CATEGORY II over 300 V		N/A
	D) K.2 secondary circuits separated from circuits defined in c) by transformer		N/A
	E) K.3 circuits having one or more of:		—
	1) maximum TRANSIENT OVERVOLTAGE is limited to known level below the level of MAINS CIRCUIT		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	2) maximum TRANSIENT OVERVOLTAGE above the level of MAINS CIRCUIT		N/A
	3) WORKING VOLTAGE is the sum of more than one circuit or a mixed voltage		N/A
	4) WORKING VOLTAGE includes recurring peak voltage, may include non-sinusoidal or non-periodic waveform		N/A
	5) WORKING VOLTAGE with a frequency above 30 kHz		N/A
6.7.2	Insulation for MAINS CIRCUITS of OVERVOLTAGE CATEGORY II with a nominal supply voltage up to 300 V		P
6.7.2.1	CLEARANCES and CREEPAGE DISTANCES	(see Form A.14 and A.15)	—
	Values for MAINS CIRCUITS of Table 4 are met		P
	Coatings to achieve reduction to POLLUTION DEGREE 1 comply with requirements of Annex H		N/A
6.7.2.2	Solid insulation		P
6.7.2.2.1	Withstands electrical and mechanical stresses in normal use and all RATED environmental conditions of 1.4		P
	Equipment passed voltage tests of 6.8.3 with values of Table 5	(see Form A.18)	P
	Complies as applicable:		—
	A) ENCLOSURE or PROTECTIVE BARRIER of Clause 8		P
	b) moulded and potted parts requirements of 6.7.2.2.2		N/A
	C) inner layers of printed wiring boards requirements of 6.7.2.2.3		N/A
	D) thin-film insulation requirements of 6.7.2.2.4		N/A
6.7.2.2.2	Moulded and potted parts		—
	Conductors between same two layers are separated by at least 0,4 mm after moulding is completed		N/A
6.7.2.2.3	Inner insulating layers of printed wiring boards		—
	Separated by at least 0,4 mm between same two layers		N/A
	REINFORCED INSULATION have adequate electric strength; one of following methods used:		—
	a) thickness of insulation is at least 0,4 mm		N/A
	b) insulation is assembled of minimum two separate layers, each RATED for test voltage of Table 5 for BASIC INSULATION		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	c) insulation is assembled of minimum two separate layers, where the combination is rated for test voltage of Table 5 for REINFORCED INSULATION		N/A
6.7.2.2.4	Thin-film insulation		—
	Conductors between same two layers are separated by applicable CLEARANCES and CREEPAGE DISTANCE of 6.7.2.1		N/A
	REINFORCED INSULATION have adequate electric strength; one of following methods used:		—
	a) thickness through the insulation at least 0.4 mm		N/A
	b) insulation is assembled of min two separate layers, each RATED for test voltage of Table 5 for BASIC INSULATION		N/A
	c) insulation is assembled of min three separate layers, where the combination of two layers passed voltage tests of 6.8.3 with values of Table 5 for REINFORCED INSULATION	(see Form A.18)	N/A
6.7.3	Insulation for secondary circuits derived from MAINS CIRCUITS of OVERVOLTAGE CATEGORY II up to 300 V		N/A
6.7.3.1	Secondary circuits where separation from MAINS CIRCUITS is achieved by a transformer providing:		—
	- REINFORCED INSULATION		N/A
	- DOUBLE INSULATION		N/A
	- screen connected to the PROTECTIVE CONDUCTOR TERMINAL		N/A
6.7.3.2	CLEARANCES	(see Form A.14 and A.15)	N/A
	a) meet the values of Table 6 for BASIC INSULATION and SUPPLEMENTARY INSULATION; or		N/A
	twice the values of Table 6 for REINFORCED INSULATION		N/A
	or		—
	b) pass the voltage tests of 6.8 with values of c) Table 6;	(see Form A.18)	N/A
	with following adjustments:		N/A
	1) values for REINFORCED INSULATION are 1,6 times the values for BASIC INSULATION		N/A
	2) if operating altitude is greater than 2000 m values of CLEARANCES multiplied with factor of Table 3		N/A
	3) minimum CLEARANCE is 0,2 mm for POLLUTION DEGREE 2 and 0,8 mm for POLLUTION DEGREE 3		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.7.3.3	CREEPAGE DISTANCES	(see Form A.14 and A.15)	N/A
	Based on WORKING VOLTAGE meets the values of Table 7 for BASIC and SUPPLEMENTARY INSULATION		N/A
	Values for REINFORCED INSULATION are twice the values of BASIC INSULATION		N/A
	Coatings to achieve reduction to POLLUTION DEGREE 1 comply with requirements of Annex H		N/A
6.7.3.4	Solid insulation		N/A
6.7.3.4.1	Withstands electrical and mechanical stresses in normal use and all RATED environmental conditions of 1.4		—
	a) Equipment passed voltage test of 6.8.3.1 for 5 s with VALUES of Table 6 for BASIC and SUPPLEMENTARY INSULATION	(see Form A.18)	N/A
	values for REINFORCED INSULATION are 1,6 times the values of BASIC INSULATION		N/A
	b) if WORKING VOLTAGE exceeds 300 V, equipment passed voltage test of 6.8.3.1 for 1 min with a test voltage of 1,5 times working voltage for BASIC or SUPPLEMENTARY INSULATION	(see Form A.18)	N/A
	value for REINFORCED INSULATION are twice the WORKING VOLTAGE		N/A
	Complies as applicable:		—
	1) ENCLOSURE or PROTECTIVE BARRIER of Clause 8		N/A
	2) moulded and potted parts requirements of 6.7.3.4.2		N/A
	3) inner layers of printed wiring boards requirements of 6.7.3.4.3		N/A
	4) thin-film insulation requirements of 6.7.3.4.4		N/A
6.7.3.4.2	Moulded and potted parts		—
	Conductors between same two layers are separated by applicable distances of Table 8		N/A
6.7.3.4.3	Inner insulation layers of printed wiring boards		—
	Separated by at least by applicable distances of Table 8 between same two layers		N/A
	REINFORCED INSULATION have adequate electric strength; one of following methods used:		—
	a) thickness at least applicable distance of Table 8		N/A
	b) insulation is assembled of minimum two separate layers, each RATED for test voltage of Table 6 for BASIC INSULATION		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	c) insulation is assembled of min two separate layers, where the combination is RATED for 1,6 times the test voltage of Table 6		N/A
6.7.3.4.4	Thin-film insulation		—
	Conductors between same two layers are separated by applicable CLEARANCES and CREEPAGE DISTANCE of 6.7.3.2 and 6.7.3.3		N/A
	REINFORCED INSULATION have adequate electric strength; one of following methods used:		—
	a) thickness at least applicable distance of Table 8		N/A
	b) insulation is assembled of min two separate layers, each RATED for test voltage of Table 6 for BASIC INSULATION		N/A
	c) insulation is assembled of min three separate layers, where the combination of two layers passed voltage tests with 1,6 time values of Table 6:	(see Form A.18)	—
	a.c. test of 6.8.3.1; or		N/A
	d.c. test of 6.8.3.2 for circuits stressed only by d.c. voltages		N/A
6.8	Procedure for dielectric strength tests	(see Form A.14 and A.18)	P
6.9	Constructional requirements for protection against electric shock		P
6.9.1	If a failure could cause a HAZARD:		—
	a) Security of wiring connections		P
	b) Screws securing removable covers		N/A
	c) Accidental loosening		P
	d) CLEARANCES and CREEPAGE DISTANCES not reduced below the values of basic insulation by loosening of parts or wires		P
6.9.2	Insulating materials		P
	Material not to be used for safety relevant insulation:		—
	a) Easily damaged materials not used	No such material used	P
	b) Non-impregnated hygroscopic materials not used	No hygroscopic material used	P
6.9.3	Colour coding		P
	Green-and-yellow insulation shall not be used except:		—
	a) protective earth conductors;		N/A
	b) PROTECTIVE BONDING conductors;		P

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Clause	Requirement + Test	Result - Remark	Verdict
	c) potential equalization conductors;		N/A
	d) functional earth conductors		N/A
6.10	Connection to MAINS supply source and connections between parts of equipment		P
6.10.1	MAINS supply cords		N/A
	RATED for maximum equipment current (see 5.1.3 c)		N/A
	Cable complies with IEC 60227 or IEC 60245		N/A
	Heat-resistant if likely to contact hot parts		N/A
	Temperature RATING (cord and inlet)..... :	(see Table 1)	—
	Green/yellow used only for connection to PROTECTIVE CONDUCTOR TERMINALS		N/A
	Detachable cords with IEC 60320 MAINS connectors:		—
	Conform to IEC 60799; or		N/A
	Have the current RATING of the MAINS connector	(see Table 1)	N/A
6.10.2	Fitting of non-detachable MAINS supply cords		—
6.10.2.1	Cord entry		—
	a) Inlet or bushing with a smoothly rounded opening; or		N/A
	b) Insulated cord guard protruding >5 D		N/A
6.10.2.2	Cord anchorage		—
	Protective earth conductor is the last to take the strain		N/A
	a) Cord is not clamped by direct pressure from a screw		N/A
	b) Knots are not used		N/A
	c) Cannot push the cord into the equipment to cause a HAZARD		N/A
	d) No failure of cord insulation in anchorage with metal parts		N/A
	e) Not to be loosened without a tool		N/A
	f) Cord replacement does not cause a HAZARD and method of strain relief is clear		N/A
	Push-pull and or torque test	(see Form A.19)	N/A
6.10.3	Plugs and connectors		P
	MAINS supply plugs, connectors etc., conform with relevant specifications		P
	If equipment supplied at voltages below 6.3.2.a) or from a sole source:		—

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	Plugs of supply cords do not fit MAINS sockets above rated SUPPLY voltage		N/A
	MAINS type plugs used only for connection to MAINS supply		P
	Plug pins which receive a charge from an internal capacitor	(see Form A.5)	N/A
	Accessory MAINS socket outlets:		—
	a) Marking if accepts a standard MAINS supply plug (see 5.1.3e)		P
	b) Input has a protective earth conductor if outlet has EARTH TERMINAL CONTACT		P
6.11	Disconnection from supply source		P
6.11.1	Disconnects all current-carrying conductors		P
6.11.2	Exceptions		N/A
6.11.3	Requirements according to type of equipment		P
6.11.3.1	PERMANENTLY CONNECTED EQUIPMENT and multi-phase equipment		N/A
	Employs switch or circuit-breaker		N/A
	If switch or circuit-breaker is not part of the equipment, documentation requires:		—
	a) Switch or circuit-breaker to be included in building installation		N/A
	b) Suitable location easily reached		N/A
	c) Marking as disconnecting for the equipment		N/A
6.11.3.2	Single-phase cord-connected equipment		—
	Equipment is provided with one of the following:		N/A
	a) Switch or circuit-breaker		—
	b) Appliance coupler (disconnected without tool)		N/A
	c) Separable plug (without locking device)		N/A
6.11.4	Disconnecting devices		P
6.11.4.1	Disconnecting device part of equipment		P
	Electrically close to the SUPPLY		P
	Power-consuming components not electrically located between the supply source and the disconnecting device		P
	Except electromagnetic interference suppression circuits permitted to be located on the supply side of the disconnecting device		N/A
6.11.4.2	Switches and circuit-breakers		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	When used as disconnection device:		—
	Meets IEC 60947-1 and IEC 60947-3		N/A
	Marked to indicate function..... :		—
	Not incorporated in MAINS cord		N/A
	Does not interrupt PROTECTIVE EARTH CONDUCTOR		N/A
6.11.4.3	Appliance couplers and plugs		P
	Where an appliance coupler or separable plug is used as the disconnecting device (see 6.11.3.2):		—
	Readily identifiable and easily reached by the operator		P
	Single-phase portable equipment cord length not more than 3 m		N/A
	PROTECTIVE EARTH CONDUCTOR connected first and disconnected last		P
7	PROTECTION AGAINST MECHANICAL HAZARDS		P
7.1	Equipment does not cause a mechanical HAZARD in NORMAL nor in SINGLE FAULT CONDITION		P
	Conformity is checked by 7.2 to 7.7		P
7.2	Sharp edges		P
	Easily touched parts are smooth and rounded		P
	Do not cause injury during NORMAL USE and		P
	Do not cause injury during SINGLE FAULT CONDITION		P
7.3	Moving parts		N/A
7.3.1	HAZARDS from moving parts limited to a tolerable level with the conditions specified in 7.3.2 and 7.3.5		N/A
	RISK assessment in accordance with 7.3.3 carried out		N/A
7.3.2	Exceptions		N/A
	Access to HAZARDOUS moving parts permitted under following circumstances:		—
	a) obviously intended to operate on parts or materials external of the equipment		N/A
	inadvertent touching of moving parts minimized by equipment design (e.g. guards or handles)		N/A
	b) If OPERATOR access is unavoidable outside NORMAL USE following precautions have been taken:		—
	1) Access requires TOOL		N/A

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	2) Statement about training in the instructions		N/A
	3) Warning markings on covers prohibiting access by untrained OPERATORS		N/A
	or symbol 14 with full details in documentation		N/A
7.3.3	RISK assessment for mechanical HAZARDS to body parts		N/A
	RISK is reduced to a tolerable level by protective measures as specified in table 12		N/A
	Minimum protective measures:		—
	A. Low level measures		N/A
	B. Moderate measures		N/A
	C. Stringent measures		N/A
7.3.4	Limitation of force and pressure	(see Form A.20)	N/A
	Following levels are met in NORMAL and SINGLE FAULT CONDITION:		—
	Continuous contact pressure below 50 N / cm² with force below 150 N		N/A
	Temporary force below 250 N for an area at least of 3 cm² for a maximum duration of 0,75 s		N/A
7.3.5	Gap limitations between moving parts	(see Form A.20)	N/A
7.3.5.1	Access normally allowed		—
	If levels of 7.3.4 exceeded and body part may be inserted minimum gap as specified in table 13 assured in NORMAL and in SINGLE FAULT CONDITION		N/A
7.3.5.2	Access normally prevented		—
	Maximum gap as specified in table 14 assured in NORMAL and in SINGLE FAULT CONDITION		N/A
7.4	Stability		P
	Equipment not secured to building structure is physical stable		N/A
	Stability maintained after opening of drawers etc. by automatic means, or		N/A
	warning marking requires the application of means		N/A
	Compliance checked by following tests as applicable:	(see Form A.20A)	—
	a) 10° tilt test for other than handheld equipment		P
	b) multi-directional force test for equipment exceeds height of 1 m and mass of 25 kg		P

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	c) downward force test for floor-standing equipment		N/A
	d) overload test with 4 times maximum load for castor or support that supports greatest load, or		N/A
	e) castor or support that supports greatest load removed from equipment		N/A
7.5	Provisions for lifting and carrying		P
7.5.1	Equipment more than 18 kg:		P
	Has means for lifting or carrying; or		P
	Directions in documentation		N/A
7.5.2	Handles and grips		N/A
	Handles or grips withstand four times weight		N/A
7.5.3	Lifting devices and supporting parts		N/A
	RATED for maximum load; or		N/A
	tested with four times maximum static load		N/A
7.6	Wall mounting		N/A
	Mounting brackets withstand four times weight		N/A
7.7	Expelled parts		N/A
	Equipment contains or limits the energy		N/A
	Protection not removable without the aid of a tool		N/A
8	RESISTANCE TO MECHANICAL STRESSES		P
8.1	Equipment does not cause a HAZARD when subjected to mechanical stresses in NORMAL USE		P
	Normal protection level is 5 J		P
	Levels below 5 J but not less than 1 J are acceptable if all of following criteria are met:		—
	a) lower level justified by RISK assessment of manufacturer		N/A
	b) equipment installed in its intended application is not easily touched		N/A
	c) only occasional access during NORMAL USE		N/A
	d) IK code in accordance to IEC 62262 marked or symbol 14 used with full information in the documentation		N/A
	For non-metallic ENCLOSURES rated below 2 °C ambient temperature value chosen for minimum RATED temperature		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Impact energies between IK values, the IK code marked for nearest lower value		N/A
	Conformity is checked by performing following tests:		—
	1) static test of 8.2.1		P
	2) impact test of 8.2.2 with 5 J except for HAND-HELD EQUIPMENT		N/A
	if impact energy not selected to 5 J alternate method of IEC 62262 used		N/A
	3) drop test of 8.3.1 or 8.3.2 except for FIXED EQUIPMENT and equipment with mass over 100 kg		P
	Equipment RATED with an impact rating of IK 08 that obviously meets the criteria		N/A
	After the tests inspection with following results:		—
	- HAZARDOUS LIVE parts above the limits of 6.3.2 not ACCESSIBLE		P
	- insulation pass the voltage tests of 6.8	(see Form A.30)	P
	i) no leaks of corrosive and harmful substances		P
	ii) ENCLOSURE shows no cracks resulting in a HAZARD		P
	iii) CLEARANCES not less than their permitted values		P
	iv) insulation of internal wiring remains undamaged		P
	v) PROTECTIVE BARRIERS not damaged or loosened		N/A
	vi) No moving parts exposed, except permitted by 7.3		N/A
	vii) no damage which could cause spread of fire		P
8.2	ENCLOSURE rigidity test		P
8.2.1	Static test	(see Form A.21A)	P
	- 30 N with 12 mm rod to each part of ENCLOSURE		P
	- in case of doubt test conducted at maximum RATED ambient temperature		P
8.2.2	Impact test	(see Form A.21A)	N/A
	Impact applied to any part of ENCLOSURE causing a HAZARD if damaged		N/A
	Impact energy level and corresponding IK code..... :	IK08	—
	Non-metallic ENCLOSURES cooled to minimum RATED ambient temperature if below 2 °C		N/A
8.3	Drop test	(see Form A.21B)	P

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
8.3.1	Other than HAND-HELD and DIRECT-PLUG-IN EQUIPMENT		P
	Tests conducted with a drop height or angle of.....:		—
8.3.2	HAND-HELD and DIRECT-PLUG-IN EQUIPMENT		P
	Non-metallic ENCLOSURES cooled to minimum RATED ambient temperature if below 2 °C		P
	Drop test conducted with a height of 1 m		P
9	PROTECTION AGAINST THE SPREAD OF FIRE		P
9.1	No spread of fire in NORMAL and SINGLE FAULT CONDITION		P
	MAINS supplied equipment meets requirements of 9.6 additionally		P
	Conformity is checked by minimum one or a combination of the following (see Figure 11):	(see Form A.22)	—
	a) SINGLE FAULT test of 4.4; or	(see Form A.1)	P
	b) Application of 9.2 (eliminating or reducing the sources of ignition); or		N/A
	c) Application of 9.3 (containment of fire within the equipment)		P
9.2	Eliminating or reducing the sources of ignition within the equipment		P
	a) 1) Limited-energy circuit (see 9.4); or		N/A
	2) BASIC INSULATION provided for parts of different potential; or	(see Form A.14 and A.18)	N/A
	Bridging the insulation does not cause ignition	(see Form A.1)	N/A
	b) Surface temperature of liquids and parts (see 9.5)		N/A
	c) No ignition in circuits designed to produce heat	(see Form A.1)	N/A
9.3	Containment of the fire within the equipment, should it occur		N/A
9.3.1	Spread of fire outside equipment reduced to a tolerable level if:		P
	a) Energizing of the equipment is controlled by an OPERATOR held switch		N/A
	b) ENCLOSURE conforms with constructional requirements of 9.3.2; and		P
	Requirements of 9.5 are met		N/A
9.3.2	Constructional requirements		P

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Clause	Requirement + Test	Result - Remark	Verdict
	a) Connectors and insulating material have flammability classification V-2 or better	(see TABLE 1.A or Form A.23)	P
	b) Insulated wires and cables are flame retardant (VW-1 or equivalent)	(see TABLE 1.A or Form A.23)	N/A
	c) ENCLOSURE meets following requirements:	(see Form A.22)	—
	1) Bottom and sides in arc of 5 ° (see Figure 13) to non-limited circuits (9.4) meets:		—
	i) no openings; or		P
	ii) perforated as specified in Table 16; or		N/A
	iii) metal screen with a mesh; or		N/A
	iv) baffles as specified in Figure 12		N/A
	2) Material of ENCLOSURE and any baffle or flame barrier is made of:		—
	Metal (except magnesium); or		N/A
	Non-metallic materials have flammability classification V-1 or better	(see TABLE 1.A or Form A.22)	P
	3) ENCLOSURE and any baffle or flame barrier have adequate rigidity		P
9.4	Limited-energy circuit	(see Form A.24)	N/A
	a) Potential not more than 30 r.m.s. and 42,4 V peak, or 60 V dc		N/A
	b) Current limited by one of following means:		—
	1) Inherently or by impedance (see Table 17); or		N/A
	2) Overcurrent protective device (see Table 18); or		N/A
	3) A regulating network limits also in SINGLE FAULT CONDITION (see Table 17)		N/A
	c) Is separated by at least BASIC INSULATION		N/A
	Fuse or a nonadjustable electromechanical device is used		N/A
9.5	Requirements for equipment containing or using flammable liquids	No flammable liquids used	N/A
	Flammable liquids contained in or specified for use with equipment do not cause spread of fire	(see Form A.25)	N/A
	RISK is reduced to a tolerable level:		—
	a) The temperature of surface or parts in contact with flammable liquids is 25 °C below fire point		N/A
	b) The quantity of liquid is limited		N/A
	c) Flames are contained within the equipment		N/A

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Detailed instructions for RISK-reduction provided		N/A
9.6	Overcurrent protection		P
9.6.1	MAINS supplied equipment protected		P
	BASIC INSULATION between MAINS parts of opposite polarity provided	(see Form A.14 and A.15)	P
	Devices not in the protective conductor		P
	Fuses or single-pole circuit-breakers not fitted in neutral (multi-phase)		N/A
9.6.2	PERMANENTLY CONNECTED EQUIPMENT		N/A
	Overcurrent protection device:		—
	Fitted within the equipment; or		N/A
	Specified in manufacturer's instructions		N/A
9.6.3	Other equipment		P
	Protection within the equipment		P
10	EQUIPMENT TEMPERATURE LIMITS AND RESISTANCE TO HEAT		P
10.1	Surface temperature limits for protection against burns		P
	Easily touched surfaces within the limits in NORMAL and in SINGLE FAULT CONDITION:	(see Form A.26A)	—
	- at a specified ambient temperature of 40 °C		P
	- for equipment rated above 40 °C ambient temperature limits not exceeded raised by the difference to 40 °C		N/A
	Heated surfaces necessary for functional reasons exceeding specified values:		—
	Are recognizable as such by appearance or function; or		N/A
	Are marked with symbol 13		N/A
	Guards are not removable without tool		N/A
10.2	Temperatures of windings		N/A
	Limits not exceeded in:	(see Form A.26B)	—
	NORMAL CONDITION		N/A
	SINGLE FAULT CONDITION		N/A
10.3	Other temperature measurements		P
	Following measurements conducted if applicable:	(see Form A.26A)	—
	a) Value of 60 °C of field-wiring terminal box not exceeded		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	b) Surface of flammable liquids and parts in contact with this liquids		N/A
	c) Surface of non-metallic ENCLOSURES		P
	d) Parts made of insulating material supporting parts connected to MAINS supply		P
	e) Terminals carrying a current more than 0,5 A		P
10.4	Conduct of temperature tests	(see Form A.26A)	P
10.4.1	Tests conducted under reference test conditions and manufacturer's instructions		P
10.4.2	Temperature measurement of heating equipment		N/A
	Tests conducted in test corner		N/A
10.4.3	Equipment intended for installation in a cabinet or wall		N/A
	Equipment built in as specified in installation instructions		N/A
10.5	Resistance to heat		P
10.5.1	Integrity of CLEARANCE and CREEPAGE DISTANCES	(see Form A.16)	P
10.5.2	Non-metallic ENCLOSURES	(see Form A.27)	P
	Within 10 min after treatment:		—
	Equipment subjected to suitable stresses of 8.2 and 8.3 complying with criteria of 8.1		P
10.5.3	Insulating material		P
	a) Parts supporting parts connected to MAINS supply		P
	b) TERMINALS carrying a current more than 0,5 A		P
	Examination of material data; or		N/A
	in case of doubt:		P
	1) Ball pressure test; or	(see Form A.28)	P
	2) Vicat softening test of ISO 306	(see Form A.29)	N/A

11	PROTECTION AGAINST HAZARDS FROM FLUIDS		P
11.1	Protection to OPERATORS and surrounding area provided by EQUIPMENT		P
	All fluids specified by manufacturer considered		P
11.2	Cleaning	(see Form A.30)	P
11.3	Spillage	(see Form A.30)	N/A
11.4	Overflow	(see Form A.30)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
11.5	Battery electrolyte		N/A
	Battery electrolyte leakage presents no HAZARD		N/A
11.6	Specially protected equipment	(see Form A.30)	P
11.7	Fluid pressure and leakage		N/A
11.7.1	Maximum pressure.....:	(see Form A.31)	—
	Maximum pressure of any part does not exceed P_{RATED}		N/A
11.7.2	Leakage and rupture at high pressure		—
	Fluid-containing parts subjected to hydraulic test if:	(see Form A.31)	—
	a) product of pressure and volume > 200 kPal; and		N/A
	b) pressure > 50 kPa		N/A
	Parts of refrigerating systems meets pressure-related requirements of IEC 60335-24 or IEC 60335-2-89		N/A
11.7.3	Leakage from low-pressure parts	(see Form A.32)	N/A
11.7.4	Overpressure safety device		N/A
	Does not operate in NORMAL USE		N/A
	a) Connected as close as possible to parts intended to be protected		N/A
	b) Easy access for inspection, maintenance and repair		N/A
	c) Adjustment only with TOOL		N/A
	d) No discharge towards person		N/A
	e) No HAZARD from deposit of discharged material		N/A
	f) Adequate discharge capacity		N/A
	No shut-off valve between overpressure safety device and protected parts		N/A
12	PROTECTION AGAINST RADIATION, INCLUDING LASER SOURCES, AND AGAINST SONIC AND ULTRASONIC PRESSURE		P
12.1	Equipment provides protection		P
12.2	Equipment producing ionizing radiation	No ionizing radiation	N/A
12.2.1	Ionizing radiation	(see Form A.33)	N/A
12.2.1.1	Equipment meets the following requirements:		—
	a) if intended to emit radiation meets requirements of 12.2.1.2; or		N/A

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	tested, classified and marked in accordance to IEC 60405		N/A
	b) if only emits stray radiation meets requirements of 12.2.1.3		N/A
12.2.1.2	Equipment intended to emit radiation		—
	Effective dose rate of radiation measured.....:		—
	If dose rate exceeds 5 µSv/h marked with the following:		—
	a) Symbol 17 (ISO 361)		N/A
	b) Abbreviations of the radionuclides.....:		—
	c) With maximum dose at 1 m; or.....:		—
	with dose rate value between 1 µSv/h and 5 µSv/h in m..... :		—
12.2.1.3	Equipment not intended to emit radiation	(see Form A.34)	—
	Limit for unintended stray radiation of 1 µSv/h at any easily reached point kept .....:		—
12.2.2	Accelerated electrons		—
	Compartments opened only by the use of a TOOL		N/A
12.3	Ultraviolet (UV) radiation	No UV radiation	N/A
	No unintentional HAZARDOUS escape of UV radiation:		—
	- checked by inspection; and		N/A
	- evaluation of RISK assessment documentation		N/A
12.4	Microwave radiation	No microwave radiation	N/A
	Power density does not exceed 10 W/m^2.....:		N/A
12.5	Sonic and ultrasonic pressure		N/A
12.5.1	Sound level		N/A
	No HAZARDOUS sound emission		—
	Maximum sound pressure level measured and calculated for maximum sound power level as specified in ISO 3746 or ISO 9614-1	(see Form A.35)	N/A
	Instruction describes measures for protection		N/A
12.5.2	Ultrasonic pressure		N/A
	Equipment not intended to emit ultrasound does not exceed limit of 110 dB between 20 kHz and 100 kHz	(see Form A.36)	N/A
	Equipment intended to emit ultrasound:		N/A
	Outside useful beam does not exceed limit of 110 dB between 20 kHz and 100 kHz		N/A
	If inside useful beam above values exceeded:		—

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Marked with Symbol 14 of table 1		N/A
	and following information in the documentation:		—
	a) dimensions of useful beam		N/A
	b) area where ultrasonic pressure exceeds 110 dB		N/A
	c) maximum sound pressure inside beam area		N/A
12.6	Laser sources		N/A
	Equipment meets requirements of IEC 60825-1		N/A
13	PROTECTION AGAINST LIBERATED GASES AND SUBSTANCES, EXPLOSION AND IMPLOSION		P
13.1	Poisonous and injurious gases and substances		P
	No poisonous or injurious gases or substances liberated in NORMAL CONDITION		P
	Attached data/test reports demonstrate conformity		N/A
13.2	Explosion and implosion		P
13.2.1	Components		P
	Components liable to explode:		—
	Pressure release device provided; or		N/A
	Apparatus incorporates operator protection (see also 7.7)		P
	Pressure release device:		—
	Discharge without danger		N/A
	Cannot be obstructed		N/A
13.2.2	Batteries and battery charging	(see Form A.37)	—
	If explosion or fire HAZARD could occur:		—
	Protection incorporated in the equipment; or		N/A
	Instructions specify batteries with built-in protection		N/A
	In case of wrong type of battery used:		—
	No HAZARD; or		N/A
	Warning by marking and within instructions		N/A
	Equipment with means to charge rechargeable batteries:		—
	Warning against the charging of non-rechargeable batteries; and		N/A
	Type of rechargeable battery indicated; or		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Symbol 14 used		N/A
	Battery compartment design		N/A
	Single component failure		N/A
	Polarity reversal test		N/A
13.2.3	Implosion of cathode ray tubes	No CRTs	N/A
	If maximum face dimensions > 160 mm.....:		—
	Intrinsically protected and correctly mounted; or		N/A
	ENCLOSURE provides protection:		N/A
	If non-intrinsically protected:		—
	Screen not removable without TOOL		N/A
	If glass screen, not in contact with surface of tube		N/A
14	COMPONENTS AND SUBASSEMBLIES		P
14.1	Where safety is involved, components and subassemblies meet relevant requirements	(see TABLE 1.A)	P
14.2	Motors		N/A
14.2.1	Motor temperatures		N/A
	Does not present a HAZARD when stopped or prevented from starting; or	(see Form A.1)	N/A
	Protected by over-temperature or thermal protection device conform with 14.3		N/A
14.2.2	Series excitation motors		N/A
	Connected direct to device, if overspeeding causes a HAZARD		N/A
14.3	Overtemperature protection devices		N/A
	Devices operating in a SINGLE FAULT CONDITION	(see Form A.38)	N/A
	a) Reliable function is ensured		N/A
	B) RATED to interrupt maximum current and voltage		N/A
	c) Does not operate in NORMAL USE		N/A
	If self-resetting device used to prevent a HAZARD, protected part requires intervention before restarting		N/A
14.4	Fuse holders		N/A
	No access to HAZARDOUS LIVE parts		N/A
14.5	MAINS voltage selecting devices		N/A
	Accidental change not possible		N/A
14.6	MAINS transformers tested outside equipment		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
14.7	Printed circuit boards		P
	Data shows conformity with V-1 of IEC 60695-11-10 or better; or	Min. V-0	P
	Test shows conformity with V-1 of IEC 60695-11-10 or better	(see Form A.23)	N/A
	Not applicable for printed wiring boards with limited-energy circuits (9.4)		N/A
14.8	Circuits or components used as TRANSIENT OVERVOLTAGE limiting devices		N/A
	Test conducted between each pair of MAINS SUPPLY TERMINALS	(see Form A.41)	N/A
	No HAZARD resulting from rupture or overheating of the component:		—
	- no bridging of safety relevant insulation		N/A
	- no heat to other parts above the self-ignition points		N/A
15	PROTECTION BY INTERLOCKS		N/A
15.1	Interlocks are designed to remove a HAZARD before OPERATOR exposed		N/A
15.2	Prevention of reactivation		N/A
15.3	Reliability		N/A
	Single fault unlikely to occur; or		N/A
	Cannot cause a HAZARD		N/A
16	HAZARDS RESULTING FROM APPLICATION		P
16.1	REASONABLY FORESEEABLE MISUSE		P
	No HAZARDS arising from settings not intended and not described in the instructions		P
	Other cases of REASONABLY FORESEEABLE MISUSE addressed by RISK assessment		N/A
16.2	Ergonomic aspects		N/A
	Factors giving rise to a HAZARD the RISK assessment is reflecting those aspects:		N/A
	a) limitation of body dimensions		N/A
	b) displays and indicators		N/A
	c) accessibility and conventions of controls		N/A
	d) arrangement of TERMINALS		N/A
17	RISK ASSESSMENT		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	RISK assessment conducted, if HAZARD might arise and not covered by Clauses 6 to 16		N/A
	TOLERABLE RISK achieved by iterative documented process covering the following:		—
	a) RISK analysis		N/A
	Identifies HAZARDS and estimates RISK		N/A
	b) RISK evaluation		N/A
	Plan to judge acceptability of resulting RISK level based on the estimated severity and likelihood of a RISK		N/A
	c) RISK reduction		N/A
	Initial RISK reduced by counter measures;		N/A
	Repeated RISK evaluation without new RISKS introduced		N/A
	RISKS remaining after RISK assessment addressed in instructions to RESPONSIBLE BODY:		—
	Information contained how to mitigate these RISKS		N/A
	Following principles in methods of RISK reduction applied by manufacturer in given order:		—
	1) RISKS eliminated or reduced as far as possible		N/A
	2) Protective measures taken for RISKS that cannot be eliminated		N/A
	3) User information about residual RISK due to any defect of the protective measures		N/A
	Indication of particular training is required		N/A
	Specification of the need for personal protective equipment		N/A
	Conformity checked by evaluation of the RISK assessment documentation		N/A

ANNEX F	ROUTINE TESTS		N/A
	Manufacturer's declaration		N/A

ANNEX H	QUALIFICATION OF CONFORMAL COATINGS FOR PROTECTION AGAINST POLLUTION		N/A
H.1	General		N/A
	Conformal coatings meet the requirements of Clause H.2 and H.3.		N/A
H.2	Technical properties		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Technical properties of conformal coatings are suitable for the intended application. In particular:		—
	a) Manufacturer indicate that it is a coating for PWBs;		N/A
	b) RATED operating temperature include the temperature range of the indicated application;		N/A
	c) CTI, insulation resistance and dielectric strength are suitable for the intended application;		N/A
	d) Coating have adequate UV resistance, if it is exposed to sunlight;		N/A
	e) Flammability RATING of the coating is at least the required flammability RATING of the applied PWB.		N/A
H.3	Qualification of coatings	(see Form A.42)	N/A
	Coating complies with the conformity requirements.		N/A
ANNEX K	INSULATION REQUIREMENTS NOT COVERED BY CLAUSE 6.7	(see Form A.15 and A.18)	N/A

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Clause	Requirement — Test	Result — Remark	Verdict

4.4	TABLE: Testing in SINGLE FAULT CONDITION – Results						Form A.1	P
Test subclause	Fault No.	Fault description			Td 4.4.3 (NOTE)	Fuse current (A)	How was test terminated Comments	Meets 4.4.4
		Component No.	Abnormal condition	Test voltage (V/Hz)				
4.4.2.12	1	U1 pin 2-3	S-C	230V/60Hz	10min	--	Unit shutdown immediately recoverable, no hazard.	Yes
4.4.2.12	2	U3 pin 1-11	S-C	230V/60Hz	10min	--	Unit shutdown immediately recoverable, no hazard.	Yes
4.4.2.12	3	U5 pin 2-12	S-C	230V/60Hz	10min	--	Unit shutdown immediately recoverable, no hazard.	Yes
4.4.2.12	4	U6 pin 8-14	S-C	230V/60Hz	10min	--	Unit shutdown immediately recoverable, no hazard.	Yes
4.4.2.12	5	U9 pin 8-15	S-C	230V/60Hz	10min	--	Unit shutdown immediately recoverable, no hazard.	Yes
NOTE Td = Test duration Record in the comments column for each test whether carried out during or after single fault condition.								
Supplementary information: 1) SC: short circuit.								

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5.1.3 c)	**TABLE: MAINS supply**		**Form A.2**	P
	Marked rating..... :	230	V~	—
	Phase..... :	--	Phase	—
	Frequency .....:	50/60	Hz	—
	Current ..... :	10	A	—
	Power ..... :	--	W	—
	Power ..... :	--	VA	—

Test No.	Voltage/ Frequency	Current	Power	Power	Comments
	V/ Hz	mA	W	VA	
1	230V/50Hz	51	11.6	--	Normal operation
3	230V/60Hz	50	12.1	--	Normal operation

NOTE – Measurements are only required for marked ratings.

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5.3	**TABLE: Durability of markings**	**Form A.3**	P

Marking method (see NOTE)	Agent
1) Adhesive label	A Water
2) Ink printed	B Isopropyl alcohol 70%
3) Laser marked	C Pure alcohol
4) Film-coated (plastic foil control panel)	D (specify agent: mild soap and water)
5) Imprinted on plastic (moulded in)	E (specify agent)

NOTE – Where applicable include print method, label material, ink or paint type, fixing method, adhesive and surface to which marking is fixed.

Marking location	Marking method (see above)
Identification (5.1.2)	3)
MAINS supply (5.1.3)	3)
Fuses (5.1.4)	N/A
Terminals and operating devices (5.1.5.2)	N/A
Switches and circuit breakers (5.1.6)	N/A
Double/reinforced equipment (5.1.7)	N/A
Field wiring Terminal boxes (5.1.8)	N/A
Warning marking (5.2)	N/A
Battery charging (13.2.2)	N/A

Method	Test agent	Remains legible	Label loose	Curled edges	Comments
		Verdict	Verdict	Verdict	
1)	A, B	Yes	--	--	Pass

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Clause	Requirement — Test	Result — Remark	Verdict

6.2	**TABLE: List of ACCESSIBLE parts** **Form A.4**	P
6.1.2	Exceptions	—
6.2	Determination of ACCESSIBLE parts	—

Item	Description	Determination method (NOTE 5)	Exception under 6.1.2 (NOTE 4)
1	Plastic enclosure	Visual	-
2	L-N terminal	Visual	-

NOTE 1 – Test fingers and pins are to be applied without force unless a force is specified (see 6.2.2)
NOTE 2 – Special consideration should be given to inadequate insulation and high voltage parts (see 6.2)
NOTE 3 – Parts are considered to be ACCESSIBLE if they could be touched in the absence of any covering which is not considered to provide suitable insulation (see 6.4).
NOTE 4 – Capacitor test may be required (see Form A.5).
NOTE 5 – The determination methods are:
V = visual; R = rigid test finger; J = jointed test finger; P3 = pin 3 mm diameter; P4 = pin 4 mm diameter.

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Clause	Requirement — Test	Result — Remark	Verdict

6	TABLE: Values in NORMAL CONDITION	Form A.5	P
6.1.2	Exceptions	11.2 Cleaning and decontamination	—
6.3.1	Values in NORMAL CONDITION (see NOTE 1)	11.3 Spillage	—
6.6.2	Terminals for external circuit	11.4 Overflow	—
6.10.3	Plugs and connections		—

Item	Voltage			Current				Capacitance		10 s / 5 s test (NOTE)			Comments
(see Form A.4)	V r.m.s.	V peak	V d.c.	Test circuit A1/ A2/ A3/A4	mA r.m.s.	mA peak	mA d.c.	µC	mJ	V	µC	mJ	
1	-	-	-	A1	-	0.211	-	-	-	-	-	-	Input 230VAC/60Hz
2	-	-	-	-	-	-	-	-	-	0	-	-	Input 230VAC/60Hz Discharged test of Cl.6.10.3; after 5s

NOTE – A 10 s test is specified in 6.1.2 a) b). A. 5 s test is specified in 6.10.3. The capacitance level versus voltage below the limits given from figure 3 of IEC 61010-1.

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Clause	Requirement — Test	Result — Remark	Verdict

6.3.2	**TABLE: Values in SINGLE FAULT CONDITION**										**Form A.6**	P
Item	Subclause and	Voltage			Transient (see NOTE)		Current				Capacitance	Comments
(see Form A.4)	fault No. (see Form A.1)	V r.m.s.	V peak	V d.c.	V	s	Test circuit A1/ A2/ V3/ A4	mA r.m.s.	mA peak	mA d.c.	µF (see NOTE)	
1	U6 pin 8-14	-	-	-	-	-	A1	-	0.211	-	-	Input 230VAC/60Hz
2	Earth open	-	-	-	-	-	A1	-	0.352	-	-	Input 230VAC/60Hz

NOTE – Transient voltages must be below the limits given from Figure 2 and the capacitance below the limits from figure 3 of IEC 61010-1.

Supplementary information:
1) Supply voltage: 253V/60Hz
2) Fault conditions in Form A.1 also measured and the worst result recorded.

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Clause	Requirement — Test	Result — Remark	Verdict

6.5.2.2	**TABLE: Cross-sectional area of bonding conductors**	**Form A.7**	N/A

Conductor location	CROSS-SECTIONAL AREA mm² OR AWG	VERDICT

Supplementary information:

TABLE: Tightening torque test Form A.8	N/A

Conductor location	Size of screw	Tightening torque [Nm]	Verdict

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Clause	Requirement — Test	Result — Remark	Verdict

6.5.2.4	TABLE: Bonding impedance of plug connected equipment	Form A.9	N/A

ACCESSIBLE part under test	Test current A	Voltage attained after 2 min V	Calculated resistance (Maximum 0,1 ~~or 0,2 Ω~~) [Ω] (NOTE 1)	Verdict
Between the earthing terminal or earthing contact of plug and earthing contact of socket	32	--	0.036	pass

NOTE 1 – For none-detachable power cord the impedance between protective conductor plug pin of MAINS cord and each ACCESSIBLE part shall not exceed 0,2 Ohm.

Supplementary information:

6.5.2.5	TABLE: Bonding impedance of permanently connected equipment	Form A.10	N/A

ACCESSIBLE part under test	Test current A	Voltage attained after 1 min (maximum 10 V) V	Verdict

Supplementary information:

6.5.2.6	TABLE: Transformer PROTECIVE BONDING screen	Form A.11	N/A

ACCESSIBLE part under test	Test current (see NOTE) A	Voltage attained after 1 min (maximum 10 V) V	Calculated resistance (maximum 0,1 Ω) Ω	Verdict

NOTE – Test current must be twice the value of the overcurrent protection means of the winding. Test is specified in 6.5.2.6 a) or b).

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Clause	Requirement — Test	Result — Remark	Verdict

6.5.4	**TABLE: protective impedance**	**Form A.12**	N/A

A single component

Component	Location	Measured		Calculated	Rated		Verdict	Comments
		Working voltage V	Current A	Power dissipation W	Working voltage V	Power dissipation W		
-	-	-	-	-	-	-	-	-

A combination of components

Component	Location	Comments
-	-	-
-	-	-
-	-	-
-	-	-

NOTE – A PROTECTIVE IMPEDANCE shall not be a single electronic device that employs electron conduction in a vacuum, gas or semiconductor.

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Clause	Requirement — Test	Result — Remark	Verdict

6.5.6	**TABLE: Current- or voltage-limiting device**						**Form A.13**	N/A
Component	Location	Measured		Rated		Verdict	Comments	
		Working voltage V	Current A	Working voltage V	Current A			
Supplementary information:								

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-	**Additional test conducted: Working Voltage**	N/A

Component	From	To	RMS voltage (V)	Peak voltage (V)	Comments

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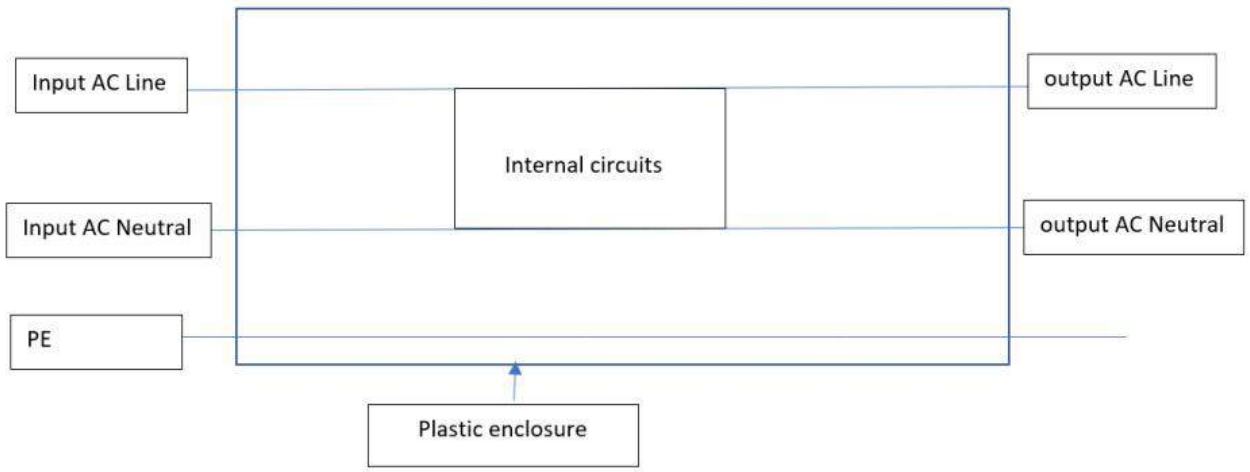
Clause	Requirement — Test	Result — Remark	Verdict

6.7	**TABLE: Insulation requirements- Block diagram of system**	**Form A.14**	P



Pollution degree.....: 2	Overvoltage category.....: II

Area	Location	Insulation type (NOTE 1)	WORKING VOLTAGE RMS V	Peak V	Frequency Hz	Test voltage (NOTE 2) V	Comments (NOTE 3)
A	Between live parts and accessible surface	RI	250	354	60	3000	CATII CI:3.0; Cr:6.0 Measured: >6.0

NOTE 1 – Type of insulation:
BI = BASIC INSULATION
DI = DOUBLE INSULATION
PI = PROTECTIVE IMPEDANCE
RI = Reinforced INSULATION
SI = Supplementary INSULATION
see also Form A.15 for further details

NOTE 2 - Types of voltage
Peak impulse test voltage (pulse)
r.m.s.
d.c.
peak

NOTE 3 - OVERVOLTAGE CATEGORIES or POLLUTION DEGREES which differ should be shown under "Comments"

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Clause	Requirement — Test	Result — Remark	Verdict

6.7	**TABLE: Insulation requirements- Clearances and Creepages**		**Form A.15**	P
6.2.2	Examination	6.5.4	Protective impedance	—
6.4.2	ENCLOSURES and protective barriers	6.5.6	Current- or voltage-limiting device	—
6.4.4	Impedance	9.6.1	BASIC INSULATION between opposite polarity	—

Area	Location (See Form A.14)	WORKING VOLTAGE (NOTE 2)		Clearance		Creepage		CTI	Verdict	Comments
		Peak V	RMS V	Required mm	Measured mm	Required mm	Measured mm			
-	L and N before fuse F1	BI	415	1.5	3.1	3.0	3.1	IIIb	P	
-	Different polarity of fuse F1	BI	415	1.5	3.1	3.0	3.1	IIIb	P	
-	Socket L to N	BI	415	1.5	3.1	3.0	3.1	IIIb	P	
-	Primary circuit and plastic enclosure	RI	415	3.0	6.2	6.0	6.2	IIIb	P	

NOTE 1 – refer to Form A.14 for type of insulation shown in the insulation diagram NOTE 2 - to be used for definition of required insulation (see Form A.14)

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Clause	Requirement — Test	Result — Remark	Verdict

6.7	**TABLE: Insulation requirements- Clearances and Creepages**			**Form A.16**	P
6.4.2	ENCLOSURES or PROTECTIVE BARRIERS	9.6.1	Overcurrent protection basic insulation between MAINS parts		—
8	Mechanical resistance to shock and impact	10.5.1	Integrity of CLEARANCES and CREEPAGE distances		—

Area	Location	Insulation type	Mechanical tests (NOTE)					Test at max.	Measured after test (if required)		Verdict	Comments
	(See Form A.14)		Applied force	Rigidity (8.2)		Drop (8.3)		RATED ambient	Clearance	Creepage distance		
			N	Static (8.2.1)	Impact (8.2.2)	Normal (8.3.1)	Hand-held/ Plug-in	(10.5.1)	mm	mm		
	Same as Form A.15	#	30	Yes	-	-	Yes	40	#	#	P	

NOTE – Refer to Form A.18 for dielectric strength tests following the above tests.

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Clause	Requirement – Test	Result — Remark	Verdict

6.7.2.2.2	**TABLE: Reliability of potted components**	**Form A.17**	N/A
14.1 b)	**Components and subassemblies**		N/A

Temperature Cycling Test	
Manufacturer.....:	
Type..... :	
Construction.....:	
Potting compound.....:	
CREEPAGE distances measured.....:	
CLEARANCES measured.....:	
Thickness through insulation..... :	
Adhesive test Pass/Fail.....:	
Test temperature T °C.....:	

Cycles at U= AC 500 V				Leakage current (500 V) mA			
Number of cycles	Date			68 h / 125 °C	1 h / 25 °C	2 h / 0 °C	1 h / 25 °C
1. Cycle from		to					
2. Cycle from		to					
3. Cycle from		to					
4. Cycle from		to					
5. Cycle from		to					
6. Cycle from		to					
7. Cycle from		to					
8. Cycle from		to					
9. Cycle from		to					
10. Cycle from		to					

After Cycling Test :		
Humidity conditioning	48 h	
Requirements for dielectric strength (s. insulation diagram)	Test voltage V r.m.s	Verdict
Basic insulation _____ V r.m.s.		
Supplementary insulation _____ V r.m.s.		
Reinforced insulation _____ V r.m.s.		
NOTE - to be used for evaluation of components containing insulation through solid insulation, when the component standard require thermal cycling test. Ref Clause 14.1 and Figure 15, option b)		
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Clause	Requirement — Test	Result — Remark	Verdict

6.8	**TABLE: Dielectric strength tests**	**Form A.18**	P
4.4.4.1 b)	Conformity after application of SINGLE FAULT CONDITIONS[1]		P
6.4	Primary means of protection[2]		P
6.6	Connections to external circuits		N/A
6.7	Insulation requirements[2] (see Annex K)		P
6.10.2	Fitting of non-detachable MAINS supply cords[1]		N/A
9.2 a) 2)	Eliminating or reducing the sources of ignition within the equipment		N/A
9.4 c)	Limited-energy circuit		N/A
9.6.1	Overcurrent protection basic insulation between MAINS - parts		N/A
	Test site altitude.....:	<500m	—
	Test voltage correction factor (see table 10).....:	Not required for solid insulation	—

Location or references from Forms A.1 and A.14	Humidity Yes/No	Test voltage r.m.s./peak/ d.c.	Comments (NOTE)	Verdict
L/N to PE	Yes	1500	-	P
V1/V2/V3 to N	Yes	1800	-	P
L/N and accessible parts with metal foil	Yes	3000	-	P
V1/V2/V3/N and accessible parts	Yes	3600	-	P

[1] Record the fault, test or treatment applied before the dielectric strength test. [2] Humidity preconditioning required.
NOTE: Test duration may be recorded.

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Clause	Requirement — Test	Result — Remark	Verdict

6.10.2	TABLE: Cord anchorage				Form A.19	N/A
Location	Mass kg	Pull N	Verdict	Torque Nm	Verdict	Comment
Dielectric strength test for 1 min. (6.8.3.1).....:			V r.m.s.			
Supplementary information:						

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Clause	Requirement — Test	Result — Remark	Verdict

7.	**TABLE: Protection against mechanical HAZARDS**	**Form A.20**	N/A
7.3.4	Limitation of force and pressure		—
7.3.5	Gap limitations between moving parts		—

Part / Location	Clause 7.3.4		Clause 7.3.5.1								Clause 7.3.5.2			Verdict	Comments
	Continuous	Temporary	Minimum gaps [mm]								Maximum gaps [mm]				
	Contact pressure max. 50 N /cm² @ max. 150 N	max. 250 N / 3 cm² @ max. 0,75 s	Torso 500	Head 300	Leg 180	Foot 120	Toes 50	Arm 120	Hand 100	Finger 25	Head 120	Foot 35	Finger 4	t	
Supplementary information:															

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Clause	Requirement – Test	Result - Remark	Verdict
7.4	**TABLE: Stability**	**Form A.20A**	P
	Equipment height / mass.....:	mm kg	—
	Equipment (Containers) loaded..... :	[~~yes~~ / no]	—
	Castors at unfavourable position..... :	[yes / ~~no~~]	—
	Doors, drawers and movable arms closed.....:	[~~yes~~ / no]	—
	Doors and drawers at unfavourable position..... :	[~~yes~~ / no]	—

Location	Tilt angle	Applied force				Comments	Verdict
	10°	250 N	20% [N]	800 N	4 times load [N]		
Front side	√	—	—	—		—	N/A
Left side	√	—	—	—		—	N/A
Rear side	√	—	—	—		—	N/A
Right side	√	—	—	—		—	N/A
Top side	√	—	—	—		—	N/A
Working surface	√	—	—	—		—	N/A
Ledge	√	—	—	—	—	—	N/A
Castor / support foot	√	—	—	—	√	—	N/A
Castor / support foot removed	√	—	—	—		—	N/A

Supplementary information:

7.6	**TABLE: Wall mounting**	**Form A.20B**	N/A
	Equipment weight.....:	kg	—
	Equipment mounted as specified by manufacturer...:	[yes / no]	—
	Equipment mounted at plasterboard (drywall).....:	[yes / no]	—
	More than one fastener used.....:	[yes / no]	—
	Test maintained (after 5 s to 10 s to full load).....:	1 min	—

Location	Applied weight		Comments	Verdict
	4 times weight [kg]	2 times weight [kg]		
-	-	-	-	-

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IEC 61010-1			
Clause	Requirement – Test	Result - Remark	Verdict
8.2	**TABLE: ENCLOSURE rigidity test**	**Form A.21A**	P
8.2.1	Static test		P
	Material of enclosure..... :	~~Metal /~~ non-metallic	—
	Preparation for the test:	-	—
	Operated at ambient temperature..... :	40 °C 2 h	—
Location		Comments	Verdict
1) Enclosure		30N force. No damage, no hazards.	P
Supplementary information:			
8.2.2	**TABLE: Impact test**		P
	Material of enclosure..... :	~~Metal /~~ non-metallic	—
	Corresponding IK-code..... :	IK08	—
	Preparation for the test:	10 minutes	—
	Cooled to (temperature)..... :	24.5 °C	—
Location		Comments	Verdict
1) Enclosure		No damage.	P
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IEC 61010-1			
Clause	Requirement – Test	Result - Remark	Verdict
8.3	**TABLE: Drop test**	**Form A.21B**	P
8.3.1	Other equipment		N/A

Location	Raised up to		Comments	Verdict
	[mm]	30 °		

Supplementary information:

8.3.2	HAND-HELD EQUIPMENT and DIRECT PLUG-IN EQUIPMENT		P
	Material of enclosure..... :	~~Metal /~~ non-metallic	—
	Preparation for the test:	10 minutes	—
	Cooled to (temperature)..... :	-10 °C	—

Location	Comments	Verdict
1) Side	No damage, no hazards	P
2) Edge	No damage, no hazards	P
3) Corner	No damage, no hazards	P

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Clause	Requirement — Test	Result — Remark	Verdict

9	TABLE: Protection against the spread of fire		Form A.22	P
Item	Source of HAZARD or area of the equipment considered (circuit, component, liquid etc.)	Protection Method (9.1 a, b or c)	Protection details	Verdict
1	Internal circuits	9a	a: See Form A.1 for details.	Pass
2	Internal circuits	9c	a: See Form A.1 for details.	Pass
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Clause	Requirement — Test	Result — Remark	Verdict

9.3.2	**TABLE: Constructional requirements**	**Form A.23**	P
14.7	Printed circuit boards		P
UL approved PCB (V-0) used.			
Material tested..... :	See appended TABLE 1		—
Generic name..... :	See appended TABLE 1		—
Material manufacturer..... :	See appended TABLE 1		—
Type..... :	See appended TABLE 1		—
Colour..... :	--		—
Conditioning details..... :	--		—

		Sample					
		1	2	3	4	5	6
Thickness of specimen	mm						
Duration of flaming after first Application	s						
Duration of flaming plus glowing After second application	s						
Specimen burns to holding clamp	Yes/No						
Cotton ignited	Yes/No						
Sample result	Pass/Fail						
Supplementary information:							

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Clause	Requirement — Test	Result — Remark	Verdict

9.4	**TABLE: Limited-energy circuit**					**Form A.24**	N/A
Item	9.4 a)	9.4 b) Current limitation (NOTE)		9.4 c)	Decision	Comments	
or Location (see Form A.22)	Maximum potential in circuit voltage r.m.s./d.c. V	Maximum available current A	Overload protection after 120 s A	Circuit separation	Yes/No		

NOTE – Maximum values see Tables 17 and 18.of 61010-1

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Clause	Requirement — Test	Result — Remark	Verdict

9.5	**TABLE: Requirements for equipment containing or using flammable liquids**	**Form A.25**	N/A
Type of liquid	9.5 Flammable liquids		Verdict
	b) Quantity	c) Containment	

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IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

10.	**TABLE: Temperature Measurements** **Form A.26A**	P
10.1	Surface temperature limits – NORMAL CONDITION and / or SINGLE FAULT CONDITION	P
10.2	Temperature of windings- NORMAL CONDITION and / or SINGLE FAULT CONDITION	P
10.3	Other temperature measurements	P

Operating conditions:	Normal operation/ Horizontal		
Voltage (V)..... :	230V AC	Test room ambient temperature (ta)....:	25°C
Frequency (Hz).....:	60	Test duration..... :	2.5h

Part / Location	t_m °C *(measure)*	t_c °C *(K+40)*	t_{max} °C *(limit)*	Verdict	Comments
AC connector	47.6	--	70	Pass	--
T1 winding	51.5	--	110	Pass	--
T1 core	49.5	--	110	Pass	--
Internal wire	36.6	--	70	Pass	--
PCB near U1	48.4	--	130	Pass	--
PCB near U3	49.6	--	130	Pass	--
PCB near U5	42.6	--	130	Pass	--
PCB near U6	38.1	--	130	Pass	--
PCB near U9	35.6	--	130	Pass	--
Plastic enclosure inside near PCB	29.1	--	Ref.	Pass	--
Plastic enclosure outside near PCB	27.7	--	77	Pass	--
Ambient	25.0	--	--	Pass	--

NOTE 1 - t_m = measured temperature
t_c = t_m corrected (t_m–t_a+ **40 °C** or max. RATED ambient)
t_{max} = maximum permitted temperature
NOTE 2 - see also 14.1 with reference to component operating conditions
NOTE 3 - Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Form use additional form if necessary
NOTE 4 - see Form A.26B for details of winding temperature measurements

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IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

10.2	**TABLE: Temperature of windings** **Form A.26B** **Resistance method Temperature Measurements**	N/A
4.4.2.7	MAINS transformers	N/A
14.2.1	Motor temperatures	N/A

Operating conditions.. :	Locked							
Frequency..... :	Hz	Test room ambient temperature (ta1/ta2). :			/		°C (initial / final)	
Voltage..... :	V	Test duration..... :			h		min	
Part / Designation	Rcold [Ω]	Rwarm [Ω]	Current [A]	t_r [K]	t_c [°C]	t_{max} [°C]	Verdict	Comments

NOTE 1- R_{cold} = initial resistance R_{warm} = final resistance
t_r = temperature rise t_c = t_r corrected (t_c= t_r + [40 °C or max RATED ambient])
t_{max} = maximum permitted temperature
NOTE 2 - Indicate insulation class (IEC 60085) under comments (optional)
NOTE 3 - Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Form use additional form if necessary

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Clause	Requirement — Test	Result — Remark	Verdict

10.5.2	**TABLE: Resistance to heat of non-metallic ENCLOSURES**	**Form A.27**	P
	Test method used:	a)	—
	Non operative treatment..... :	[X]	P
	Empty ENCLOSURE..... :	[ ]	N/A
	Operative treatment..... :	[ ]	N/A
	Temperature during tests..... :	88	—

Description	Material	Comments	Verdict
Whole unit	Plastic material	No shrinkage or distortion	Pass

NOTE – Within 10 minutes of the end of treatment suitable tests in acc. to 8.2 and 8.3 must be conducted and pass criteria of 8.1.

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Clause	Requirement — Test	Result — Remark	Verdict

10.5.3	**TABLE: Insulating Materials**	**Form A.28**	P
10.5.3 1)	Ball-pressure test		P
	Max. allowed impression diameter.....:	2 mm	—

Part	Test temperature °C	Impression Diameter (mm)	Verdict
Plastic enclosure	125	Max. 1.1	Pass

Supplementary information:

10.5.3 2)	**Vicat softening test (ISO 306)**	**Form A.29**	N/A

Part	Vicat softening temperature °C	Thickness of sample (mm)	Verdict

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Clause	Requirement — Test	Result — Remark	Verdict

8	**TABLE: Mechanical resistance to shock and impact** **Form A.30**	P
11	**Protection against HAZARDS from fluids**	P

Voltage tests can be carried out once after performing the tests of clause **8** and clause **11**. However, if voltage tests are carried out separately after each set of tests, two forms can be used.

	Clause 8 tests				Clause 11 tests				Working voltage V	Test voltage V	Verdict	Comments
Location (see Form A.14)	Static (8.2.1) 30N	Impact (8.2.2)	Normal (8.3.1)	Handheld Plug-in	Cleaning (11.2)	Spillage (11.3)	Overflow (11.4)	IEC 60529 (11.6)				
See Form A.14	Yes	-	-	Yes	Yes	-	-	IP20	250	3000VAC	P	

NOTE – Use r.m.s., d.c. or peak to indicate the used test voltage.

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Clause	Requirement — Test	Result — Remark	Verdict

11.7.2	TABLE: Leakage and rupture at high pressure				Form A.31	N/A
Part	Maximum permissible working pressure Mpa	Test pressure MPa	Leakage Yes / No	Deformation Yes / No	Burst Yes / No	Comments

NOTE – see also Annex G with requirements for USA and Canada.

Supplementary information:

11.7.3	Leakage from low-pressure parts		Form A.32	N/A
Part	Test pressure MPa	Leakage Yes / No	Comments	

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Clause	Requirement — Test	Result — Remark	Verdict

12.2.1	**TABLE: Ionizing radiation**	**Form A.33**	N/A
12.2.1.2	Equipment intended to emit radiation		

Locations tested	Measured values µSv/h	Verdict	Comments

Supplementary information:

12.2.1.3	**Equipment not intended to emit radiation**	**Form A.34**	N/A
	Max. allowed effective dose rate at 100 mm……:	1 µSv/h	—

Locations tested	Measured values µSv/h	Verdict	Comments

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Clause	Requirement — Test	Result — Remark	Verdict

12.5.1	**TABLE: Sound level**	**Form A.35**	N/A

Locations tested	Measured maximum sound pressure level Db(A)	Calculated maximum sound power level
At operator's normal position and at bystanders' positions		
a)		
b)		
c)		
d)		
e)		
f)		

Supplementary information:

12.5.2	**Ultrasonic pressure**	**Form A.36**	N/A

Locations tested	Measured values		Comments
	dB	kHz	
At operator's normal position			
At 1 m from the ENCLOSURE			
a)			
b)			
c)			
d)			
e)			

NOTE – No limit is specified at present, but a limit of 110 dB above the reference pressure value of 20 μPa is under consideration for applicable frequencies between 20 kHz and 100 kHz.

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IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

13.2.2	**TABLE: Batteries**	**Form A.37**	N/A
	Battery load and charging circuit diagram:		
	Battery type.....:		—
	Battery manufacturer/model/catalogue No.....:		—
	Battery ratings..... :		—
	Reverse polarity instalment test		N/A

Single component failures	Verdict	
Component	Open circuit	Short circuit

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IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

14.3	**TABLE: Overtemperature protection devices**	**Form A.38**	N/A

Reliability test			
Component	Type (NOTE)	Verdict	Comments

NOTE:
NSR = non-self-resetting (10 times)
NR = non-resetting (1 time)
SR = self-resetting (200 times)

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Clause	Requirement — Test	Result — Remark	Verdict

4.4.2.7	**TABLE: MAINS transformer**				**Form A.39**	N/A
4.4.2.7.2	Short circuit					N/A
14.6	MAINS transformers tested outside equipment					N/A
Type.....:						—
Manufacturer.....:						—
Test in equipment						N/A
Test on bench						N/A
Test repeated inside equipment (see 14.6)						N/A
Optional – Insulation class (IEC 60085) of the lowest rated winding.....:						—
Winding identification						
Type of Protector for winding (NOTE 1)						
Elapsed time						
Current, A primary						
secondary						
Winding temperature, °C primary						
(see NOTE 2) secondary						
Tissue paper / cheesecloth OK? (Pass / Fail)						
Voltage tests (see NOTE 3)						
Primary to secondary	_____ V ____					
Primary to core	_____ V ____					
Secondary to secondary	_____ V ____					
Secondary to core	_____ V ____					
Verdict						

NOTE 1: Primary fuse - PF / ( ) A
Secondary fuse - SF / ( ) A
Overtemperature protection - OP / ( ) °C
Impedance protection - Z

NOTE 2: Indicate method of measurement TC = with thermocouple
R = resistance method
If resistance method is used, record resistance in cold and warm condition in FormA.26B!

NOTE 3: Record the voltage applied and the type of voltage (r.m.s. / d.c. / peak) and for results use NB = no breakdown or B = breakdown

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Clause	Requirement — Test	Result — Remark	Verdict

14.8	**TABLE: Transient overvoltage limiting devices**	**Form A.41**	N/A

Component / Designation	Overvoltage Category	MAINS voltage V rms	Test voltage V	t_m °C	t_c °C	t_{max} °C	Rupture Yes / No	Circuit breaker tripped	Verdict	Comments

Test room ambient temperature ....: 25°C

NOTE - t_m = measured temperature

t_c = t_m corrected (t_m–t_a+ **40 °C** or max. RATED ambient)

t_{max} = maximum permitted temperature

Conformity is checked by applying 5 positive and 5 negative impulses with the applicable impulse withstand voltage, spaced up to 1 min apart, from a hybrid impulse generator (see IEC 61180-1).

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Clause	Requirement – Test	Result — Remark	Verdict

Annex H	**TABLE: Qualification of conformal coating for protection against pollution**	**Form A.42**	N/A

Technical properties		
Manufacturer.....		—
Type.....		—
Meet requirements of ANSI / UL	[yes / no]	
Manufacturer declaration of coating	[yes / no]	
Operating temperature of coating.....	[ ] °C	
Comparative tracking index (CTI).....	[ ]	
Insulation resistance.....	[ ] Ω	
Dielectric strength.....	[ ] V	
UV resistance (if required).....	[yes / no]	
Flammability rating.....		
Preparation of the test specimens	[yes / no]	

Item	Test conditioning	Parameter	Td	Samples						Verdict	Comments
			h	1	2	3	4	5	6		
1	Scratch resistance										
	Visual inspection										
2	Cold		24								
3	Dry heat		48								
4	Rapid temp. change										
5	Damp heat		24								
6	Adhesion of coating	5 N									
	Visual inspection										
7	Humidity		48								
8	Insulation resistance	≥ 100 MΩ									
	Visual inspection										

NOTE Td = Test duration time

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Clause	Requirement – Test	Result — Remark	Verdict

	TABLE: Additional or special tests conducted	**Form A.43**	N/A
Clause and name of test	Test type and condition	Observed results	—

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Clause	Requirement — Test	Result — Remark	Verdict

	TABLE 1: - List of components and circuits relied on for safety					P
Unique component reference or location	Application/function	Manufacturer / trademark (NOTE 1)	Type / model	Technical data (NOTE 2)	Standard	Mark(s) of conformity evidence of acceptance (NOTE 3 and 4)
AC connector		ZHEJIANG JIESHITAI ELECTRONICSCOLTD	A3962	250Vac, 7.0A, 85 °C	UL 1977	UL E314369
Plastic enclosure	--	SILVER AGE ENGINEERING PLASTICS(DONGGUAN) CO LTD	790	V-0, min.1.6 mm thick, 85 °C	UL94, UL 746	UL E225348
Internal wire	--	Shenzhen Dingyu Electrical Technology Co Ltd	1571	Min. 26AWG, VW-1. Min. 80°C	UL 758	UL E365423
PCB	--	Wenzhou Yongli Electron Co.,Ltd.	XT-1,XT-2,XT-3	130°C, V-0	UL 94, UL 796	UL E322382
LCD display	--	Kunshan Quanbao Electronics Co., Ltd.	MT61 LCD Display	1.16inch	EN 61010-1	Test with appliance

NOTE → 1 List all different manufacturers of the above components → 4 asterisk indicates mark assuring agreed level of surveillance
→ 2 May include electrical, mechanical values
→ 3 List licence no or method of acceptance

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IEC 61010_1P ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
ATTACHMENT TO TEST REPORT **IEC 61010-1** **EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES** (Electrical Equipment For Measurement, Control, and Laboratory Use; Part1: General Requirements)			
Differences according to.....: EN 61010-1:2010/A1			
Attachment Form No..... : EU_GD_IEC61010_1P **Attachment Originator**.....: TÜV Rheinland LGA Products GmbH **Master Attachment**..... : Date 2021-04-12			
Copyright © 2021 IEC System for Conformity Testing and Certification of Electrical Equipment (IECEE), Geneva, Switzerland. All rights reserved.			
	CENELEC COMMON MODIFICATIONS (EN)		P
	Procedure for voltage tests		P
6.8.3.1	**The a.c. voltage test** *Replace the first sentence by the following sentence:* The voltage tester shall be capable of maintaining the test voltage throughout the test within +/- 5 % of the specified value.		P
Annex ZA (normative)	The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.		P
Annex ZZ (informative)	Relationship between this European standard and the safety objectives of Directive 2014/35/EU [2014 OJ L96] aimed to be covered		P

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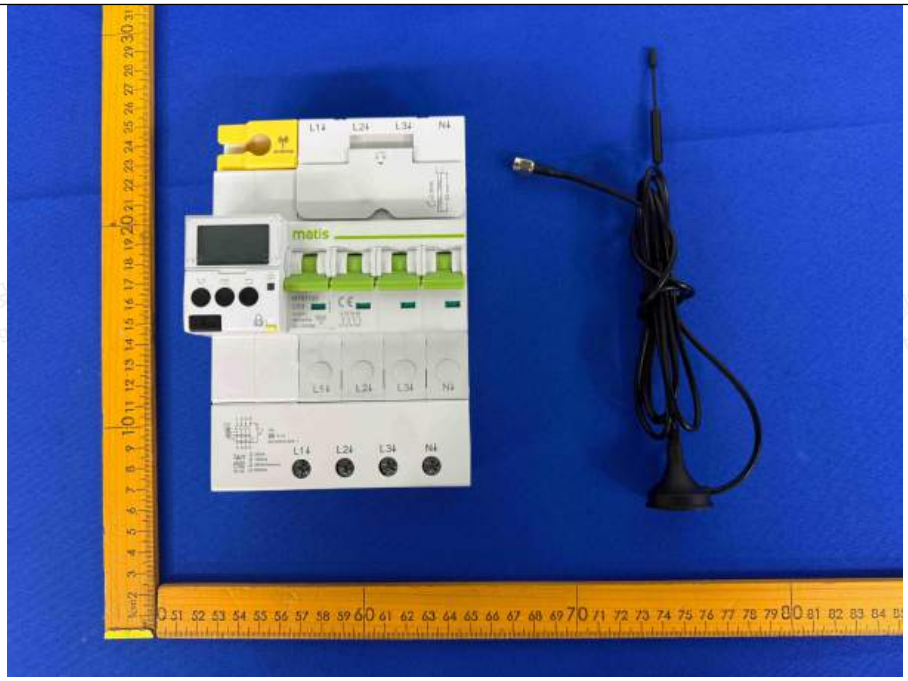

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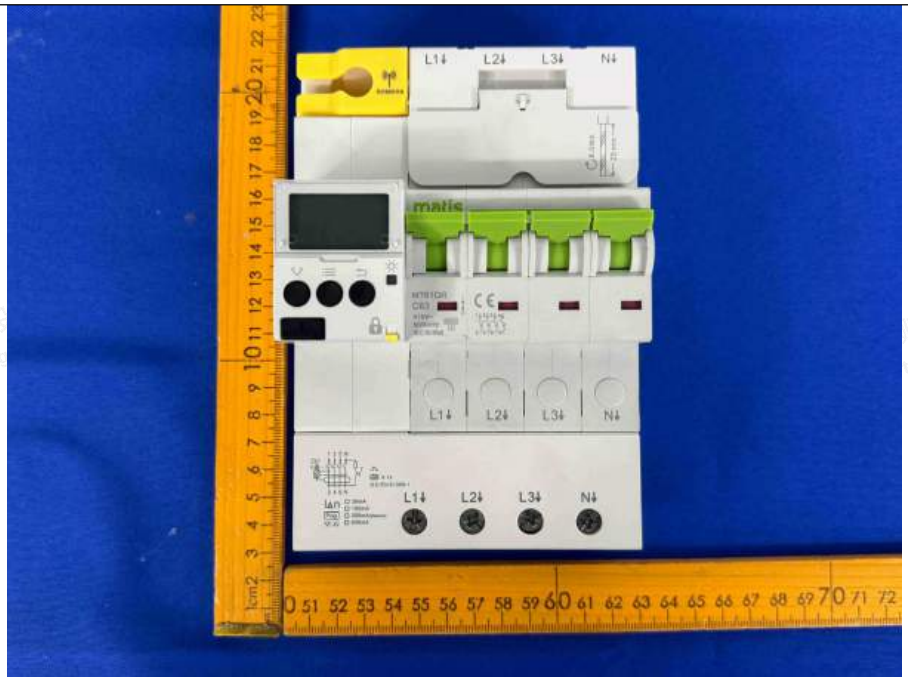

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Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com
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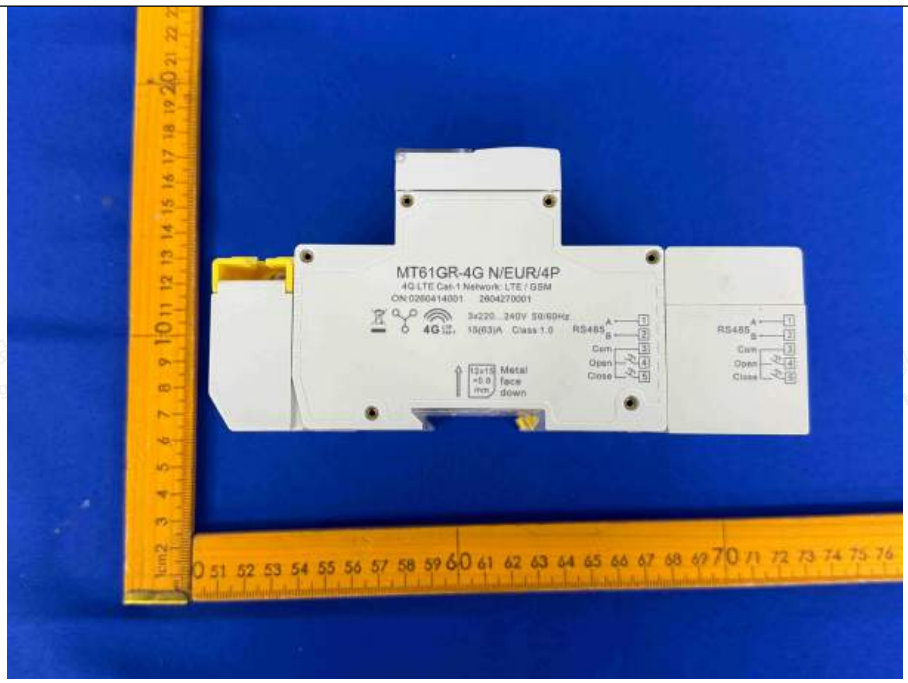
Details of: External View



Details of: External View



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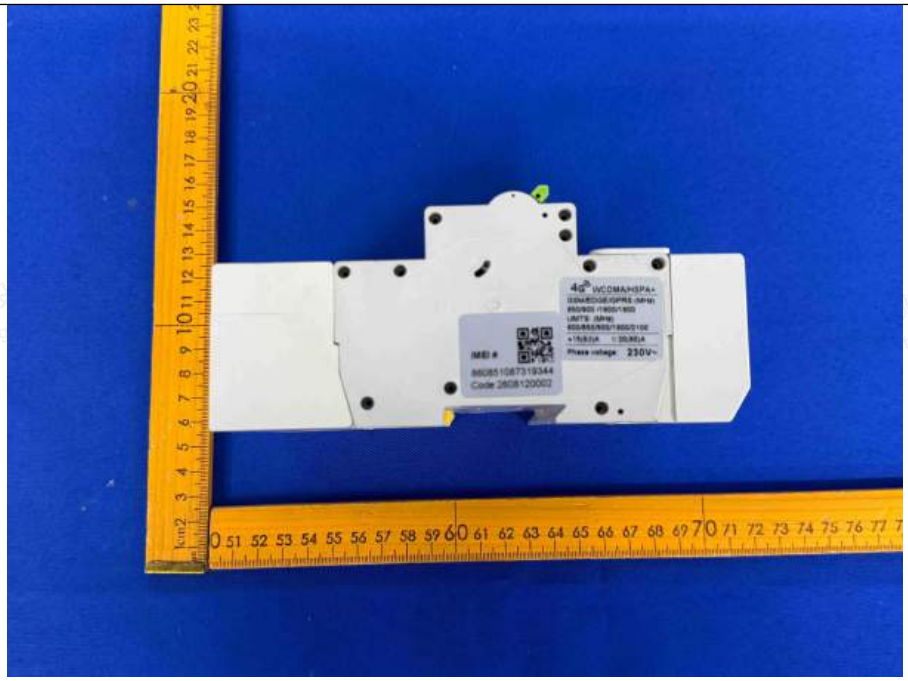
Details of: External View



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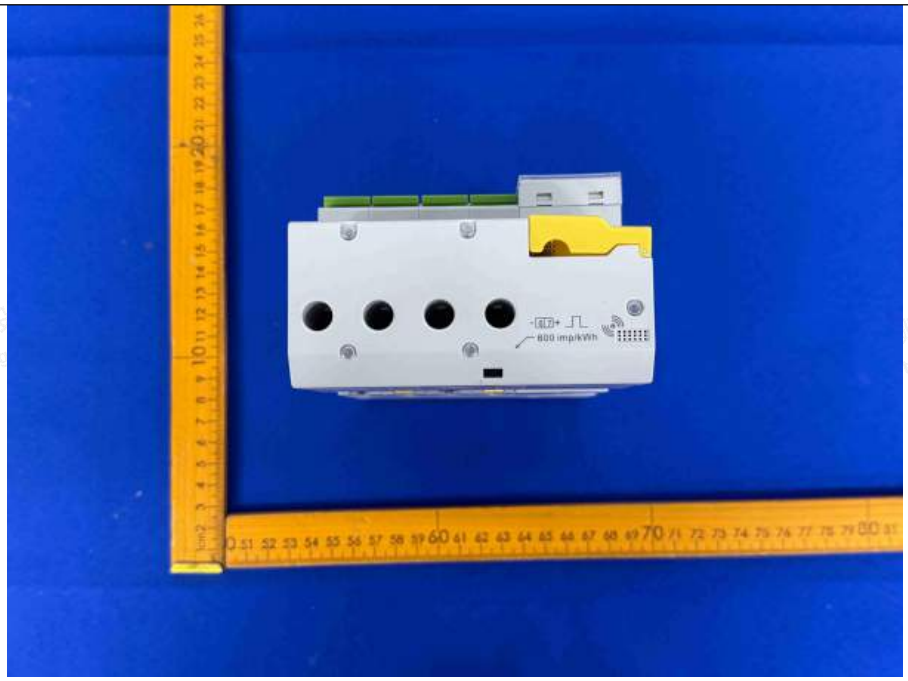

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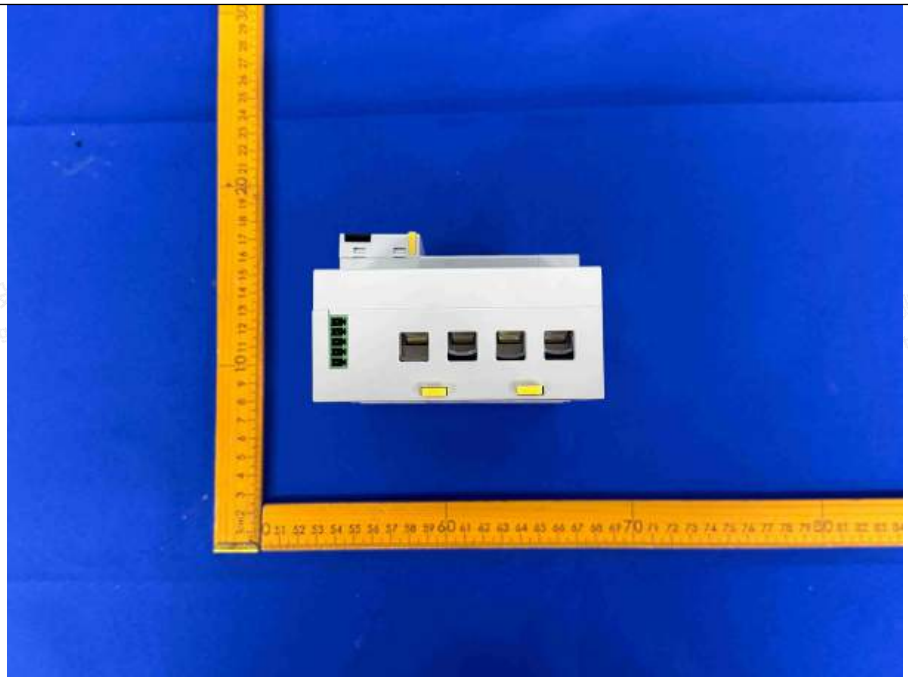
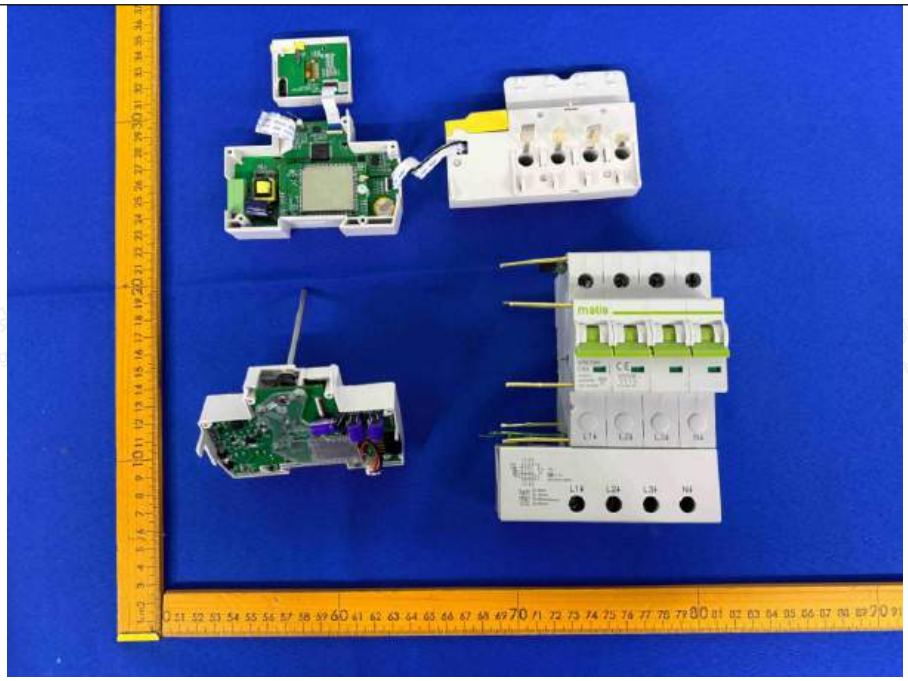
Details of: External View



Details of: Internal View



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Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com
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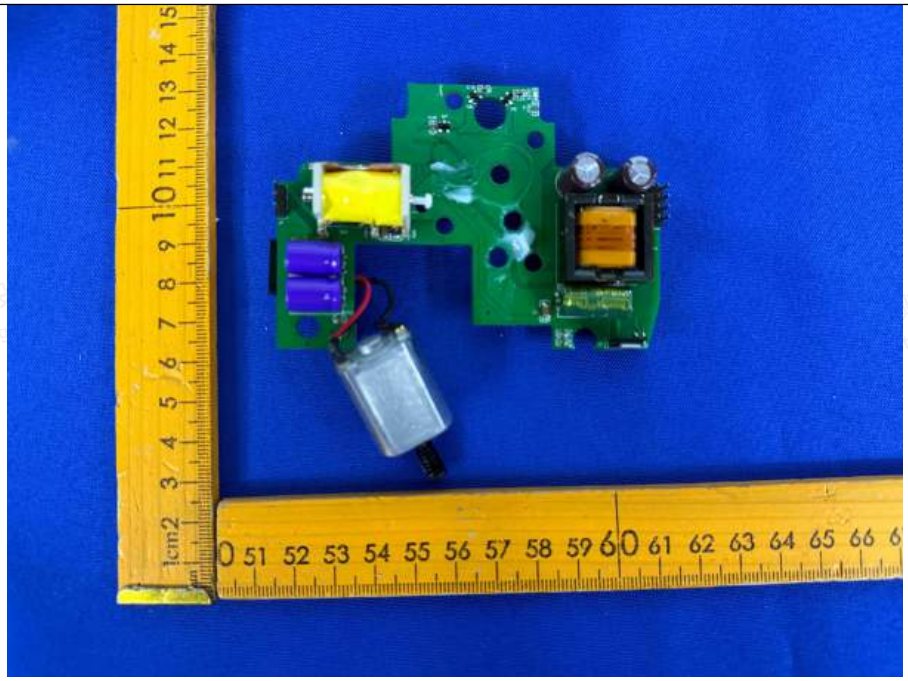
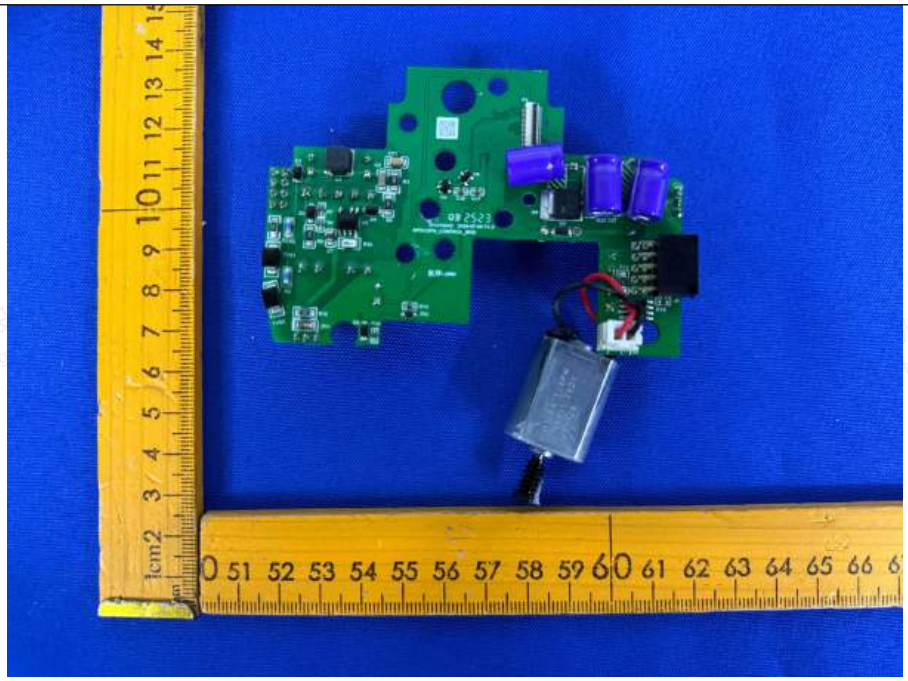
Details of: PCB View



Details of: PCB View



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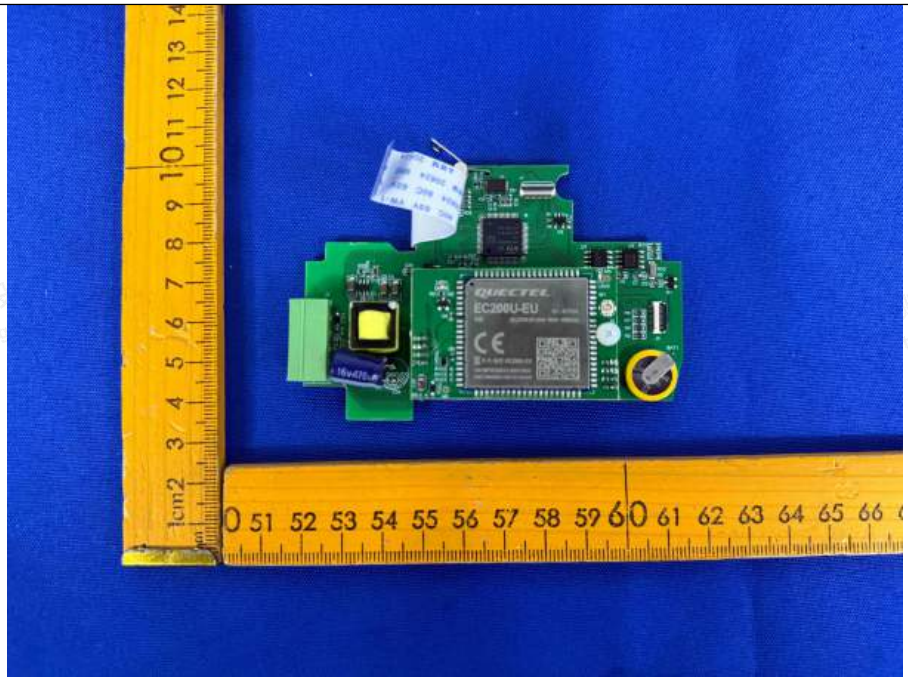
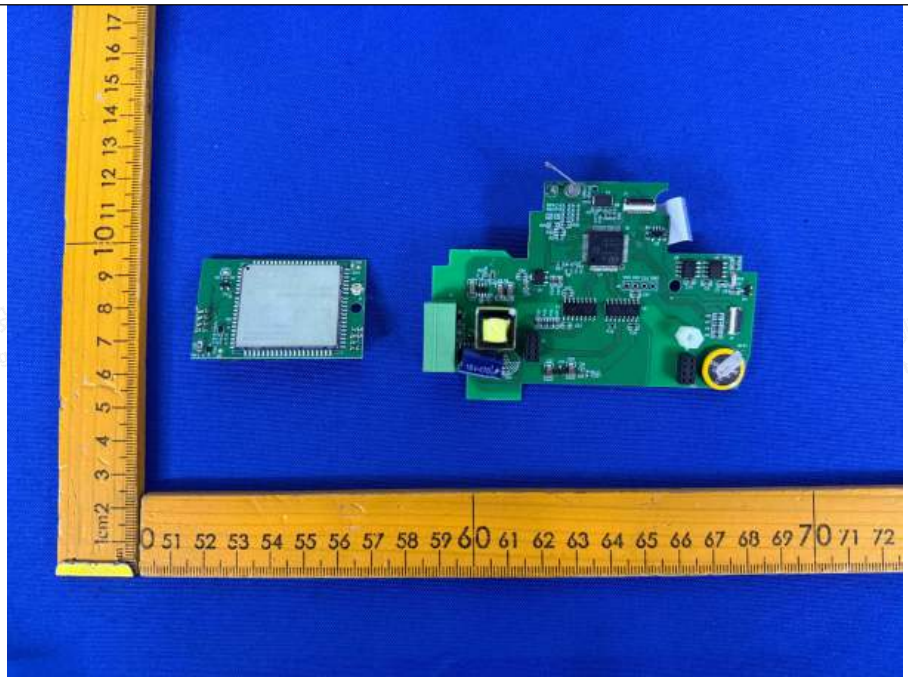
Details of: PCB View



Details of: PCB View



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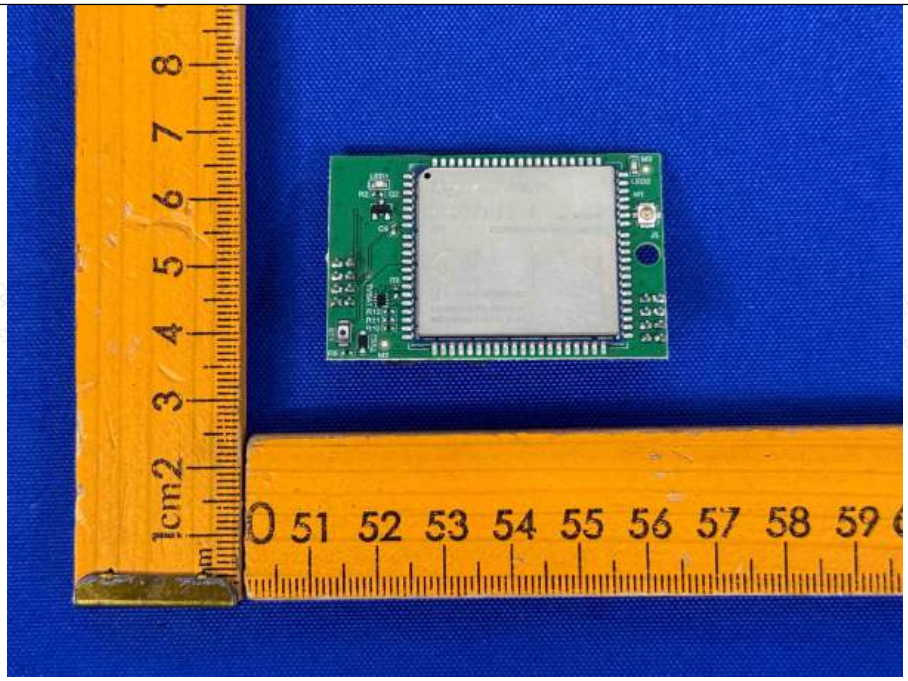
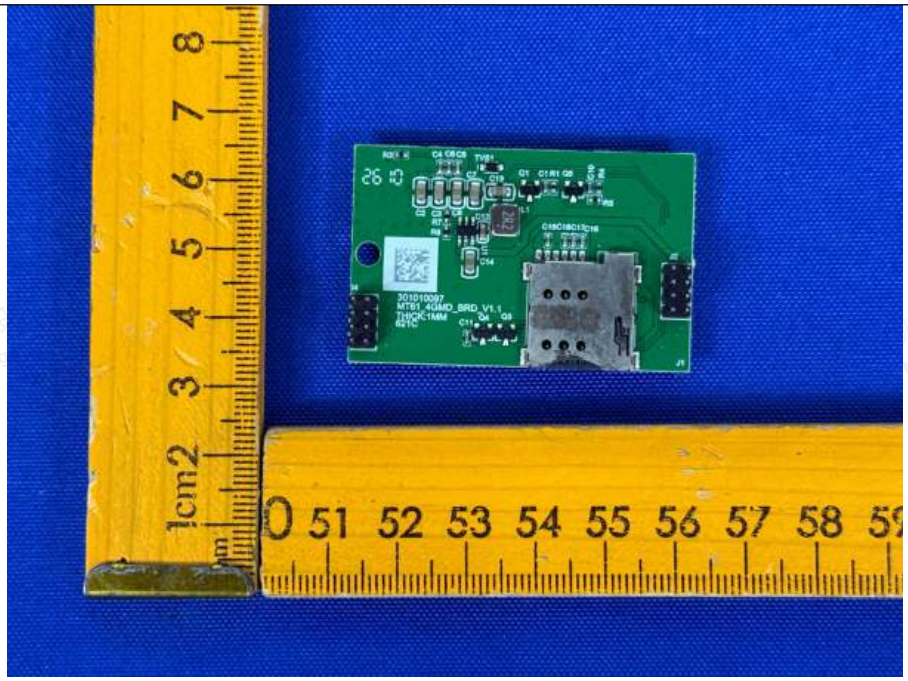
Details of: PCB View



Details of: PCB View



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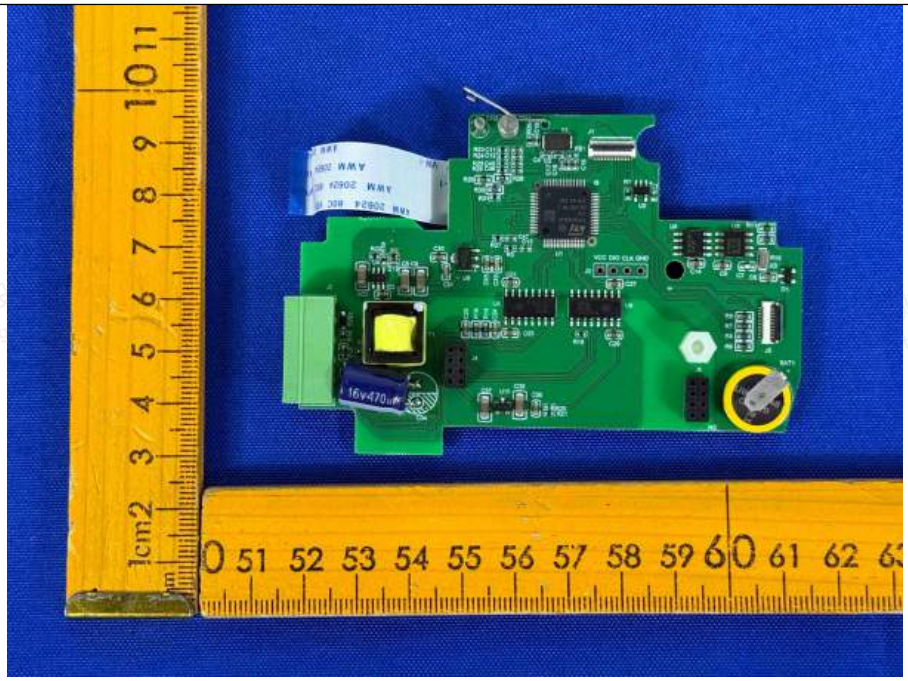
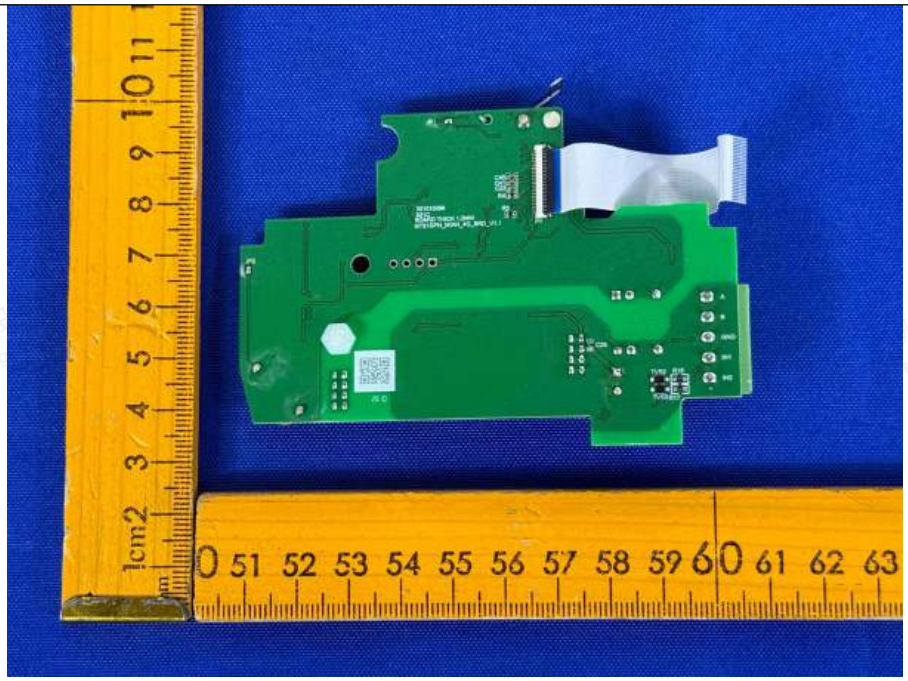


Details of: PCB View



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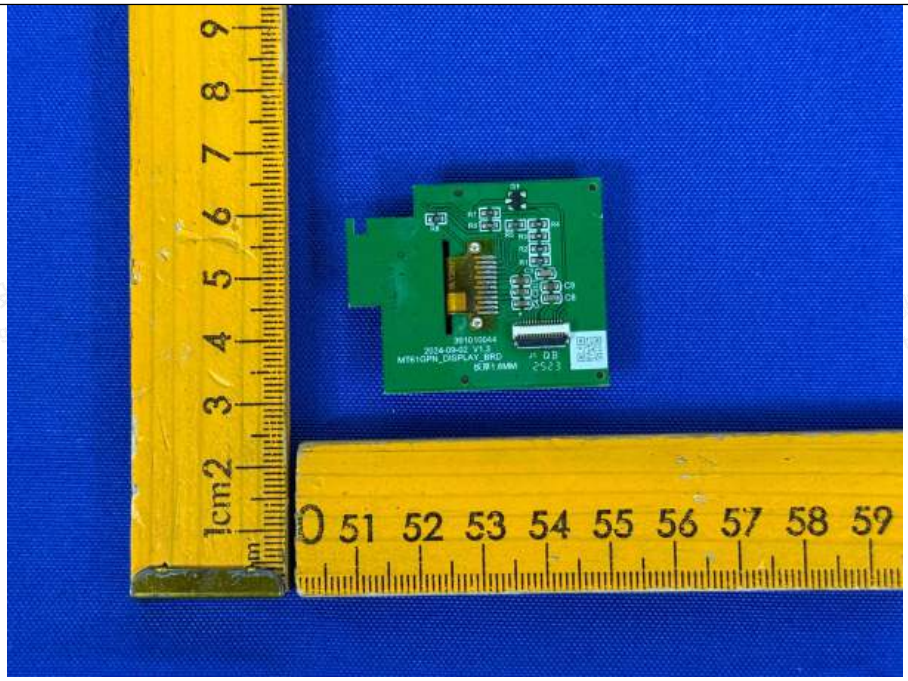
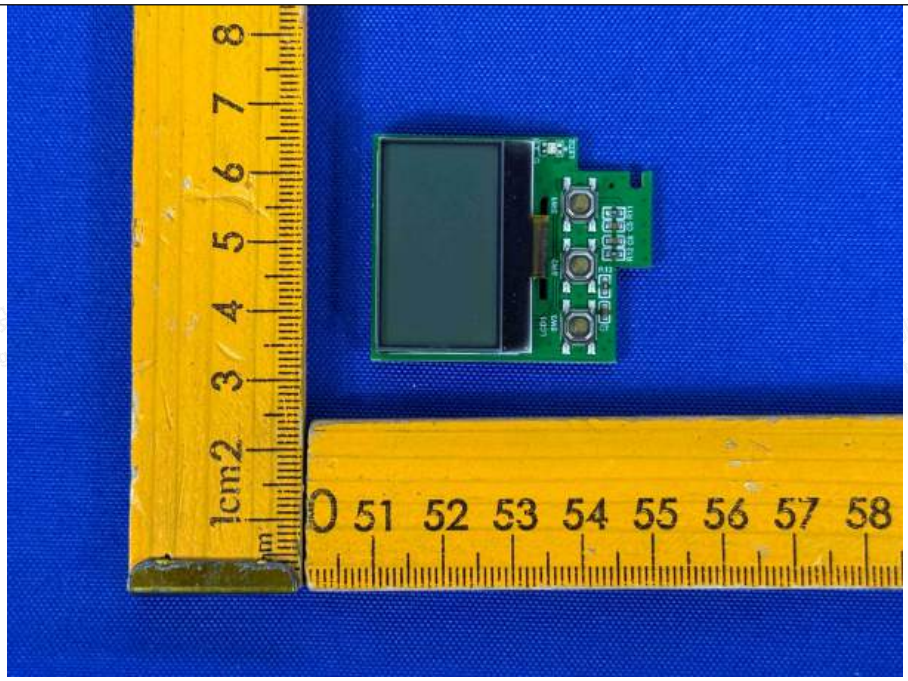
Details of: PCB View



Details of: PCB View



----------End of test report----------

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测试报告

No. C220418069001-1 日期: 2022年04月29日 第1页,共31页

申请公司: 上海麦豆电气有限公司

申请公司地址: 上海市浦东新区临港新片区环湖西三路83号318-320

以下测试之样品是由申请者所提供及确认

样品名称:	MT61GP
样品数量:	01件
CPST 参考编号:	C220418069
收样日期:	2022年04月18日
测试周期:	2022年04月18日至2022年04月29日
测试方法:	请参见下一页
测试结果:	请参见下一页

谨代表
东莞市欧冠检测技术服务有限公司

编 写：	审 核:	签 发:
Fair Lu	Sunshine Liu	Will Pan
卢剑飞, Fair	刘小芳, Sunshine	潘坚定, Will
报告编写员	报告审核员	技术总监

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结　　论:

测试样品	测试项目	结果
MT61GP	1.RoHS 指令 2011/65/EU 附录Ⅱ的修正指令(EU)2015/863	
	— 铅、汞、镉、六价铬、多溴联苯和多溴二苯醚含量	**合格**
	— 邻苯二甲酸二(2-乙基己基)酯(DEHP)、邻苯二甲酸苯基丁酯(BBP)、邻苯二甲酸二丁酯(DBP)、邻苯二甲酸二异丁酯(DIBP)含量	**合格**

****

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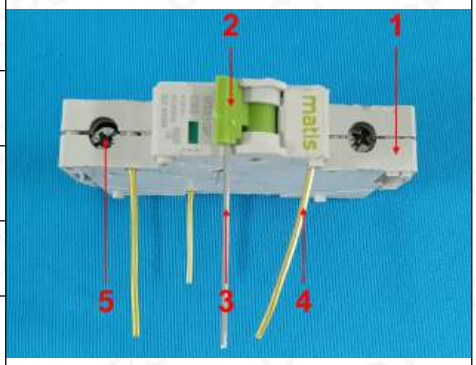
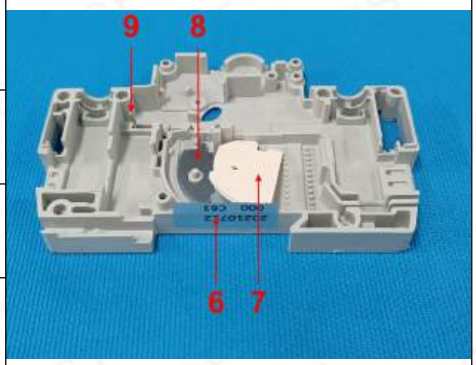
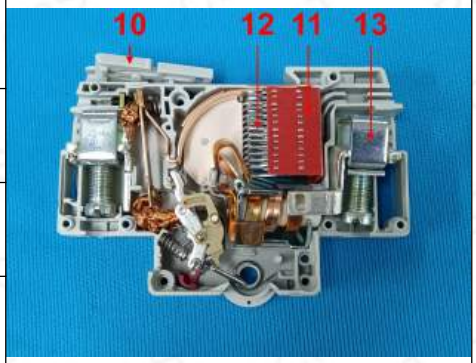
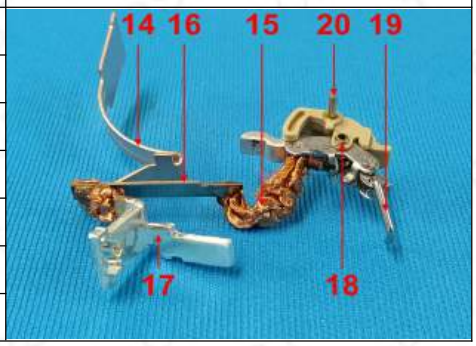
2. 测试项目描述和样品照片清单

样品编号	描述	图示
001	灰色塑料（外壳）	
002	绿色塑料	
003	银色金属	
004	金色金属	
005	彩色金属（螺丝）	
006	银色塑胶贴带黑色印刷	
007	白色塑料	
008	银色金属	
009	银色金属轴	
010	灰色塑料	
011	红色纸	
012	银色金属	
013	彩色金属（螺母）	
014	铜色金属	
015	铜色金属丝	
016	银色金属	
017	银白色金属	
018	银色金属（弹簧）	
019	银色金属轴	
020	银色金属轴	

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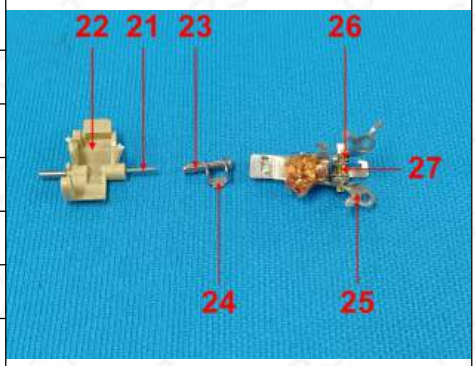
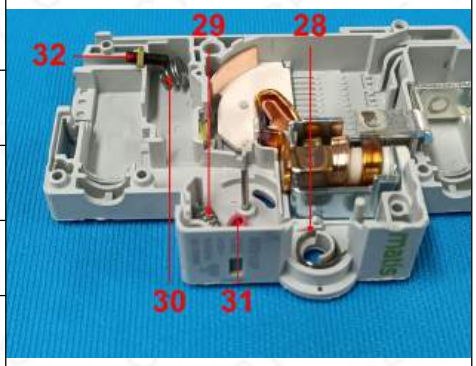
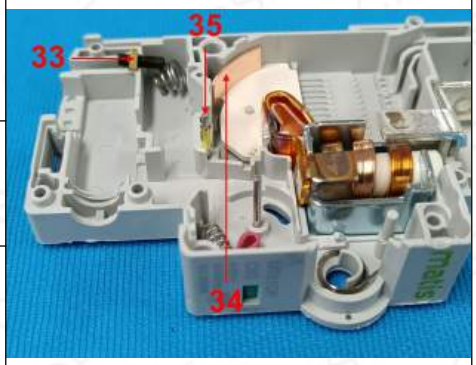
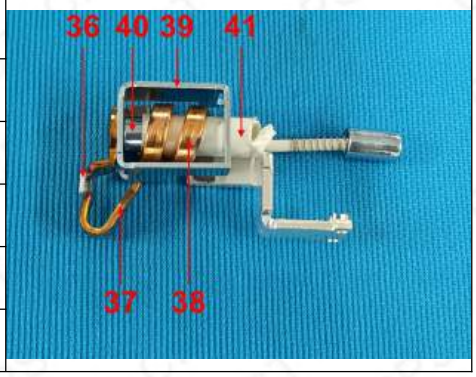
样品编号	描述	图示
021	银色金属轴	
022	米黄色塑料	
023	银色金属轴	
024	银色金属	
025	银色金属	
026	银色金属（弹簧）	
027	金色金属	
028	银色金属（弹簧）	
029	银色金属（弹簧）	
030	银色金属（弹簧）	
031	红色塑料带绿色涂层	
032	黑色金属（螺丝）	
033	金色金属（螺母）	
034	铜色金属	
035	银色金属轴	
036	银白色金属	
037	铜色金属	
038	铜色金属	
039	银色金属	
040	银色金属	
041	白色塑料	

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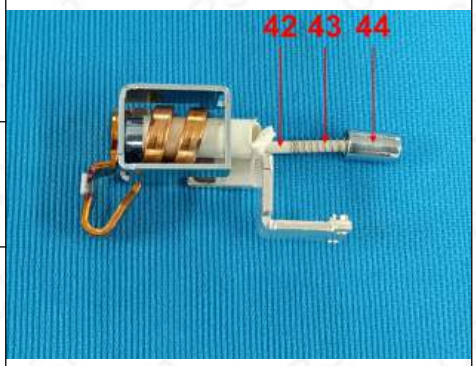
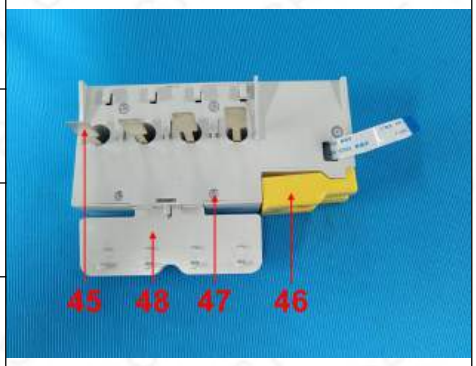
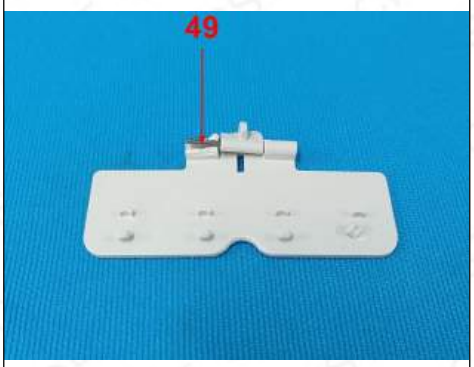
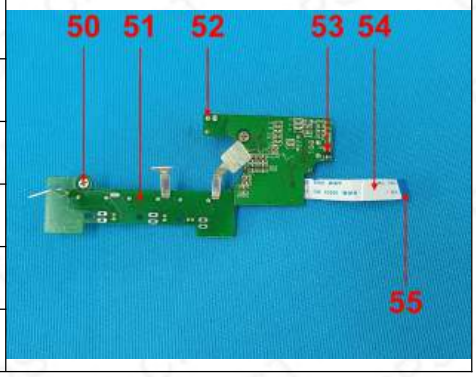
样品编号	描述	图示
042	白色塑料	
043	银色金属（弹簧）	
044	银色金属	
045	银色金属	
046	黄色塑料	
047	银色金属（铆钉）	
048	灰色塑料	
049	银色金属轴	
050	银色金属（螺丝）	
051	绿色 PCB	
052	银色焊锡	
053	黑色本体	
054	白色 FPC 带蓝色印刷	
055	蓝色塑胶	

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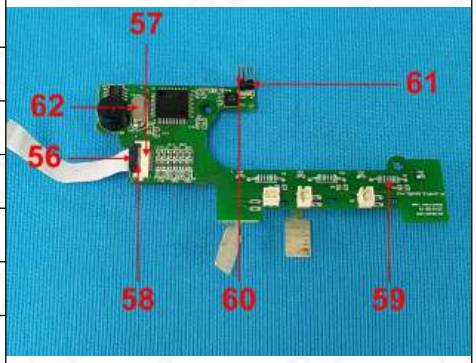
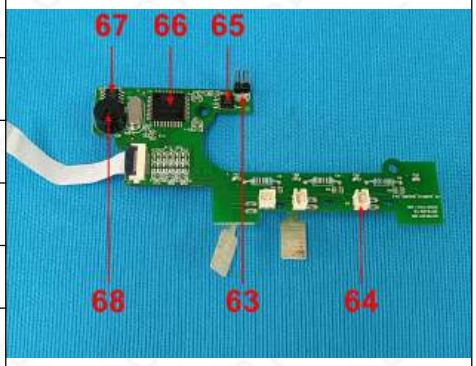
样品编号	描述	图示
056	黑色塑料（插槽）	
057	白色塑料（插槽）	
058	银色金属（插针）	
059	蓝色本体	
060	银色金属（插针）	
061	黑色塑料	
062	银色本体（晶振）	
063	白色塑料	
064	白色塑料（插槽）	
065	黑色本体	
066	黑色本体	
067	黑色本体	
068	黑色塑料（蜂鸣器）	
069	银色金属（蜂鸣器）	
070	银色金属（蜂鸣器）	
071	黑色磁圈（蜂鸣器）	
072	银色金属（蜂鸣器）	
073	铜色金属（线圈 蜂鸣器）	
074	黑色硬胶（蜂鸣器）	
075	绿色 PCB（蜂鸣器）	
076	银色焊锡（蜂鸣器）	

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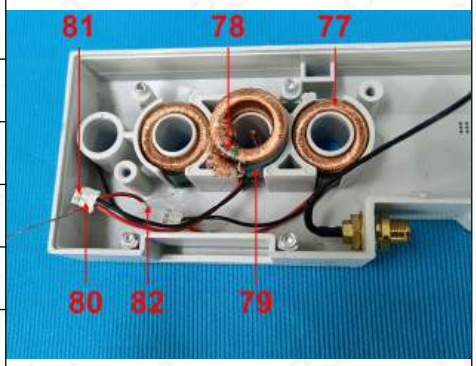
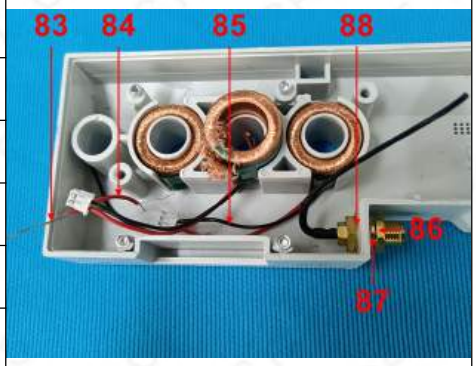
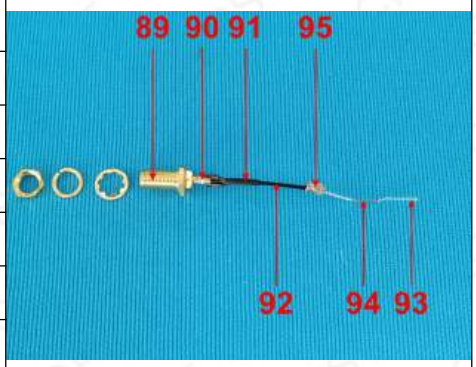
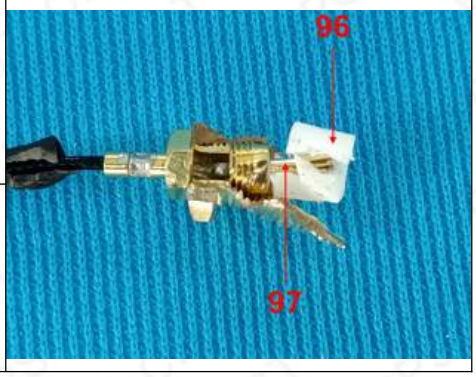
样品编号	描述	图示
077	铜色金属（线圈 电感）	
078	绿色磁石（电感）	
079	绿色胶带（电感）	
080	白色塑料	
081	银色金属（端子）	
082	银色焊锡	
083	银色金属（线芯）	
084	红色塑胶（电线外皮）	
085	黑色塑胶（电线外皮）	
086	金色金属（螺母）	
087	金色金属（垫圈）	
088	金色金属（垫圈）	
089	金色金属（螺柱）	
090	银色焊锡	
091	黑色塑胶套	
092	黑色塑胶（电线外皮）	
093	无色透明塑胶（电线外皮）	
094	银色金属（线芯）	
095	银色金属（线芯）	
096	白色塑料	
097	金色金属	

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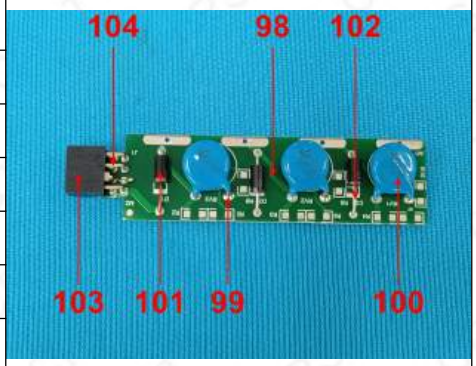
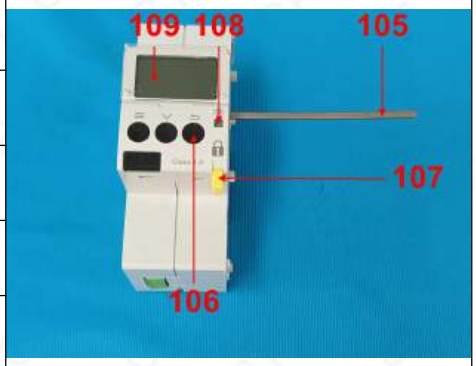
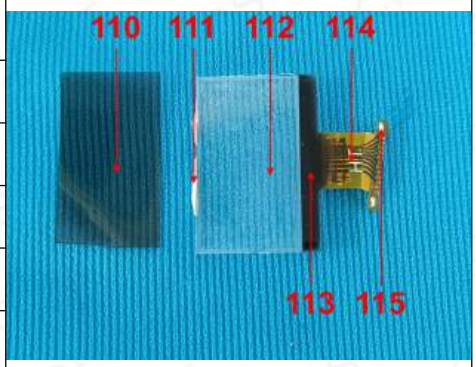
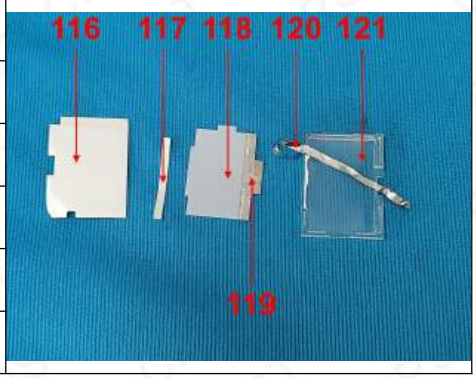
样品编号	描述	图示
098	绿色 PCB	
099	银色焊锡	
100	蓝色本体	
101	黑色本体	
102	银色金属（接脚）	
103	黑色塑料（插槽）	
104	银色金属（插槽）	
105	银色金属	
106	黑色塑料（按键）	
107	黄色塑料	
108	无色透明塑料	
109	无色透明塑料（显示屏）	
110	黑色塑胶（显示屏）	
111	白色胶（显示屏）	
112	无色透明玻璃（显示屏）	
113	黑色胶（显示屏）	
114	棕色 FPC（显示屏）	
115	银色焊锡（显示屏）	
116	白色塑胶（显示屏）	
117	白色双面胶（显示屏）	
118	白色塑胶（显示屏）	
119	银色塑胶（显示屏）	
120	银色塑胶（显示屏）	
121	无色透明塑料（显示屏）	

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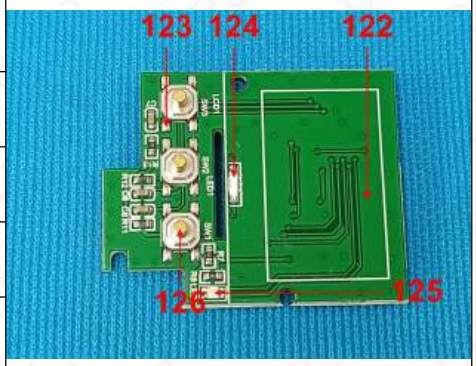
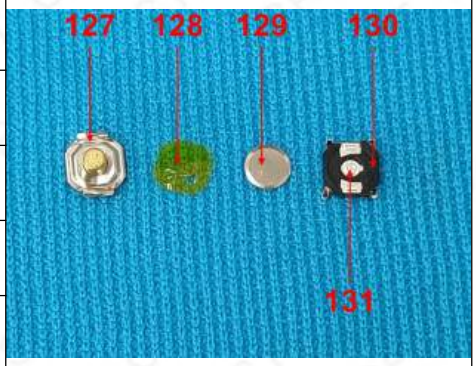
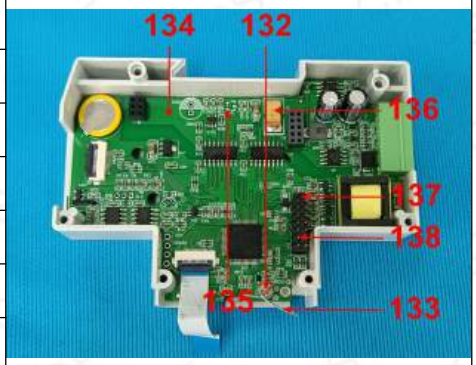
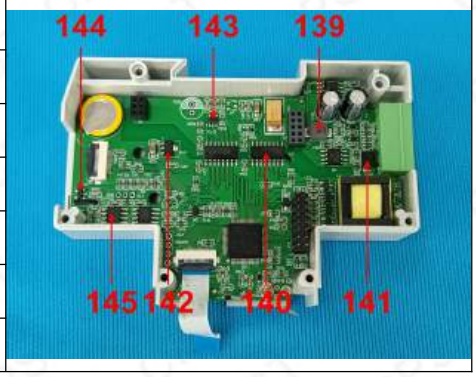
样品编号	描述	图示
122	绿色 PCB	
123	银色焊锡	
124	白色本体（LED）	
125	白色本体（LED）	
126	金色金属（开关）	
127	银色金属（开关）	
128	黄色塑胶膜（开关）	
129	银色金属（开关）	
130	黑色塑料（开关）	
131	银色金属（接脚 开关）	
132	彩色金属	
133	银色金属（弹簧）	
134	绿色 PCB	
135	银色焊锡	
136	黄色本体	
137	黑色塑料	
138	银色金属（插针）	
139	灰黑色本体（电感）	
140	黑色本体	
141	黑色本体	
142	黑色本体	
143	黑色本体	
144	黑色本体	
145	黑色本体	

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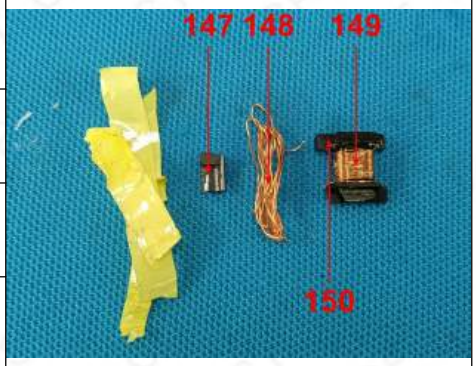
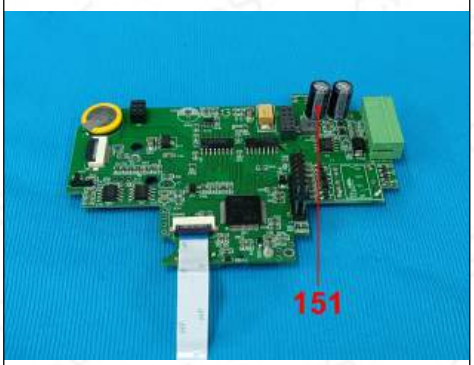
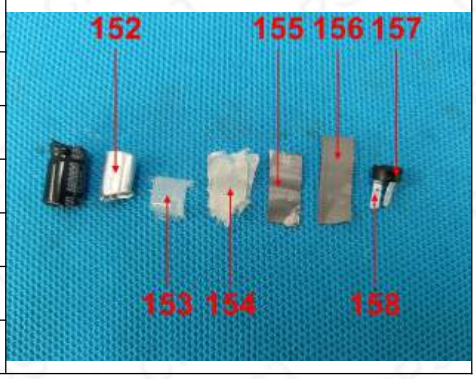
样品编号	描述	图示
146	黄色胶带（变压器）	
147	黑色磁石（变压器）	
148	铜色金属（线圈 变压器）	
149	铜色金属（线圈 变压器）	
150	黑色塑料（变压器）	
151	黑色塑胶带灰色印刷（电容）	
152	银色金属（电容）	
153	无色透明胶带（电容）	
154	灰色纸（电容）	
155	银灰色金属箔（电容）	
156	灰色金属箔（电容）	
157	黑色橡胶（电容）	
158	银色金属（接脚 电容）	

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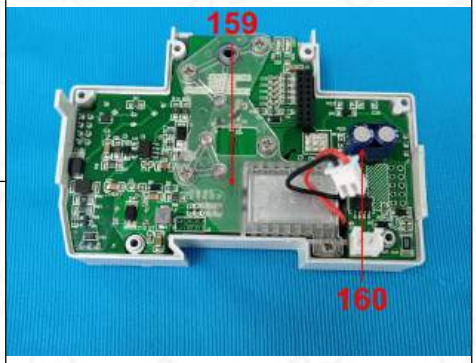
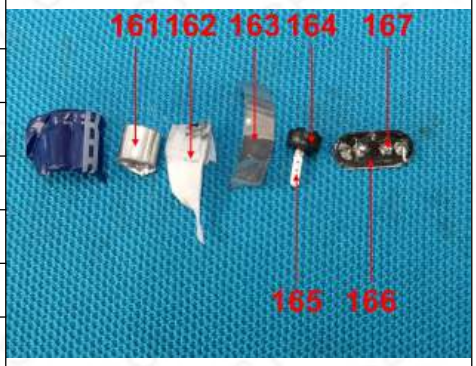
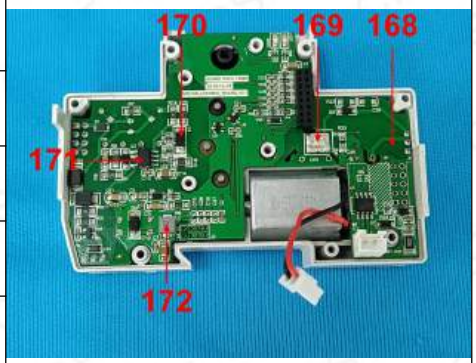
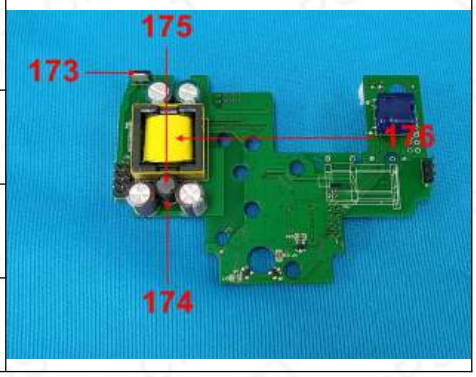
样品编号	描述	图示
159	无色透明塑料	
160	蓝色塑胶带灰色印刷（电容）	
161	银色金属（电容）	
162	白色纸（电容）	
163	银色金属箔（电容）	
164	黑色橡胶（电容）	
165	银色金属（接脚 电容）	
166	黑色 PCB（电容）	
167	银色焊锡（电容）	
168	绿色 PCB	
169	银色焊锡	
170	黑色本体	
171	黑色本体	
172	灰色本体（电感）	
173	黑色本体	
174	黑色塑胶套	
175	黑色本体（电感）	
176	杏黄色胶带（变压器）	

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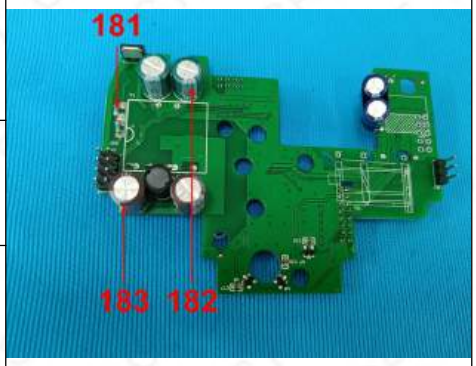
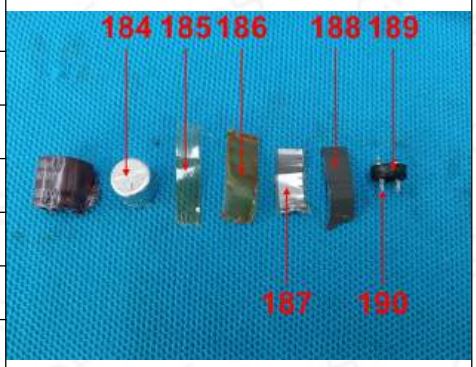
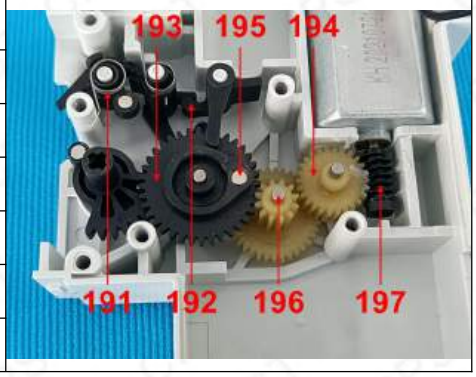
样品编号	描述	图示
177	黑色磁石（变压器）	
178	铜色金属（线圈 变压器）	
179	铜色金属（线圈 变压器）	
180	黑色塑料（变压器）	
181	蓝色本体	
182	绿色塑胶带灰色印刷（电容）	
183	棕色塑胶带灰色印刷（电容）	
184	银色金属（电容）	
185	无色透明胶带（电容）	
186	棕色纸（电容）	
187	银色金属箔（电容）	
188	灰黑色金属箔（电容）	
189	黑色橡胶（电容）	
190	银色金属（接脚 电容）	
191	银色金属（弹簧）	
192	黑色塑料	
193	黑色塑料（齿轮）	
194	卡其色塑料（齿轮）	
195	银色磁铁	
196	银色金属轴	
197	黑色塑料	

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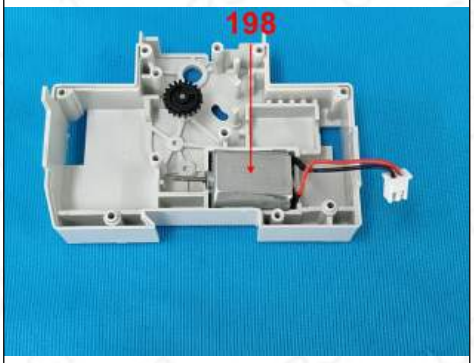
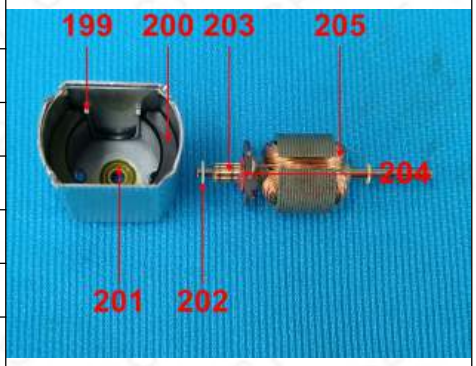
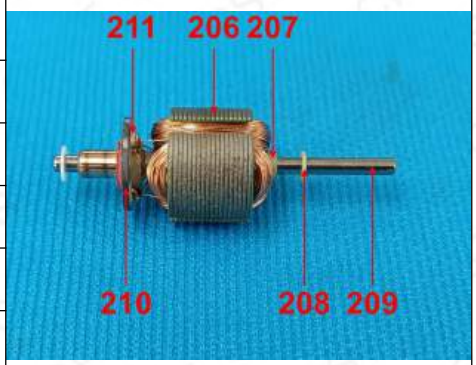
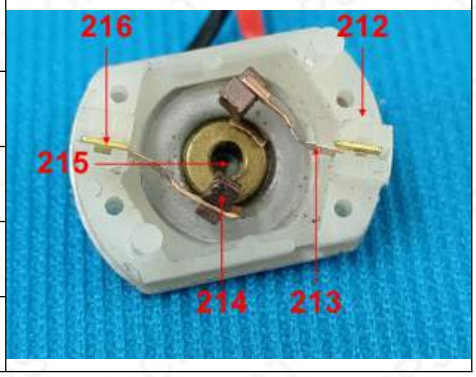
样品编号	描述	图示
198	银色金属壳（电机）	
199	灰色金属夹（电机）	
200	黑色磁石（电机）	
201	金色金属圈（电机）	
202	白色塑胶圈（电机）	
203	铜色金属（电机）	
204	红色纸圈（电机）	
205	铜色金属（线圈 电机）	
206	银色金属（电机）	
207	灰色塑料（电机）	
208	白色塑胶圈（电机）	
209	银色金属轴（电机）	
210	黑色磁圈（电机）	
211	银色焊锡（电机）	
212	米灰色塑料（电机）	
213	铜色金属（电机）	
214	铜色碳刷（电机）	
215	灰色塑胶（电机）	
216	金色金属（电机）	

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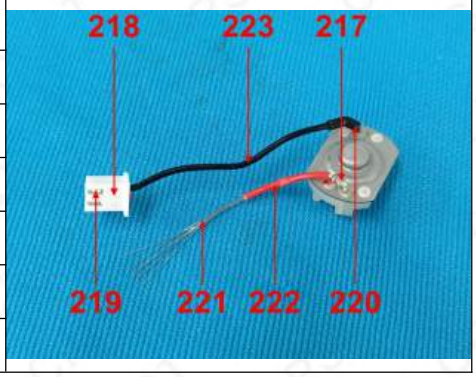
样品编号	描述	图示
217	银色焊锡（电机）	
218	白色塑料（电机）	
219	银色金属（端子 电机）	
220	黑色塑胶套（电机）	
221	银色金属（线芯 电机）	
222	红色塑胶（电线外皮 电机）	
223	黑色塑胶（电线外皮 电机）	

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3. 测试结果

3.1 指定的RoHS有害物质的筛检试验所选材料的提交样品:

- 重金属 (镉, 铬, 汞, 铅) 含量测试
- 溴含量测试

根据 IEC 62321-3-1:2013, 采用能量散射 X 射线荧光光谱仪（ED-XRF）进行分析.

样品编号	总镉	总铅	总汞	总铬	总溴
样品 001	BL	BL	BL	BL	BL
样品 002	BL	BL	BL	BL	BL
样品 003	BL	BL	BL	BL	N.A.
样品 004	BL	BL	BL	BL	N.A.
样品 005	BL	BL	BL	不确定^	N.A.
样品 006	BL	BL	BL	BL	BL
样品 007	BL	BL	BL	BL	BL
样品 008	BL	BL	BL	BL	N.A.
样品 009	BL	BL	BL	BL	N.A.
样品 010	BL	BL	BL	BL	BL
样品 011	BL	BL	BL	BL	BL
样品 012	BL	BL	BL	BL	N.A.
样品 013	BL	BL	BL	不确定^	N.A.
样品 014	BL	BL	BL	BL	N.A.
样品 015	BL	BL	BL	BL	N.A.
样品 016	BL	BL	BL	BL	N.A.
样品 017	BL	BL	BL	BL	N.A.
样品 018	BL	BL	BL	BL	N.A.
样品 019	BL	BL	BL	BL	N.A.
样品 020	BL	BL	BL	BL	N.A.
样品 021	BL	BL	BL	BL	N.A.
样品 022	BL	BL	BL	BL	BL
样品 023	BL	BL	BL	BL	N.A.
样品 024	BL	BL	BL	BL	N.A.
样品 025	BL	BL	BL	BL	N.A.
样品 026	BL	BL	BL	BL	N.A.
样品 027	BL	BL	BL	BL	N.A.
样品 028	BL	BL	BL	BL	N.A.

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样品编号	总镉	总铅	总汞	总铬	总溴
样品 029	BL	BL	BL	BL	N.A.
样品 030	BL	BL	BL	BL	N.A.
样品 031	BL	BL	BL	BL	BL
样品 032	BL	BL	BL	BL	N.A.
样品 033	BL	BL	BL	BL	N.A.
样品 034	BL	BL	BL	BL	N.A.
样品 035	BL	BL	BL	BL	N.A.
样品 036	BL	BL	BL	BL	N.A.
样品 037	BL	BL	BL	BL	N.A.
样品 038	BL	BL	BL	BL	N.A.
样品 039	BL	BL	BL	BL	N.A.
样品 040	BL	BL	BL	BL	N.A.
样品 041	BL	BL	BL	BL	BL
样品 042	BL	BL	BL	BL	BL
样品 043	BL	BL	BL	BL	N.A.
样品 044	BL	BL	BL	不确定^	N.A.
样品 045	BL	不确定^	BL	BL	N.A.
样品 046	BL	BL	BL	BL	BL
样品 047	BL	BL	BL	BL	N.A.
样品 048	BL	BL	BL	BL	BL
样品 049	BL	BL	BL	BL	N.A.
样品 050	BL	BL	BL	BL	N.A.
样品 051	BL	BL	BL	BL	不确定^
样品 052	BL	BL	BL	BL	N.A.
样品 053	BL	BL	BL	BL	BL
样品 054	BL	不确定^	BL	BL	不确定^
样品 055	BL	BL	BL	BL	BL
样品 056	BL	BL	BL	BL	BL
样品 057	BL	BL	BL	BL	BL
样品 058	BL	BL	BL	BL	N.A.
样品 059	BL	BL	BL	BL	BL
样品 060	BL	BL	BL	BL	N.A.
样品 061	BL	BL	BL	BL	BL
样品 062	BL	BL	BL	BL	BL
样品 063	BL	BL	BL	BL	BL

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样品编号	总镉	总铅	总汞	总铬	总溴
样品 064	BL	BL	BL	BL	BL
样品 065	BL	BL	BL	BL	BL
样品 066	BL	BL	BL	BL	BL
样品 067	BL	BL	BL	BL	BL
样品 068	BL	BL	BL	BL	BL
样品 069	BL	BL	BL	BL	N.A.
样品 070	BL	BL	BL	BL	N.A.
样品 071	BL	BL	BL	BL	BL
样品 072	BL	BL	BL	BL	N.A.
样品 073	BL	BL	BL	BL	N.A.
样品 074	BL	BL	BL	BL	BL
样品 075	BL	BL	BL	BL	BL
样品 076	BL	BL	BL	BL	N.A.
样品 077	BL	BL	BL	BL	N.A.
样品 078	BL	BL	BL	BL	BL
样品 079	BL	BL	BL	BL	BL
样品 080	BL	BL	BL	BL	BL
样品 081	BL	BL	BL	BL	N.A.
样品 082	BL	OL^	BL	BL	N.A.
样品 083	BL	BL	BL	BL	N.A.
样品 084	BL	BL	BL	BL	BL
样品 085	BL	BL	BL	BL	BL
样品 086	BL	OL^	BL	BL	N.A.
样品 087	BL	BL	BL	BL	N.A.
样品 088	BL	BL	BL	BL	N.A.
样品 089	BL	OL^	BL	BL	N.A.
样品 090	BL	BL	BL	BL	N.A.
样品 091	BL	BL	BL	BL	BL
样品 092	BL	BL	BL	BL	BL
样品 093	BL	BL	BL	BL	BL
样品 094	BL	BL	BL	BL	N.A.
样品 095	BL	BL	BL	BL	N.A.
样品 096	BL	BL	BL	BL	BL
样品 097	BL	BL	BL	BL	N.A.
样品 098	BL	BL	BL	BL	不确定^

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测试报告

No. C220418069001-1　　日期: 2022年04月29日　　

样品编号	总镉	总铅	总汞	总铬	总溴
样品 099	BL	BL	BL	BL	N.A.
样品 100	BL	BL	BL	BL	BL
样品 101	BL	BL	BL	BL	BL
样品 102	BL	BL	BL	BL	N.A.
样品 103	BL	BL	BL	BL	BL
样品 104	BL	BL	BL	BL	N.A.
样品 105	BL	BL	BL	不确定^	N.A.
样品 106	BL	BL	BL	BL	BL
样品 107	BL	BL	BL	BL	BL
样品 108	BL	BL	BL	BL	BL
样品 109	BL	BL	BL	BL	BL
样品 110	BL	BL	BL	BL	BL
样品 111	BL	BL	BL	BL	BL
样品 112	BL	BL	BL	BL	BL
样品 113	BL	BL	BL	BL	BL
样品 114	BL	BL	BL	BL	BL
样品 115	BL	BL	BL	BL	N.A.
样品 116	BL	BL	BL	BL	BL
样品 117	BL	BL	BL	BL	BL
样品 118	BL	BL	BL	BL	BL
样品 119	BL	BL	BL	BL	BL
样品 120	BL	BL	BL	BL	BL
样品 121	BL	BL	BL	BL	BL
样品 122	BL	BL	BL	BL	不确定^
样品 123	BL	BL	BL	BL	N.A.
样品 124	BL	BL	BL	BL	BL
样品 125	BL	BL	BL	BL	BL
样品 126	BL	BL	BL	BL	N.A.
样品 127	BL	BL	BL	BL	N.A.
样品 128	BL	BL	BL	BL	BL
样品 129	BL	BL	BL	BL	N.A.
样品 130	BL	BL	BL	BL	BL
样品 131	BL	BL	BL	BL	N.A.
样品 132	BL	BL	BL	BL	N.A.
样品 133	BL	BL	BL	BL	N.A.

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样品编号	总镉	总铅	总汞	总铬	总溴
样品 134	BL	BL	BL	BL	不确定^
样品 135	BL	BL	BL	BL	N.A.
样品 136	BL	BL	BL	BL	BL
样品 137	BL	BL	BL	BL	BL
样品 138	BL	BL	BL	BL	N.A.
样品 139	BL	BL	BL	BL	BL
样品 140	BL	BL	BL	BL	BL
样品 141	BL	BL	BL	BL	BL
样品 142	BL	BL	BL	BL	BL
样品 143	BL	BL	BL	BL	BL
样品 144	BL	BL	BL	BL	BL
样品 145	BL	BL	BL	BL	BL
样品 146	BL	BL	BL	BL	BL
样品 147	BL	BL	BL	BL	BL
样品 148	BL	BL	BL	BL	N.A.
样品 149	BL	BL	BL	BL	N.A.
样品 150	BL	BL	BL	BL	BL
样品 151	BL	BL	BL	BL	BL
样品 152	BL	BL	BL	BL	N.A.
样品 153	BL	BL	BL	BL	BL
样品 154	BL	BL	BL	BL	BL
样品 155	BL	BL	BL	BL	N.A.
样品 156	BL	BL	BL	BL	N.A.
样品 157	BL	BL	BL	BL	BL
样品 158	BL	BL	BL	BL	N.A.
样品 159	BL	BL	BL	BL	BL
样品 160	BL	BL	BL	BL	BL
样品 161	BL	BL	BL	BL	N.A.
样品 162	BL	BL	BL	BL	BL
样品 163	BL	BL	BL	BL	N.A.
样品 164	BL	BL	BL	BL	BL
样品 165	BL	BL	BL	BL	N.A.
样品 166	BL	BL	BL	BL	不确定^
样品 167	不确定^	BL	BL	BL	N.A.
样品 168	BL	BL	BL	BL	BL

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样品编号	总镉	总铅	总汞	总铬	总溴
样品 169	BL	BL	BL	BL	N.A.
样品 170	BL	BL	BL	BL	BL
样品 171	BL	BL	BL	BL	BL
样品 172	BL	BL	BL	BL	BL
样品 173	BL	BL	BL	BL	BL
样品 174	BL	BL	BL	BL	BL
样品 175	BL	BL	BL	BL	BL
样品 176	BL	BL	BL	BL	BL
样品 177	BL	BL	BL	BL	BL
样品 178	BL	BL	BL	BL	N.A.
样品 179	BL	BL	BL	BL	N.A.
样品 180	BL	BL	BL	BL	BL
样品 181	BL	BL	BL	BL	BL
样品 182	BL	BL	BL	BL	BL
样品 183	BL	BL	BL	BL	BL
样品 184	BL	BL	BL	BL	N.A.
样品 185	BL	BL	BL	BL	BL
样品 186	BL	BL	BL	BL	BL
样品 187	BL	BL	BL	BL	N.A.
样品 188	BL	BL	BL	BL	N.A.
样品 189	BL	BL	BL	BL	BL
样品 190	BL	BL	BL	BL	N.A.
样品 191	BL	BL	BL	BL	N.A.
样品 192	BL	BL	BL	BL	BL
样品 193	BL	BL	BL	BL	BL
样品 194	BL	BL	BL	BL	BL
样品 195	BL	BL	BL	BL	BL
样品 196	BL	BL	BL	BL	N.A.
样品 197	BL	BL	BL	BL	BL
样品 198	BL	BL	BL	BL	N.A.
样品 199	BL	BL	BL	BL	N.A.
样品 200	BL	BL	BL	BL	BL
样品 201	BL	BL	BL	BL	N.A.
样品 202	BL	BL	BL	BL	BL
样品 203	BL	BL	BL	BL	N.A.

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样品编号	总镉	总铅	总汞	总铬	总溴
样品 204	BL	BL	BL	BL	BL
样品 205	BL	BL	BL	BL	N.A.
样品 206	BL	BL	BL	BL	N.A.
样品 207	BL	BL	BL	BL	BL
样品 208	BL	BL	BL	BL	BL
样品 209	BL	BL	BL	BL	N.A.
样品 210	BL	BL	BL	BL	BL
样品 211	BL	不确定^	BL	BL	N.A.
样品 212	BL	BL	BL	BL	BL
样品 213	BL	BL	BL	BL	N.A.
样品 214	BL	BL	BL	BL	BL
样品 215	BL	BL	BL	BL	BL
样品 216	不确定^	BL	BL	BL	N.A.
样品 217	BL	BL	BL	BL	N.A.
样品 218	BL	BL	BL	BL	BL
样品 219	BL	BL	BL	BL	N.A.
样品 220	BL	BL	BL	BL	BL
样品 221	BL	BL	BL	BL	N.A.
样品 222	BL	BL	BL	BL	BL
样品 223	BL	BL	BL	BL	BL

备注:

1. 所有浓度表示方式“mg/kg” (毫克每千克), mg/kg 等于 ppm
2. “OL” 表示 “超出限值”
3. “BL” 表示 “低于限值”
4. “N.A.” 表示 “不适用”
5. “不确定” 表示 结果在 “OL” 和 “BL” 之间
6. “^”表示 检查的结果是不确定的或者超出限值的, 从而进一步确认, 结果清单在 3.2 和 3.3.

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XRF 对不同材料的筛选范围:

材料	浓度 (mg/kg)				
	镉	铬	铅	汞	溴
金属	BL≤(70-3σ)<X<(130+3σ)≤OL	BL≤(700-3σ)<X	BL≤(700-3σ)<X<(1300+3σ)≤OL	BL≤(700-3σ)<X<(1300+3σ)≤OL	N.A.
塑料	BL≤(70-3σ)<X<(130+3σ)≤OL	BL≤(700-3σ)<X	BL≤(700-3σ)<X<(1300+3σ)≤OL	BL≤(700-3σ)<X<(1300+3σ)≤OL	BL≤(300-3σ)<X
复合材料	BL≤(50-3σ)<X<(150+3σ)≤OL	BL≤(500-3σ)<X	BL≤(500-3σ)<X<(1500+3σ)≤OL	BL≤(500-3σ)<X<(1500+3σ)≤OL	BL≤(250-3σ)<X

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3.2 重金属测试

– 铅，镉，六价铬和汞 测试参考 IEC 62321-4:2013+A1:2017 & IEC 62321-5:2013 & IEC 62321-7-1:2015&IEC 62321-7-2:2017. 用电感耦合等离子体发射光谱仪（ICP-OES），紫外-可见分光光度计（UV-VIS）测试.

元素	总镉 [mg/kg]	总铅 [mg/kg]	总汞 [mg/kg]	六价铬 [μg/cm²]	六价铬 [mg/kg]
检出限	**5**	**5**	**5**	**0.10**	**5**
限值	**100**	**1000**	**1000**	**0.10**	**1000**
样品 005	/	/	/	N.D.	/
样品 013	/	/	/	N.D.	/
样品 044	/	/	/	N.D.	/
样品 045	/	171	/	/	/
样品 054	/	N.D.	/	/	/
样品 082	/	N.D.*	/	/	/
样品 086	/	27489Φ	/	/	/
样品 089	/	22402Φ	/	/	/
样品 105	/	/	/	N.D.	/
样品 167	N.D.	/	/	/	/
样品 211	/	23	/	/	/
样品 216	13	/	/	/	/

备注:

1. 所有浓度表示方式“mg/kg” (毫克每千克), mg/kg 等于 ppm
2. “N.D.” = “未检出”.
3. 沸水萃取:
   阴性 = 未检测到六价铬：每1cm²表面积的被测试样品的沸水萃取液中六价铬的浓度小于0.10μg.
   阳性 = 检测到六价铬：每 1cm² 表面积的被测试样品的沸水萃取液中六价铬的浓度大于 0.13μg.
   不确定 = 检测到六价铬：每 1cm² 表面积的被测试样品的沸水萃取液中六价铬的浓度大于 0.10μg 而小于 0.13μg.
4. 阳性表示六价铬不符合 RoHS 要求
   阴性表示六价铬符合 RoHS 要求
5. “-” = 未规定
6. “Φ”=样品 086, 样品 089 是铜合金，按照 RoHS 指令 2011/65/EU 附录III 6(c)的要求，铅含量低于 4%豁免。
7. “*”=该测试项目的样品是由客户于 2022 年 04 月 28 日重新提交。

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3.3 阻燃剂的测试

测试方法: 参考 IEC 62321-6:2015, 使用甲苯萃取，用气相色谱质谱联用仪(GC-MS)测试. [报告限值: 5mg/kg]

测试项目		结果 [mg/kg]		RoHS 要求 [mg/kg]
		样品 051	样品 054	
多溴联苯	一溴联苯	< 5	< 5	多溴联苯总和< 1000
	二溴联苯	< 5	< 5	
	三溴联苯	< 5	< 5	
	四溴联苯	< 5	< 5	
	五溴联苯	< 5	< 5	
	六溴联苯	< 5	< 5	
	七溴联苯	< 5	< 5	
	八溴联苯	< 5	< 5	
	九溴联苯	< 5	< 5	
	十溴联苯	< 5	< 5	
	多溴联苯总和(PBBs)	< 5	< 5	
多溴二苯醚	一溴二苯醚	< 5	< 5	多溴二苯醚总和< 1000
	二溴二苯醚	< 5	< 5	
	三溴二苯醚	< 5	< 5	
	四溴二苯醚	< 5	< 5	
	五溴二苯醚	< 5	< 5	
	六溴二苯醚	< 5	< 5	
	七溴二苯醚	< 5	< 5	
	八溴二苯醚	< 5	< 5	
	九溴二苯醚	< 5	< 5	
	十溴二苯醚	< 5	< 5	
	多溴二苯醚总和(PBDEs)	< 5	< 5	

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测试项目		结果 [mg/kg]		RoHS 要求 [mg/kg]
		样品 098	样品 122	
多溴联苯	一溴联苯	< 5	< 5	多溴联苯总和< 1000
	二溴联苯	< 5	< 5	
	三溴联苯	< 5	< 5	
	四溴联苯	< 5	< 5	
	五溴联苯	< 5	< 5	
	六溴联苯	< 5	< 5	
	七溴联苯	< 5	< 5	
	八溴联苯	< 5	< 5	
	九溴联苯	< 5	< 5	
	十溴联苯	< 5	< 5	
	多溴联苯总和(PBBs)	< 5	< 5	
多溴二苯醚	一溴二苯醚	< 5	< 5	多溴二苯醚总和< 1000
	二溴二苯醚	< 5	< 5	
	三溴二苯醚	< 5	< 5	
	四溴二苯醚	< 5	< 5	
	五溴二苯醚	< 5	< 5	
	六溴二苯醚	< 5	< 5	
	七溴二苯醚	< 5	< 5	
	八溴二苯醚	< 5	< 5	
	九溴二苯醚	< 5	< 5	
	十溴二苯醚	< 5	< 5	
	多溴二苯醚总和(PBDEs)	< 5	< 5	

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测试项目		结果 [mg/kg]		RoHS 要求 [mg/kg]
		样品 134	样品 166	
多溴联苯	一溴联苯	< 5	< 5	多溴联苯总和< 1000
	二溴联苯	< 5	< 5	
	三溴联苯	< 5	< 5	
	四溴联苯	< 5	< 5	
	五溴联苯	< 5	< 5	
	六溴联苯	< 5	< 5	
	七溴联苯	< 5	< 5	
	八溴联苯	< 5	< 5	
	九溴联苯	< 5	< 5	
	十溴联苯	< 5	< 5	
	多溴联苯总和(PBBs)	< 5	< 5	
多溴二苯醚	一溴二苯醚	< 5	< 5	多溴二苯醚总和< 1000
	二溴二苯醚	< 5	< 5	
	三溴二苯醚	< 5	< 5	
	四溴二苯醚	< 5	< 5	
	五溴二苯醚	< 5	< 5	
	六溴二苯醚	< 5	< 5	
	七溴二苯醚	< 5	< 5	
	八溴二苯醚	< 5	< 5	
	九溴二苯醚	< 5	< 5	
	十溴二苯醚	< 5	< 5	
	多溴二苯醚总和(PBDEs)	< 5	< 5	

备注:

1. 所有浓度表示方式“mg/kg” (毫克每千克), mg/kg 等于 ppm
2. “<” 表示 小于

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3.4 邻苯二甲酸二(2-乙基己基)酯(DEHP)、邻苯二甲酸苯基丁酯(BBP)、邻苯二甲酸二丁酯(DBP)、邻苯二甲酸二异丁酯(DIBP)含量—RoHS 指令2011/65/EU附录Ⅱ的修正指令(EU)2015/863

测试方法:参考 IEC 62321-8:2017, 使用气相色谱质谱联用仪(GC-MS)进行分析。

元素	邻苯二甲酸二(2-乙基己基)酯 (DEHP) [mg/kg]	邻苯二甲酸苯基丁酯(BBP) [mg/kg]	邻苯二甲酸二丁酯 (DBP) [mg/kg]	邻苯二甲酸二异丁酯(DIBP) [mg/kg]
检出限	**50**	**50**	**50**	**50**
限值	**1000**	**1000**	**1000**	**1000**
样品 001	N.D.	N.D.	N.D.	N.D.
样品 002	N.D.	N.D.	N.D.	N.D.
样品 006	N.D.	N.D.	N.D.	N.D.
样品 007	N.D.	N.D.	N.D.	N.D.
样品 010	N.D.	N.D.	N.D.	N.D.
样品 011	N.D.	N.D.	N.D.	N.D.
样品 022	N.D.	N.D.	N.D.	N.D.
样品 031	N.D.	N.D.	N.D.	N.D.
样品 041	N.D.	N.D.	N.D.	N.D.
样品 042	N.D.	N.D.	N.D.	N.D.
样品 046	N.D.	N.D.	N.D.	N.D.
样品 048	N.D.	N.D.	N.D.	N.D.
样品 051	N.D.	N.D.	N.D.	N.D.
样品 053	N.D.	N.D.	N.D.	N.D.
样品 054	N.D.	N.D.	N.D.	N.D.
样品 055	N.D.	N.D.	N.D.	N.D.
样品 056	N.D.	N.D.	N.D.	N.D.
样品 057	N.D.	N.D.	N.D.	N.D.
样品 059	N.D.	N.D.	N.D.	N.D.
样品 061	N.D.	N.D.	N.D.	N.D.
样品 062	N.D.	N.D.	N.D.	N.D.
样品 063	N.D.	N.D.	N.D.	N.D.
样品 064	N.D.	N.D.	N.D.	N.D.
样品 065	N.D.	N.D.	N.D.	N.D.
样品 066	N.D.	N.D.	N.D.	N.D.
样品 067	N.D.	N.D.	N.D.	N.D.
样品 068	N.D.	N.D.	N.D.	N.D.
样品 071	N.D.	N.D.	N.D.	N.D.
样品 074	N.D.	N.D.	N.D.	N.D.
样品 075	N.D.	N.D.	N.D.	N.D.
样品 078	N.D.	N.D.	N.D.	N.D.

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元素	邻苯二甲酸二(2-乙基己基)酯 (DEHP) [mg/kg]	邻苯二甲酸苯基丁酯(BBP) [mg/kg]	邻苯二甲酸二丁酯(DBP) [mg/kg]	邻苯二甲酸二异丁酯(DIBP) [mg/kg]
检出限	**50**	**50**	**50**	**50**
限值	**1000**	**1000**	**1000**	**1000**
样品 079	N.D.	N.D.	N.D.	N.D.
样品 080	N.D.	N.D.	N.D.	N.D.
样品 084	N.D.	N.D.	N.D.	N.D.
样品 085	N.D.	N.D.	N.D.	N.D.
样品 091	N.D.	N.D.	N.D.	N.D.
样品 092	N.D.	N.D.	N.D.	N.D.
样品 093	N.D.	N.D.	N.D.	N.D.
样品 096	N.D.	N.D.	N.D.	N.D.
样品 098	N.D.	N.D.	N.D.	N.D.
样品 100	N.D.	N.D.	N.D.	N.D.
样品 101	N.D.	N.D.	N.D.	N.D.
样品 103	N.D.	N.D.	N.D.	N.D.
样品 106	N.D.	N.D.	N.D.	N.D.
样品 107	N.D.	N.D.	N.D.	N.D.
样品 108	N.D.	N.D.	N.D.	N.D.
样品 109	N.D.	N.D.	N.D.	N.D.
样品 110	N.D.	N.D.	N.D.	N.D.
样品 111	N.D.	N.D.	N.D.	N.D.
样品 112	N.D.	N.D.	N.D.	N.D.
样品 113	N.D.	N.D.	N.D.	N.D.
样品 114	N.D.	N.D.	N.D.	N.D.
样品 116	N.D.	N.D.	N.D.	N.D.
样品 117	N.D.	N.D.	N.D.	N.D.
样品 118	N.D.	N.D.	N.D.	N.D.
样品 119	N.D.	N.D.	N.D.	N.D.
样品 120	N.D.	N.D.	N.D.	N.D.
样品 121	N.D.	N.D.	N.D.	N.D.
样品 122	N.D.	N.D.	N.D.	N.D.
样品 124	N.D.	N.D.	N.D.	N.D.
样品 125	N.D.	N.D.	N.D.	N.D.
样品 128	N.D.	N.D.	N.D.	N.D.
样品 130	N.D.	N.D.	N.D.	N.D.
样品 134	N.D.	N.D.	N.D.	N.D.

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测试报告

No. C220418069001-1　　日期: 2022年04月29日　　第29页,共31页

元素	邻苯二甲酸二(2-乙基己基)酯 (DEHP) [mg/kg]	邻苯二甲酸苯基丁酯(BBP) [mg/kg]	邻苯二甲酸二丁酯(DBP) [mg/kg]	邻苯二甲酸二异丁酯(DIBP) [mg/kg]
检出限	**50**	**50**	**50**	**50**
限值	**1000**	**1000**	**1000**	**1000**
样品 136	N.D.	N.D.	N.D.	N.D.
样品 137	N.D.	N.D.	N.D.	N.D.
样品 139	N.D.	N.D.	N.D.	N.D.
样品 140	N.D.	N.D.	N.D.	N.D.
样品 141	N.D.	N.D.	N.D.	N.D.
样品 142	N.D.	N.D.	N.D.	N.D.
样品 143	N.D.	N.D.	N.D.	N.D.
样品 144	N.D.	N.D.	N.D.	N.D.
样品 145	N.D.	N.D.	N.D.	N.D.
样品 146	N.D.	N.D.	N.D.	N.D.
样品 147	N.D.	N.D.	N.D.	N.D.
样品 150	N.D.	N.D.	N.D.	N.D.
样品 151	N.D.	N.D.	N.D.	N.D.
样品 153	N.D.	N.D.	N.D.	N.D.
样品 154	N.D.	N.D.	N.D.	N.D.
样品 157	N.D.	N.D.	N.D.	N.D.
样品 159	N.D.	N.D.	N.D.	N.D.
样品 160	N.D.	N.D.	N.D.	N.D.
样品 162	N.D.	N.D.	N.D.	N.D.
样品 164	N.D.	N.D.	N.D.	N.D.
样品 166	N.D.	N.D.	N.D.	N.D.
样品 168	N.D.	N.D.	N.D.	N.D.
样品 170	N.D.	N.D.	N.D.	N.D.
样品 171	N.D.	N.D.	N.D.	N.D.
样品 172	N.D.	N.D.	N.D.	N.D.
样品 173	N.D.	N.D.	N.D.	N.D.
样品 174	N.D.	N.D.	N.D.	N.D.
样品 175	N.D.	N.D.	N.D.	N.D.
样品 176	N.D.	N.D.	N.D.	N.D.
样品 177	N.D.	N.D.	N.D.	N.D.
样品 180	N.D.	N.D.	N.D.	N.D.
样品 181	N.D.	N.D.	N.D.	N.D.
样品 182	N.D.	N.D.	N.D.	N.D.

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测试报告

No. C220418069001-1　　日期: 2022年04月29日　　第30页,共31页

元素	邻苯二甲酸二(2-乙基己基)酯 (DEHP) [mg/kg]	邻苯二甲酸苯基丁酯(BBP) [mg/kg]	邻苯二甲酸二丁酯(DBP) [mg/kg]	邻苯二甲酸二异丁酯(DIBP) [mg/kg]
检出限	**50**	**50**	**50**	**50**
限值	**1000**	**1000**	**1000**	**1000**
样品 183	N.D.	N.D.	N.D.	N.D.
样品 185	N.D.	N.D.	N.D.	N.D.
样品 186	N.D.	N.D.	N.D.	N.D.
样品 189	N.D.	N.D.	N.D.	N.D.
样品 192	N.D.	N.D.	N.D.	N.D.
样品 193	N.D.	N.D.	N.D.	N.D.
样品 194	N.D.	N.D.	N.D.	N.D.
样品 195	N.D.	N.D.	N.D.	N.D.
样品 197	N.D.	N.D.	N.D.	N.D.
样品 200	N.D.	N.D.	N.D.	N.D.
样品 202	N.D.	N.D.	N.D.	N.D.
样品 204	N.D.	N.D.	N.D.	N.D.
样品 207	N.D.	N.D.	N.D.	N.D.
样品 208	N.D.	N.D.	N.D.	N.D.
样品 210	N.D.	N.D.	N.D.	N.D.
样品 212	N.D.	N.D.	N.D.	N.D.
样品 214	N.D.	N.D.	N.D.	N.D.
样品 215	N.D.	N.D.	N.D.	N.D.
样品 218	N.D.	N.D.	N.D.	N.D.
样品 220	N.D.	N.D.	N.D.	N.D.
样品 222	N.D.	N.D.	N.D.	N.D.
样品 223	N.D.	N.D.	N.D.	N.D.

备注:

1. 所有浓度表示方式“mg/kg” (毫克每千克), mg/kg 等于 ppm
2. “N.D.” = “未检出”.

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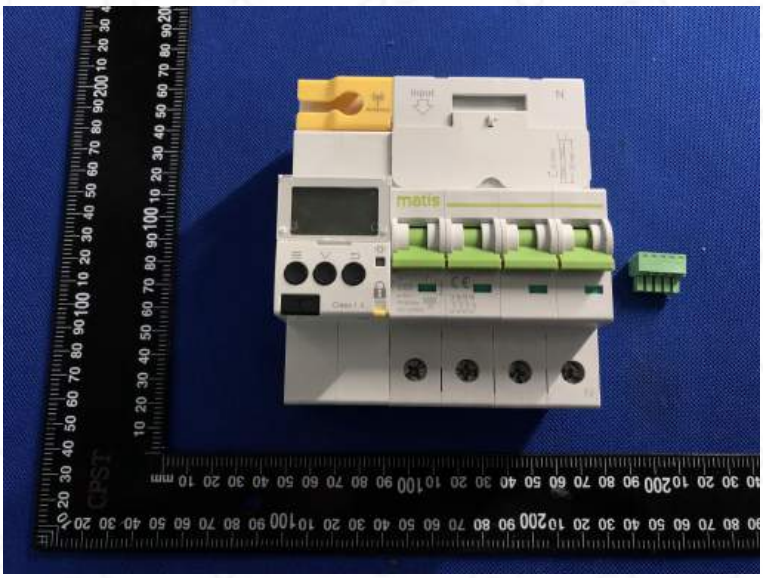
送检样品照片





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測試報告
Test Report

號碼(No.): ETR21B03125　　日期(Date): 24-Nov-2021　　

南亞塑膠工業股份有限公司 (NAN YA PLASTICS CORPORATION)
南亞電子材料(昆山)有限公司 (NANYA ELECTRONIC MATERIALS (KUNSHAN) CORP. LTD.)
南亞電子材料(惠州)有限公司 (NAN YA ELECTRONIC MATERIALS (HUIZHOU) CORP., LTD)
台北市松山區敦化北路201號 (NO. 201 TUNG HWA NORTH ROAD, SONGSHAN DIST., TAIPEI, TAIWAN, R.O.C.)
江蘇省昆山市昆山經濟技術開發區長江南路201號 (201 CHANG JIANG ROAD(S) KUNSHAN ECONOMIC & TECHNICAL DEVELOPMENT ZONE, KUNSHAN, JIANG SU, CHINA 215300)
廣東省惠州市博羅縣石灣鎮永石大道230號 (NO. 230, YONGSHI BOULEVARD SHIWAN TOWN BOLUO COUNTY HUIZHOU CITY GUANG DONG)

以下測試樣品係由申請廠商所提供及確認 (The following sample(s) was/were submitted and identified by/on behalf of the applicant as)：

送樣廠商(Sample Submitted By)	:	南亞塑膠工業股份有限公司 (NAN YA PLASTICS CORPORATION)
樣品名稱(Sample Name)	:	LAMINATE (UL E98983)
樣品型號(Style/Item No.)	:	NP-155FR/NP-155FTL
訂單編號(Order No.)	:	1915322

==========

收件日(Sample Receiving Date)	:	17-Nov-2021
測試期間(Testing Period)	:	17-Nov-2021 to 24-Nov-2021

測試需求(Test Requested) :
(1) 依據客戶指定，參考RoHS 2011/65/EU Annex II及其修訂指令(EU) 2015/863測試鎘、鉛、汞、六價鉻、多溴聯苯、多溴聯苯醚, DBP, BBP, DEHP, DIBP。 (As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample(s).)

(2) 其他測試項目請見下一頁。 (Please refer to next pages for the other item(s).)

測試結果(Test Results) : 請參閱下一頁 (Please refer to following pages.)

結　　論(Conclusion) :
(1) 根據客戶所提供的樣品，其鎘、鉛、汞、六價鉻、多溴聯苯、多溴聯苯醚, DBP, BBP, DEHP, DIBP的測試結果符合RoHS 2011/65/EU Annex II暨其修訂指令(EU) 2015/863之限值要求。 (Based on the performed tests on submitted sample(s), the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.)

Troy Chang / Manager
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory - Taipei

PIN CODE: C04205A9

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測試報告
Test Report

南亞塑膠工業股份有限公司 (NAN YA PLASTICS CORPORATION)
南亞電子材料(昆山)有限公司 (NANYA ELECTRONIC MATERIALS (KUNSHAN) CORP. LTD.)
南亞電子材料(惠州)有限公司 (NAN YA ELECTRONIC MATERIALS (HUIZHOU) CORP., LTD)
台北市松山區敦化北路201號 (NO. 201 TUNG HWA NORTH ROAD, SONGSHAN DIST., TAIPEI, TAIWAN, R.O.C.)
江蘇省昆山市昆山經濟技術開發區長江南路201號 (201 CHANG JIANG ROAD(S) KUNSHAN ECONOMIC & TECHNICAL DEVELOPMENT ZONE, KUNSHAN, JIANG SU, CHINA 215300)
廣東省惠州市博羅縣石灣鎮永石大道230號 (NO. 230, YONGSHI BOULEVARD SHIWAN TOWN BOLUO COUNTY HUIZHOU CITY GUANG DONG)

測試部位敘述 (Test Part Description)

No.1 : 銅色/棕色板子 (COPPER/BROWN SHEET)

測試結果 (Test Results)

測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result)	限值 (Limit)
				No.1	
鎘 (Cd) (Cadmium (Cd)) (CAS No.: 7440-43-9)	參考IEC 62321-5: 2013，以感應耦合電漿發射光譜儀分析。(With reference to IEC 62321-5: 2013, analysis was performed by ICP-OES.)	mg/kg	2	n.d.	100
鉛 (Pb) (Lead (Pb)) (CAS No.: 7439-92-1)		mg/kg	2	5.65	1000
汞 (Hg) (Mercury (Hg)) (CAS No.: 7439-97-6)	參考IEC 62321-4: 2013+ AMD1: 2017，以感應耦合電漿發射光譜儀分析。(With reference to IEC 62321-4: 2013+ AMD1: 2017, analysis was performed by ICP-OES.)	mg/kg	2	n.d.	1000
六價鉻 Cr(VI) (Hexavalent Chromium Cr(VI)) (CAS No.: 18540-29-9)	參考IEC 62321-7-2: 2017，以紫外光-可見光分光光度計分析。(With reference to IEC 62321-7-2: 2017, analysis was performed by UV-VIS.)	mg/kg	8	n.d.	1000
鈹 (Be) (Beryllium (Be)) (CAS No.: 7440-41-7)	參考US EPA 3052: 1996，以感應耦合電漿發射光譜儀分析。(With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.)	mg/kg	2	n.d.	-
氧化鈹 (BeO) (Beryllium oxide (BeO)) (CAS No.: 1304-56-9)	由鈹結果計算得之。(Calculated from the result of Beryllium.)	mg/kg	2▲	n.d.	-
聚氯乙烯 (Polyvinylchloride) (PVC)	參考ASTM E1252: 2013，以傅立葉轉換紅外線光譜儀及焰色法分析。(With reference to ASTM E1252: 2013, analysis was performed by FT-IR and Flame Test.)	**	-	Negative	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
一溴聯苯 (Monobromobiphenyl)	參考IEC 62321-6: 2015，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-6: 2015, analysis was performed by GC/MS.)	mg/kg	5	n.d.	-
二溴聯苯 (Dibromobiphenyl)		mg/kg	5	n.d.	-
三溴聯苯 (Tribromobiphenyl)		mg/kg	5	n.d.	-
四溴聯苯 (Tetrabromobiphenyl)		mg/kg	5	n.d.	-
五溴聯苯 (Pentabromobiphenyl)		mg/kg	5	n.d.	-
六溴聯苯 (Hexabromobiphenyl)		mg/kg	5	n.d.	-
七溴聯苯 (Heptabromobiphenyl)		mg/kg	5	n.d.	-
八溴聯苯 (Octabromobiphenyl)		mg/kg	5	n.d.	-
九溴聯苯 (Nonabromobiphenyl)		mg/kg	5	n.d.	-
十溴聯苯 (Decabromobiphenyl)		mg/kg	5	n.d.	-
多溴聯苯總和 (Sum of PBBs)		mg/kg	-	n.d.	1000
一溴聯苯醚 (Monobromodiphenyl ether)	參考IEC 62321-6: 2015，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-6: 2015, analysis was performed by GC/MS.)	mg/kg	5	n.d.	-
二溴聯苯醚 (Dibromodiphenyl ether)		mg/kg	5	n.d.	-
三溴聯苯醚 (Tribromodiphenyl ether)		mg/kg	5	n.d.	-
四溴聯苯醚 (Tetrabromodiphenyl ether)		mg/kg	5	n.d.	-
五溴聯苯醚 (Pentabromodiphenyl ether)		mg/kg	5	n.d.	-
六溴聯苯醚 (Hexabromodiphenyl ether)		mg/kg	5	n.d.	-
七溴聯苯醚 (Heptabromodiphenyl ether)		mg/kg	5	n.d.	-
八溴聯苯醚 (Octabromodiphenyl ether)		mg/kg	5	n.d.	-
九溴聯苯醚 (Nonabromodiphenyl ether)		mg/kg	5	n.d.	-
十溴聯苯醚 (Decabromodiphenyl ether)		mg/kg	5	n.d.	-
多溴聯苯醚總和 (Sum of PBDEs)		mg/kg	-	n.d.	1000
多氯聯苯 (PCBs) (Polychlorinated biphenyls (PCBs))	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	0.5	n.d.	-
多氯萘 (PCNs) (Polychlorinated naphthalene (PCNs))		mg/kg	5	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
多氯三聯苯 (PCTs) (Polychlorinated terphenyls (PCTs))	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	0.5	n.d.	-
短鏈氯化石蠟(C10-C13) (SCCP) (Short Chain Chlorinated Paraffins(C10-C13) (SCCP)) (CAS No.: 85535-84-8)	參考ISO 18219: 2015，以氣相層析儀/質譜儀分析。(With reference to ISO 18219: 2015, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
石綿 (Asbestos)					
白石綿/溫石綿 (Chrysotile) (CAS No.: 12001-29-5)	參考EPA 600/R-93/116: 1993，以立體顯微鏡(SM)與分散染色式偏光顯微鏡(DS-PLM)及X光繞射光譜分析法(XRD)分析。(With reference to EPA 600/R-93/116: 1993, analysis was performed by Stereo Microscope (SM), Dispersion Staining Polarized Light Microscope (DS-PLM) and X-ray Diffraction Spectrometer (XRD).)	%	-	Negative	-
褐石綿/鐵石綿 (Amosite) (CAS No.: 12172-73-5)		%	-	Negative	-
青石綿 (Crocidolite) (CAS No.: 12001-28-4)		%	-	Negative	-
斜方角閃石綿 (Anthophyllite) (CAS No.: 77536-67-5)		%	-	Negative	-
透閃石綿 (Tremolite) (CAS No.: 77536-68-6)		%	-	Negative	-
陽起石綿 (Actinolite) (CAS No.: 77536-66-4)		%	-	Negative	-
三丁基錫 (TBT) (Tributyl tin (TBT))	參考ISO 17353: 2004，以氣相層析儀/火焰光度偵測器分析。(With reference to ISO 17353: 2004, analysis was performed by GC/FPD.)	mg/kg	0.03	n.d.	-
三苯基錫 (TPT) (Triphenyl tin (TPT))		mg/kg	0.03	n.d.	-
二丁基錫 (DBT) (Dibutyl tin (DBT))		mg/kg	0.03	n.d.	-
二辛基錫 (DOT) (Dioctyl tin (DOT))		mg/kg	0.03	n.d.	-
氧化雙三丁基錫 (TBTO) (Bis(tributyltin) oxide (TBTO)) (CAS No.: 56-35-9)	由三丁基錫結果計算得之。(Calculated from the result of Tributyl Tin (TBT).)	mg/kg	0.03▲	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
偶氮染料 (AZO Dyes)					
4-氨基二苯 (4-aminodiphenyl) (CAS No.: 92-67-1)	參考EN ISO 14362-1: 2017，以氣相層析質譜儀及高效液相層析儀/二極體陣列偵測器分析。(With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.)	mg/kg	3	n.d.	-
聯苯胺 (Benzidine) (CAS No.: 92-87-5)		mg/kg	3	n.d.	-
4-氯鄰甲苯胺 (4-chloro-o-toluidine) (CAS No.: 95-69-2)		mg/kg	3	n.d.	-
2-萘胺 (2-naphthylamine) (CAS No.: 91-59-8)		mg/kg	3	n.d.	-
鄰-胺基偶氮甲苯 (o-aminoazotoluene) (CAS No.: 97-56-3)		mg/kg	3	n.d.	-
2-胺基-4-硝基甲苯 (5-nitro-o-toluidine) (CAS No.: 99-55-8)		mg/kg	3	n.d.	-
4-氯苯胺 (4-chloroaniline) (CAS No.: 106-47-8)		mg/kg	3	n.d.	-
2,4-二氨基苯甲醚 (2,4-diaminoanisole) (CAS No.: 615-05-4)		mg/kg	3	n.d.	-
4,4'-二胺基二苯甲烷 (4,4'-diaminodiphenylmethane (MDA)) (CAS No.: 101-77-9)		mg/kg	3	n.d.	-
3,3'-二氯聯苯胺 (3,3'-dichlorobenzidine) (CAS No.: 91-94-1)		mg/kg	3	n.d.	-
3,3'-二甲氧基聯苯胺 (3,3'-dimethoxybenzidine) (CAS No.: 119-90-4)		mg/kg	3	n.d.	-
3,3'-二甲基聯苯胺 (3,3'-dimethylbenzidine) (CAS No.: 119-93-7)		mg/kg	3	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
3,3'-二甲基-4,4'-二胺基二苯甲烷 (3,3'-dimethyl-4,4'-diaminodiphenylmethane) (CAS No.: 838-88-0)	參考EN ISO 14362-1: 2017，以氣相層析質譜儀及高效液相層析儀/二極體陣列偵測器分析。(With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.)	mg/kg	3	n.d.	-
2-甲氧基-5-甲基苯胺 (2-methoxy-5-methylaniline) (CAS No.: 120-71-8)		mg/kg	3	n.d.	-
4,4'-亞甲雙(2-氯苯胺) (4,4'-methylene-bis-(2-chloroaniline)) (CAS No.: 101-14-4)		mg/kg	3	n.d.	-
4,4'-二胺基二苯醚 (4,4'-oxydianiline) (CAS No.: 101-80-4)		mg/kg	3	n.d.	-
4,4'-硫二苯胺 (4,4'-thiodianiline) (CAS No.: 139-65-1)		mg/kg	3	n.d.	-
鄰-甲苯胺 (o-toluidine) (CAS No.: 95-53-4)		mg/kg	3	n.d.	-
2,4-甲苯二胺 (2,4-diaminotoluene) (CAS No.: 95-80-7)		mg/kg	3	n.d.	-
2,4,5-三甲苯胺 (2,4,5-trimethylaniline) (CAS No.: 137-17-7)		mg/kg	3	n.d.	-
鄰-甲氧基苯胺 (o-anisidine) (CAS No.: 90-04-0)		mg/kg	3	n.d.	-
2,4-二甲基苯胺 (2,4-xylidine) (CAS No.: 95-68-1)		mg/kg	3	n.d.	-
2,6-二甲基苯胺 (2,6-xylidine) (CAS No.: 87-62-7)		mg/kg	3	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
4-苯基偶氮基苯胺 (4-aminoazobenzene) (CAS No.: 60-09-3)	參考EN ISO 14362-1: 2017 or/and EN ISO 14362-3: 2017，以氣相層析質譜儀及高效液相層析儀/二極體陣列偵測器分析。(With reference to EN ISO 14362-1: 2017 or/and EN ISO 14362-3: 2017, analysis was performed by GC/MS & HPLC/DAD.)	mg/kg	3	n.d.	-
全氟辛烷磺酸及其鹽類 (PFOS and its salts) (CAS No.: 1763-23-1 and its salts)	參考CEN/TS 15968: 2010，以液相層析串聯質譜儀分析。(With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.)	mg/kg	0.01	n.d.	-
全氟辛酸及其鹽類 (PFOA and its salts) (CAS No.: 335-67-1 and its salts)		mg/kg	0.01	n.d.	-
2-[2-羥基-3',5'-二-叔-丁基苯基]-苯並三唑 (紫外線吸收劑320) (2-benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320)) (CAS No.: 3846-71-7)	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	5	n.d.	-
富馬酸二甲酯 (DMFu) (Dimethyl fumarate (DMFu)) (CAS No.: 624-49-7)	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	0.1	n.d.	-
磷酸三(2-氯乙基)酯 (TCEP) (Tris(2-chloroethyl) phosphate (TCEP)) (CAS No.: 115-96-8)	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	5	n.d.	-
磷酸三(1-氯-2-丙基)酯 (TCPP) (Tris(1-chloro-2-propyl) phosphate (TCPP)) (CAS No.: 13674-84-5)	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	5	n.d.	-
磷酸三(1,3-二氯異丙基)酯 (Tris(1,3-dichloro-2-propyl) phosphate) (CAS No.: 13674-87-8)	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	5	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
六溴環十二烷及所有主要被辨別出的異構物(HBCDD) (α- HBCDD, β- HBCDD, γ- HBCDD) (Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α- HBCDD, β- HBCDD, γ- HBCDD)) (CAS No.: 25637-99-4, 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	參考IEC 62321: 2008，以氣相層析儀/質譜儀分析。(With reference to IEC 62321: 2008, analysis was performed by GC/MS.)	mg/kg	5	n.d.	-
氫氟碳化合物 (Hydrofluorocarbon) (HFCs)					
HFC-23 (CHF3) (CAS No.: 75-46-7)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
HFC-32 (CH2F2) (CAS No.: 75-10-5)		mg/kg	1	n.d.	-
HFC-41 (CH3F) (CAS No.: 593-53-3)		mg/kg	1	n.d.	-
HFC-43-10mee (C5H2F10)		mg/kg	1	n.d.	-
HFC-125 (C2HF5)		mg/kg	1	n.d.	-
HFC-134 (C2H2F4)		mg/kg	1	n.d.	-
HFC-134a (CH2FCF3) (CAS No.: 811-97-2)		mg/kg	1	n.d.	-
HFC-143 (CH3F3)		mg/kg	1	n.d.	-
HFC-143a (CH3F3)		mg/kg	1	n.d.	-
HFC-152a (C2H4F2) (CAS No.: 75-37-6)		mg/kg	1	n.d.	-
HFC-227ea (C3HF7) (CAS No.: 431-89-0)		mg/kg	1	n.d.	-
HFC-236fa (C3H2F6)		mg/kg	1	n.d.	-
HFC-236ea (C3H2F6) (CAS No.: 431-63-0)		mg/kg	1	n.d.	-
HFC-245ca (C3H3F5)		mg/kg	1	n.d.	-
HFC-245fa (C3H3F5)		mg/kg	1	n.d.	-
HFC-365mfc (C4H5F5)		mg/kg	1	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
全氟化碳 (Perfluorocarbon) (PFCs)					
四氟甲烷 (Freon-14) (CAS No.: 75-73-0)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
六氟乙烷 (Fluorocarbon 116) (CAS No.: 76-16-4)		mg/kg	1	n.d.	-
八氟丙烷 (Freon 218) (CAS No.: 76-19-7)		mg/kg	1	n.d.	-
十氟丁烷 (Decafluorobutane) (CAS No.: 355-25-9)		mg/kg	1	n.d.	-
八氟環丁烷 (Freon C318) (CAS No.: 115-25-3)		mg/kg	1	n.d.	-
全氟-1-丁烯 (Perfluor-1-butene) (CAS No.: 357-26-6)		mg/kg	1	n.d.	-
全氟異丁烯 (Perfluorisobutene) (CAS No.: 382-21-8)		mg/kg	1	n.d.	-
1,4-二氫八氟丁烷 (1,4-dihydrooctafluorobutane) (CAS No.: 377-36-6)		mg/kg	1	n.d.	-
2-全氟甲基丁烷 (Nonafluor-2-(trifluoromethyl)butane) (CAS No.: 594-91-2)		mg/kg	1	n.d.	-
全氟戊烷 (Perfluoro-n-pentane) (CAS No.: 678-26-2)		mg/kg	1	n.d.	-
2-全氟甲基戊烷 (2-Perfluoromethylpentane) (CAS No.: 355-04-4)		mg/kg	1	n.d.	-
全氟己烷 (Perfluorohexane) (CAS No.: 355-42-0)		mg/kg	1	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
氟氯碳化物 (Chlorofluorocarbons) (CFCs)					
CFC-11	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
CFC-12		mg/kg	1	n.d.	-
CFC-113		mg/kg	1	n.d.	-
CFC-114		mg/kg	1	n.d.	-
CFC-115		mg/kg	1	n.d.	-
CFC-13		mg/kg	1	n.d.	-
CFC-111		mg/kg	1	n.d.	-
CFC-112		mg/kg	1	n.d.	-
CFC-211		mg/kg	1	n.d.	-
CFC-212		mg/kg	1	n.d.	-
CFC-213		mg/kg	1	n.d.	-
CFC-214		mg/kg	1	n.d.	-
CFC-215		mg/kg	1	n.d.	-
CFC-216		mg/kg	1	n.d.	-
CFC-217		mg/kg	1	n.d.	-
氟氯氫烷碳化物 (Hydrochlorofluorocarbons) (HCFCs)					
HCFC-21	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
HCFC-22		mg/kg	1	n.d.	-
HCFC-31		mg/kg	1	n.d.	-
HCFC-121		mg/kg	1	n.d.	-
HCFC-122		mg/kg	1	n.d.	-
HCFC-123		mg/kg	1	n.d.	-
HCFC-124		mg/kg	1	n.d.	-
HCFC-131		mg/kg	1	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
HCFC-132b	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
HCFC-133a		mg/kg	1	n.d.	-
HCFC-141b		mg/kg	1	n.d.	-
HCFC-142b		mg/kg	1	n.d.	-
HCFC-221		mg/kg	1	n.d.	-
HCFC-222		mg/kg	1	n.d.	-
HCFC-223		mg/kg	1	n.d.	-
HCFC-224		mg/kg	1	n.d.	-
HCFC-225ca		mg/kg	1	n.d.	-
HCFC-225cb		mg/kg	1	n.d.	-
HCFC-226		mg/kg	1	n.d.	-
HCFC-231		mg/kg	1	n.d.	-
HCFC-232		mg/kg	1	n.d.	-
HCFC-233		mg/kg	1	n.d.	-
HCFC-234		mg/kg	1	n.d.	-
HCFC-235		mg/kg	1	n.d.	-
HCFC-241		mg/kg	1	n.d.	-
HCFC-242		mg/kg	1	n.d.	-
HCFC-243		mg/kg	1	n.d.	-
HCFC-244		mg/kg	1	n.d.	-
HCFC-251		mg/kg	1	n.d.	-
HCFC-252		mg/kg	1	n.d.	-
HCFC-253		mg/kg	1	n.d.	-
HCFC-261		mg/kg	1	n.d.	-
HCFC-262		mg/kg	1	n.d.	-
HCFC-271		mg/kg	1	n.d.	-

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HCFC-141	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
HCFC-142		mg/kg	1	n.d.	-
HCFC-151		mg/kg	1	n.d.	-
HCFC-225		mg/kg	1	n.d.	-
溴甲烷 (Methyl bromide) (CAS No.: 74-83-9)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
海龍 (Halons)					
海龍-1211 (Halon-1211) (CAS No.: 353-59-3)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
海龍-1301 (Halon-1301) (CAS No.: 75-63-8)		mg/kg	1	n.d.	-
海龍-2402 (Halon-2402) (CAS No.: 124-73-2)		mg/kg	1	n.d.	-
不完全鹵化氟溴化物 (Hydrobromofluorocarbons) (HBFCs)					
HBFC-21B2 (CHFBr2) (CAS No.: 1868-53-7)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
HBFC-22B1 (CHF2Br) (CAS No.: 1511-62-2)		mg/kg	1	n.d.	-
HBFC-31B1 (CH2FBr) (CAS No.: 373-52-4)		mg/kg	1	n.d.	-
HBFC-121B4 (C2HFBr4)		mg/kg	1	n.d.	-
HBFC-122B3 (C2HF2Br3)		mg/kg	1	n.d.	-
HBFC-123B2 (C2HF3Br2)		mg/kg	1	n.d.	-
HBFC-124B1 (C2HF4Br)		mg/kg	1	n.d.	-
HBFC-131B3 (C2H2FBr3)		mg/kg	1	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
HBFC-132B2 (C2H2F2Br2)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
HBFC-133B1 (C2H2F3Br)		mg/kg	1	n.d.	-
HBFC-141B2 (C2H3FBr2)		mg/kg	1	n.d.	-
HBFC-142B1 (C2H3F2Br)		mg/kg	1	n.d.	-
HBFC-151B1 (C2H4FBr)		mg/kg	1	n.d.	-
HBFC-221B6 (C3HFBr6)		mg/kg	1	n.d.	-
HBFC-222B5 (C3HF2Br5)		mg/kg	1	n.d.	-
HBFC-223B4 (C3HF3Br4)		mg/kg	1	n.d.	-
HBFC-224B3 (C3HF4Br3)		mg/kg	1	n.d.	-
HBFC-225B2 (C3HF5Br2)		mg/kg	1	n.d.	-
HBFC-226B1 (C3HF6Br)		mg/kg	1	n.d.	-
HBFC-231B5 (C3H2FBr5)		mg/kg	1	n.d.	-
HBFC-232B4 (C3H2F2Br4)		mg/kg	1	n.d.	-
HBFC-233B3 (C3H2F3Br3)		mg/kg	1	n.d.	-
HBFC-234B2 (C3H2F4Br2)		mg/kg	1	n.d.	-
HBFC-235B1 (C3H2F5Br)		mg/kg	1	n.d.	-
HBFC-241B4 (C3H3FBr4)		mg/kg	1	n.d.	-
HBFC-242B3 (C3H3F2Br3)		mg/kg	1	n.d.	-
HBFC-243B2 (C3H3F3Br2)		mg/kg	1	n.d.	-
HBFC-244B1 (C3H3F4Br)		mg/kg	1	n.d.	-
HBFC-251B3 (C3H4FBr3)		mg/kg	1	n.d.	-
HBFC-252B2 (C3H4F2Br2)		mg/kg	1	n.d.	-
HBFC-253B1 (C3H4F3Br)		mg/kg	1	n.d.	-
HBFC-261B2 (C3H5FBr2)		mg/kg	1	n.d.	-
HBFC-262B1 (C3H5F2Br)		mg/kg	1	n.d.	-
HBFC-271B1 (C3H6FBr)		mg/kg	1	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
氯碳氫化物 (Chlorinate hydrocarbon) (CHCs)					
1,1,1,2-四氯乙烷 (1,1,1,2-Tetrachloroethane) (CAS No.: 630-20-6)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
1,1,1-三氯乙烷 (1,1,1-Trichloroethane) (CAS No.: 71-55-6)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
1,1,2,2-四氯乙烷 (1,1,2,2-Tetrachloroethane) (CAS No.: 79-34-5)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
1,1,2-三氯乙烷 (1,1,2-Trichloroethane) (CAS No.: 79-00-5)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
1,1-二氯乙烷 (1,1-Dichloroethane) (CAS No.: 75-34-3)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
1,1-二氯乙烯 (1,1-Dichloroethylene) (CAS No.: 75-35-4)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
1,1-二氯丙烯 (1,1-Dichloropropene) (CAS No.: 563-58-6)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
1,2,3-三氯丙烷 (1,2,3-Trichloropropane) (CAS No.: 96-18-4)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
1,2-二氯乙烷 (1,2-Dichloroethane) (CAS No.: 107-06-2)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
1,2-二氯丙烷 (1,2-Dichloropropane) (CAS No.: 78-87-5)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
1,3-二氯丙烷 (1,3-Dichloropropane) (CAS No.: 142-28-9)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
2,2-二氯丙烷 (2,2-Dichloropropane) (CAS No.: 594-20-7)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
四氯甲烷(四氯化碳) (Carbon tetrachloride) (CAS No.: 56-23-5)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
氯乙烷 (Chloroethane) (CAS No.: 75-00-3)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
氯仿 (Chloroform) (CAS No.: 67-66-3)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
氯甲烷 (Chloromethane) (CAS No.: 74-87-3)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
順-1,2-二氯乙烯 (cis-1,2-Dichloroethene) (CAS No.: 156-59-2)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
順-1,3-二氯丙烯 (cis-1,3-Dichloropropene) (CAS No.: 10061-01-5)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
六氯-1,3-丁二烯 (Hexachlorobutadiene) (CAS No.: 87-68-3)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
二氯甲烷 (Dichloromethane) (CAS No.: 75-09-2)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
四氯乙烯 (Tetrachloroethene) (CAS No.: 127-18-4)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
反-1,2-二氯乙烯 (trans-1,2-Dichloroethene) (CAS No.: 156-60-5)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
反-1,3-二氯丙烯 (trans-1,3-Dichloropropene) (CAS No.: 10061-02-6)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
三氯乙烯 (Trichloroethylene) (CAS No.: 79-01-6)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
六氟化硫 (Sulfur hexafluoride) (CAS No.: 2551-62-4)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
砷 (Arsenic) (As) (※ E)	參考RSTS-EE-SVHC-007，以感應耦合電漿發射光譜儀分析。(With reference to RSTS-EE-SVHC-007, analysis was performed by ICP-OES.)	mg/kg	50	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
五氧化二砷 (As_2O_5) (Diarsenic pentaoxide (As_2O_5)) (CAS No.: 1303-28-2)	由砷結果計算得之。(Calculated from the result of Arsenic.)	mg/kg	50▲	n.d.	-
三氧化二砷 (As_2O_3) (Diarsenic trioxide (As_2O_3)) (CAS No.: 1327-53-3)	由砷結果計算得之。(Calculated from the result of Arsenic.)	mg/kg	50▲	n.d.	-
鄰苯二甲酸丁苯甲酯 (BBP) (Butyl benzyl phthalate (BBP)) (CAS No.: 85-68-7)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	1000
鄰苯二甲酸二丁酯 (DBP) (Dibutyl phthalate (DBP)) (CAS No.: 84-74-2)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	1000
鄰苯二甲酸二(2-乙基己基)酯 (DEHP) (Di-(2-ethylhexyl) phthalate (DEHP)) (CAS No.: 117-81-7)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	1000
鄰苯二甲酸二異丁酯 (DIBP) (Diisobutyl phthalate (DIBP)) (CAS No.: 84-69-5)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	1000
鄰苯二甲酸二異癸酯 (DIDP) (Diisodecyl phthalate (DIDP)) (CAS No.: 26761-40-0, 68515-49-1)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二異壬酯 (DINP) (Diisononyl phthalate (DINP)) (CAS No.: 28553-12-0, 68515-48-0)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二正辛酯 (DNOP) (Di-n-octyl phthalate (DNOP)) (CAS No.: 117-84-0)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
鄰苯二甲酸二正己酯 (DNHP) (Di-n-hexyl phthalate (DNHP)) (CAS No.: 84-75-3)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
二氯化鈷 ($CoCl_2$) (Cobalt dichloride ($CoCl_2$)) (CAS No.: 7646-79-9)	以感應耦合電漿發射光譜儀，離子層析儀分析；由氯、鈷的結果計算得之。(Analysis was performed by ICP-OES, IC. Calculated from the results of Cobalt, Chlorine.)	mg/kg	50▲	n.d.	-
二辛基錫 (DOT) (Dioctyl tin (DOT))	參考RSTS-EE-SVHC-007，以氣相層析儀/火焰光度偵測器分析。(With reference to RSTS-EE-SVHC-007, analysis was performed by GC/FPD.)	mg/kg	225	n.d.	-
二正辛基-雙(2-乙基己基巰基乙酸酯)錫 (2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate) (CAS No.: 15571-58-1)	由二辛基錫結果計算得之。(Calculated from the result of DOT.)	mg/kg	225▲	n.d.	-
單辛基錫 (MOT) (Monooctyl tin (MOT))	參考RSTS-EE-SVHC-007，以氣相層析儀/火焰光度偵測器分析。(With reference to RSTS-EE-SVHC-007, analysis was performed by GC/FPD.)	mg/kg	140	n.d.	-
二正辛基-雙(2-乙基己基巰基乙酸酯)錫和單辛基-三(2-乙基己基巰基乙酸酯)錫的反應物 (Reaction mass of 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate and 2-ethylhexyl 10-ethyl-4-[[2-[(2-ethylhexyl)oxy]-2-oxoethyl]thio]-4-octyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (reaction mass of DOTE and MOTE))	由二辛基錫及單辛基錫結果計算得之。(Calculated from the result of DOT and MOT.)	mg/kg	-	n.d.	-

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江蘇省昆山市昆山經濟技術開發區長江南路201號 (201 CHANG JIANG ROAD(S) KUNSHAN ECONOMIC & TECHNICAL DEVELOPMENT ZONE, KUNSHAN, JIANG SU, CHINA 215300)
廣東省惠州市博羅縣石灣鎮永石大道230號 (NO. 230, YONGSHI BOULEVARD SHIWAN TOWN BOLUO COUNTY HUIZHOU CITY GUANG DONG)

測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
鄰苯二甲酸二(支鏈與直鏈)己基酯 (DHP) (1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear (DHP)) (CAS No.: 68515-50-4)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二 (C6-8支鏈)烷基酯，富C7 (DIHP) (1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (DIHP)) (CAS No.: 71888-89-6)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二(C7-11支鏈與直鏈)烷基酯 (DHNUP) (1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP)) (CAS No.: 68515-42-4)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸雙(2-甲氧基乙基)酯 (DMEP) (Bis(2-methoxyethyl) phthalate (DMEP)) (CAS No.: 117-82-8)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二異戊酯 (DIPP) (Diisopentyl phthalate (DIPP)) (CAS No.: 605-50-5)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二(支鏈及直鏈戊基)酯 (DPP) (1,2-Benzenedicarboxylic acid, dipentylester, branched and linear (DPP)) (CAS No.: 84777-06-0)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二正戊酯 (DNPP) (Di-n-pentyl phthalate (DNPP)) (CAS No.: 131-18-0)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸正戊異戊酯 (NPIPP) (N-pentyl iso-pentyl phthalate (NPIPP)) (CAS No.: 776297-69-9)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
鄰苯二甲酸二甲酯 (DMP) (Dimethyl phthalate (DMP)) (CAS No.: 131-11-3)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二環己酯 (DCHP) (Di-cyclohexyl phthalate (DCHP)) (CAS No.: 84-61-7)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二苯酯 (DPhP) (Diphenyl phthalate (DPhP)) (CAS No.: 84-62-8)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二苯甲基酯 (Dibenzyl phthalate) (CAS No.: 523-31-9)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二異辛酯 (DIOP) (Diisooctyl phthalate (DIOP)) (CAS No.: 27554-26-3)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二丙酯 (DPrP) (Dipropyl phthalate (DPrP)) (CAS No.: 131-16-8)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二正壬酯 (DNNP) (Di-n-nonyl phthalate (DNNP)) (CAS No.: 84-76-4)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二乙酯 (DEP) (Di-ethyl phthalate (DEP)) (CAS No.: 84-66-2)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
全氟己基磺酸及其鹽類 (PFHxS) (Perfluorohexane-1-sulphonic acid and its salts (PFHxS)) (CAS No.: 355-46-4)	參考CEN/TS 15968: 2010，以液相層析串聯質譜儀分析。(With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.)	mg/kg	0.01	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
紅磷 (Red Phosphorus)	以熱裂解-氣相層析儀/質譜儀分析。(Analysis was performed by Pyrolyzer-GC/MS.)	**	-	Negative	-
硼 (Boron) (B) (※ E)	參考RSTS-EE-SVHC-007，以感應耦合電漿發射光譜儀分析。(With reference to RSTS-EE-SVHC-007, analysis was performed by ICP-OES.)	mg/kg	50	n.d.	-
硼酸 (Boric acid) (CAS No.: 10043-35-3, 11113-50-1)	由硼結果計算得之。(Calculated from the result of Boron.)	mg/kg	50▲	n.d.	-
無水四硼酸二鈉 (Disodium tetraborate, anhydrous) (CAS No.: 1303-96-4, 1330-43-4, 12179-04-3)	由硼結果計算得之。(Calculated from the result of Boron.)	mg/kg	50▲	n.d.	-
水合硼酸鈉 (Tetraboron disodium heptaoxide, hydrate) (CAS No.: 12267-73-1) (※ H)	由硼結果計算得之。(Calculated from the result of Boron.)	mg/kg	50▲	n.d.	-
二乙二醇二甲醚 (DEGDME) (Diethylene glycol dimethyl ether (DEGDME)) (CAS No.: 111-96-6)	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	10	n.d.	-
N, N-二甲基乙醯胺 (DMAC) (N,N-Dimethylacetamide (DMAC)) (CAS No.: 127-19-5)	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	10	n.d.	-
乙二醇二甲醚 (Ethylene glycol dimethyl ether) (CAS No.: 110-71-4)	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	10	n.d.	-
磷酸三(二甲苯)酯 (Trixylyl phosphate) (CAS No.: 25155-23-1)	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	25	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
對特辛基苯酚 (4-Tert-octylphenol) (CAS No.: 140-66-9)	參考US EPA 3550C: 2007，以液相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by LC/MS.)	mg/kg	10	n.d.	-
N-苯基苯胺與苯乙烯和2,4,4-三甲基戊烯的反應物 (Benzenamine, N-phenyl-, reaction products with styrene and 2,4,4-trimethylpentene) (CAS No.: 68921-45-9)	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	100	n.d.	-
2-(2'-羥基-3',5'-二-叔-戊基苯基)苯並三唑 (紫外線吸收劑328) (2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328)) (CAS No.: 25973-55-1)	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	5	n.d.	-
溴氯甲烷 (Bromochloromethan) (CAS No.: 74-97-5)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
溴 (Br) (Bromine (Br)) (CAS No.: 10097-32-2)	參考BS EN 14582: 2016，以離子層析儀分析。(With reference to BS EN 14582: 2016, analysis was performed by IC.)	mg/kg	50	29100	-
氯 (Cl) (Chlorine (Cl)) (CAS No.: 22537-15-1)		mg/kg	50	236	-

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備註(Note)：

1. mg/kg = ppm；0.1wt% = 1000ppm
2. MDL = Method Detection Limit (方法偵測極限值)
3. n.d. = Not Detected (未檢出)；小於MDL / Less than MDL
4. "-" = Not Regulated (無規格值)
5. **= Qualitative analysis (No Unit) 定性分析(無單位)
6. Negative = Undetectable 陰性(未偵測到); Positive = Detectable 陽性(已偵測到)
7. 石綿定性分析試驗範圍： <0.1%~100%，石綿鑑定的判定基準是以檢出含有石綿纖維為『Positive』，未檢出石綿纖維為『Negative』。(Testing range of asbestos qualitative analysis is from less than 0.1% to 100%. The judgment criterion: asbestos fibers being found is shown as "Positive"; asbestos fibers not being found is shown as "Negative".)
8. ▲：MDL是針對元素/測試化合物之評估。(The MDL was evaluated for element / tested substance.)
   換算公式 (Conversion Formula)：AX = A × F

AX	A	F
五氧化二砷 (Diarsenic pentaoxide)	砷 (Arsenic)	1.5339
三氧化二砷 (Diarsenic trioxide)	砷 (Arsenic)	1.3203
硼酸 (Boric acid)	硼 (Boron)	5.7184
無水四硼酸二鈉 (Disodium tetraborate, anhydrous)	硼 (Boron)	4.6531
水合硼酸鈉(五水四硼酸二鈉) (Disodium tetraborate, pentahydrate)	硼 (Boron)	6.7361
水合硼酸鈉(十水四硼酸二鈉) (Disodium tetraborate, decahydrate)	硼 (Boron)	8.8191
氧化鈹 (Beryllium oxide (BeO))	鈹 (Beryllium)	2.7753
氧化雙三丁基錫 (Bis(tributyltin)oxide) (TBTO)	三丁基錫 (Tributyl Tin) (TBT)	1.024
二正辛基-雙(2-乙基己基巰基乙酸酯)錫 (2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate) (DOTE)	二辛基錫 (Dioctyl Tin) (DOT)	2.1781

參數換算表 (Parameter Conversion Table)：
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9. 全氟辛烷磺酸及其鹽類包含 (PFOS and its salts including) :
   CAS No.: 29081-56-9, 2795-39-3, 29457-72-5, 70225-14-8, 56773-42-3, 251099-16-8, 307-35-7.
10. 全氟辛酸及其鹽類包含 (PFOA and its salts including) :
    CAS No.: 3825-26-1, 335-95-5, 2395-00-8, 335-93-3, 335-66-0.
11. (※ E): 被萃取出的溶出硼/砷是以感應耦合電漿發射光譜儀檢測得之。(The extracted soluble Boron / Arsenic are detected by ICP-OES.)
12. (※ H): 水合硼酸鈉: 依照歐洲化學總署解釋以無水四硼酸二鈉數據作為代表(歐洲化學總署回信編號 Ref no.: INC 000000032519) / Tetraboron disodium heptaoxide, hydrate: Only anhydrous form of disodium tetraborate is relevant and considered according to ECHA explanation (Ref no.: INC 000000032519).
13. 鈹青銅是一種主要成份為鈹及銅的合金, 當偵測不到總鈹含量時, 亦表示不含鈹青銅.
    (Since beryllium copper is a metal alloy of copper and beryllium and the test result is n.d. for beryllium, we can have conclusion that the beryllium copper is n.d..)
14. 符合性結果之判定係以測試結果與限值做比較。(The statement of compliance conformity is based on comparison of testing results and limits.)
15. 本報告部份測試結果係引用自報告 ETR21B03124 之樣品測試結果。(The some test results of this report were quoted from ETR21B03124)

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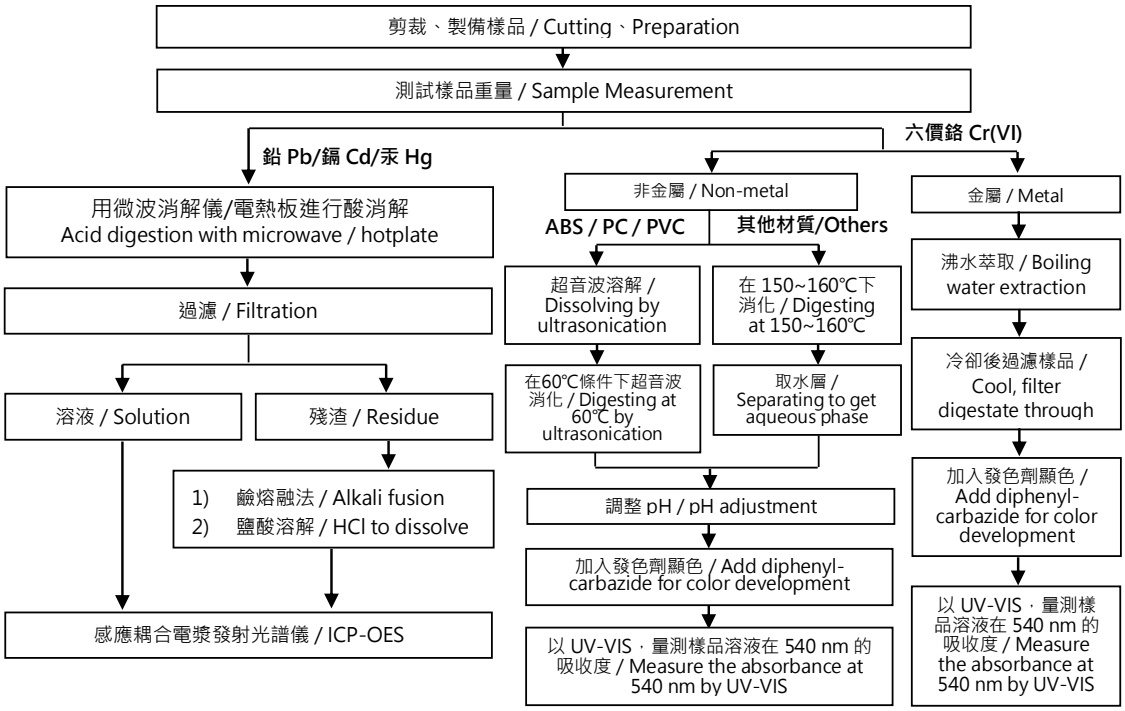
重金屬流程圖 / Analytical flow chart of Heavy Metal

根據以下的流程圖之條件，樣品已完全溶解。（六價鉻測試方法除外）

These samples were dissolved totally by pre-conditioning method according to below flow chart.

（Cr^{6+} test method excluded）



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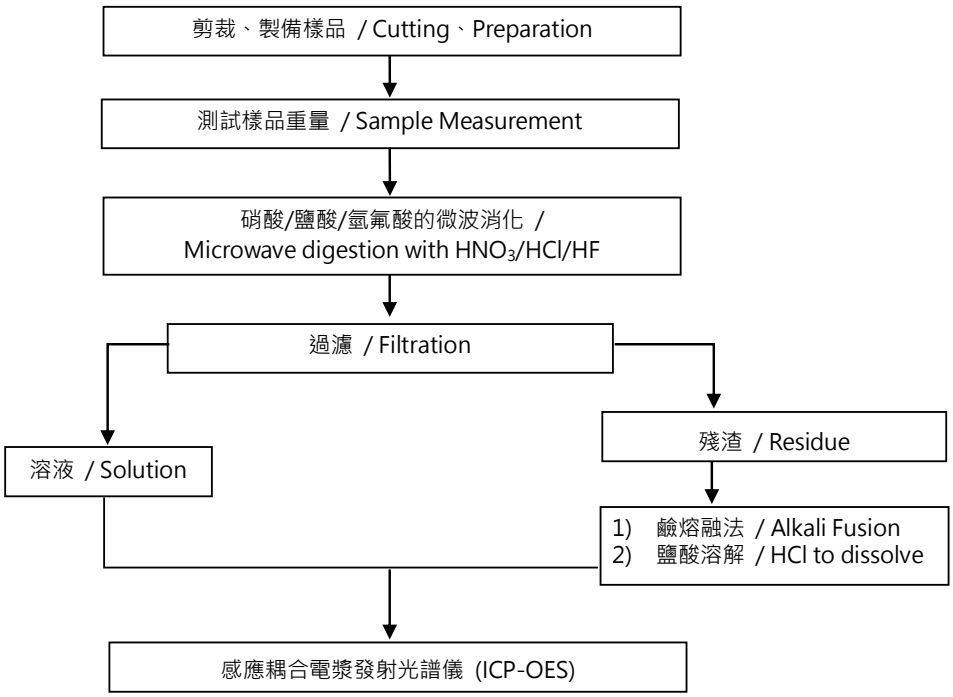
元素(含重金屬)分析流程圖 / Analytical flow chart of Elements (Heavy metal included)

根據以下的流程圖之條件，樣品已完全溶解。
These samples were dissolved totally by pre-conditioning method according to below flow chart.
【參考方法/Reference method：US EPA 3051A、US EPA 3052】



* US EPA 3051A 方法未添加氫氟酸 / US EPA 3051A method does not add HF.

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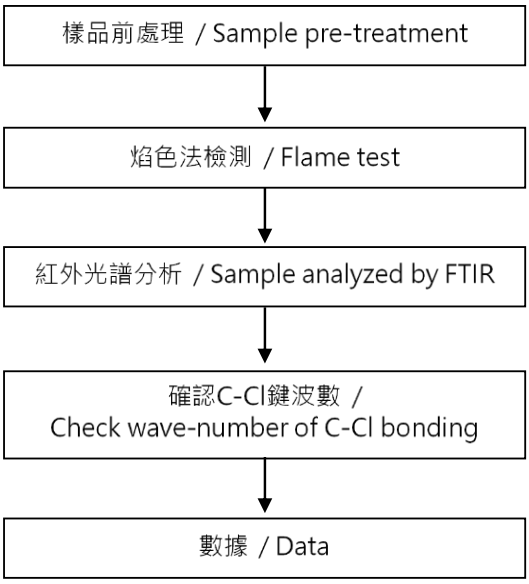
聚氯乙烯物質判定分析流程圖 / Analysis flow chart - PVC



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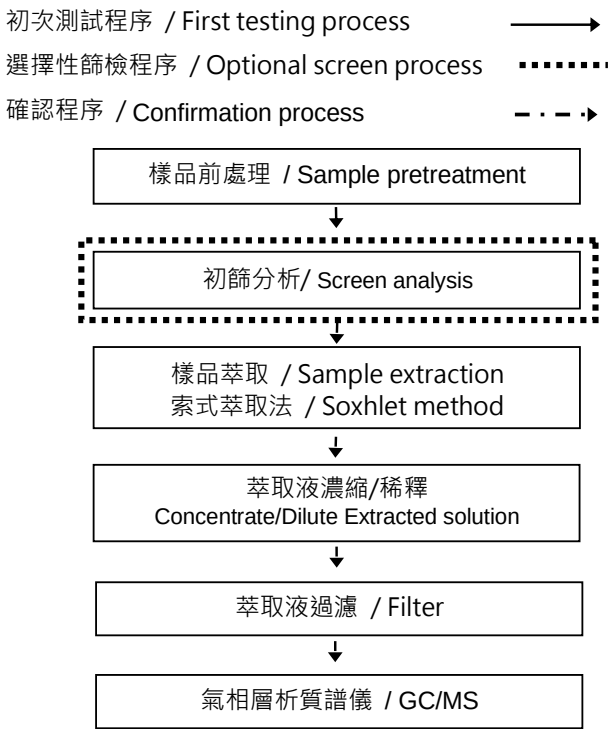
多溴聯苯/多溴聯苯醚分析流程圖 / Analytical flow chart - PBBs/PBDEs



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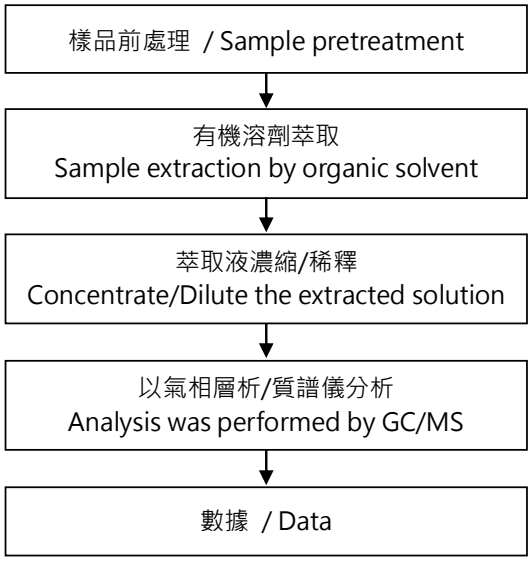
分析流程圖 / Analytical flow chart

【適用於：多氯聯苯、多氯奈、多氯三聯苯、滅蟻靈、氯化石蠟、DBBT】

*Apply to: PCBs, PCNs, PCTs, Mirex, Chlorinated Paraffins, DBBT



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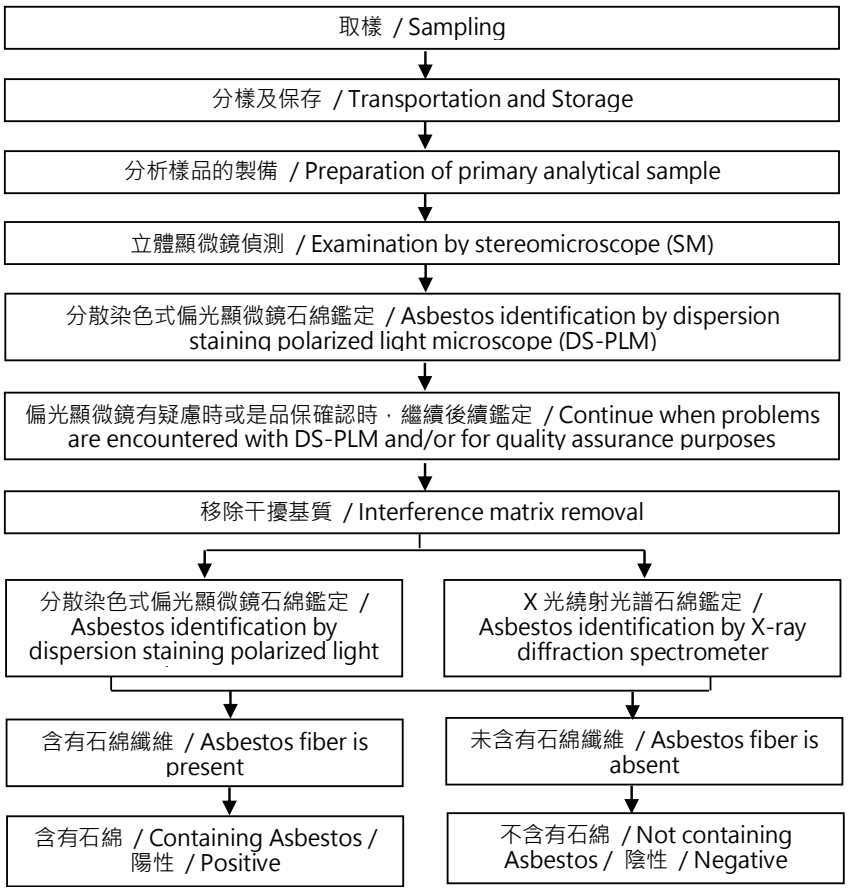
石綿鑑定分析流程圖 / Analysis flow chart for determination of Asbestos

【參考方法(Reference method): EPA 600/R-93/116】



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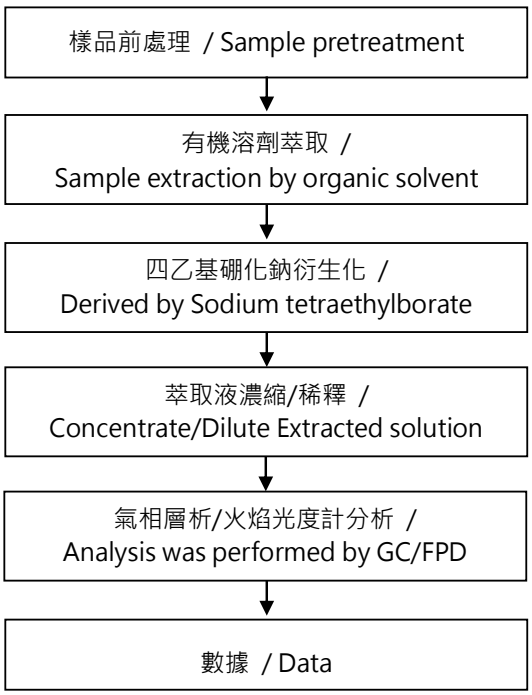
有機錫分析流程圖 / Analytical flow chart - Organic-Tin



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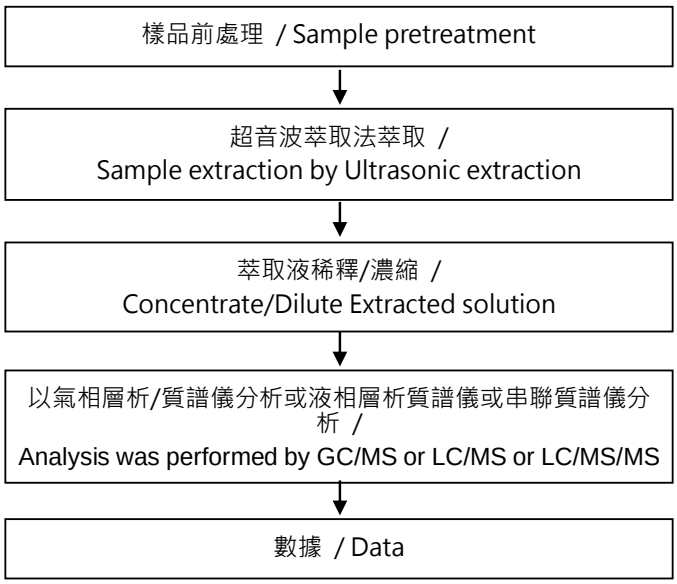
全氟化合物(包含全氟辛酸/全氟辛烷磺酸/其相關化合物等等)分析流程圖 / Analytical flow chart – PFAS (including PFOA/PFOS/its related compound, etc.)



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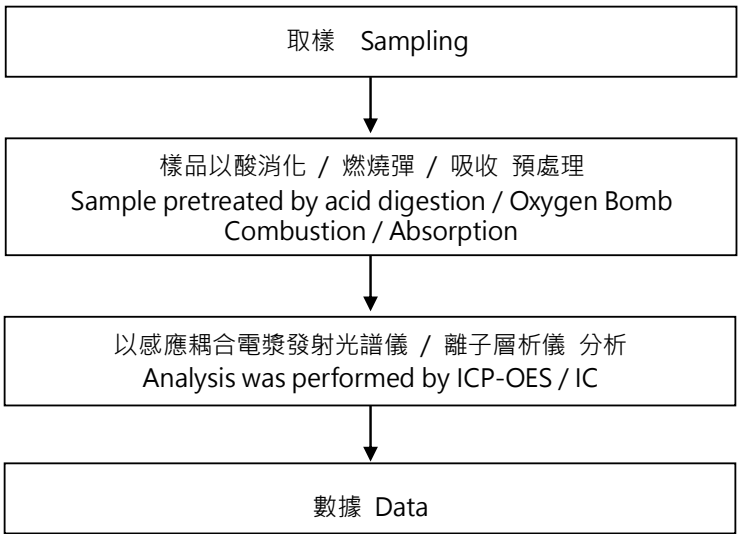
二氯化鈷分析流程圖 / Analytical flow chart - Cobalt dichloride



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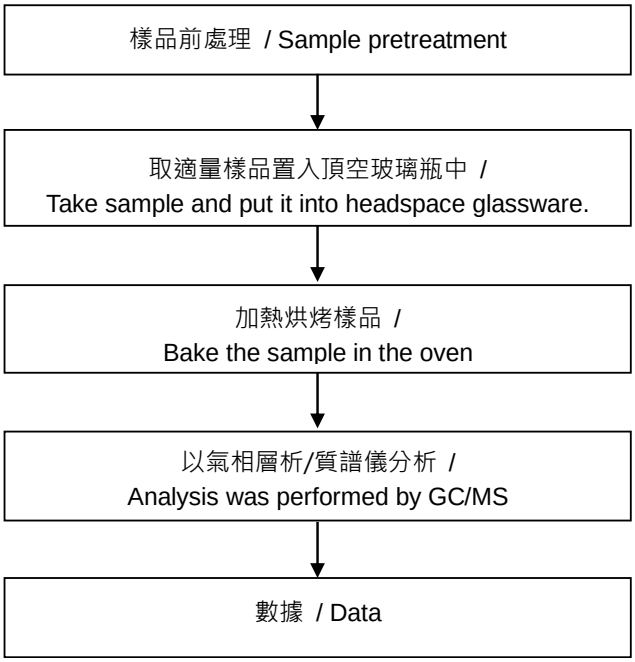
揮發性有機化合物分析流程圖 /
Analytical flow chart of volatile organic compounds (VOCs)

【參考方法/Reference method：US EPA 5021A】



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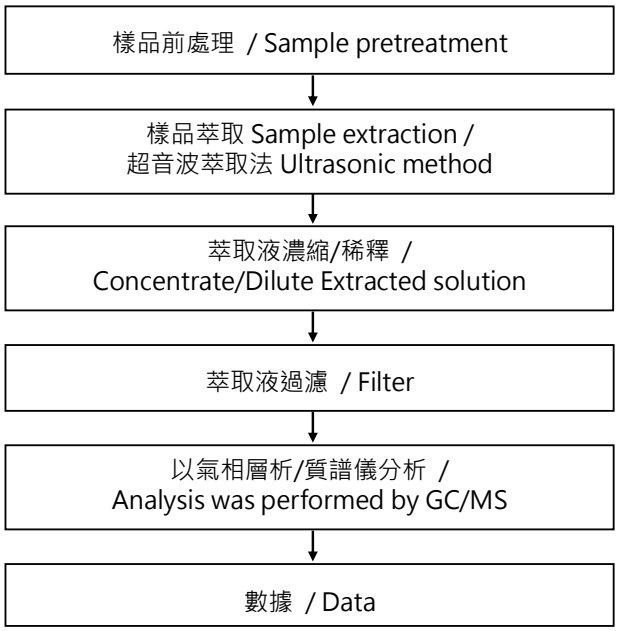
分析流程圖 / Analytical flow chart

* 適用於 / Apply to: 富馬酸二甲酯(DMFU)、六溴環十二烷(HBCDD)、乙二醇醚及其酯類(Ethylene glycol ether) 、有機磷化合物(Organic phosphorus compounds)、BNST



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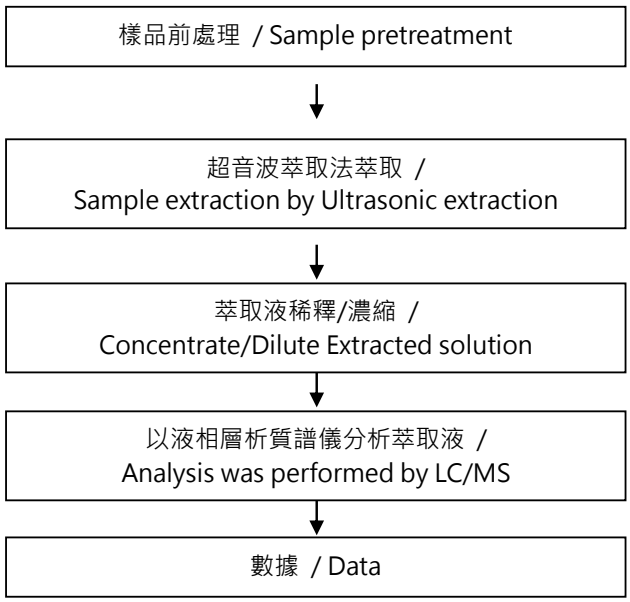
分析流程圖 / Analytical flow chart

*** 適用於 / Apply to: NP、OP、4-t-OP、NPEO、OPEO**



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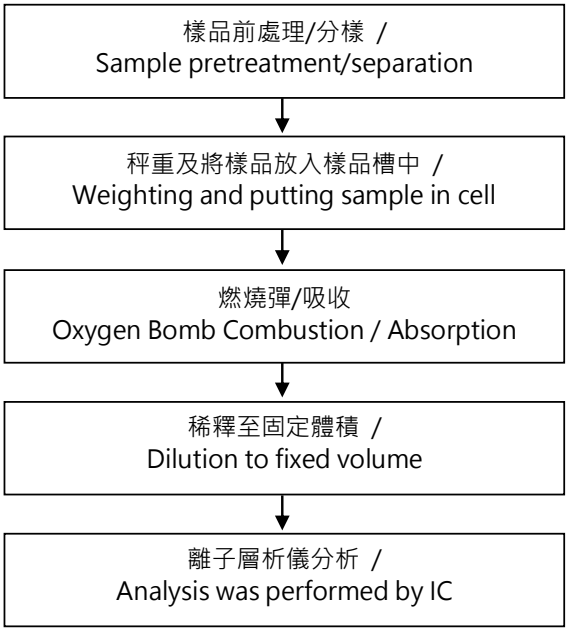
鹵素分析流程圖 / Analytical flow chart - Halogen



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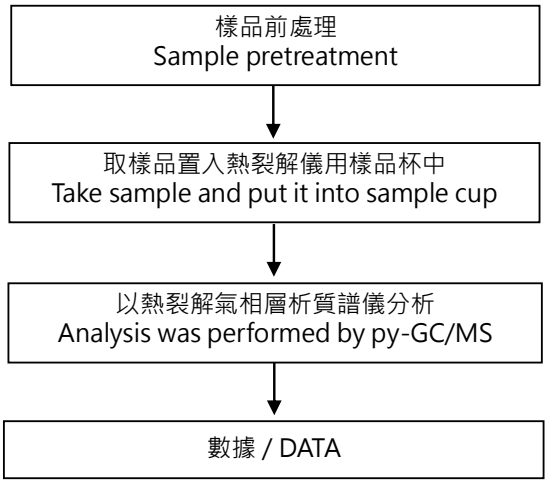
紅磷分析流程 / Analytical flow chart - Red phosphorus



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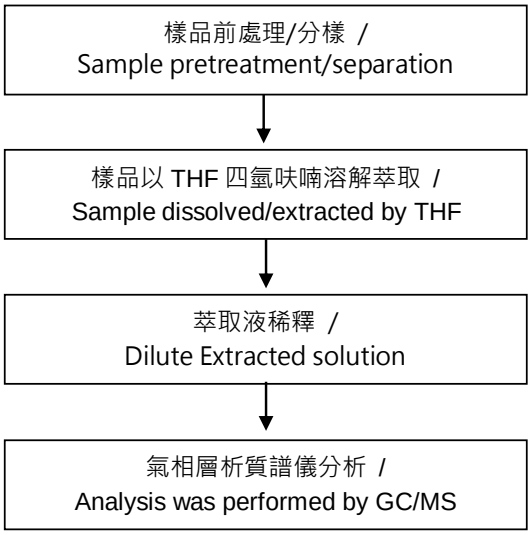
可塑劑分析流程圖 / Analytical flow chart - Phthalate

【測試方法/Test method: IEC 62321-8】



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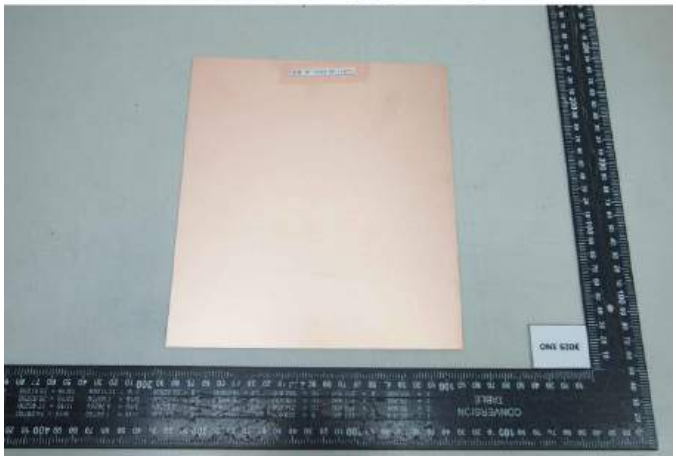
*** 照片中如有箭頭標示，則表示為實際檢測之樣品/部位. ***
(The tested sample / part is marked by an arrow if it's shown on the photo.)

ETR21B03125



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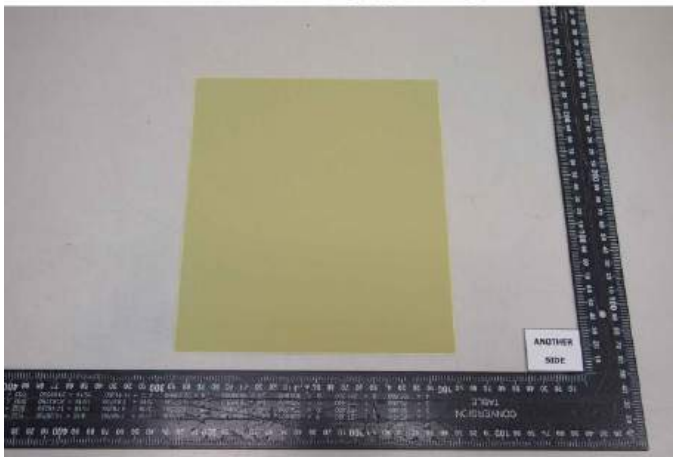

** 報告結尾 (End of Report) **

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測試報告
Test Report

號碼(No.): ETR21B03161　　日期(Date): 24-Nov-2021　　

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以下測試樣品係由申請廠商所提供及確認 (The following sample(s) was/were submitted and identified by/on behalf of the applicant as)：

送樣廠商(Sample Submitted By)	:	南亞塑膠工業股份有限公司 (NAN YA PLASTICS CORPORATION)
樣品名稱(Sample Name)	:	LAMINATE (UL E98983)
樣品型號(Style/Item No.)	:	NP-140F
訂單編號(Order No.)	:	1A12445

==========

收件日(Sample Receiving Date)	:	17-Nov-2021
測試期間(Testing Period)	:	17-Nov-2021 to 24-Nov-2021

測試需求(Test Requested) :
(1) 依據客戶指定，參考RoHS 2011/65/EU Annex II及其修訂指令(EU) 2015/863測試鎘、鉛、汞、六價鉻、多溴聯苯、多溴聯苯醚, DBP, BBP, DEHP, DIBP。 (As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample(s).)

(2) 其他測試項目請見下一頁。 (Please refer to next pages for the other item(s).)

測試結果(Test Results) : 請參閱下一頁 (Please refer to following pages.)

結　　論(Conclusion) : (1) 根據客戶所提供的樣品，其鎘、鉛、汞、六價鉻、多溴聯苯、多溴聯苯醚, DBP, BBP, DEHP, DIBP的測試結果符合RoHS 2011/65/EU Annex II暨其修訂指令(EU) 2015/863之限值要求。 (Based on the performed tests on submitted sample(s), the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.)

Troy Chang / Manager / Tech
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory - Taipei

CHECK REPORT
PIN CODE: 744FA4B0

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測試部位敘述 (Test Part Description)

No.1 : 銅色/棕色板子 (COPPER/BROWN SHEET)

測試結果 (Test Results)

測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
鎘 (Cd) (Cadmium (Cd)) (CAS No.: 7440-43-9)	參考IEC 62321-5: 2013，以感應耦合電漿發射光譜儀分析。(With reference to IEC 62321-5: 2013, analysis was performed by ICP-OES.)	mg/kg	2	n.d.	100
鉛 (Pb) (Lead (Pb)) (CAS No.: 7439-92-1)		mg/kg	2	4.62	1000
汞 (Hg) (Mercury (Hg)) (CAS No.: 7439-97-6)	參考IEC 62321-4: 2013+ AMD1: 2017，以感應耦合電漿發射光譜儀分析。(With reference to IEC 62321-4: 2013+ AMD1: 2017, analysis was performed by ICP-OES.)	mg/kg	2	n.d.	1000
六價鉻 Cr(VI) (Hexavalent Chromium Cr(VI)) (CAS No.: 18540-29-9)	參考IEC 62321-7-2: 2017，以紫外光-可見光分光光度計分析。(With reference to IEC 62321-7-2: 2017, analysis was performed by UV-VIS.)	mg/kg	8	n.d.	1000
鈹 (Be) (Beryllium (Be)) (CAS No.: 7440-41-7)	參考US EPA 3052: 1996，以感應耦合電漿發射光譜儀分析。(With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.)	mg/kg	2	n.d.	-
氧化鈹 (BeO) (Beryllium oxide (BeO)) (CAS No.: 1304-56-9)	由鈹結果計算得之。(Calculated from the result of Beryllium.)	mg/kg	2▲	n.d.	-
聚氯乙烯 (Polyvinylchloride) (PVC)	參考ASTM E1252: 2013，以傅立葉轉換紅外線光譜儀及焰色法分析。(With reference to ASTM E1252: 2013, analysis was performed by FT-IR and Flame Test.)	**	-	Negative	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
一溴聯苯 (Monobromobiphenyl)	參考IEC 62321-6: 2015，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-6: 2015, analysis was performed by GC/MS.)	mg/kg	5	n.d.	-
二溴聯苯 (Dibromobiphenyl)		mg/kg	5	n.d.	-
三溴聯苯 (Tribromobiphenyl)		mg/kg	5	n.d.	-
四溴聯苯 (Tetrabromobiphenyl)		mg/kg	5	n.d.	-
五溴聯苯 (Pentabromobiphenyl)		mg/kg	5	n.d.	-
六溴聯苯 (Hexabromobiphenyl)		mg/kg	5	n.d.	-
七溴聯苯 (Heptabromobiphenyl)		mg/kg	5	n.d.	-
八溴聯苯 (Octabromobiphenyl)		mg/kg	5	n.d.	-
九溴聯苯 (Nonabromobiphenyl)		mg/kg	5	n.d.	-
十溴聯苯 (Decabromobiphenyl)		mg/kg	5	n.d.	-
多溴聯苯總和 (Sum of PBBs)		mg/kg	-	n.d.	1000
一溴聯苯醚 (Monobromodiphenyl ether)	參考IEC 62321-6: 2015，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-6: 2015, analysis was performed by GC/MS.)	mg/kg	5	n.d.	-
二溴聯苯醚 (Dibromodiphenyl ether)		mg/kg	5	n.d.	-
三溴聯苯醚 (Tribromodiphenyl ether)		mg/kg	5	n.d.	-
四溴聯苯醚 (Tetrabromodiphenyl ether)		mg/kg	5	n.d.	-
五溴聯苯醚 (Pentabromodiphenyl ether)		mg/kg	5	n.d.	-
六溴聯苯醚 (Hexabromodiphenyl ether)		mg/kg	5	n.d.	-
七溴聯苯醚 (Heptabromodiphenyl ether)		mg/kg	5	n.d.	-
八溴聯苯醚 (Octabromodiphenyl ether)		mg/kg	5	n.d.	-
九溴聯苯醚 (Nonabromodiphenyl ether)		mg/kg	5	n.d.	-
十溴聯苯醚 (Decabromodiphenyl ether)		mg/kg	5	n.d.	-
多溴聯苯醚總和 (Sum of PBDEs)		mg/kg	-	n.d.	1000
多氯聯苯 (PCBs) (Polychlorinated biphenyls (PCBs))	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	0.5	n.d.	-
多氯奈 (PCNs) (Polychlorinated naphthalene (PCNs))		mg/kg	5	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
多氯三聯苯 (PCTs) (Polychlorinated terphenyls (PCTs))	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	0.5	n.d.	-
短鏈氯化石蠟(C10-C13) (SCCP) (Short Chain Chlorinated Paraffins(C10-C13) (SCCP)) (CAS No.: 85535-84-8)	參考ISO 18219: 2015，以氣相層析儀/質譜儀分析。(With reference to ISO 18219: 2015, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
石綿 (Asbestos)					
白石綿/溫石綿 (Chrysotile) (CAS No.: 12001-29-5)	參考EPA 600/R-93/116: 1993，以立體顯微鏡(SM)與分散染色式偏光顯微鏡(DS-PLM)及X光繞射光譜分析法(XRD)分析。(With reference to EPA 600/R-93/116: 1993, analysis was performed by Stereo Microscope (SM), Dispersion Staining Polarized Light Microscope (DS-PLM) and X-ray Diffraction Spectrometer (XRD).)	%	-	Negative	-
褐石綿/鐵石綿 (Amosite) (CAS No.: 12172-73-5)		%	-	Negative	-
青石綿 (Crocidolite) (CAS No.: 12001-28-4)		%	-	Negative	-
斜方角閃石綿 (Anthophyllite) (CAS No.: 77536-67-5)		%	-	Negative	-
透閃石綿 (Tremolite) (CAS No.: 77536-68-6)		%	-	Negative	-
陽起石綿 (Actinolite) (CAS No.: 77536-66-4)		%	-	Negative	-
三丁基錫 (TBT) (Tributyl tin (TBT))	參考ISO 17353: 2004，以氣相層析儀/火焰光度偵測器分析。(With reference to ISO 17353: 2004, analysis was performed by GC/FPD.)	mg/kg	0.03	n.d.	-
三苯基錫 (TPT) (Triphenyl tin (TPT))		mg/kg	0.03	n.d.	-
二丁基錫 (DBT) (Dibutyl tin (DBT))		mg/kg	0.03	n.d.	-
二辛基錫 (DOT) (Dioctyl tin (DOT))		mg/kg	0.03	n.d.	-
氧化雙三丁基錫 (TBTO) (Bis(tributyltin) oxide (TBTO)) (CAS No.: 56-35-9)	由三丁基錫結果計算得之。(Calculated from the result of Tributyl Tin (TBT).)	mg/kg	0.03▲	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
偶氮染料 (AZO Dyes)					
4-氨基二苯 (4-aminodiphenyl) (CAS No.: 92-67-1)	參考EN ISO 14362-1: 2017，以氣相層析質譜儀及高效液相層析儀/二極體陣列偵測器分析。(With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.)	mg/kg	3	n.d.	-
聯苯胺 (Benzidine) (CAS No.: 92-87-5)		mg/kg	3	n.d.	-
4-氯鄰甲苯胺 (4-chloro-o-toluidine) (CAS No.: 95-69-2)		mg/kg	3	n.d.	-
2-萘胺 (2-naphthylamine) (CAS No.: 91-59-8)		mg/kg	3	n.d.	-
鄰-胺基偶氮甲苯 (o-aminoazotoluene) (CAS No.: 97-56-3)		mg/kg	3	n.d.	-
2-胺基-4-硝基甲苯 (5-nitro-o-toluidine) (CAS No.: 99-55-8)		mg/kg	3	n.d.	-
4-氯苯胺 (4-chloroaniline) (CAS No.: 106-47-8)		mg/kg	3	n.d.	-
2,4-二氨基苯甲醚 (2,4-diaminoanisole) (CAS No.: 615-05-4)		mg/kg	3	n.d.	-
4,4'-二胺基二苯甲烷 (4,4'-diaminodiphenylmethane (MDA)) (CAS No.: 101-77-9)		mg/kg	3	n.d.	-
3,3'-二氯聯苯胺 (3,3'-dichlorobenzidine) (CAS No.: 91-94-1)		mg/kg	3	n.d.	-
3,3'-二甲氧基聯苯胺 (3,3'-dimethoxybenzidine) (CAS No.: 119-90-4)		mg/kg	3	n.d.	-
3,3'-二甲基聯苯胺 (3,3'-dimethylbenzidine) (CAS No.: 119-93-7)		mg/kg	3	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
3,3'-二甲基-4,4'-二胺基二苯甲烷 (3,3'-dimethyl-4,4'-diaminodiphenylmethane) (CAS No.: 838-88-0)	參考EN ISO 14362-1: 2017，以氣相層析質譜儀及高效液相層析儀/二極體陣列偵測器分析。(With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.)	mg/kg	3	n.d.	-
2-甲氧基-5-甲基苯胺 (2-methoxy-5-methylaniline) (CAS No.: 120-71-8)		mg/kg	3	n.d.	-
4,4'-亞甲雙(2-氯苯胺) (4,4'-methylene-bis-(2-chloroaniline)) (CAS No.: 101-14-4)		mg/kg	3	n.d.	-
4,4'-二胺基二苯醚 (4,4'-oxydianiline) (CAS No.: 101-80-4)		mg/kg	3	n.d.	-
4,4'-硫二苯胺 (4,4'-thiodianiline) (CAS No.: 139-65-1)		mg/kg	3	n.d.	-
鄰-甲苯胺 (o-toluidine) (CAS No.: 95-53-4)		mg/kg	3	n.d.	-
2,4-甲苯二胺 (2,4-diaminotoluene) (CAS No.: 95-80-7)		mg/kg	3	n.d.	-
2,4,5-三甲苯胺 (2,4,5-trimethylaniline) (CAS No.: 137-17-7)		mg/kg	3	n.d.	-
鄰-甲氧基苯胺 (o-anisidine) (CAS No.: 90-04-0)		mg/kg	3	n.d.	-
2,4-二甲基苯胺 (2,4-xylidine) (CAS No.: 95-68-1)		mg/kg	3	n.d.	-
2,6-二甲基苯胺 (2,6-xylidine) (CAS No.: 87-62-7)		mg/kg	3	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
4-苯基偶氮基苯胺 (4-aminoazobenzene) (CAS No.: 60-09-3)	參考EN ISO 14362-1: 2017 or/and EN ISO 14362-3: 2017，以氣相層析質譜儀及高效液相層析儀/二極體陣列偵測器分析。(With reference to EN ISO 14362-1: 2017 or/and EN ISO 14362-3: 2017, analysis was performed by GC/MS & HPLC/DAD.)	mg/kg	3	n.d.	-
全氟辛烷磺酸及其鹽類 (PFOS and its salts) (CAS No.: 1763-23-1 and its salts)	參考CEN/TS 15968: 2010，以液相層析串聯質譜儀分析。(With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.)	mg/kg	0.01	n.d.	-
全氟辛酸及其鹽類 (PFOA and its salts) (CAS No.: 335-67-1 and its salts)		mg/kg	0.01	n.d.	-
2-[2-羥基-3',5'-二-叔-丁基苯基]-苯並三唑 (紫外線吸收劑320) (2-benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320)) (CAS No.: 3846-71-7)	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	5	n.d.	-
富馬酸二甲酯 (DMFu) (Dimethyl fumarate (DMFu)) (CAS No.: 624-49-7)	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	0.1	n.d.	-
磷酸三(2-氯乙基)酯 (TCEP) (Tris(2-chloroethyl) phosphate (TCEP)) (CAS No.: 115-96-8)	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	5	n.d.	-
磷酸三(1-氯-2-丙基)酯 (TCPP) (Tris(1-chloro-2-propyl) phosphate (TCPP)) (CAS No.: 13674-84-5)	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	5	n.d.	-
磷酸三(1,3-二氯異丙基)酯 (Tris(1,3-dichloro-2-propyl) phosphate) (CAS No.: 13674-87-8)	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	5	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
六溴環十二烷及所有主要被辨別出的異構物(HBCDD) (α- HBCDD, β- HBCDD, γ- HBCDD) (Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α- HBCDD, β- HBCDD, γ- HBCDD)) (CAS No.: 25637-99-4, 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	參考IEC 62321: 2008，以氣相層析儀/質譜儀分析。(With reference to IEC 62321: 2008, analysis was performed by GC/MS.)	mg/kg	5	n.d.	-
氫氟碳化合物 (Hydrofluorocarbon) (HFCs)					
HFC-23 (CHF3) (CAS No.: 75-46-7)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
HFC-32 (CH2F2) (CAS No.: 75-10-5)		mg/kg	1	n.d.	-
HFC-41 (CH3F) (CAS No.: 593-53-3)		mg/kg	1	n.d.	-
HFC-43-10mee (C5H2F10)		mg/kg	1	n.d.	-
HFC-125 (C2HF5)		mg/kg	1	n.d.	-
HFC-134 (C2H2F4)		mg/kg	1	n.d.	-
HFC-134a (CH2FCF3) (CAS No.: 811-97-2)		mg/kg	1	n.d.	-
HFC-143 (CH3F3)		mg/kg	1	n.d.	-
HFC-143a (CH3F3)		mg/kg	1	n.d.	-
HFC-152a (C2H4F2) (CAS No.: 75-37-6)		mg/kg	1	n.d.	-
HFC-227ea (C3HF7) (CAS No.: 431-89-0)		mg/kg	1	n.d.	-
HFC-236fa (C3H2F6)		mg/kg	1	n.d.	-
HFC-236ea (C3H2F6) (CAS No.: 431-63-0)		mg/kg	1	n.d.	-
HFC-245ca (C3H3F5)		mg/kg	1	n.d.	-
HFC-245fa (C3H3F5)		mg/kg	1	n.d.	-
HFC-365mfc (C4H5F5)		mg/kg	1	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
全氟化碳 (Perfluorocarbon) (PFCs)					
四氟甲烷 (Freon-14) (CAS No.: 75-73-0)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
六氟乙烷 (Fluorocarbon 116) (CAS No.: 76-16-4)		mg/kg	1	n.d.	-
八氟丙烷 (Freon 218) (CAS No.: 76-19-7)		mg/kg	1	n.d.	-
十氟丁烷 (Decafluorobutane) (CAS No.: 355-25-9)		mg/kg	1	n.d.	-
八氟環丁烷 (Freon C318) (CAS No.: 115-25-3)		mg/kg	1	n.d.	-
全氟-1-丁烯 (Perfluor-1-butene) (CAS No.: 357-26-6)		mg/kg	1	n.d.	-
全氟異丁烯 (Perfluorisobutene) (CAS No.: 382-21-8)		mg/kg	1	n.d.	-
1,4-二氫八氟丁烷 (1,4-dihydrooctafluorobutane) (CAS No.: 377-36-6)		mg/kg	1	n.d.	-
2-全氟甲基丁烷 (Nonafluor-2-(trifluoromethyl)butane) (CAS No.: 594-91-2)		mg/kg	1	n.d.	-
全氟戊烷 (Perfluoro-n-pentane) (CAS No.: 678-26-2)		mg/kg	1	n.d.	-
2-全氟甲基戊烷 (2-Perfluoromethylpentane) (CAS No.: 355-04-4)		mg/kg	1	n.d.	-
全氟己烷 (Perfluorohexane) (CAS No.: 355-42-0)		mg/kg	1	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
氟氯碳化物 (Chlorofluorocarbons) (CFCs)					
CFC-11	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
CFC-12		mg/kg	1	n.d.	-
CFC-113		mg/kg	1	n.d.	-
CFC-114		mg/kg	1	n.d.	-
CFC-115		mg/kg	1	n.d.	-
CFC-13		mg/kg	1	n.d.	-
CFC-111		mg/kg	1	n.d.	-
CFC-112		mg/kg	1	n.d.	-
CFC-211		mg/kg	1	n.d.	-
CFC-212		mg/kg	1	n.d.	-
CFC-213		mg/kg	1	n.d.	-
CFC-214		mg/kg	1	n.d.	-
CFC-215		mg/kg	1	n.d.	-
CFC-216		mg/kg	1	n.d.	-
CFC-217		mg/kg	1	n.d.	-
氟氯氫烷碳化物 (Hydrochlorofluorocarbons) (HCFCs)					
HCFC-21	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
HCFC-22		mg/kg	1	n.d.	-
HCFC-31		mg/kg	1	n.d.	-
HCFC-121		mg/kg	1	n.d.	-
HCFC-122		mg/kg	1	n.d.	-
HCFC-123		mg/kg	1	n.d.	-
HCFC-124		mg/kg	1	n.d.	-
HCFC-131		mg/kg	1	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
HCFC-132b	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
HCFC-133a		mg/kg	1	n.d.	-
HCFC-141b		mg/kg	1	n.d.	-
HCFC-142b		mg/kg	1	n.d.	-
HCFC-221		mg/kg	1	n.d.	-
HCFC-222		mg/kg	1	n.d.	-
HCFC-223		mg/kg	1	n.d.	-
HCFC-224		mg/kg	1	n.d.	-
HCFC-225ca		mg/kg	1	n.d.	-
HCFC-225cb		mg/kg	1	n.d.	-
HCFC-226		mg/kg	1	n.d.	-
HCFC-231		mg/kg	1	n.d.	-
HCFC-232		mg/kg	1	n.d.	-
HCFC-233		mg/kg	1	n.d.	-
HCFC-234		mg/kg	1	n.d.	-
HCFC-235		mg/kg	1	n.d.	-
HCFC-241		mg/kg	1	n.d.	-
HCFC-242		mg/kg	1	n.d.	-
HCFC-243		mg/kg	1	n.d.	-
HCFC-244		mg/kg	1	n.d.	-
HCFC-251		mg/kg	1	n.d.	-
HCFC-252		mg/kg	1	n.d.	-
HCFC-253		mg/kg	1	n.d.	-
HCFC-261		mg/kg	1	n.d.	-
HCFC-262		mg/kg	1	n.d.	-
HCFC-271		mg/kg	1	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
HCFC-141	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
HCFC-142		mg/kg	1	n.d.	-
HCFC-151		mg/kg	1	n.d.	-
HCFC-225		mg/kg	1	n.d.	-
溴甲烷 (Methyl bromide) (CAS No.: 74-83-9)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
海龍 (Halons)					
海龍-1211 (Halon-1211) (CAS No.: 353-59-3)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
海龍-1301 (Halon-1301) (CAS No.: 75-63-8)		mg/kg	1	n.d.	-
海龍-2402 (Halon-2402) (CAS No.: 124-73-2)		mg/kg	1	n.d.	-
不完全鹵化氟溴化物 (Hydrobromofluorocarbons) (HBFCs)					
HBFC-21B2 (CHFBr2) (CAS No.: 1868-53-7)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
HBFC-22B1 (CHF2Br) (CAS No.: 1511-62-2)		mg/kg	1	n.d.	-
HBFC-31B1 (CH2FBr) (CAS No.: 373-52-4)		mg/kg	1	n.d.	-
HBFC-121B4 (C2HFBr4)		mg/kg	1	n.d.	-
HBFC-122B3 (C2HF2Br3)		mg/kg	1	n.d.	-
HBFC-123B2 (C2HF3Br2)		mg/kg	1	n.d.	-
HBFC-124B1 (C2HF4Br)		mg/kg	1	n.d.	-
HBFC-131B3 (C2H2FBr3)		mg/kg	1	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
HBFC-132B2 (C2H2F2Br2)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
HBFC-133B1 (C2H2F3Br)		mg/kg	1	n.d.	-
HBFC-141B2 (C2H3FBr2)		mg/kg	1	n.d.	-
HBFC-142B1 (C2H3F2Br)		mg/kg	1	n.d.	-
HBFC-151B1 (C2H4FBr)		mg/kg	1	n.d.	-
HBFC-221B6 (C3HFBr6)		mg/kg	1	n.d.	-
HBFC-222B5 (C3HF2Br5)		mg/kg	1	n.d.	-
HBFC-223B4 (C3HF3Br4)		mg/kg	1	n.d.	-
HBFC-224B3 (C3HF4Br3)		mg/kg	1	n.d.	-
HBFC-225B2 (C3HF5Br2)		mg/kg	1	n.d.	-
HBFC-226B1 (C3HF6Br)		mg/kg	1	n.d.	-
HBFC-231B5 (C3H2FBr5)		mg/kg	1	n.d.	-
HBFC-232B4 (C3H2F2Br4)		mg/kg	1	n.d.	-
HBFC-233B3 (C3H2F3Br3)		mg/kg	1	n.d.	-
HBFC-234B2 (C3H2F4Br2)		mg/kg	1	n.d.	-
HBFC-235B1 (C3H2F5Br)		mg/kg	1	n.d.	-
HBFC-241B4 (C3H3FBr4)		mg/kg	1	n.d.	-
HBFC-242B3 (C3H3F2Br3)		mg/kg	1	n.d.	-
HBFC-243B2 (C3H3F3Br2)		mg/kg	1	n.d.	-
HBFC-244B1 (C3H3F4Br)		mg/kg	1	n.d.	-
HBFC-251B3 (C3H4FBr3)		mg/kg	1	n.d.	-
HBFC-252B2 (C3H4F2Br2)		mg/kg	1	n.d.	-
HBFC-253B1 (C3H4F3Br)		mg/kg	1	n.d.	-
HBFC-261B2 (C3H5FBr2)		mg/kg	1	n.d.	-
HBFC-262B1 (C3H5F2Br)		mg/kg	1	n.d.	-
HBFC-271B1 (C3H6FBr)		mg/kg	1	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
氯碳氫化物 (Chlorinate hydrocarbon) (CHCs)					
1,1,1,2-四氯乙烷 (1,1,1,2-Tetrachloroethane) (CAS No.: 630-20-6)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
1,1,1-三氯乙烷 (1,1,1-Trichloroethane) (CAS No.: 71-55-6)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
1,1,2,2-四氯乙烷 (1,1,2,2-Tetrachloroethane) (CAS No.: 79-34-5)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
1,1,2-三氯乙烷 (1,1,2-Trichloroethane) (CAS No.: 79-00-5)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
1,1-二氯乙烷 (1,1-Dichloroethane) (CAS No.: 75-34-3)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
1,1-二氯乙烯 (1,1-Dichloroethylene) (CAS No.: 75-35-4)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
1,1-二氯丙烯 (1,1-Dichloropropene) (CAS No.: 563-58-6)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
1,2,3-三氯丙烷 (1,2,3-Trichloropropane) (CAS No.: 96-18-4)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
1,2-二氯乙烷 (1,2-Dichloroethane) (CAS No.: 107-06-2)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
1,2-二氯丙烷 (1,2-Dichloropropane) (CAS No.: 78-87-5)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
1,3-二氯丙烷 (1,3-Dichloropropane) (CAS No.: 142-28-9)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
2,2-二氯丙烷 (2,2-Dichloropropane) (CAS No.: 594-20-7)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
四氯甲烷(四氯化碳) (Carbon tetrachloride) (CAS No.: 56-23-5)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
氯乙烷 (Chloroethane) (CAS No.: 75-00-3)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
氯仿 (Chloroform) (CAS No.: 67-66-3)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
氯甲烷 (Chloromethane) (CAS No.: 74-87-3)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
順-1,2-二氯乙烯 (cis-1,2-Dichloroethene) (CAS No.: 156-59-2)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
順-1,3-二氯丙烯 (cis-1,3-Dichloropropene) (CAS No.: 10061-01-5)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
六氯-1,3-丁二烯 (Hexachlorobutadiene) (CAS No.: 87-68-3)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
二氯甲烷 (Dichloromethane) (CAS No.: 75-09-2)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
四氯乙烯 (Tetrachloroethene) (CAS No.: 127-18-4)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
反-1,2-二氯乙烯 (trans-1,2-Dichloroethene) (CAS No.: 156-60-5)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
反-1,3-二氯丙烯 (trans-1,3-Dichloropropene) (CAS No.: 10061-02-6)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
三氯乙烯 (Trichloroethylene) (CAS No.: 79-01-6)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
六氟化硫 (Sulfur hexafluoride) (CAS No.: 2551-62-4)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
砷 (Arsenic) (As) (※ E)	參考RSTS-EE-SVHC-007，以感應耦合電漿發射光譜儀分析。(With reference to RSTS-EE-SVHC-007, analysis was performed by ICP-OES.)	mg/kg	50	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
五氧化二砷 (As_2O_5) (Diarsenic pentaoxide (As_2O_5)) (CAS No.: 1303-28-2)	由砷結果計算得之。(Calculated from the result of Arsenic.)	mg/kg	50▲	n.d.	-
三氧化二砷 (As_2O_3) (Diarsenic trioxide (As_2O_3)) (CAS No.: 1327-53-3)	由砷結果計算得之。(Calculated from the result of Arsenic.)	mg/kg	50▲	n.d.	-
鄰苯二甲酸丁苯甲酯 (BBP) (Butyl benzyl phthalate (BBP)) (CAS No.: 85-68-7)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	1000
鄰苯二甲酸二丁酯 (DBP) (Dibutyl phthalate (DBP)) (CAS No.: 84-74-2)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	1000
鄰苯二甲酸二(2-乙基己基)酯 (DEHP) (Di-(2-ethylhexyl) phthalate (DEHP)) (CAS No.: 117-81-7)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	1000
鄰苯二甲酸二異丁酯 (DIBP) (Diisobutyl phthalate (DIBP)) (CAS No.: 84-69-5)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	1000
鄰苯二甲酸二異癸酯 (DIDP) (Diisodecyl phthalate (DIDP)) (CAS No.: 26761-40-0, 68515-49-1)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二異壬酯 (DINP) (Diisononyl phthalate (DINP)) (CAS No.: 28553-12-0, 68515-48-0)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二正辛酯 (DNOP) (Di-n-octyl phthalate (DNOP)) (CAS No.: 117-84-0)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
鄰苯二甲酸二正己酯 (DNHP) (Di-n-hexyl phthalate (DNHP)) (CAS No.: 84-75-3)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
二氯化鈷 ($CoCl_2$) (Cobalt dichloride ($CoCl_2$)) (CAS No.: 7646-79-9)	以感應耦合電漿發射光譜儀，離子層析儀分析；由氯、鈷的結果計算得之。(Analysis was performed by ICP-OES, IC. Calculated from the results of Cobalt, Chlorine.)	mg/kg	50▲	n.d.	-
二辛基錫 (DOT) (Dioctyl tin (DOT))	參考RSTS-EE-SVHC-007，以氣相層析儀/火焰光度偵測器分析。(With reference to RSTS-EE-SVHC-007, analysis was performed by GC/FPD.)	mg/kg	225	n.d.	-
二正辛基-雙(2-乙基己基巰基乙酸酯)錫 (2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate) (CAS No.: 15571-58-1)	由二辛基錫結果計算得之。(Calculated from the result of DOT.)	mg/kg	225▲	n.d.	-
單辛基錫 (MOT) (Monooctyl tin (MOT))	參考RSTS-EE-SVHC-007，以氣相層析儀/火焰光度偵測器分析。(With reference to RSTS-EE-SVHC-007, analysis was performed by GC/FPD.)	mg/kg	140	n.d.	-
二正辛基-雙(2-乙基己基巰基乙酸酯)錫和單辛基-三(2-乙基己基巰基乙酸酯)錫的反應物 (Reaction mass of 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate and 2-ethylhexyl 10-ethyl-4-[[2-[(2-ethylhexyl)oxy]-2-oxoethyl]thio]-4-octyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (reaction mass of DOTE and MOTE))	由二辛基錫及單辛基錫結果計算得之。(Calculated from the result of DOT and MOT.)	mg/kg	-	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
鄰苯二甲酸二(支鏈與直鏈)己基酯 (DHP) (1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear (DHP)) (CAS No.: 68515-50-4)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二 (C6-8支鏈)烷基酯，富C7 (DIHP) (1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (DIHP)) (CAS No.: 71888-89-6)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二(C7-11支鏈與直鏈)烷基酯 (DHNUP) (1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP)) (CAS No.: 68515-42-4)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸雙(2-甲氧基乙基)酯 (DMEP) (Bis(2-methoxyethyl) phthalate (DMEP)) (CAS No.: 117-82-8)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二異戊酯 (DIPP) (Diisopentyl phthalate (DIPP)) (CAS No.: 605-50-5)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二(支鏈及直鏈戊基)酯 (DPP) (1,2-Benzenedicarboxylic acid, dipentylester, branched and linear (DPP)) (CAS No.: 84777-06-0)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二正戊酯 (DNPP) (Di-n-pentyl phthalate (DNPP)) (CAS No.: 131-18-0)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸正戊異戊酯 (NPIPP) (N-pentyl iso-pentyl phthalate (NPIPP)) (CAS No.: 776297-69-9)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
鄰苯二甲酸二甲酯 (DMP) (Dimethyl phthalate (DMP)) (CAS No.: 131-11-3)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二環己酯 (DCHP) (Di-cyclohexyl phthalate (DCHP)) (CAS No.: 84-61-7)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二苯酯 (DPhP) (Diphenyl phthalate (DPhP)) (CAS No.: 84-62-8)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二苯甲基酯 (Dibenzyl phthalate) (CAS No.: 523-31-9)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二異辛酯 (DIOP) (Diisooctyl phthalate (DIOP)) (CAS No.: 27554-26-3)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二丙酯 (DPrP) (Dipropyl phthalate (DPrP)) (CAS No.: 131-16-8)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二正壬酯 (DNNP) (Di-n-nonyl phthalate (DNNP)) (CAS No.: 84-76-4)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鄰苯二甲酸二乙酯 (DEP) (Di-ethyl phthalate (DEP)) (CAS No.: 84-66-2)	參考IEC 62321-8: 2017，以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
全氟己基磺酸及其鹽類 (PFHxS) (Perfluorohexane-1-sulphonic acid and its salts (PFHxS)) (CAS No.: 355-46-4)	參考CEN/TS 15968: 2010，以液相層析串聯質譜儀分析。(With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.)	mg/kg	0.01	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
紅磷 (Red Phosphorus)	以熱裂解-氣相層析儀/質譜儀分析。(Analysis was performed by Pyrolyzer-GC/MS.)	**	-	Negative	-
硼 (Boron) (B) (※ E)	參考RSTS-EE-SVHC-007，以感應耦合電漿發射光譜儀分析。(With reference to RSTS-EE-SVHC-007, analysis was performed by ICP-OES.)	mg/kg	50	n.d.	-
硼酸 (Boric acid) (CAS No.: 10043-35-3, 11113-50-1)	由硼結果計算得之。(Calculated from the result of Boron.)	mg/kg	50▲	n.d.	-
無水四硼酸二鈉 (Disodium tetraborate, anhydrous) (CAS No.: 1303-96-4, 1330-43-4, 12179-04-3)	由硼結果計算得之。(Calculated from the result of Boron.)	mg/kg	50▲	n.d.	-
水合硼酸鈉 (Tetraboron disodium heptaoxide, hydrate) (CAS No.: 12267-73-1) (※ H)	由硼結果計算得之。(Calculated from the result of Boron.)	mg/kg	50▲	n.d.	-
二乙二醇二甲醚 (DEGDME) (Diethylene glycol dimethyl ether (DEGDME)) (CAS No.: 111-96-6)	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	10	n.d.	-
N, N-二甲基乙醯胺 (DMAC) (N,N-Dimethylacetamide (DMAC)) (CAS No.: 127-19-5)	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	10	n.d.	-
乙二醇二甲醚 (Ethylene glycol dimethyl ether) (CAS No.: 110-71-4)	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	10	n.d.	-
磷酸三(二甲苯)酯 (Trixylyl phosphate) (CAS No.: 25155-23-1)	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	25	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1	限值 (Limit)
對特辛基苯酚 (4-Tert-octylphenol) (CAS No.: 140-66-9)	參考US EPA 3550C: 2007，以液相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by LC/MS.)	mg/kg	10	n.d.	-
N-苯基苯胺與苯乙烯和2,4,4-三甲基戊烯的反應物 (Benzenamine, N-phenyl-, reaction products with styrene and 2,4,4-trimethylpentene) (CAS No.: 68921-45-9)	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	100	n.d.	-
2-(2'-羥基-3',5'-二-叔-戊基苯基)苯並三唑(紫外線吸收劑328) (2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328)) (CAS No.: 25973-55-1)	參考US EPA 3550C: 2007，以氣相層析儀/質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	5	n.d.	-
溴氯甲烷 (Bromochloromethan) (CAS No.: 74-97-5)	參考US EPA 5021A: 2014，以氣相層析儀/質譜儀分析。(With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.)	mg/kg	1	n.d.	-
溴 (Br) (Bromine (Br)) (CAS No.: 10097-32-2)	參考BS EN 14582: 2016，以離子層析儀分析。(With reference to BS EN 14582: 2016, analysis was performed by IC.)	mg/kg	50	49900	-
氯 (Cl) (Chlorine (Cl)) (CAS No.: 22537-15-1)		mg/kg	50	354	-

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備註(Note)：

1. mg/kg = ppm；0.1wt% = 1000ppm
2. MDL = Method Detection Limit (方法偵測極限值)
3. n.d. = Not Detected (未檢出)；小於MDL / Less than MDL
4. "-" = Not Regulated (無規格值)
5. **= Qualitative analysis (No Unit) 定性分析(無單位)
6. Negative = Undetectable 陰性(未偵測到); Positive = Detectable 陽性(已偵測到)
7. 石綿定性分析試驗範圍： <0.1%~100%，石綿鑑定的判定基準是以檢出含有石綿纖維為『Positive』，未檢出石綿纖維為『Negative』。(Testing range of asbestos qualitative analysis is from less than 0.1% to 100%. The judgment criterion: asbestos fibers being found is shown as "Positive"; asbestos fibers not being found is shown as "Negative".)
8. ▲：MDL是針對元素/測試化合物之評估。(The MDL was evaluated for element / tested substance.)
   換算公式 (Conversion Formula)：AX = A × F

AX	A	F
五氧化二砷 (Diarsenic pentaoxide)	砷 (Arsenic)	1.5339
三氧化二砷 (Diarsenic trioxide)	砷 (Arsenic)	1.3203
硼酸 (Boric acid)	硼 (Boron)	5.7184
無水四硼酸二鈉 (Disodium tetraborate, anhydrous)	硼 (Boron)	4.6531
水合硼酸鈉(五水四硼酸二鈉) (Disodium tetraborate, pentahydrate)	硼 (Boron)	6.7361
水合硼酸鈉(十水四硼酸二鈉) (Disodium tetraborate, decahydrate)	硼 (Boron)	8.8191
氧化鈹 (Beryllium oxide (BeO))	鈹 (Beryllium)	2.7753
氧化雙三丁基錫 (Bis(tributyltin)oxide) (TBTO)	三丁基錫 (Tributyl Tin) (TBT)	1.024
二正辛基-雙(2-乙基己基巰基乙酸酯)錫 (2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate) (DOTE)	二辛基錫 (Dioctyl Tin) (DOT)	2.1781

參數換算表 (Parameter Conversion Table)：
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9. 全氟辛烷磺酸及其鹽類包含 (PFOS and its salts including) :
   CAS No.: 29081-56-9, 2795-39-3, 29457-72-5, 70225-14-8, 56773-42-3, 251099-16-8, 307-35-7.
10. 全氟辛酸及其鹽類包含 (PFOA and its salts including) :
    CAS No.: 3825-26-1, 335-95-5, 2395-00-8, 335-93-3, 335-66-0.
11. (※ E): 被萃取出的溶出硼/砷是以感應耦合電漿發射光譜儀檢測得之。(The extracted soluble Boron / Arsenic are detected by ICP-OES.)
12. (※ H): 水合硼酸鈉: 依照歐洲化學總署解釋以無水四硼酸二鈉數據作為代表(歐洲化學總署回信編號 Ref no.: INC 000000032519) / Tetraboron disodium heptaoxide, hydrate: Only anhydrous form of disodium tetraborate is relevant and considered according to ECHA explanation (Ref no.: INC 000000032519).
13. 鈹青銅是一種主要成份為鈹及銅的合金, 當偵測不到總鈹含量時, 亦表示不含鈹青銅.
    (Since beryllium copper is a metal alloy of copper and beryllium and the test result is n.d. for beryllium, we can have conclusion that the beryllium copper is n.d..)
14. 符合性結果之判定係以測試結果與限值做比較。(The statement of compliance conformity is based on comparison of testing results and limits.)
15. 本報告測試結果係引用自報告 ETR21B03160 之樣品測試結果。(The test results of this report were quoted from ETR21B03160.)

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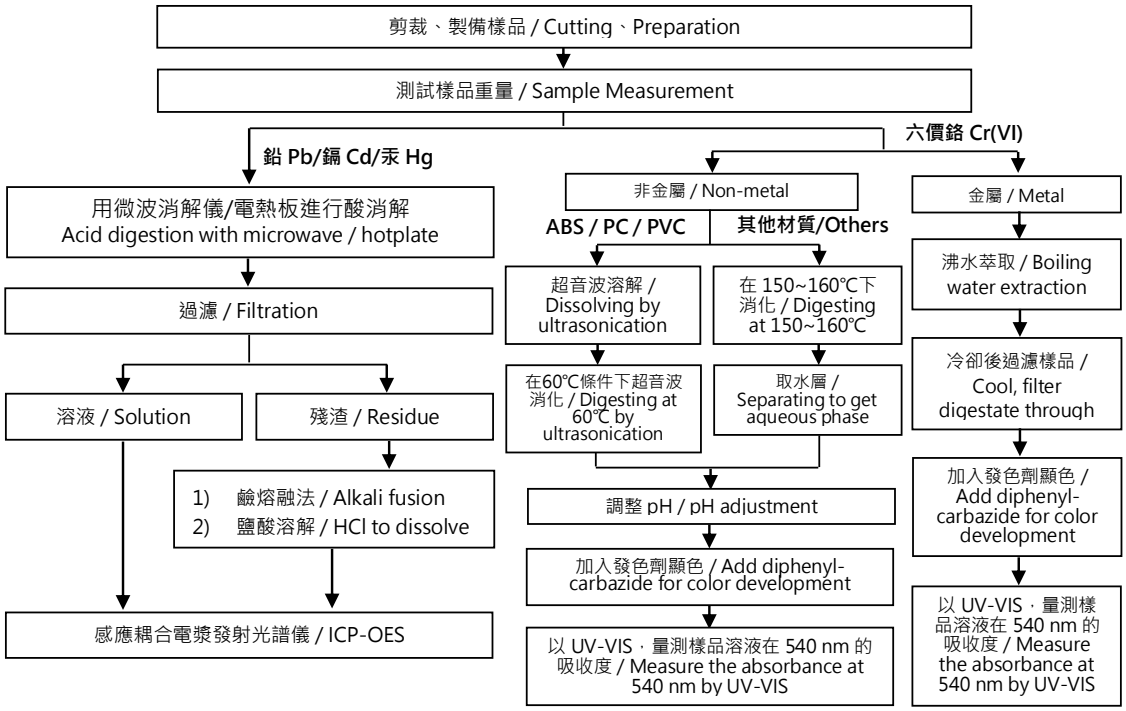
重金屬流程圖 / Analytical flow chart of Heavy Metal

根據以下的流程圖之條件，樣品已完全溶解。（六價鉻測試方法除外）

These samples were dissolved totally by pre-conditioning method according to below flow chart.
（Cr^{6+} test method excluded）



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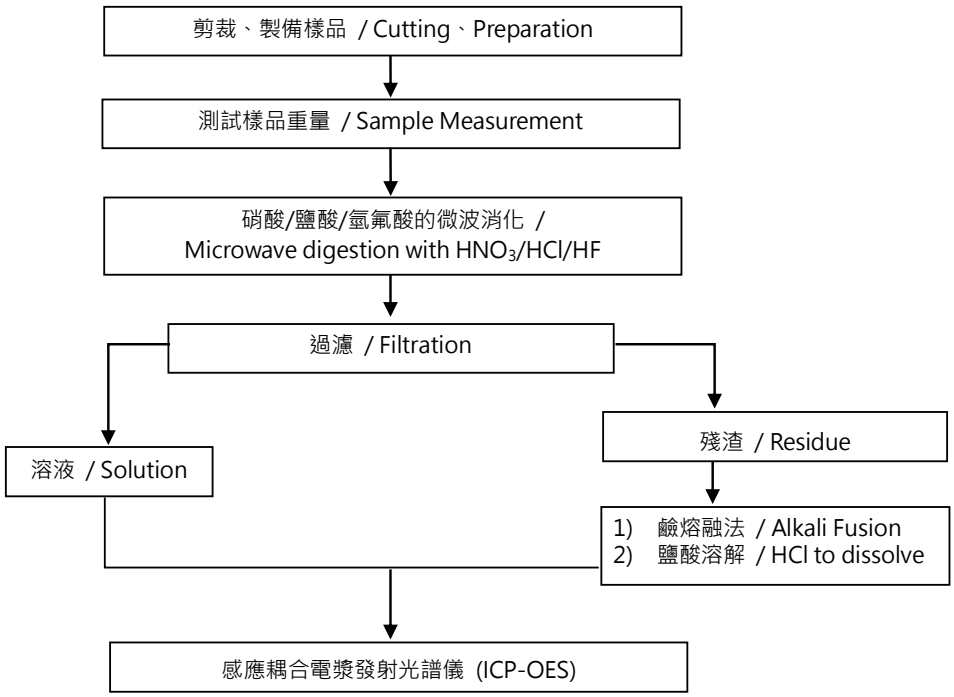
元素(含重金屬)分析流程圖 / Analytical flow chart of Elements (Heavy metal included)

根據以下的流程圖之條件，樣品已完全溶解。
These samples were dissolved totally by pre-conditioning method according to below flow chart.
【參考方法/Reference method：US EPA 3051A、US EPA 3052】



* US EPA 3051A 方法未添加氫氟酸 / US EPA 3051A method does not add HF.

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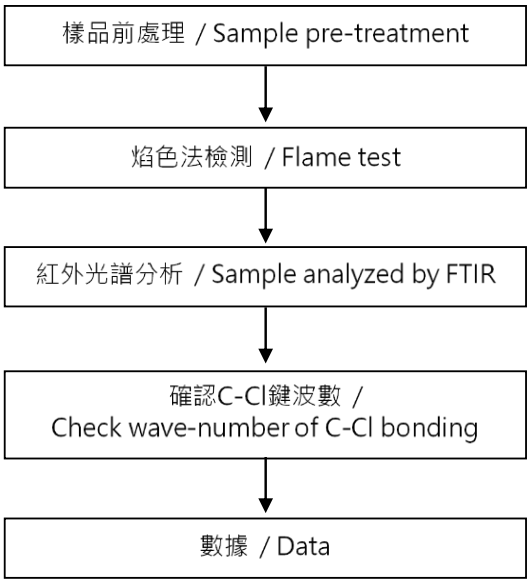
聚氯乙烯物質判定分析流程圖 / Analysis flow chart - PVC



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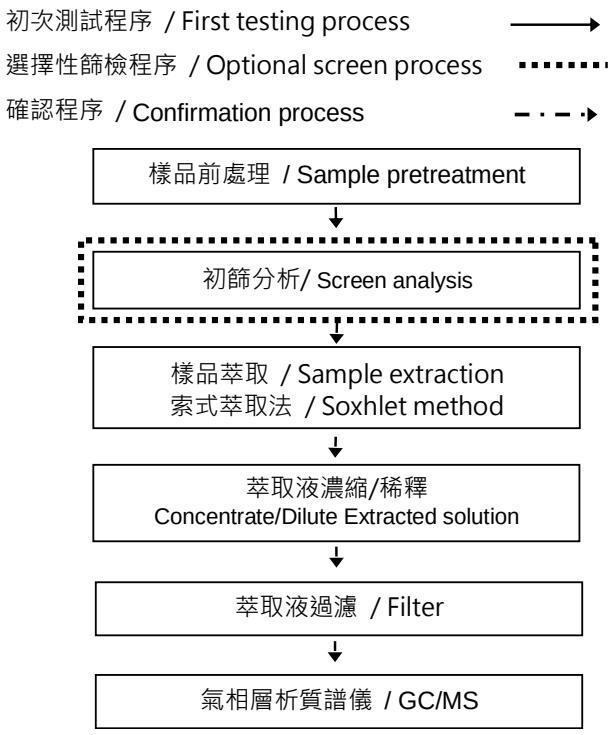
多溴聯苯/多溴聯苯醚分析流程圖 / Analytical flow chart - PBBs/PBDEs



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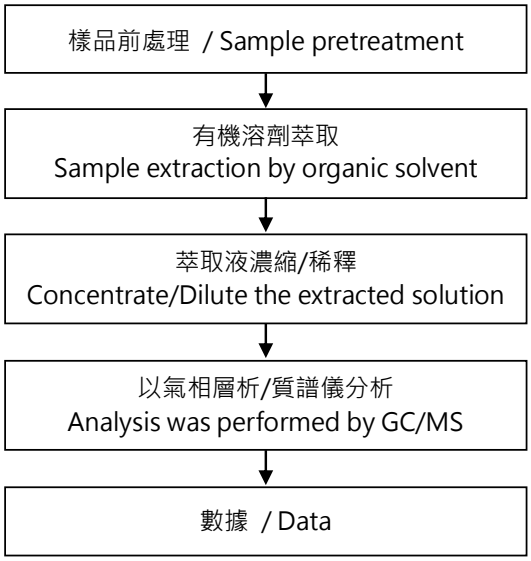
分析流程圖 / Analytical flow chart

【適用於：多氯聯苯、多氯奈、多氯三聯苯、滅蟻靈、氯化石蠟、DBBT】

*Apply to: PCBs, PCNs, PCTs, Mirex, Chlorinated Paraffins, DBBT



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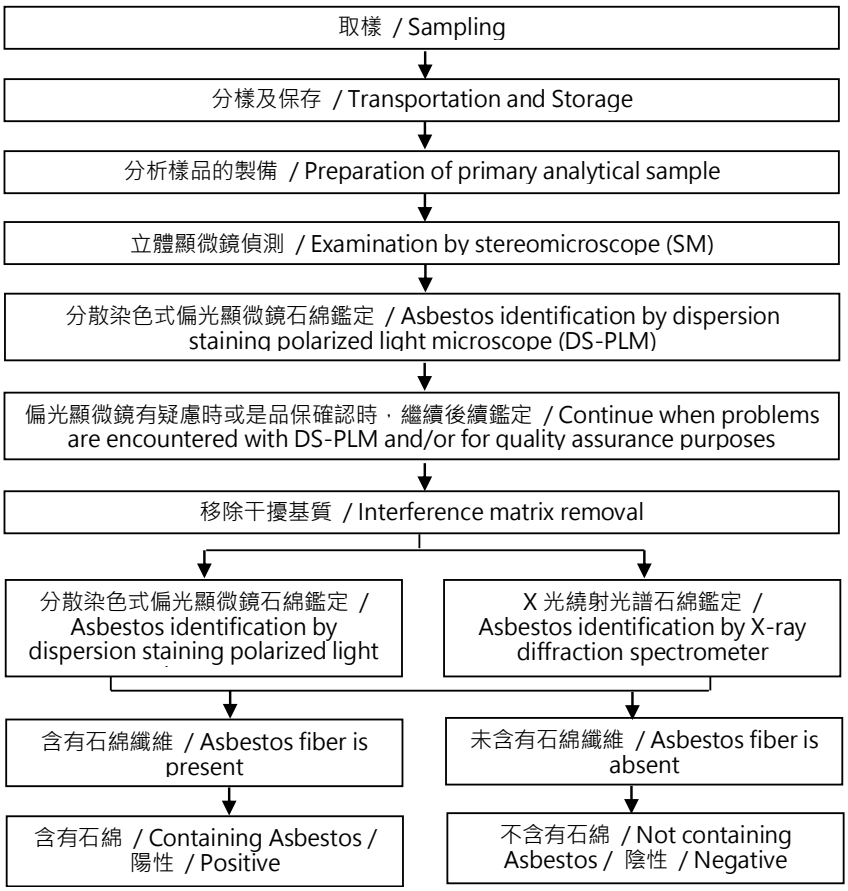
石綿鑑定分析流程圖 / Analysis flow chart for determination of Asbestos

【參考方法(Reference method): EPA 600/R-93/116】



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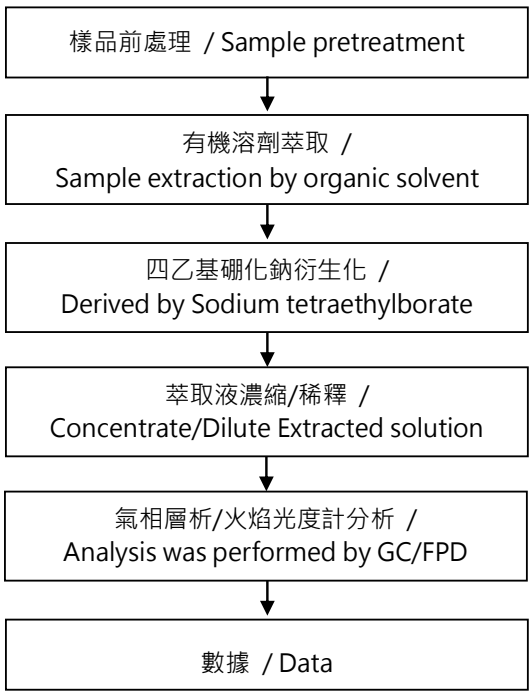
有機錫分析流程圖 / Analytical flow chart - Organic-Tin



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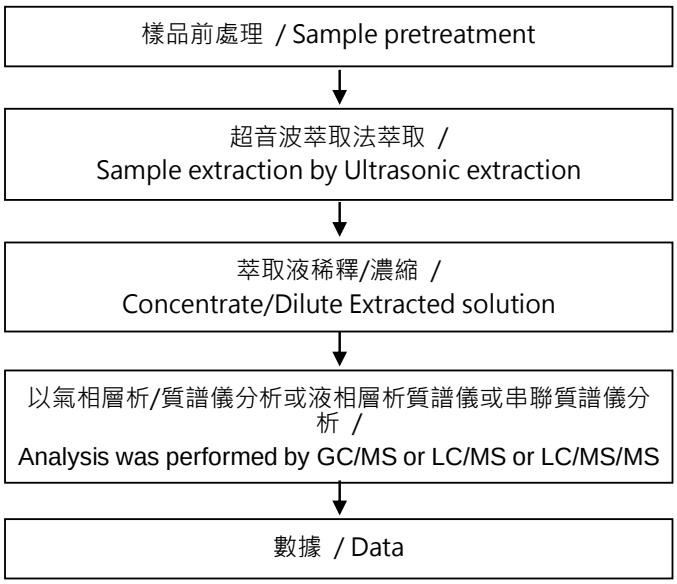
全氟化合物(包含全氟辛酸/全氟辛烷磺酸/其相關化合物等等)分析流程圖 / Analytical flow chart – PFAS (including PFOA/PFOS/its related compound, etc.)



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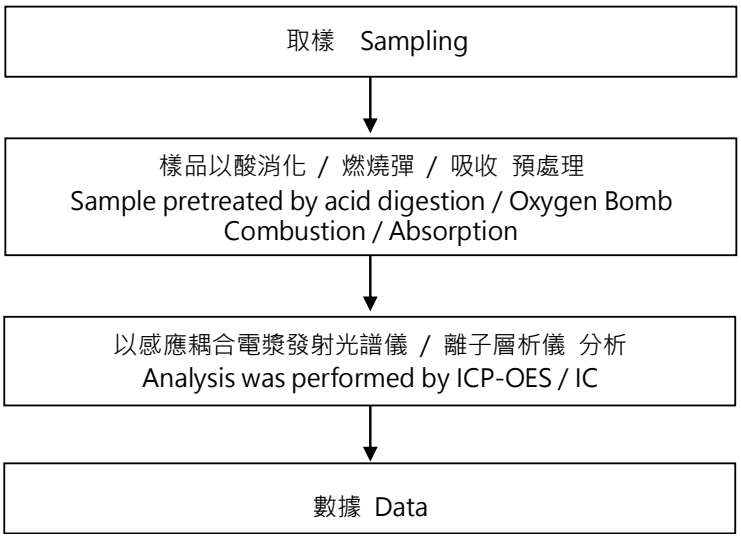
二氯化鈷分析流程圖 / Analytical flow chart - Cobalt dichloride



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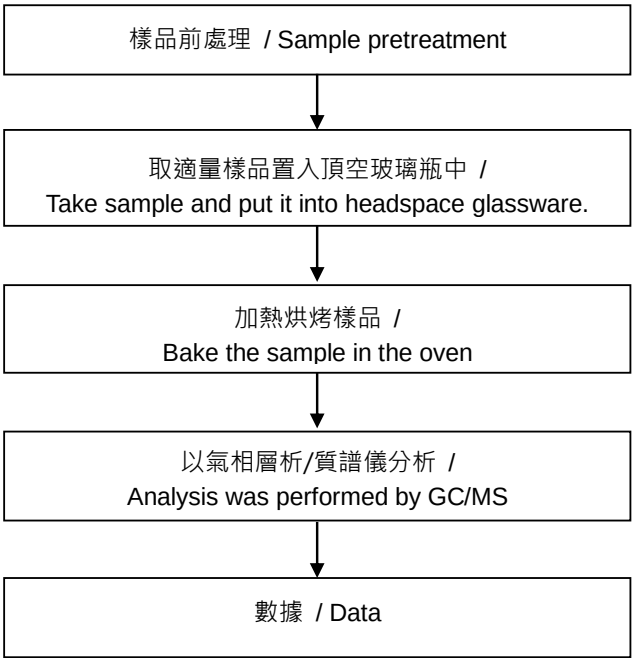
揮發性有機化合物分析流程圖 /
Analytical flow chart of volatile organic compounds (VOCs)

【參考方法/Reference method：US EPA 5021A】



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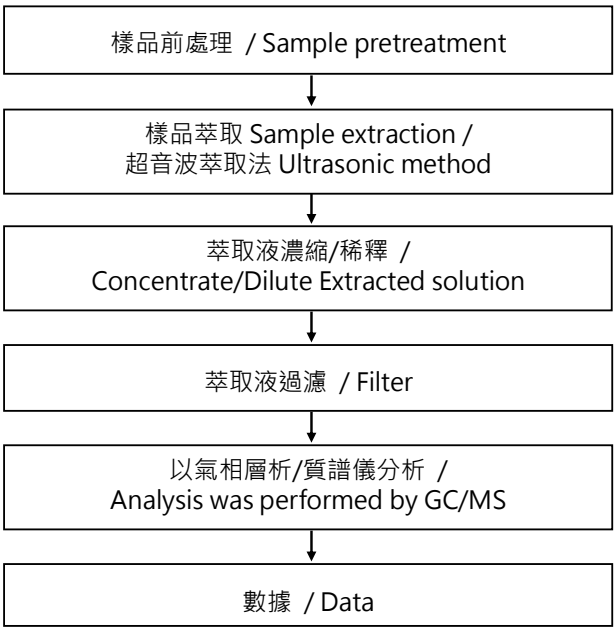
分析流程圖 / Analytical flow chart

* 適用於 / Apply to: 富馬酸二甲酯(DMFU)、六溴環十二烷(HBCDD)、乙二醇醚及其酯類(Ethylene glycol ether) 、有機磷化合物(Organic phosphorus compounds)、BNST



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南亞電子材料(惠州)有限公司 (NAN YA ELECTRONIC MATERIALS (HUIZHOU) CORP., LTD)
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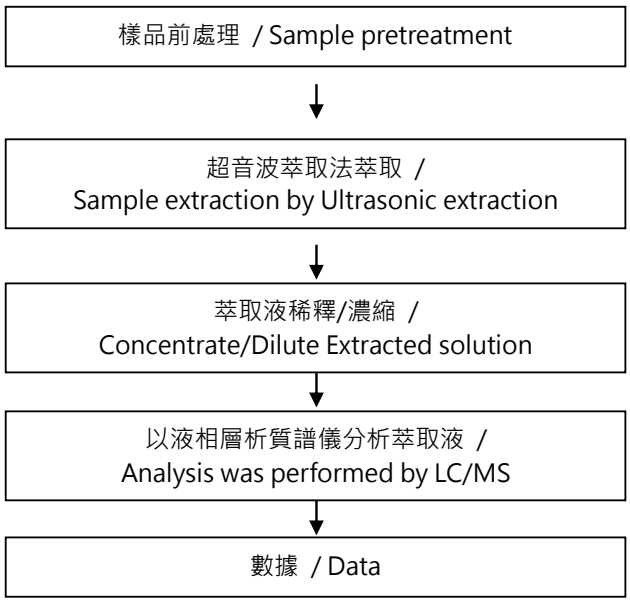
廣東省惠州市博羅縣石灣鎮永石大道230號 (NO. 230, YONGSHI BOULEVARD SHIWAN TOWN BOLUO COUNTY HUIZHOU CITY GUANG DONG)

分析流程圖 / Analytical flow chart

*** 適用於 / Apply to: NP、OP、4-t-OP、NPEO、OPEO**



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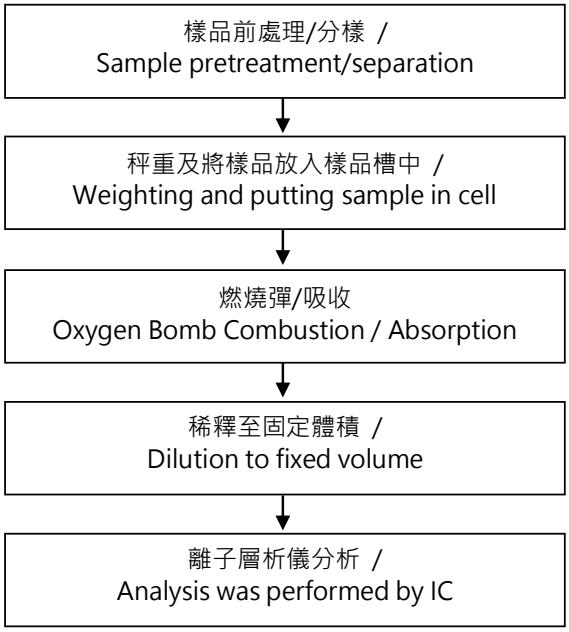
鹵素分析流程圖 / Analytical flow chart - Halogen



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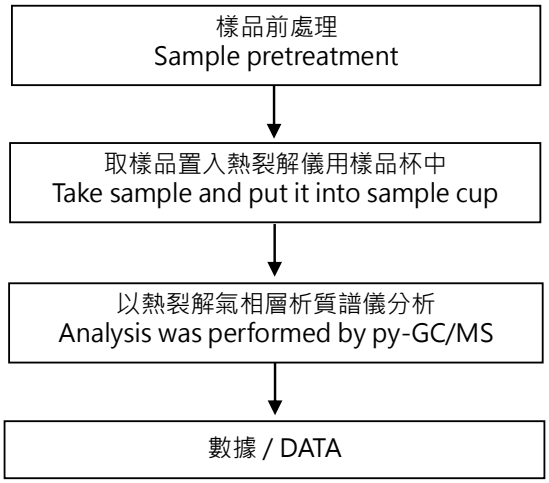
紅磷分析流程 / Analytical flow chart - Red phosphorus



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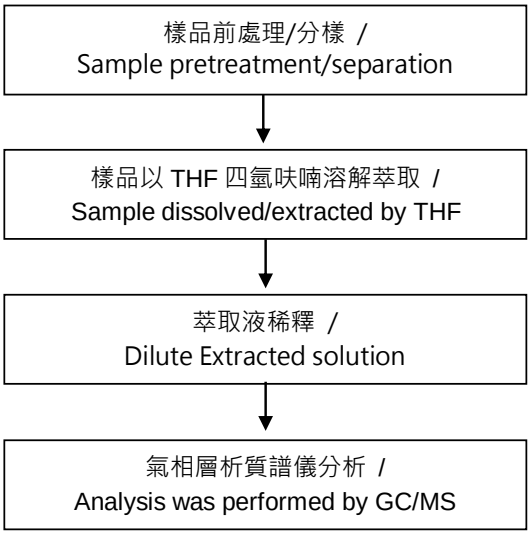
可塑劑分析流程圖 / Analytical flow chart - Phthalate

【測試方法/Test method: IEC 62321-8】



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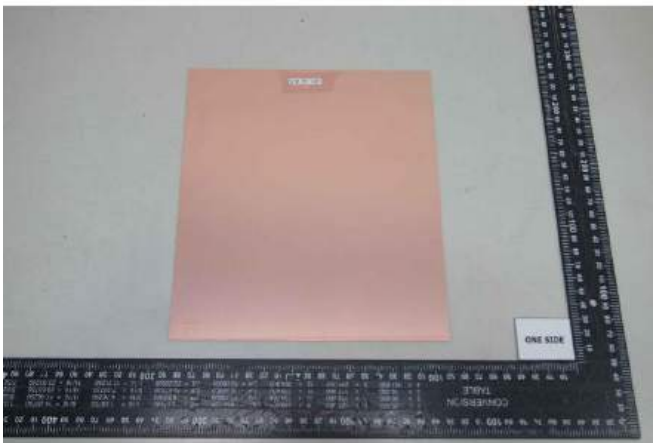
*** 照片中如有箭頭標示，則表示為實際檢測之樣品/部位. ***
(The tested sample / part is marked by an arrow if it's shown on the photo.)

ETR21B03161



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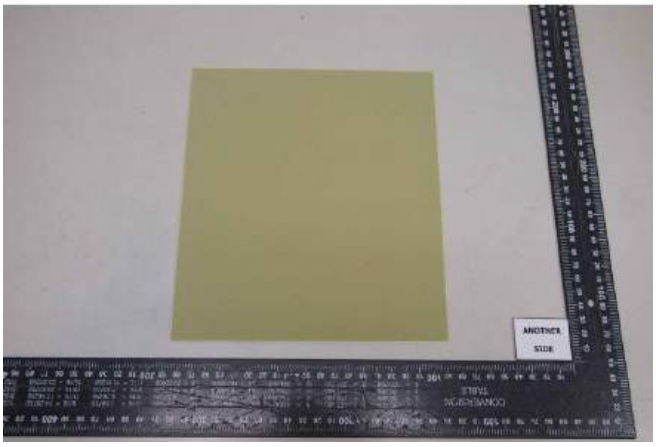

** 報告結尾 (End of Report) **

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ROHS & ELV

RESTRICTION OF HAZARDOUS SUBSTANCES & END OF LIFE-VEHICLE:

The European Union (EU) is introducing new legislation that will affect the electronics industry. The coming RoHS directive (Restriction of Hazardous Substances) will ban six materials from use. By 1st January 2006, Member States of the European Union shall ensure that new electrical and electronic equipment's put on the market do not contain lead (Pb), mercury (Hg), cadmium (Cd), hexavalent chromium (Cr^{+6}), polybrominated biphenyls (PBBs), and/or polybrominated diphenyl ethers (PBDEs).

RoHS/ELV COMPLIANT CHIP RESISTORS PRODUCT LIST

O: RoHS/ELV Compliant; X: Non RoHS/ELV Compliant

Product Group	Series	Six Hazardous Substances						Others
		lead (Pb)	mercury (Hg)	cadmium (Cd)	hexavalent chromium (Cr^{+6})	polybrominated biphenyls (PBBs)	polybrominated diphenyl ethers (PBDEs)	Halogen (Chlorine or Bromine)
Chip Resistors	RC	O	O	O	O	O	O	O
	YC/TC	O	O	O	O	O	O	O
	RT/RJ	O	O	O	O	O	O	O
	RL	O	O	O	O	O	O	O
	AR	O	O	O	O	O	O	O
	TR	O	O	O	O	O	O	O
	SR	O	O	O	O	O	O	O
	PF/PH	O	O	O	O	O	O	O
	RV	O	O	O	O	O	O	O
	PR	O	O	O	O	O	O	O
	RE	O	O	O	O	O	O	O
	AF	O	O	O	O	O	O	O
	PT	O	O	O	O	O	O	O
	ATV	O	O	O	O	O	O	O

ROHS & ELV

RoHS/ELV COMPLIANT MLCC PRODUCT LIST

O: RoHS/ELV Compliant; X: Non RoHS/ELV Compliant

Product Group	Series	Six Hazardous Substances						Others
		lead (Pb)	mercury (Hg)	cadmium (Cd)	hexavalent chromium (Cr^{+6})	polybrominated biphenyls (PBBs)	polybrominated diphenyl ethers (PBDEs)	Halogen (Chlorine or Bromine)
MLCC	CC	O	O	O	O	O	O	O
	CH	O	O	O	O	O	O	O
	CM	O	O	O	O	O	O	O
	CL	O	O	O	O	O	O	O
	SC	O	O	O	O	O	O	O
	CX	O	O	O	O	O	O	O
	CA	O	O	O	O	O	O	O

RoHS/ELV COMPLIANT MLV PRODUCT LIST

O: RoHS/ELV Compliant; X: Non RoHS/ELV Compliant

Product Group	Series	Six Hazardous Substances						Others
		lead (Pb)	mercury (Hg)	cadmium (Cd)	hexavalent chromium (Cr^{+6})	polybrominated biphenyls (PBBs)	polybrominated diphenyl ethers (PBDEs)	Halogen (Chlorine or Bromine)
MLV	VR	O	O	O	O	O	O	O

RoHS/ELV COMPLIANT HF PRODUCT LIST

O: RoHS/ELV Compliant; X: Non RoHS/ELV Compliant

Product Group	Series	Six Hazardous Substances						Others
		lead (Pb)	mercury (Hg)	cadmium (Cd)	hexavalent chromium (Cr^{+6})	polybrominated biphenyls (PBBs)	polybrominated diphenyl ethers (PBDEs)	Halogen (Chlorine or Bromine)
HF product	Metal antenna	O	O	O	O	O	O	O
	Chip/Patch/ Active antenna	O	O	O	O	O	O	O
	RF components	O	O	O	O	O	O	O

ROHS & ELV

RoHS/ELV COMPLIANT LEADED RESISTOR PRODUCT LIST

O: RoHS/ELV Compliant; X: Non RoHS/ELV Compliant

Product Group	Series	Six Hazardous Substances						Others
		lead (Pb)	mercury (Hg)	cadmium (Cd)	hexavalent chromium (Cr^{+6})	polybrominated biphenyls (PBBs)	polybrominated diphenyl ethers (PBDEs)	Halogen (Chlorine or Bromine)
Leaded R	MFR	O	O	O	O	O	O	O
	MFP	O	O	O	O	O	O	O
	MHP	O	O	O	O	O	O	O
	MF0	O	O	O	O	O	O	O
	FMF	O	O	O	O	O	O	O
	FM0	O	O	O	O	O	O	O
	FMP	O	O	O	O	O	O	O
	RSF	O	O	O	O	O	O	O
	LIR	O	O	O	O	O	O	O
	FRM	O	O	O	O	O	O	O
	MMF	O	O	O	O	O	O	O
	MMP	O	O	O	O	O	O	O
	CFR	O	O	O	O	O	O	O
	CF0	O	O	O	O	O	O	O
	FCR	O	O	O	O	O	O	O
	FC0	O	O	O	O	O	O	O
	NCR	O	O	O	O	O	O	O
	MCF	O	O	O	O	O	O	O
	MCP	O	O	O	O	O	O	O
	HHV	O	O	O	O	O	O	O
	APR	O	O	O	O	O	O	O
	HTR / HTM	O	O	O	O	O	O	O
	CFN	O	O	O	O	O	O	O
	MFN	O	O	O	O	O	O	O
	ZOR	O	O	O	O	O	O	O
	JPW	O	O	O	O		O	

ROHS & ELV

Product Group	Series	Six Hazardous Substances						Others
		lead (Pb)	mercury (Hg)	cadmium (Cd)	hexavalent chromium (Cr^{+6})	polybrominated biphenyls (PBBs)	polybrominated diphenyl ethers (PBDEs)	Halogen (Chlorine or Bromine)
Leaded R	KNP	O	O	O	O	O	O	O
	NKN	O	O	O	O	O	O	O
	FKN	O	O	O	O	O	O	O
	PNP	O	O	O	O	O	O	O
	SQP / NSP	O	O	O	O	O	O	O
	SQM / NSM	O	O	O	O	O	O	O
	SQZ / NSZ	O	O	O	O	O	O	O
	PSP	O	O	O	O	O	O	O
	PSM	O	O	O	O	O	O	O
	FTR	O	O	O	O	O	O	O
	SLR	O	O	O	O	O	O	O
	AHA / AHP	O	O	O	O	O	O	O

ROHS & ELV

YAGEO RoHS/ELV COMPLIANT ELECTROLYTIC CAPACITORS PRODUCT LIST

O: RoHS/ELV Compliant; X: Non RoHS/ELV Compliant

Product Group	Series	Six Hazardous Substances						Others
		lead (Pb)	mercury (Hg)	cadmium (Cd)	hexavalent chromium (Cr^{+6})	polybrominated biphenyls (PBBs)	polybrominated diphenyl ethers (PBDEs)	Halogen (Chlorine or Bromine)
E-Cap Miniature	SS	O	O	O	O	O	O	O
	S5	O	O	O	O	O	O	O
	SK	O	O	O	O	O	O	O
	SEK	O	O	O	O	O	O	O
	SH	O	O	O	O	O	O	O
	SG	O	O	O	O	O	O	O
	SP	O	O	O	O	O	O	O
	SB	O	O	O	O	O	O	O
	SR	O	O	O	O	O	O	O
	SN	O	O	O	O	O	O	O
	SC	O	O	O	O	O	O	O
	SJ	O	O	O	O	O	O	O
	SQ	O	O	O	O	O	O	O
	SY	O	O	O	O	O	O	O
	SZ	O	O	O	O	O	O	O
	ST	O	O	O	O	O	O	O
	SU	O	O	O	O	O	O	O
	SW	O	O	O	O	O	O	O
	SL	O	O	O	O	O	O	O
	SD	O	O	O	O	O	O	O
E-Cap Large Can	LH	O	O	O	O	O	O	O
	LG	O	O	O	O	O	O	O
	LV	O	O	O	O	O	O	O
	LC	O	O	O	O	O	O	O

ROHS & ELV

Product Group	Series	Six Hazardous Substances						Others
		lead (Pb)	mercury (Hg)	cadmium (Cd)	hexavalent chromium (Cr^{+6})	polybrominated biphenyls (PBBs)	polybrominated diphenyl ethers (PBDEs)	Halogen (Chlorine or Bromine)
E-Cap Surface Mount	CA	O	O	O	O	O	O	O
	CB	O	O	O	O	O	O	O
	CE	O	O	O	O	O	O	O
	CZ	O	O	O	O	O	O	O
	CD	O	O	O	O	O	O	O
	CX	O	O	O	O	O	O	O
	CH	O	O	O	O	O	O	O
E-Cap Polymer	CG	O	O	O	O	O	O	O
	CP	O	O	O	O	O	O	O
E-Cap Screw Type	NP	O	O	O	O	O	O	O
	NM	O	O	O	O	O	O	O
	NF	O	O	O	O	O	O	O
	NH	O	O	O	O	O	O	O
	NG	O	O	O	O	O	O	O
	SL-N	O	O	O	O	O	O	O
	SSL-N	O	O	O	O	O	O	O
	STD-N	O	O	O	O	O	O	O
	XL-N	O	O	O	O	O	O	O

ROHS & ELV

RoHS/ELV COMPLIANT INDUCTOR PRODUCT LIST

O: RoHS/ELV Compliant; X: Non RoHS/ELV Compliant

Product Group	Series	Six Hazardous Substances						Others
		lead (Pb)	Mercury (Hg)	cadmium (Cd)	hexavalent chromium (Cr^{+6})	polybrominated biphenyls (PBBs)	polybrominated diphenyl ethers (PBDEs)	Halogen (Chlorine or Bromine)
Inductor	CL-N	O	O	O	O	O	O	O
	NL-N	O	O	O	O	O	O	O
	NLC - N							O
	LCN - N							O
	PB/SB/NB-N	O	O	O	O	O	O	O
	RC-N	O	O	O	O	O	O	O
	SCD-N	O	O	O	O	O	O	O
	SDS-N	O	O	O	O	O	O	O
	SL-N	O	O	O	O	O	O	O
	SSL-N	O	O	O	O	O	O	O
	STD-N	O	O	O	O	O	O	O
	XL-N	O	O	O	O	O	O	O

测试报告 (SVHC)

No. SHAEC2128063402 日期: 2021年12月29日

苏州市恒顺纸塑有限公司
苏州市相城区太平街道聚金路168号

以下测试之样品是由申请者所提供及确认：瓦楞纸板

SGS工作编号：	SP21-039874 - SH
样品接收日期：	2021年12月22日
测试周期：	2021年12月22日 - 2021年12月29日
测试要求：	根据客户要求， (i) 基于欧洲化学品管理署截止2021年7月8日公布的供授权审议的高关注物质候选清单(根据欧盟第1907/2006号REACH法规)，对219种高关注物质(SVHC)进行筛分测试。 (ii) 基于WTO 2021年6月1日的通知，对1种潜在的高关注物质(SVHC)进行筛分测试。 (iii) 基于欧洲化学品管理署截止2021年9月3日公布的潜在的高关注物质咨询清单(根据欧盟第1907/2006号REACH法规)，对4种高关注物质(SVHC)进行筛分测试。
测试结果：	请参见下一页

总结：

根据具体的范围和筛分测试，所提交样品中SVHC测试结果> 0.1% (w/w)。 见SGS样品ID 001。	见备注2 REACH法规相关义务

通标标准技术服务（上海）有限公司
授权签名

Jenny Lan兰柳珍
批准签署人

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提交样品中SVHC测试结果超过限值信息汇总

SGS 样品ID	描述	物质名称	CAS No.	浓度 (%)
001	棕色纸板	原硼酸钠盐*	13840-56-7	0.116

检验检测专用章 Inspection & Testing Services

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备注：

1. 本报告所涉及的关于特定高关注物质的化学分析是根据欧洲化学品管理署发布的下列文件，利用现有的分析技术完成的。
   http://echa.europa.eu/web/guest/candidate-list-table
   这些文件清单由欧洲化学品管理署评估, 将来可能会有变化。
2. REACH法规义务：
   2.1关于物品：
   告知：
   欧盟第1907/2006（EC）号法规第33条规定，含有满足第57条中的标准并根据第59条第一款被确定且质量分数大于0.1%的物质的物品的所有供应商应向物品接受者提供其可获取的充足信息，以使物品使用安全，这些信息至少包括含有的候选清单中物质的名称。

   通报：
   根据欧盟第1907/2006（EC）号法规，如果满足以下两个条件，如果物质符合第57条中的标准并根据第59条第一款被确定，物品的任何欧洲制造商或进口商应根据第7条第4款向欧盟化学品管理署进行通报：(a) 候选清单中的物质在物品中的总含量超过1吨/年/生产商或进口商；(b) 候选清单中的物质在物品中的总含量以质量分数计超过0.1% 的浓度。

   SGS采用欧盟法院对REACH物品定义的裁定，除非另有说明。详细的解释请见下列网址：
   http://www.sgs.com/-/media/global/documents/technical-documents/technical-bulletins/sgs-crs-position-statement-on-svhc-in-articles-a4-en-16-06.pdf?la=en

   2.2 关于材料：
   报告中的测试结果是基于测试样品。如样品是均一材质，当其构成成品时，此结果不能代表成品中的SVHC浓度。如样品为均一材质等比例合测，这些材质也可能来自不同的物品。

   如果样品是一种物质或混合物，并且直接出口到欧盟，客户有责任遵守欧盟第1907/2006号REACH法规第31 条供应链信息传递的义务和附件十四中的授权高关注物质授权的责任。

   2.3 关于物质和配制品：
   如果样品中高关注物质的浓度超过0.1% (w/w)和/或欧盟第1272/2008号CLP法规及其修订中设定的特殊浓度限值，建议客户根据欧盟第1907/2006号REACH法规对有关高关注物质准备安全数据表(SDS)以符合供应链通信的义务，如
   -根据欧盟第1272/2008号CLP法规被列为有害物质。
   -根据欧盟第1272/2008号CLP法规被列为有害混合物，而当中物质的浓度大于或等于欧盟第1272/2008号CLP法规列出的浓度限值;或
   -根据欧盟第1272/2008号CLP法规并未列为有害混合物，但包含：
   (a) 对人类健康或环境有害的物质，而在固体或液体混合物（即非气体混合物）中其浓度≥1%(w/w)或在气体混合物中占体积≥0.2%，或
   (b) PBT或vPvB物质，在固体或液体混合物（即非气体混合物）中个别浓度≥0.1%(w/w)，或
   (c) 授权审议的高关注物质候选清单上的物质（除上述以外的原因）在个别非气体混合物中的浓度≥0.1%(w/w)，或

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(d) 设有欧洲范围内工作场所接触限值的物质。

3. 如果样品中SVHC的测试结果超过报告限，建议客户进一步定量分析检测含有SVHC的组分并且得到SVHC物质的准确浓度。

测试样品：

测试样品描述：

样品编号	SGS样品ID	描述
SN1	SHA21-280634.001	棕色纸板

测试方法：

SGS内部方法-SHTC-CHEM-SOP-97-T, SHTC-CHEM-SOP-302-T ，采用ICP-OES、UV-VIS、GC-MS、HPLC-DAD/MS和比色法分析。

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(SVHC)

测试结果: (SVHC候选清单中的高关注物质)

批次	物质名称	CAS No.	001 浓度 (%)	RL (%)
III	硼酸*	-	0.056	0.005
III	无水四硼酸钠*	1303-96-4, 1330-43-4, 12179-04-3	0.046	0.005
III	水合硼酸钠*	12267-73-1	0.046	0.005
VII	三氧化二硼*	1303-86-2	0.032	0.005
XIX	氧化硼钠*	12008-41-2	0.039	0.005
XXV	原硼酸钠盐*	13840-56-7	0.116	0.005
-	其余测试的候选清单中的SVHC	-	ND	-

测试结果：(潜在的SVHC)

批次	物质名称	CAS No.	001 浓度 (%)	RL (%)
-	所有测试的潜在的SVHC	-	ND	-

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注释：

(1) 上表仅显示检出的SVHC，低于RL的SVHC没有列出。所有测试的SVHC请参见附录。
(2) RL = 报告限(当测试结果 ≥ RL时显示数据。RL不同于法规限值。)
ND = 未检出(< RL)，ND针对SVHC物质。
(3) *测试结果是由选定的元素的结果并基于最坏的情况计算得出；
** 测试结果是由选定的标记物的结果并基于最坏的情况计算得出。
硼化合物的结果由ICP-OES测试的水提取硼元素结果换算得出。
RL = 0.005% 是针对元素 (例如钴、砷 、铅 、铬 (VI) 、铝、锆、硼、锶、锌、锑、钛、钡、镉)，除了钼的RL= 0.0005%，硼的RL= 0.0025%(仅对四氟硼酸铅)。
(4) § 只有当物质包含米氏酮(CAS No.: 90-94-8) 或米氏碱(CAS No.: 101-61-1) 的浓度≥ 0.1%(w / w) 的情况下，该物质才被提议定为SVHC
(5) / = 潜在的SVHC
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(SVHC)

附录

所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
I	1	4,4'-二氨基二苯甲烷(MDA)	101-77-9	0.050
I	2	2,4,6-三硝基-5-叔丁基间二甲苯(二甲苯麝香)	81-15-2	0.050
I	3	C10-13 氯代烃(短链氯化石蜡)	85535-84-8	0.050
I	4	蒽	120-12-7	0.050
I	5	邻苯二甲酸丁苄酯(BBP)	85-68-7	0.050
I	6	邻苯二甲酸二(2-乙基己基)酯(DEHP)	117-81-7	0.050
I	7	氧化双三丁基锡(TBTO)	56-35-9	0.050
I	8	二氯化钴*	7646-79-9	0.005
I	9	五氧化二砷*	1303-28-2	0.005
I	10	三氧化二砷*	1327-53-3	0.005
I	11	邻苯二甲酸二丁酯(DBP)	84-74-2	0.050
I	12	六溴环十二烷(HBCDD) 及其非对映异构体(α-HBCDD, β-HBCDD, γ-HBCDD)	-	0.050
I	13	砷酸氢铅*	7784-40-9	0.005
I	14	重铬酸钠*	7789-12-0, 10588-01-9	0.005
I	15	三乙基砷酸酯*	15606-95-8	0.005
II	16	2,4-二硝基甲苯	121-14-2	0.050
II	17	丙烯酰胺	79-06-1	0.050
II	18	蒽油**	90640-80-5	0.050
II	19	蒽油，蒽糊**	90640-81-6	0.050
II	20	蒽油，蒽糊，蒽馏分**	91995-15-2	0.050

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(SVHC)

附录

所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
II	21	蒽油，蒽糊，轻油**	91995-17-4	0.050
II	22	蒽油，含蒽量少**	90640-82-7	0.050
II	23	邻苯二甲酸二异丁酯	84-69-5	0.050
II	24	钼铬红(C.I.颜料红104)*	12656-85-8	0.005
II	25	铬酸铅*	7758-97-6	0.005
II	26	铅铬黄(C.I.颜料黄34)*	1344-37-2	0.005
II	27	沥青，煤焦油，高温**	65996-93-2	0.050
II	28	磷酸三(2-氯乙基)酯	115-96-8	0.050
III	29	重铬酸铵*	7789-09-5	0.005
III	30	硼酸*	-	0.005
III	31	无水四硼酸钠*	1303-96-4, 1330-43-4, 12179-04-3	0.005
III	32	铬酸钾*	7789-00-6	0.005
III	33	重铬酸钾*	7778-50-9	0.005
III	34	铬酸钠*	7775-11-3	0.005
III	35	水合硼酸钠*	12267-73-1	0.005
III	36	三氯乙烯	79-01-6	0.050
IV	37	乙二醇乙醚	110-80-5	0.050
IV	38	乙二醇单甲醚	109-86-4	0.050
IV	39	铬酸, 铬酸及重铬酸低聚物, 重铬酸*	-	0.005

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(SVHC)

附录

所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
IV	40	三氧化铬*	1333-82-0	0.005
IV	41	碳酸钴*	513-79-1	0.005
IV	42	乙酸钴*	71-48-7	0.005
IV	43	硝酸钴*	10141-05-6	0.005
IV	44	硫酸钴*	10124-43-3	0.005
V	45	1,2,3-三氯丙烷	96-18-4	0.050
V	46	1,2-苯二酸-二(C6-8支链)烷基酯(富C7)	71888-89-6	0.050
V	47	1,2-苯二酸-二(C7-11支链与直链)烷基(醇)酯	68515-42-4	0.050
V	48	1-甲基-2-吡咯烷酮	872-50-4	0.050
V	49	乙二醇乙醚醋酸酯	111-15-9	0.050
V	50	联氨	7803-57-8, 302-01-2	0.050
V	51	铬酸锶*	7789-06-2	0.005
VI	52	1,2-二氯乙烷	107-06-2	0.050
VI	53	4,4'-二氨基-3,3'-二氯二苯甲烷	101-14-4	0.050
VI	54	2-甲氧基苯胺	90-04-0	0.050
VI	55	对特辛基苯酚	140-66-9	0.050
VI	56	硅酸铝耐火陶瓷纤维*	-	0.005
VI	57	砷酸*	7778-39-4	0.005
VI	58	二乙二醇二甲醚	111-96-6	0.050
VI	59	邻苯二甲酸二甲氧基乙酯	117-82-8	0.050

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所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
VI	60	砷酸钙*	7778-44-1	0.005
VI	61	铬酸铬*	24613-89-6	0.005
VI	62	甲醛与苯胺的低聚物	25214-70-4	0.050
VI	63	叠氮化铅*	13424-46-9	0.005
VI	64	苦味酸铅*	6477-64-1	0.005
VI	65	史蒂芬酸铅*	15245-44-0	0.005
VI	66	N,N-二甲基乙酰胺	127-19-5	0.050
VI	67	氢氧化铬酸锌*	49663-84-5	0.005
VI	68	酚酞	77-09-8	0.050
VI	69	氢氧化铬酸锌钾*	11103-86-9	0.005
VI	70	砷酸铅*	3687-31-8	0.005
VI	71	氧化锆硅酸铝耐火陶瓷纤维*	-	0.005
VII	72	C.I.碱性蓝26§	2580-56-5	0.050
VII	73	C.I.碱性紫3§	548-62-9	0.050
VII	74	三乙二醇二甲醚(TEGDME)	112-49-2	0.050
VII	75	乙二醇二甲醚(EGDME)	110-71-4	0.050
VII	76	4,4'-二(二甲氨基)二苯甲酮(米氏酮)	90-94-8	0.050
VII	77	4,4'-二(二甲氨基)-4''-甲氨基三苯甲醇§	561-41-1	0.050
VII	78	三氧化二硼*	1303-86-2	0.005
VII	79	甲酰胺	75-12-7	0.050
VII	80	甲基磺酸铅*	17570-76-2	0.005

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批次	序号	物质名称	CAS No.	RL (%)
VII	81	N,N,N',N'-四甲基-4,4'-二氨基二苯甲烷(米氏碱)	101-61-1	0.050
VII	82	1,3,5-三(环氧乙基甲基)-1,3,5-三嗪-2,4,6-(1H, 3H,5H)-三酮(TGIC)	2451-62-9	0.050
VII	83	C.I.溶剂蓝4§	6786-83-0	0.050
VII	84	1,3,5-三-[(2S和2R)-2,3-环氧丙基]-1,3,5-三嗪-2,4,6-(1H, 3H, 5H)-三酮(β-TGIC)	59653-74-6	0.050
VIII	85	二盐基邻苯二甲酸铅*	69011-06-9	0.005
VIII	86	1,2-苯二酸-二(支链与直链)戊基酯	84777-06-0	0.050
VIII	87	乙二醇二乙醚	629-14-1	0.050
VIII	88	1-溴丙烷	106-94-5	0.050
VIII	89	3-乙基-2-甲基-2-(3-甲基丁基)-1,3-恶唑烷	143860-04-2	0.050
VIII	90	对特辛基苯酚乙氧基醚	-	0.050
VIII	91	4,4'-二氨基-3,3'-二甲基二苯甲烷	838-88-0	0.050
VIII	92	4,4'-二氨基二苯醚及其盐	101-80-4	0.050
VIII	93	4-氨基偶氮苯	60-09-3	0.050
VIII	94	2,4-二氨基甲苯	95-80-7	0.050
VIII	95	4-壬基(支链与直链)苯酚	-	0.050
VIII	96	2-甲氧基-5-甲基苯胺	120-71-8	0.050
VIII	97	碱式乙酸铅*	51404-69-4	0.005
VIII	98	4-氨基联苯	92-67-1	0.050
VIII	99	十溴二苯醚(DecaBDE)	1163-19-5	0.050
VIII	100	环己烷-1,2-二羧酸酐,顺式-环己烷-1,2-二羧酸酐,反式-环己烷-1,2-二羧酸酐	-	0.050

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批次	序号	物质名称	CAS No.	RL (%)
VIII	101	偶氮二甲酰胺	123-77-3	0.050
VIII	102	二丁基二氯化锡(DBTC)	683-18-1	0.050
VIII	103	硫酸二乙酯	64-67-5	0.050
VIII	104	邻苯二甲酸二异戊酯	605-50-5	0.050
VIII	105	硫酸二甲酯	77-78-1	0.050
VIII	106	地乐酚	88-85-7	0.050
VIII	107	双(十八酸基)二氧代三铅*	12578-12-0	0.005
VIII	108	C16-18-脂肪酸铅*	91031-62-8	0.005
VIII	109	呋喃	110-00-9	0.050
VIII	110	全氟十一烷酸	2058-94-8	0.050
VIII	111	全氟十四烷酸	376-06-7	0.050
VIII	112	甲基六氢邻苯二甲酸酐,4-甲基六氢邻苯二甲酸酐,1-甲基六氢邻苯二甲酸酐,3-甲基六氢邻苯二甲酸酐	-	0.050
VIII	113	四氟硼酸铅*	13814-96-5	0.005
VIII	114	氨基氰铅盐*	20837-86-9	0.005
VIII	115	硝酸铅*	10099-74-8	0.005
VIII	116	一氧化铅*	1317-36-8	0.005
VIII	117	碱式硫酸铅*	12036-76-9	0.005
VIII	118	四氧化三铅*	1314-41-6	0.005
VIII	119	钛酸铅*	12060-00-3	0.005
VIII	120	钛酸铅锆*	12626-81-2	0.005

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VIII	121	甲氧基乙酸	625-45-6	0.050
VIII	122	1,2-环氧丙烷	75-56-9	0.050
VIII	123	N,N-二甲基甲酰胺	68-12-2	0.050
VIII	124	N-甲基乙酰胺	79-16-3	0.050
VIII	125	邻苯二甲酸正戊基异戊基酯	776297-69-9	0.050
VIII	126	邻-氨基偶氮甲苯	97-56-3	0.050
VIII	127	2-氨基甲苯	95-53-4	0.050
VIII	128	全氟十三烷酸	72629-94-8	0.050
VIII	129	硫酸四氧化五铅*	12065-90-6	0.005
VIII	130	铅锑黄*	8012-00-8	0.005
VIII	131	掺杂铅的硅酸钡*	68784-75-8	0.005
VIII	132	硅酸铅*	11120-22-2	0.005
VIII	133	二碱式亚硫酸铅*	62229-08-7	0.005
VIII	134	四乙基铅*	78-00-2	0.005
VIII	135	硫酸三氧化四铅*	12202-17-4	0.005
VIII	136	全氟十二烷酸	307-55-1	0.050
VIII	137	碱式碳酸铅*	1319-46-6	0.005
VIII	138	二碱式亚磷酸铅*	12141-20-7	0.005
IX	139	4-壬基(支链与直链)苯酚乙氧基醚	-	0.050
IX	140	全氟辛酸铵(APFO)**	3825-26-1	0.050
IX	141	氧化镉*	1306-19-0	0.005

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批次	序号	物质名称	CAS No.	RL (%)
IX	142	镉	7440-43-9	0.005
IX	143	邻苯二甲酸二正戊酯(DPP)	131-18-0	0.050
IX	144	全氟辛酸(PFOA)	335-67-1	0.050
X	145	硫化镉*	1306-23-6	0.005
X	146	邻苯二甲酸二正己酯	84-75-3	0.050
X	147	C.I.直接红28	573-58-0	0.050
X	148	C.I.直接黑38	1937-37-7	0.050
X	149	2-巯基咪唑啉	96-45-7	0.050
X	150	乙酸铅*	301-04-2	0.005
X	151	磷酸三二甲苯酯	25155-23-1	0.050
XI	152	邻苯二甲酸二(支链与直链)己基酯	68515-50-4	0.050
XI	153	氯化镉*	10108-64-2	0.005
XI	154	水合过硼酸钠*	-	0.005
XI	155	过硼酸钠*	7632-04-4	0.005
XII	156	2-(2H-苯并三唑-2-基)-4,6-二叔戊基苯酚(UV-328)	25973-55-1	0.050
XII	157	2-苯并三唑-2-基-4,6-二叔丁基苯酚(UV-320)	3846-71-7	0.050
XII	158	二正辛基-双(2-乙基己基巯基乙酸酯)锡 (DOTE)	15571-58-1	0.050
XII	159	氟化镉 *	7790-79-6	0.005
XII	160	硫酸镉 *	10124-36-4,31119-53-6	0.005
XII	161	二正辛基-双(2-乙基己基巯基乙酸酯)锡(DOTE)和单辛基-三(2-乙基己基巯基乙酸酯)锡(MOTE)的反应物	-	0.050

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所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
XIII	162	1,2-苯二甲酸, 二(C6-10)烷基酯 / 1,2-苯二甲酸, 混合二己二辛二癸酯, 其中邻苯二甲酸二己酯含量≥0.3%	-	0.050
XIII	163	5-二级丁基-2-(2,4-二甲基环己-3-烯-1-基)-5-甲基-1,3-二恶烷[1]，5-二级丁基-2-(4,6-二甲基环己-3-烯-1-基)-5-甲基-1,3-二恶烷[2] [任何[1]和[2]或者其任意组合的单独异构体或其任何组合]	-	0.050
XIV	164	1,3-丙磺酸内酯	1120-71-4	0.050
XIV	165	2,4-二叔丁基-6-(5-氯苯并三唑-2-基)苯酚(UV-327)	3864-99-1	0.050
XIV	166	2-(2H-苯并三唑-2-基)-4-叔丁基-6-仲丁基苯酚 (UV-350)	36437-37-3	0.050
XIV	167	硝基苯	98-95-3	0.050
XIV	168	全氟壬酸及其钠盐和铵盐	-	0.050
XV	169	苯并(a)芘	50-32-8	0.050
XVI	170	4,4'-异亚丙基联苯酚 (双酚A)	80-05-7	0.050
XVI	171	4-庚基(支链与直链)苯酚	-	0.050
XVI	172	全氟癸酸 (PFDA) 及其钠盐和铵盐	-	0.050
XVI	173	对叔戊基苯酚	80-46-6	0.050
XVII	174	全氟己烷-1-磺酸及其盐	-	0.050
XVIII	175	双(六氯环戊二烯)环辛烷(包含任何顺式与反式同分异构体或其组合)	-	0.050
XVIII	176	苯并蒽(BaA)	56-55-3	0.050
XVIII	177	硝酸镉*	10325-94-7	0.005
XVIII	178	碳酸镉*	513-78-0	0.005
XVIII	179	氢氧化镉*	21041-95-2	0.005
XVIII	180	屈(CHR)	218-01-9	0.050

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XVIII	181	1,3,4-噻二唑-2,5-二硫酮、甲醛与支链和直链4-庚基苯酚的反应产物(RP-HP)[含有支链和直链4-庚基苯酚重量比≥0.1%]	-	0.050
XIX	182	1,2,4-苯三酸酐(偏苯三酸酐)(TMA)	552-30-7	0.050
XIX	183	苯并(g,h,i)苝(二萘嵌苯) (BPE)	191-24-2	0.050
XIX	184	十甲基环五硅氧烷(D5)	541-02-6	0.050
XIX	185	邻苯二甲酸二环己酯(DCHP)	84-61-7	0.050
XIX	186	氧化硼钠*	12008-41-2	0.005
XIX	187	十二甲基环六硅氧烷(D6)	540-97-6	0.050
XIX	188	乙二胺(EDA)	107-15-3	0.050
XIX	189	铅	7439-92-1	0.005
XIX	190	八甲基环四硅氧烷(D4)	556-67-2	0.050
XIX	191	氢化三联苯	61788-32-7	0.050
XX	192	1,7,7-三甲基-3-(苯基亚甲基)双环[2.2.1]庚-2-酮 (3-亚苄基樟脑)	15087-24-8	0.050
XX	193	4,4'-(1,3-二甲基丁基)二苯酚(1,3-DMBBP)	6807-17-6	0.050
XX	194	苯并 (k)荧蒽(BkF)	207-08-9	0.050
XX	195	荧蒽(FLT)	206-44-0	0.050
XX	196	菲(PHE)	85-01-8	0.050
XX	197	芘(PYR)	129-00-0	0.050
XXI	198	2,3,3,3-四氟-2-(七氟丙氧基)丙酸及其盐和酰基卤化物(包括单体和组合)(HFPO-DA)	-	0.050
XXI	199	2-甲氧基乙基乙酸酯	110-49-6	0.050
XXI	200	4-叔丁基苯酚(PTBP)	98-54-4	0.050

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(SVHC)

附录

所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
XXI	201	三(4-壬基苯基，支链和直链)亚磷酸酯(TNPP)(含≥0.1%的支链和直链4-壬基苯酚)	-	0.050
XXII	202	2-苄基-2-二甲基氨基-4'-吗啉基苯基丁酮	119313-12-1	0.050
XXII	203	2-甲基-1-(4-甲硫基苯基)-2-吗啉基-1-丙酮	71868-10-5	0.050
XXII	204	邻苯二甲酸二异己酯	71850-09-4	0.050
XXII	205	全氟丁烷磺酸及其盐	-	0.050
XXIII	206	1-乙烯基咪唑	1072-63-5	0.050
XXIII	207	2-甲基咪唑	693-98-1	0.050
XXIII	208	对羟基苯甲酸丁酯	94-26-8	0.050
XXIII	209	双(乙酰丙酮基)二丁基锡**	22673-19-4	0.050
XXIV	210	四乙二醇二甲醚	143-24-8	0.050
XXIV	211	二月桂酸二辛基锡及任何其他二辛基锡双(脂肪酰氧基)衍生物**	-	0.050
XXV	212	1,4-二氧六环	123-91-1	0.050
XXV	213	二溴新戊二醇(BMP); 三溴新戊醇(TBNPA); 2,3-二溴-1-丙醇(2,3-DBPA)	-	0.050
XXV	214	铃兰醛及其立体异构体	-	0.050
XXV	215	双酚B	77-40-7	0.050
XXV	216	戊二醛	111-30-8	0.050
XXV	217	中链氯化石蜡(MCCP)	-	0.050
XXV	218	原硼酸钠盐*	13840-56-7	0.005
XXV	219	对十二烷基苯酚及其异构体(PDDP)	-	0.050

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批次	序号	物质名称	CAS No.	RL (%)
/	220	间苯二酚	108-46-3	0.050
/	221	(±)-1,7,7-三甲基-3-[(4-甲基苯基)亚甲基]二环[2.2.1]庚-2-酮，包括各个异构体和/或其组合(4-MBC)	-	0.050
/	222	2,2'-亚甲基双-(4-甲基-6-叔丁基苯酚) (DBMC)	119-47-1	0.050
/	223	S-(三环[5.2.1.0'2,6]癸-3-烯-8(或9)-基) O-(异丙基或异丁基或2-乙基己基) O-(异丙基或异丁基或2-乙基己基)二硫代磷酸酯	255881-94-8	0.050
/	224	乙烯基-三(2-甲氧基乙氧基)硅烷	1067-53-4	0.050

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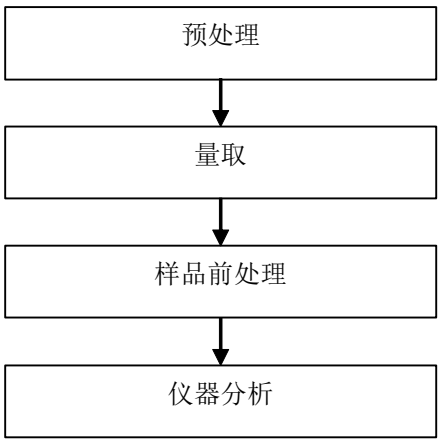
SVHC 测试流程图



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(SVHC)

样品照片:

SHAEC2128063402



SHA21-280634.001

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测试报告

No. SHAEC2128062202　　日期: 2021年12月29日　第1页,共8页

苏州市恒顺纸塑有限公司

苏州市相城区太平街道聚金路168号

以下测试之样品是由申请者所提供及确认：瓦楞纸板

SGS工作编号：	SP21-039874 - SH
样品接收日期：	2021年12月22日
测试周期：	2021年12月22日 - 2021年12月29日
测试要求：	根据客户要求测试
测试方法：	请参见下一页
测试结果：	请参见下一页
结论：	基于所送样品进行的测试，镉、铅、汞、六价铬、多溴联苯(PBBs)、多溴二苯醚(PBDEs)、邻苯二甲酸酯(如邻苯二甲酸二丁酯 (DBP)、邻苯二甲酸丁苄酯(BBP)、邻苯二甲酸二(2-乙基已基)酯(DEHP)和邻苯二甲酸二异丁酯(DIBP))的测试结果符合欧盟RoHS指令2011/65/EU附录II的修正指令(EU) 2015/863的限值要求。

通标标准技术服务（上海）有限公司
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scan to see the report

362E82C3

Carol Luo罗萍
批准签署人

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测试结果 :

测试样品描述 :

样品编号	SGS样品ID	描述
SN1	SHA21-280622.001	棕色纸板

备注 :

(1) 1 mg/kg = 0.0001%

(2) MDL = 方法检测限

(3) ND = 未检出 (< MDL)

(4) "-" = 未规定

RoHS指令2011/65/EU附录II的修正指令(EU) 2015/863

测试方法 : 参考IEC 62321-4:2013+AMD1:2017， IEC 62321-5:2013，IEC 62321-7-2:2017，IEC 62321-6:2015和IEC 62321-8:2017，采用ICP-OES，UV-Vis和GC-MS进行分析。

测试项目	限值	单位	MDL	*001*
镉(Cd)	100	mg/kg	2	ND
铅(Pb)	1000	mg/kg	2	7
汞(Hg)	1000	mg/kg	2	ND
六价铬 (Cr(VI))	1000	mg/kg	8	ND
多溴联苯之和(PBBs)	1000	mg/kg	-	ND
一溴联苯	-	mg/kg	5	ND
二溴联苯	-	mg/kg	5	ND
三溴联苯	-	mg/kg	5	ND
四溴联苯	-	mg/kg	5	ND
五溴联苯	-	mg/kg	5	ND
六溴联苯	-	mg/kg	5	ND
七溴联苯	-	mg/kg	5	ND
八溴联苯	-	mg/kg	5	ND
九溴联苯	-	mg/kg	5	ND
十溴联苯	-	mg/kg	5	ND
多溴二苯醚之和(PBDEs)	1000	mg/kg	-	ND
一溴二苯醚	-	mg/kg	5	ND
二溴二苯醚	-	mg/kg	5	ND
三溴二苯醚	-	mg/kg	5	ND
四溴二苯醚	-	mg/kg	5	ND

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测试项目	限值	单位	MDL	*001*
五溴二苯醚	-	mg/kg	5	ND
六溴二苯醚	-	mg/kg	5	ND
七溴二苯醚	-	mg/kg	5	ND
八溴二苯醚	-	mg/kg	5	ND
九溴二苯醚	-	mg/kg	5	ND
十溴二苯醚	-	mg/kg	5	ND
邻苯二甲酸二丁酯 (DBP)	1000	mg/kg	50	ND
邻苯二甲酸丁苄酯(BBP)	1000	mg/kg	50	ND
邻苯二甲酸二(2-乙基己基)酯(DEHP)	1000	mg/kg	50	ND
邻苯二甲酸二异丁酯(DIBP)	1000	mg/kg	50	ND

备注：

(1) 最大允许极限值引用自RoHS指令(EU) 2015/863 。
IEC 62321系列等同于 EN 62321系列
https://www.cenelec.eu/dyn/www/f?p=104:30:17422328703511101::::FSP_ORG_ID,FSP_LANG_ID:1258637,25

(2) 2021年7月22号开始，DEHP, BBP, DBP 和 DIBP的限制适用于医疗器械，包括体外医疗器械，监控仪表，包括工业监测和控制仪器。

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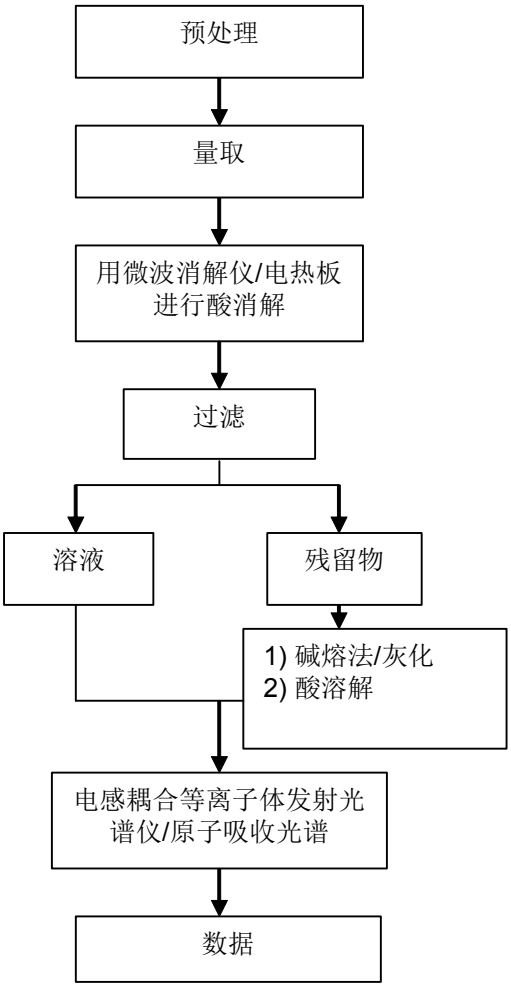
元素(IEC62321) 测试流程图

1)样品按照下述流程被完全消解



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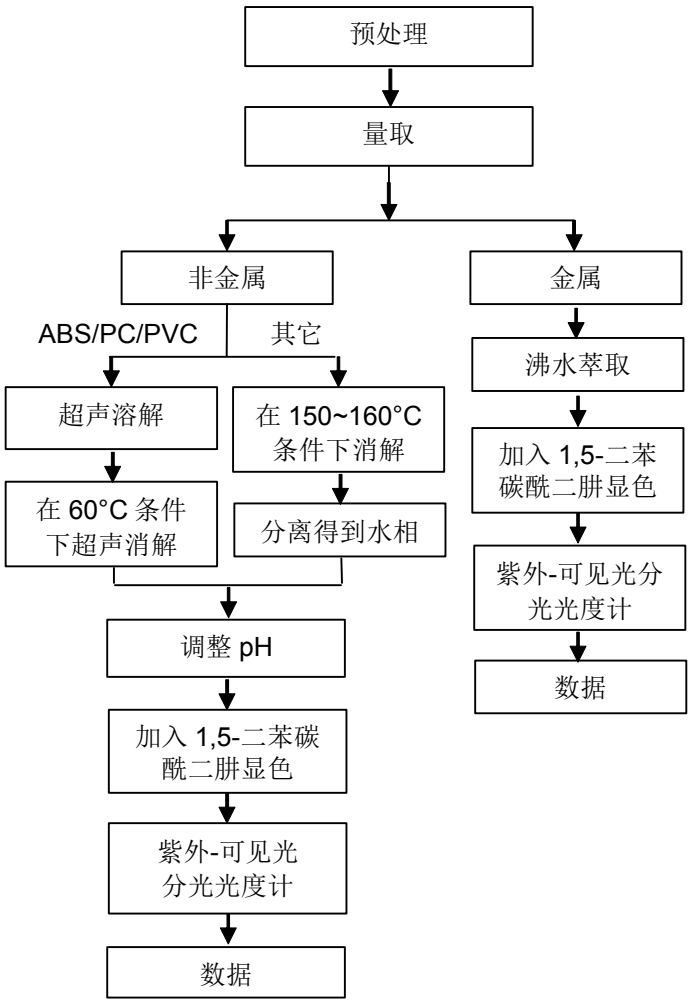
六价铬测试流程图



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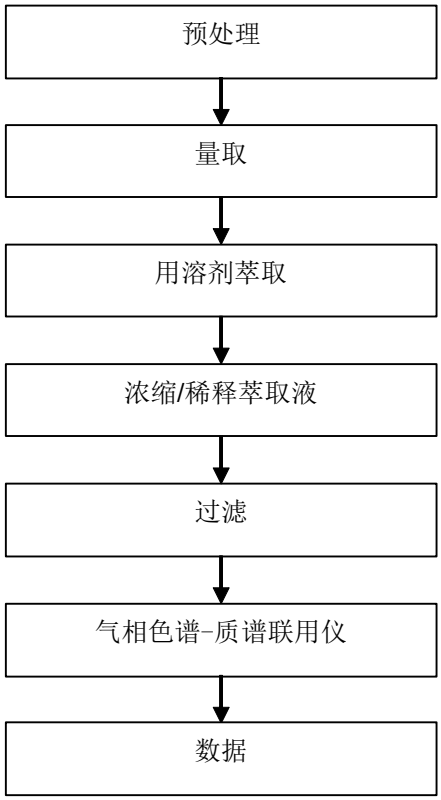
附件

PBBs/PBDEs 测试流程图



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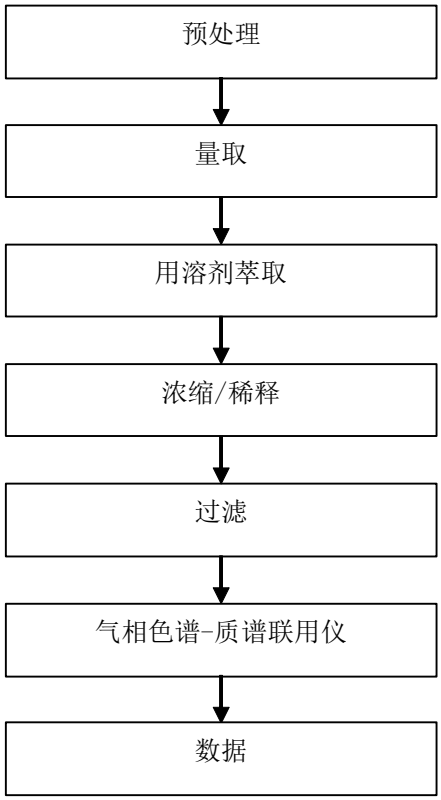
附件

Phthalates 测试流程图



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样品照片:



SHA21-280622.001

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测试报告

No. SHAEC2128062204

苏州市恒顺纸塑有限公司

苏州市相城区太平街道聚金路168号

以下测试之样品是由申请者所提供及确认：瓦楞纸板

SGS工作编号：	SP21-039874 - SH
样品接收日期：	2021年12月22日
测试周期：	2021年12月22日 - 2021年12月29日
测试要求：	根据客户要求测试
测试方法：	请参见下一页
测试结果：	请参见下一页

通标标准技术服务（上海）有限公司
授权签名

scan to see the report

FA8E4A4A

Carol Luo罗萍
批准签署人

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测试结果 :

测试样品描述 :

样品编号	SGS样品ID	描述
SN1	SHA21-280622.001	棕色纸板

备注 :

(1) 1 mg/kg = 0.0001%

(2) MDL = 方法检测限

(3) ND = 未检出 (< MDL)

(4) "-" = 未规定

卤素

测试方法 : 参照EN 14582: 2016方法 测定, 采用 IC进行分析.

测试项目	单位	MDL	*001*
氟 (F)	mg/kg	50	ND
氯 (Cl)	mg/kg	50	353
溴 (Br)	mg/kg	50	ND
碘 (I)	mg/kg	50	ND

除非另有说明，此报告结果仅对测试的样品负责。本报告未经本公司书面许可，不可部分复制。检测报告仅用于客户科研、教学、内部质量控制、产品研发等目的，仅供内部参考。

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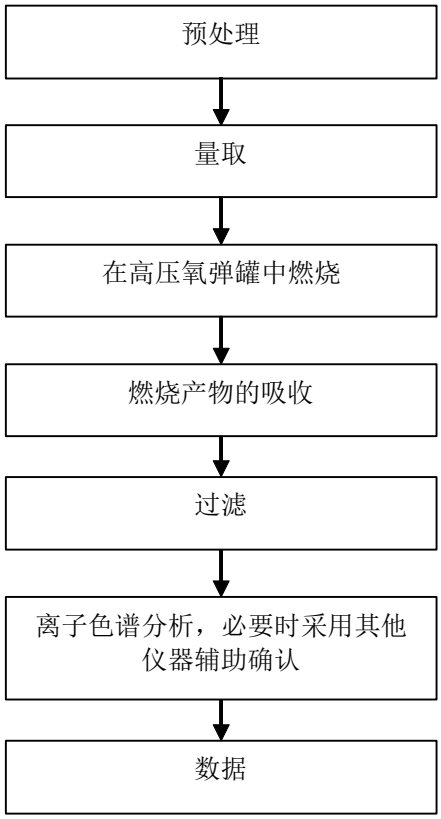
Halogen(氧弹法)测试流程图



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DSM Engineering Materials

Urmonderbaan 22, 6167 RD Geleen, The Netherlands

PDM.dem@dsm.com

Reference: R000014686

To: DACHUAN

Revision date: 2021-07-13
Print date: 2021-10-26

REACH and SVHC statement

DSM Engineering Materials (DEM), established at Urmonderbaan 22, 6167 RD Geleen, the Netherlands, is committed to comply with the requirements of Regulation (EC) No 1907/2006 (REACH).

The "Products" (**Akulon®, Arnite®, Arnitel®, EcoPaXX®, ForTii®, Novamid®, Nylatron™, Stanyl®** and **Xytron™** grades (all colors)) comply with the REACH legislation, if ordered from DEM.

Should you consider importing Products as such or as part of your own products into the European Union (EU) directly, please contact your account responsible person of DSM Engineering Materials to check REACH compliance. This declaration does not cover such imports.

According to their respective formulations the Products do not contain:

- substances listed in Annex XIV of REACH (List of Substances Subject to Authorisation (referred to in Annex 1)) that are intentionally used or added;
- substances included in the Candidate List of Substances of Very High Concern for Authorisation (referred to in Annex 1), in concentrations exceeding 0.1% (w/w).

This declaration has been prepared and issued based on currently applicable laws and regulations and our best knowledge and expertise currently available; the addressee or recipient is advised to regularly request updates hereof. This declaration replaces all previous ones relating to this subject.

The General Conditions of Sale of DEM or any of its affiliate(s) selling Products apply to and are part of all our quotations, offers, agreements, sales, deliveries, and all other similar dealings, unless explicitly agreed otherwise by means of duly and mutually executed document.

This information is valid for the Products as these leave its production facilities and does not include any other additive, pigment, etc. subsequently added by the converter or processing steps undertaken by any other third party.

On behalf of DSM Engineering Materials,

W. Saelmans
Senior Expert
Regulatory Affairs & Product Safety

R. Offermanns
Senior Expert
Regulatory Affairs & Product Safety

Annex 1: Links to Candidate and Authorisation lists

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DSM Engineering Materials

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Annex 1:
Links to Candidate and Authorisation lists

Candidate list, updated on 08 July 2021
http://echa.europa.eu/web/guest/candidate-list-table

Authorisation list
https://echa.europa.eu/authorisation-list

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HEALTH • NUTRITION • MATERIALS

DSM Engineering Materials

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PDM.dem@dsm.com

Reference: R000011530

To: DACHUAN

Revision date: 2021-04-22
Print date: 2021-10-26

RoHS DECLARATION
(Directive 2011/65/EU (Annex II amended by Commission Delegated Directive (EU) 2015/863)

According to the recipe for the manufacturing of **Akulon®**, **Arnite®**, **Arnitel®**, **EcoPaXX®**, **Novamid®**, **Nylatron™**, **Stanyl®**, **ForTii®** and **Xytron™** grades **(all colors)** the following substances are not intentionally used or added:

- The heavy metals cadmium, lead, chromium (VI) and mercury
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ethers (PBDE) including Decabromodiphenyl ether (decaBDE)
- Bis(2-ethylhexyl) phthalate (DEHP)
- Butyl benzyl phthalate (BBP)
- Dibutyl phthalate (DBP)
- Diisobutyl phthalate (DIBP).

Since the presence of the above-mentioned substances couldn't be expected under normal conditions, the absence has not been checked by tests.

Although the above-mentioned substances are not intentionally added, this does not exclude the presence of traces due to (among others) impurities in the components supplied by third parties and used in our production facilities.

However, it is our opinion that the chemical composition of the above mentioned products fully complies with the requirements for the above-mentioned substances according to Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU of the European Parliament and of the Council as regards the list of restricted substances.

This information holds for the material as it leaves its production facilities and does not include any additive, pigment, etc. subsequently added by the converter or processing steps undertaken by any other third party.

This declaration has been prepared and issued on the basis of currently applicable laws and regulations and our best knowledge and expertise currently available; the addressee or recipient is advised to regularly request updates hereof. This declaration replaces all previous ones relating to this subject.

The General Conditions of Sale of the entity selling this product apply to and are part of all our quotations, offers, agreements, sales, deliveries and all other similar dealings, unless explicitly agreed otherwise by means of a duly and mutually executed document.

On behalf of DSM Engineering Materials,

W. Saelmans
Senior Expert
Regulatory Affairs & Product Safety

R. Offermanns
Senior Expert
Regulatory Affairs & Product Safety

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HEALTH • NUTRITION • MATERIALS

SDS Report

No.: CANML2116487001 Date: 06 Sep 2021 Page 1 of 1

ZHEJIANG SPECIAL RIBBON TECHNOLOGY & MATERIALS CO., LTD.
CHANGXING DISTRICT,SOUTHERN,TAIHU, LNDUSTRIAL CLUSTER,HUZHOU,ZHEJIANG PROVINCE

SGS Job No.	:	GZIN2109051790PC(NBIN2109010793ML)
Sample Name	:	nano ribbon
End Uses	:	Electrical and electronic accessories
Composition/Ingredient of sample (as per client submission)	:	See *section 3 Composition/information on ingredients* on the SDS report
Job Receiving Date	:	02 Sep 2021
SDS Preparation Period	:	02 Sep 2021-06 Sep 2021
Service Requested	:	Safety Data Sheet (SDS) for the sample with submitted composition.
Summary	:	As per request, the contents and formats of the SDS are prepared in accordance with European Commission Regulation (EC) No 1907/2006, Regulation (EC) No 1272/2008 and Regulation (EU) No 2015/830, and is provided per attached. Remark: The SDS is prepared based on the information provided by client.

Signed for and on behalf of
SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch

Zm guan
Approved Signatory

SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch Testing Center Chemical Laboratory

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Safety data sheet
Regulation (EC) No. 1907/2006 and 1272/2008

Printing date 02.09.2021 Version number 1 Revision: 02.09.2021

SECTION 1: Identification of the substance/mixture and of the company/undertaking

· **1.1 Product identifier**

· **Trade name: nano ribbon**

· **1.2 Relevant identified uses of the substance or mixture and uses advised against**
· **Application of the substance / the mixture:** Electrical and electronic accessories

· **1.3 Details of the supplier of the safety data sheet**
· **Manufacturer / Supplier:** ZHEJIANG SPECIAL RIBBON TECHNOLOGY & MATERIALS CO., LTD.
· **Full address:**
CHANGXING DISTRICT,SOUTHERN,TAIHU, LNDUSTRIAL CLUSTER,HUZHOU,ZHEJIANG PROVINCE
· **Phone number:** 13968935050
· **Email:** 46204051@QQ.COM

· **Only Representative / other EU contact point:** Not available

· **Further information obtainable from:**
ZHEJIANG SPECIAL RIBBON TECHNOLOGY & MATERIALS CO., LTD.

· **1.4 Emergency telephone number:**
GERMANY
Poison Center Berlin - Institute of Toxicology
Tel: +49 030 192 40

· **1.5 Reference Number:** CANML2116487001,GZIN2109051790PC(NBIN2109010793ML)

· **1.6 Remark:**
* This sample is likely to be classified as article with substances not intended to be released and is out of scope of a SDS as set out in Regulation (EC) No 1907/2006. This SDS is generated for client's reference only.

SECTION 2: Hazards identification

· **2.1 Classification of the substance or mixture**
· **Classification according to Regulation (EC) No 1272/2008**
The product is not classified according to the CLP regulation.

· **Information concerning particular hazards for human and environment:**
The product has not to be labelled due to the calculation procedure of Regulation (EC) No. 1272/2008.

· **Classification system:**
The classification is according to the latest edition of EU Regulation (EC) No. 1272/2008, and extended by company and literature data.

· **2.2 Label elements**
· **Labelling according to Regulation (EC) No. 1272/2008** Void
· **Hazard pictograms** Void
· **Signal word** Void
· **Hazard statements** Void

· **2.3 Other hazards:**
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

SECTION 3: Composition/information on ingredients

· **3.2 Mixtures**
· **Description:**
Mixture of the substances listed below with nonhazardous additions.
For the wording of the listed hazard statements refer to section 16.

(Contd. on page 2)

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Trade name: nano ribbon

(Contd. of page 1)

· **Composition:**

CAS: 7439-89-6 EINECS: 231-096-4	Iron		82.79%
CAS: 7440-21-3 EINECS: 231-130-8	Silicon	substance with a Community workplace exposure limit	8.79%
CAS: 7440-03-1 EINECS: 231-113-5	Niobium		5.63%
CAS: 7440-42-8 EINECS: 231-151-2	Boron	substance with a Community workplace exposure limit	1.52%
CAS: 7440-50-8 EINECS: 231-159-6	Copper	substance with a Community workplace exposure limit	1.27%

SECTION 4: First aid measures

· **4.1 Description of first aid measures**
· **General description:** No special measures required.
· **After inhalation:** Supply fresh air; consult doctor in case of complaints.
· **After skin contact:** Generally the product does not irritate the skin.
· **After eye contact:** Rinse opened eye for several minutes under running water.
· **After swallowing:** If symptoms persist consult doctor.

· **4.2 Most important symptoms and effects, both acute and delayed:**
No further relevant information available.

· **4.3 Indication of any immediate medical attention and special treatment needed:**
No further relevant information available.

SECTION 5: Firefighting measures

· **5.1 Extinguishing media**
· **Suitable extinguishing agents:** Use fire extinguishing methods suitable to surrounding conditions.

· **5.2 Special hazards arising from the substance or mixture:** No further relevant information available.

· **5.3 Advice for firefighters**
· **Protective equipment:** No special measures required.

SECTION 6: Accidental release measures

· **6.1 Personal precautions, protective equipment and emergency procedures:** Not required.

· **6.2 Environmental precautions:** Do not allow to enter sewers/ surface or ground water.

· **6.3 Methods and material for containment and cleaning up:** Pick up mechanically.

· **6.4 Reference to other sections:**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

SECTION 7: Handling and storage

· **7.1 Precautions for safe handling:**
No special measures required.
For the general occupational hygienic measures refer to Section 8.

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· ***Information about fire - and explosion protection:*** *No special measures required.*

· ***7.2 Conditions for safe storage, including any incompatibilities***
· ***Requirements to be met by storerooms and receptacles:*** *No special requirements.*
· ***Information about storage in one common storage facility:*** *Not required.*
· ***Further information about storage conditions:*** *None.*

· ***7.3 Specific end use(s):*** *No further relevant information available.*

SECTION 8: Exposure controls/personal protection

· ***8.1 Control parameters***

· **Ingredients with limit values that require monitoring at the workplace:**	
7440-21-3 Silicon (8.79%)	
WEL (Great Britain)	Long-term value: 10* 4** mg/m³ *inhalable dust **respirable dust
VLEP (France)	Long-term value: 10 mg/m³
7440-42-8 Boron (1.52%)	
MAK (Germany)	Long-term value: 0.75E mg/m³
7440-50-8 Copper (1.27%)	
WEL (Great Britain)	Short-term value: 2** mg/m³ Long-term value: 0.2* 1** mg/m³ *fume **dusts and mists (as Cu)
MAK (Germany)	Long-term value: 0.01 A mg/m³ als Cu
VLEP (France)	Short-term value: 2** mg/m³ Long-term value: 0.2* 1** mg/m³ *fumées **poussières, en Cu

· ***Regulatory information***
WEL (Great Britain): EH40/2020
VLEP (France): ED 1487 12.2019
MAK (Germany): MAK- und BAT-Liste
· ***DNELs:*** *Not available*
· ***PNECs:*** *Not available*

· ***Additional information:*** *The lists valid during the making were used as basis.*

· ***8.2 Exposure controls***
Based on the composition shown in Section 3, the following measures are suggested for occupational safety measure.
· ***Appropriate engineering controls:*** *See Section 7 for information about design of technical facilities.*

· ***Personal protective equipment***
· ***Respiratory protection:*** *Not required.*
· ***Protection of hands:***



Protective gloves

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.
Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation.
· ***Material of gloves***
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several

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substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.

· ***Penetration time of glove material:***
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.

· ***Eye protection:*** *Not required.*

· ***Environmental exposure controls:***
Control measures must be made in accordance with Community environmental protection legislation.

SECTION 9: Physical and chemical properties

· **9.1 Information on basic physical and chemical properties**	
· **Appearance**	
Form:	Solid
Colour:	Sliver
· **Odour:**	Odorless
· **Odour threshold:**	Not available
· **pH-value:**	Not available
· **Change in condition**	
Melting point/Freezing point:	Not available
Initial boiling point and boiling range:	Not available
· **Flash point:**	Not available
· **Flammability (solid, gas):**	Not available
· **Auto-ignition temperature:**	Not available
· **Decomposition temperature:**	Not available
· **Self-igniting:**	Not available
· **Explosive properties:**	Not available
· **Explosion limits**	
Lower:	Not available
Upper:	Not available
· **Oxidising properties:**	Not available
· **Vapour pressure:**	Not available
· **Density:**	Not available
· **Relative density:**	Not available
· **Vapour density:**	Not available
· **Evaporation rate:**	Not available
· **Solubility in / Miscibility with water:**	Not available
· **Partition coefficient: n-octanol/water:**	Not available
· **Viscosity**	
Dynamic:	Not available
Kinematic:	Not available
· **9.2 Other information**	No further relevant information available.

SECTION 10: Stability and reactivity

· **10.1 Reactivity:** *Data not available*

(Contd. on page 5)

Safety data sheet
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· **10.2 Chemical stability:** Data not available

· **10.3 Possibility of hazardous reactions:** No dangerous reactions known.

· **10.4 Conditions to avoid:** No further relevant information available.

· **10.5 Incompatible materials:** No further relevant information available.

· **10.6 Hazardous decomposition products:** No dangerous decomposition products known.

SECTION 11: Toxicological information

· **11.1 Information on toxicological effects**
· **Acute toxicity** Based on available data, the classification criteria are not met.

· **LD/LC50 values relevant for classification:**		
7439-89-6 Iron		
Oral	LD50	30,000 mg/kg (rat)

· **Skin corrosion/irritation:** Based on available data, the classification criteria are not met.
· **Serious eye damage/irritation:** Based on available data, the classification criteria are not met.
· **Respiratory or skin sensitization:** Based on available data, the classification criteria are not met.
· **Germ cell mutagenicity** Based on available data, the classification criteria are not met.
· **Carcinogenicity** Based on available data, the classification criteria are not met.
· **Reproductive toxicity** Based on available data, the classification criteria are not met.
· **STOT-single exposure** Based on available data, the classification criteria are not met.
· **STOT-repeated exposure** Based on available data, the classification criteria are not met.
· **Aspiration hazard** Based on available data, the classification criteria are not met.

SECTION 12: Ecological information

· **12.1 Toxicity**
· **Aquatic toxicity:** No further relevant information available.

· **12.2 Persistence and degradability:** No further relevant information available.

· **12.3 Bioaccumulative potential:** No further relevant information available.

· **12.4 Mobility in soil:** No further relevant information available.

· **12.5 Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

· **12.6 Other adverse effects** No further relevant information available.

· **12.7 Additional ecological information:**
· **General notes:**
Water hazard class 1 (German Regulation) (Self-assessment): slightly hazardous for water
Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.

SECTION 13: Disposal considerations

· **13.1 Waste treatment methods**
· **Recommendation:** Smaller quantities can be disposed of with household waste.

· **Uncleaned packaging**
· **Recommendation:** Disposal must be made according to official regulations.

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Safety data sheet
Regulation (EC) No. 1907/2006 and 1272/2008

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· **Recommended cleansing agents:** Water, if necessary together with cleansing agents.

SECTION 14: Transport information

· **14.1 UN-Number**	
· **ADR/RID/ADN, IMDG, IATA**	Not applicable
· **14.2 UN proper shipping name**	
· **ADR/RID/ADN, IMDG, IATA**	Not applicable
· **14.3 Transport hazard class(es)**	
· **ADR/RID/ADN, IMDG, IATA**	
· **Class**	Not applicable
· **Label**	-
· **14.4 Packing group**	
· **ADR/RID/ADN, IMDG, IATA**	Not applicable
· **14.5 Environmental hazards**	
· **Marine pollutant:**	No
· **14.6 Special precautions for user:**	Not applicable
· **Hazard identification number (Kemler code):**	-
· **14.7 Transport in bulk according to Annex II of Marpol and the IBC Code**	Not applicable
· **14.8 Transport/Additional information:**	Not dangerous according to the above specifications.
· **UN "Model Regulation":**	Void

SECTION 15: Regulatory information

· **15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**

· **MAK(German Maximum Workplace Concentration)**

None of the ingredients is listed.

· **Directive 2012/18/EU**
· **Named dangerous substances - ANNEX I** None of the ingredients is listed.
· **Seveso category** Not applicable
· **Qualifying quantity (tonnes) for the application of lower-tier requirements** Not available
· **Qualifying quantity (tonnes) for the application of upper-tier requirements** Not available

· **DIRECTIVE 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment – Annex II**

None of the ingredients is listed.

· **National regulations:**

· **Waterhazard class:** Water hazard class 1 (Self-assessment): slightly hazardous for water.

· **Other regulations, limitations and prohibitive regulations**

· **SVHC Candidate List of REACH Regulation Annex XIV Authorisation (8/7/2021)**

None of the ingredients is listed

· **REACH Regulation Annex XVII Restriction (25/1/2021)**
See Section 16 for information about restriction of use.

None of the ingredients is listed

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Safety data sheet
Regulation (EC) No. 1907/2006 and 1272/2008

Trade name: nano ribbon

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· **REACH Regulation Annex XIV Authorisation List (6/2/2020)**

None of the ingredients is listed

· **15.2 Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

SECTION 16: Other information

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The contents and format of this SDS are in accordance with Regulation (EC) No 1907/2006, 1272/2008 and Regulation (EU) No 2015/830.

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· **Abbreviations and acronyms:**
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
IATA: International Air Transport Association
GHS: Globally Harmonised System of Classification and Labelling of Chemicals
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
DNEL: Derived No-Effect Level (REACH)
PNEC: Predicted No-Effect Concentration (REACH)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
PBT: Persistent, Bioaccumulative and Toxic
vPvB: very Persistent and very Bioaccumulative
. **********

End of document

Test Report

ZHEJIANG SPECIAL RIBBON TECHNOLOGY & MATERIALS CO.,LTD
CHANGXING DISTRICT,SOUTHERN,TAIHU, LNDUSTRIAL CLUSTER,HUZHOU,ZHEJIANG PROVINCE

The following sample(s) was/were submitted and identified on behalf of the clients as : NANO RIBBON

SGS Job No. :	NBIN2109010813PC - NB
Product Specification :	12mm
Material and Mark :	1K107B
Manufacturer :	ZHEJIANG SPECIAL RIBBON TECHNOLOGY & MATERIALS CO.,LTD
Reference No. :	NBIN2109010792ML
Date of Sample Received :	02 Sep 2021
Testing Period :	02 Sep 2021 - 08 Sep 2021
Test Requested :	Selected test(s) as requested by client.
Test Method :	Please refer to next page(s).
Test Results :	Please refer to next page(s).
Conclusion :	Based on the performed tests on selected part of submitted sample(s), the results of Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) and Phthalates such as Bis(2-ethylhexyl) phthalate (DEHP) , Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) , and Diisobutyl phthalate (DIBP) comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Signed for and on behalf of
SGS-CSTC Standards Technical Services Co., Ltd. Ningbo Branch

Pearson Zhou
Approved Signatory

scan to see the report
NGBML2104390601

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Test Results :

Test Part Description :

Specimen No.	SGS Sample ID	Description
SN1	NGB21-043906.001	SILVERY-GREY SOFT SOLID RIBBON PART

Remarks :

(1) 1 mg/kg = 0.0001%
(2) MDL = Method Detection Limit
(3) ND = Not Detected (< MDL)
(4) "-" = Not Regulated

RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

Test Method : With reference to IEC 62321-4:2013+AMD1:2017, IEC62321-5:2013, IEC62321-7-2:2017, IEC 62321-6:2015 and IEC62321-8:2017, analyzed by ICP-OES, UV-Vis and GC-MS.

Test Item(s)	Limit	Unit	MDL	*001*
Cadmium (Cd)	100	mg/kg	2	ND
Lead (Pb)	1000	mg/kg	2	ND
Mercury (Hg)	1000	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))	1000	mg/kg	8	ND
Sum of PBBs	1000	mg/kg	-	ND
Monobromobiphenyl	-	mg/kg	5	ND
Dibromobiphenyl	-	mg/kg	5	ND
Tribromobiphenyl	-	mg/kg	5	ND
Tetrabromobiphenyl	-	mg/kg	5	ND
Pentabromobiphenyl	-	mg/kg	5	ND
Hexabromobiphenyl	-	mg/kg	5	ND
Heptabromobiphenyl	-	mg/kg	5	ND
Octabromobiphenyl	-	mg/kg	5	ND
Nonabromobiphenyl	-	mg/kg	5	ND
Decabromobiphenyl	-	mg/kg	5	ND
Sum of PBDEs	1000	mg/kg	-	ND
Monobromodiphenyl ether	-	mg/kg	5	ND
Dibromodiphenyl ether	-	mg/kg	5	ND
Tribromodiphenyl ether	-	mg/kg	5	ND
Tetrabromodiphenyl ether	-	mg/kg	5	ND
Pentabromodiphenyl ether	-	mg/kg	5	ND
Hexabromodiphenyl ether	-	mg/kg	5	ND

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Test Item(s)	Limit	Unit	MDL	001
Heptabromodiphenyl ether	-	mg/kg	5	ND
Octabromodiphenyl ether	-	mg/kg	5	ND
Nonabromodiphenyl ether	-	mg/kg	5	ND
Decabromodiphenyl ether	-	mg/kg	5	ND
Di-butyl Phthalate (DBP)	1000	mg/kg	50	ND
Benzyl Butyl Phthalate (BBP)	1000	mg/kg	50	ND
Bis(2-ethylhexyl) Phthalate(DEHP)	1000	mg/kg	50	ND
Diisobutyl Phthalates (DIBP)	1000	mg/kg	50	ND

Notes :

(1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.

(2) IEC 62321 series is equivalent to EN 62321 series https://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101::::FSP_ORG_ID,FSP_LANG_ID:1258637,25.

(3) The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, from 22 July 2021.

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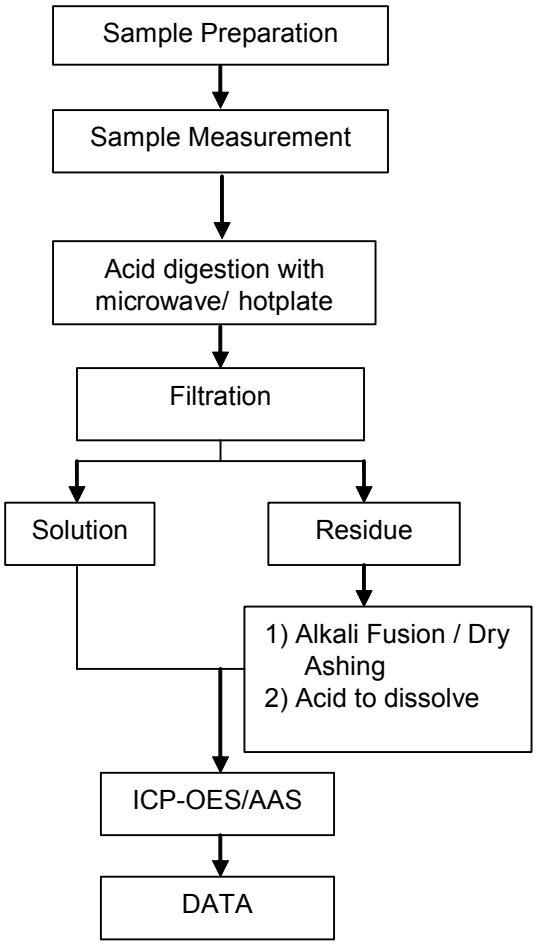
Elements (IEC62321) Testing Flow Chart

1) These samples were dissolved totally by pre-conditioning method according to below flow chart.



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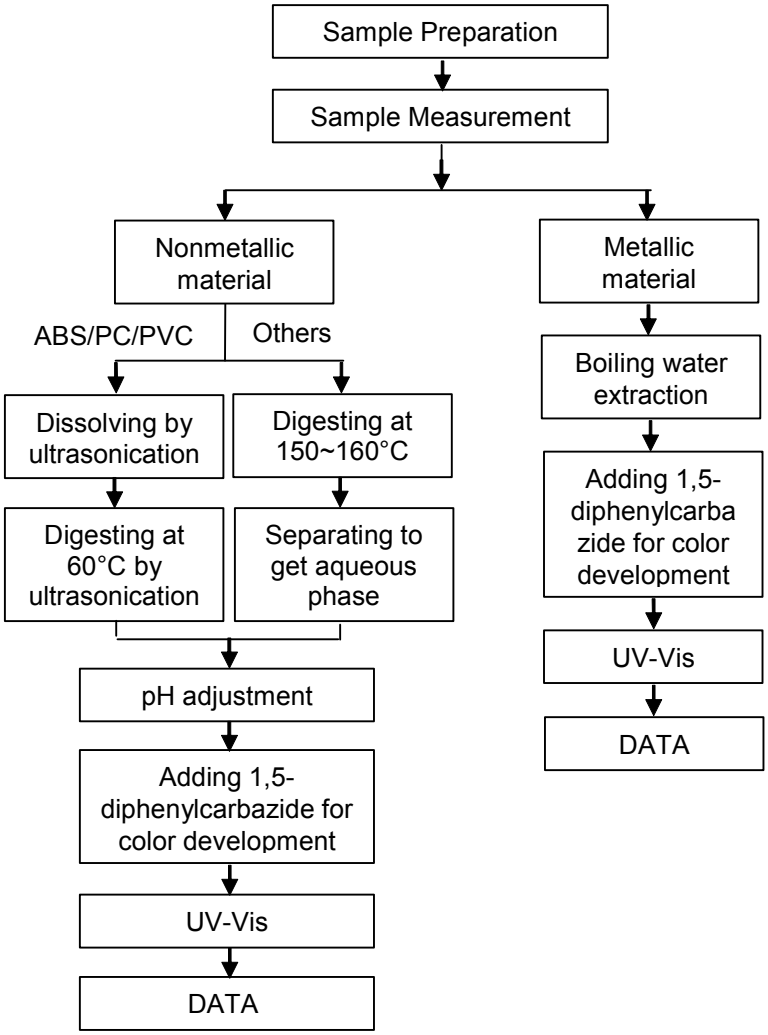
Hexavalent Chromium (Cr(VI)) Testing Flow Chart



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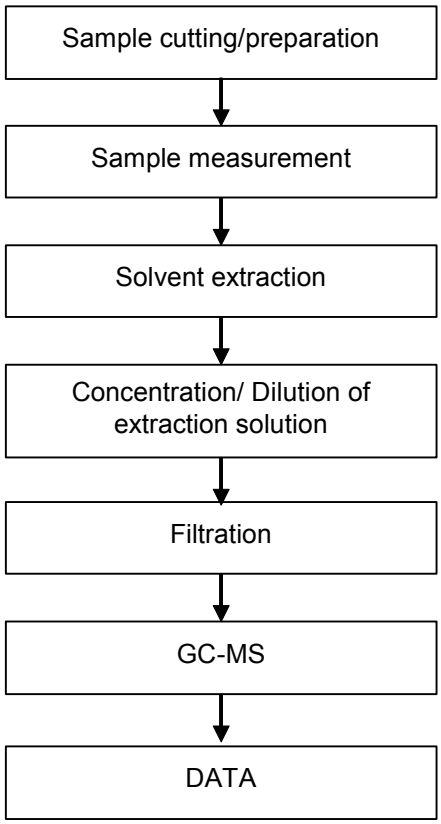
PBBs/PBDEs Testing Flow Chart



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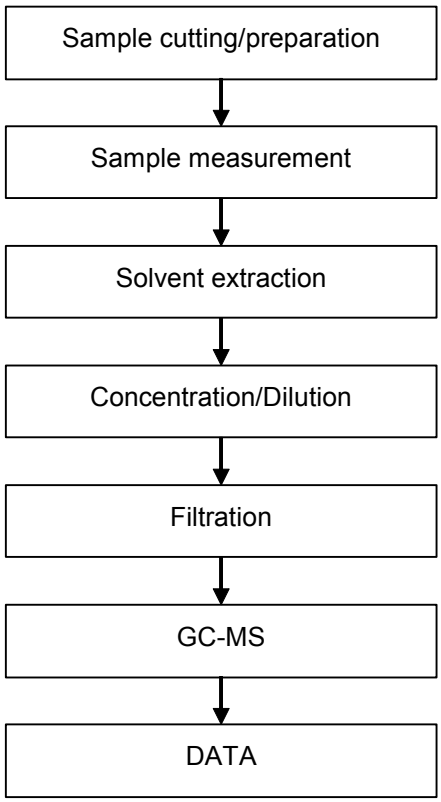
Phthalates Testing Flow Chart



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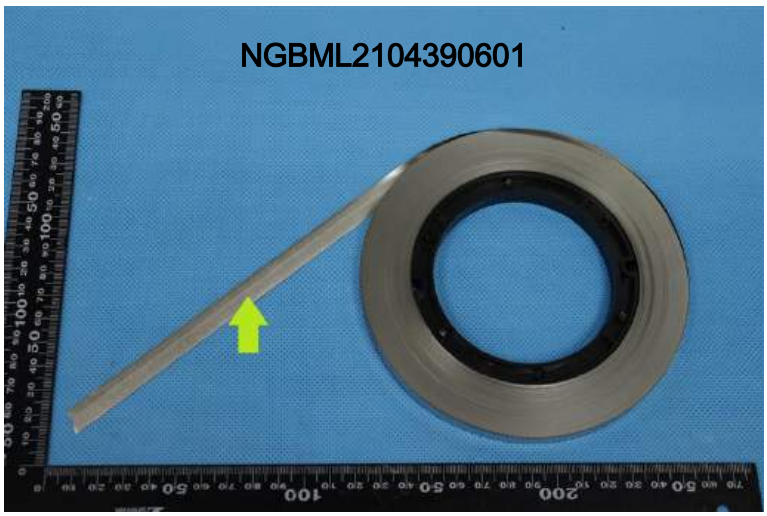
Sample photo:



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SGS authenticate the photo on original report only

*** End of Report ***

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Test Report (SVHC)

ZHEJIANG SPECIAL RIBBON TECHNOLOGY & MATERIALS CO.,LTD
CHANGXING DISTRICT,SOUTHERN,TAIHU, LNDUSTRIAL CLUSTER,HUZHOU,ZHEJIANG PROVINCE

The following sample(s) was/were submitted and identified on behalf of the clients as : NANO RIBBON

SGS Job No. :	NBIN2109010813PC - NB
Product Specification :	12mm
Material and Mark :	1K107B
Manufacturer :	ZHEJIANG SPECIAL RIBBON TECHNOLOGY & MATERIALS CO.,LTD
Reference No. :	NBIN2109010792ML
Date of Sample Received :	02 Sep 2021
Testing Period :	02 Sep 2021 - 08 Sep 2021
Test Requested :	As requested by client, SVHC screening is performed according to: (i) Two hundred and nineteen (219) substances in the Candidate List of Substances of Very High Concern (SVHC) for authorization published by European Chemicals Agency (ECHA) on and before Jul 8, 2021 regarding Regulation (EC) No 1907/2006 concerning the REACH. (ii) One (1) potential Substances of Very High Concern (SVHC) in the notification of WTO on Jun 1, 2021.
Test Results :	Please refer to next page(s).

Summary :

According to the specified scope and evaluation screening, the test results of SVHC are ≤ 0.1% (w/w) in the submitted sample.	PASS

Signed for and on behalf of
SGS-CSTC Standards Technical Services Co., Ltd. Ningbo Branch

Pearson Zhou
Approved Signatory

scan to see the report
NGBML2104391001

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Remark :

1. The chemical analysis of specified SVHC is performed by means of currently available analytical techniques against the following SVHC related documents published by ECHA: http://echa.europa.eu/web/guest/candidate-list-table
   These lists are under evaluation by ECHA and may subject to change in the future.
2. REACH obligation:
   2.1 Concerning article(s):
   Communication:
   Article 33 of Regulation (EC) No 1907/2006 requires supplier of an article containing a substance meeting the criteria in Article 57 and identified in accordance with Article 59(1) in a concentration above 0.1% weight by weight (w/w) shall provide the recipient of the article with sufficient information, available to the supplier, to allow safe use of the article including, as a minimum, the name of that substance in the Candidate List.

   Notification:
   In accordance with Regulation (EC) No 1907/2006, any EU producer or importer of articles shall notify ECHA, in accordance with paragraph 4 of Article 7, if a substance meets the criteria in Article 57 and is identified in accordance with Article 59(1) of the Regulation, if (a) the substance in the Candidate List is present in those articles in quantities totaling over one tonne per producer or importer per year; and (b) the substance in the Candidate List is present in those articles above a concentration of 0.1% weight by weight (w/w).

   SGS adopts the ruling of the Court of Justice of the European Union on the definition of an article under REACH unless indicated otherwise. Detail explanation is available at the following link:
   http://www.sgs.com/-/media/global/documents/technical-documents/technical-bulletins/sgs-crs-position-statement-on-svhc-in-articles-a4-en-16-06.pdf?la=en

   2.2 Concerning material(s):
   Test results in this report are based on the tested sample. This report refers to testing result of tested sample submitted as homogenous material(s). In case such material is being used to compose an article, the results indicated in this report may not represent SVHC concentration in such article. If this report refers to testing result of composite material group by equal weight proportion, the material in each composite test group may come from more than one article.

   If the sample is a substance or mixture, and it directly exports to EU, client has the obligation to comply with the supply chain communication obligation under Article 31 of Regulation (EC) No. 1907/2006 and the conditions of Authorization of substance of very high concern included in the Annex XIV of the Regulation (EC) No. 1907/2006.

   2.3 Concerning substance and preparation:
   If a SVHC is found over 0.1% (w/w) and/or the specific concentration limit which is set in Regulation (EC) No 1272/2008 and its amendments, client is suggested to prepare a Safety

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Data Sheet (SDS) against the SVHC to comply with the supply chain communication obligation under Regulation (EC) No 1907/2006, in which:
- a substance that is classified as hazardous under the CLP Regulation (EC) No 1272/2008.
- a mixture that is classified as hazardous under the CLP Regulation (EC) No 1272/2008, when it contains a substance with concentration equal to, or greater than the classification limit as set in Regulation (EC) No. 1272/2008; or
- a mixture is not classified as hazardous under the CLP Regulation (EC) No 1272/2008, but contains either:
(a) a substance posing human health or environmental hazards in an individual concentration of ≥ 1 % by weight for mixtures that are solid or liquids (i.e., non-gaseous mixtures) or ≥ 0.2 % by volume for gaseous mixtures; or
(b) a substance that is PBT, or vPvB in an individual concentration of ≥ 0.1 % by weight for mixtures that are solid or liquids (i.e., non-gaseous mixtures); or
(c) a substance on the SVHC candidate list (for reasons other than those listed above), in an individual concentration of ≥ 0.1 % by weight for non-gaseous mixtures; or
(d) a substance for which there are Europe-wide workplace exposure limits.

3. If a SVHC is found over the reporting limit, client is suggested to identify the component which contains the SVHC and the exact concentration of the SVHC by requesting further quantitative analysis from the laboratory.

Test Sample :

Sample Description :

Specimen No.	SGS Sample ID	Description
SN1	NGB21-043910.001	SILVERY-GREY SOFT SOLID RIBBON PART

Test Method :

SGS In-House method-NBCHEM-TOP-138, NBCHEM-TOP-124. Analyzed by ICP-OES, UV-VIS, GC-MS, HPLC-DAD/MS and Colorimetric Method.

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(SVHC)

Test Result: (Substances in the Candidate List of SVHC)

Batch	Substance Name	CAS No.	001 Concentration (%)	RL (%)
III	Boric acid*	-	0.039	0.005
III	Disodium tetraborate, anhydrous*	1303-96-4, 1330-43-4, 12179-04-3	0.032	0.005
III	Tetraboron disodium heptaoxide, hydrate*	12267-73-1	0.032	0.005
VII	Diboron trioxide*	1303-86-2	0.022	0.005
XIX	Disodium octaborate*	12008-41-2	0.027	0.005
XXV	Orthoboric acid, sodium salt*	13840-56-7	0.080	0.005
-	Other tested SVHC in candidate list	-	ND	-

Test Result: (Potential SVHC)

Batch	Substance Name	CAS No.	001 Concentration (%)	RL (%)
-	All tested Potential SVHC	-	ND	-

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Notes :

(1)The table above only shows detected SVHC, and SVHC that below RL are not reported. Please refer to Appendix for the full list of tested SVHC.

(2) RL = Reporting Limit (Test data will be shown if it ≥ RL. RL is not regulatory limit.)
ND = Not detected (lower than RL), ND is denoted on the SVHC substance.

(3) * The test result is based on the calculation of selected element(s) and to the worst-case scenario.
** The test result is based on the calculation of selected marker(s) and to the worst-case scenario.
For detail information, please refer to the SGS REACH website:
http://www.sgs.com/en/Consumer-Goods-Retail/Toys-and-Juvenile-Products/Toys/REACH/Management-of-SVHC.aspx
Calculated concentration of boric compounds are based on the total boron for liquid, powder and paste samples and water extractive boron for other samples by ICP-OES.
RL = 0.005% is evaluated for element (i.e. cobalt, arsenic, lead, chromium (VI), aluminum, zirconium, boron, strontium, zinc, antimony, titanium, barium and cadmium respectively), except molybdenum RL=0.0005%, boron RL=0.0025% (only for Lead bis(tetrafluoroborate)).

(4) § The substance is proposed for the identification as SVHC only where it contains Michler's ketone (CAS Number: 90-94-8) or Michler's base (CAS Number: 101-61-1) ≥0.1% (w/w).

(5) / = Potential SVHC

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(SVHC)

Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
I	1	4,4' -Diaminodiphenylmethane(MDA)	101-77-9	0.050
I	2	5-tert-butyl-2,4,6-trinitro-m-xylene (musk xylene)	81-15-2	0.050
I	3	Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins)	85535-84-8	0.050
I	4	Anthracene	120-12-7	0.050
I	5	Benzyl butyl phthalate (BBP)	85-68-7	0.050
I	6	Bis (2-ethylhexyl)phthalate (DEHP)	117-81-7	0.050
I	7	Bis(tributyltin)oxide (TBTO)	56-35-9	0.050
I	8	Cobalt dichloride*	7646-79-9	0.005
I	9	Diarsenic pentaoxide*	1303-28-2	0.005
I	10	Diarsenic trioxide*	1327-53-3	0.005
I	11	Dibutyl phthalate (DBP)	84-74-2	0.050
I	12	Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α-HBCDD, β-HBCDD, γ-HBCDD)	-	0.050
I	13	Lead hydrogen arsenate*	7784-40-9	0.005
I	14	Sodium dichromate*	7789-12-0, 10588-01-9	0.005
I	15	Triethyl arsenate*	15606-95-8	0.005
II	16	2,4-Dinitrotoluene	121-14-2	0.050
II	17	Acrylamide	79-06-1	0.050
II	18	Anthracene oil**	90640-80-5	0.050
II	19	Anthracene oil, anthracene paste**	90640-81-6	0.050
II	20	Anthracene oil, anthracene paste, anthracene fraction**	91995-15-2	0.050

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(SVHC)

Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
II	21	Anthracene oil, anthracene paste, distn. lights**	91995-17-4	0.050
II	22	Anthracene oil, anthracene-low**	90640-82-7	0.050
II	23	Diisobutyl phthalate	84-69-5	0.050
II	24	Lead chromate molybdate sulphate red (C.I. Pigment Red 104)*	12656-85-8	0.005
II	25	Lead chromate*	7758-97-6	0.005
II	26	Lead sulfochromate yellow (C.I. Pigment Yellow 34)*	1344-37-2	0.005
II	27	Pitch, coal tar, high temp.**	65996-93-2	0.050
II	28	Tris(2-chloroethyl)phosphate	115-96-8	0.050
III	29	Ammonium dichromate*	7789-09-5	0.005
III	30	Boric acid*	-	0.005
III	31	Disodium tetraborate, anhydrous*	1303-96-4, 1330-43-4, 12179-04-3	0.005
III	32	Potassium chromate*	7789-00-6	0.005
III	33	Potassium dichromate*	7778-50-9	0.005
III	34	Sodium chromate*	7775-11-3	0.005
III	35	Tetraboron disodium heptaoxide, hydrate*	12267-73-1	0.005
III	36	Trichloroethylene	79-01-6	0.050
IV	37	2-Ethoxyethanol	110-80-5	0.050
IV	38	2-Methoxyethanol	109-86-4	0.050
IV	39	Chromic acid, Oligomers of chromic acid and dichromic acid, Dichromic acid*	-	0.005

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
IV	40	Chromium trioxide*	1333-82-0	0.005
IV	41	Cobalt(II) carbonate*	513-79-1	0.005
IV	42	Cobalt(II) diacetate*	71-48-7	0.005
IV	43	Cobalt(II) dinitrate*	10141-05-6	0.005
IV	44	Cobalt(II) sulphate*	10124-43-3	0.005
V	45	1,2,3-trichloropropane	96-18-4	0.050
V	46	1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich	71888-89-6	0.050
V	47	1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters	68515-42-4	0.050
V	48	1-methyl-2-pyrrolidone	872-50-4	0.050
V	49	2-ethoxyethyl acetate	111-15-9	0.050
V	50	Hydrazine	7803-57-8, 302-01-2	0.050
V	51	Strontium chromate*	7789-06-2	0.005
VI	52	1,2-Dichloroethane	107-06-2	0.050
VI	53	2,2'-dichloro-4,4'-methylenedianiline	101-14-4	0.050
VI	54	2-Methoxyaniline; o-Anisidine	90-04-0	0.050
VI	55	4-(1,1,3,3-tetramethylbutyl)phenol	140-66-9	0.050
VI	56	Aluminosilicate Refractory Ceramic Fibres *	-	0.005
VI	57	Arsenic acid*	7778-39-4	0.005
VI	58	Bis(2-methoxyethyl) ether	111-96-6	0.050
VI	59	Bis(2-methoxyethyl) phthalate	117-82-8	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VI	60	Calcium arsenate*	7778-44-1	0.005
VI	61	Dichromium tris(chromate) *	24613-89-6	0.005
VI	62	Formaldehyde, oligomeric reaction products with aniline	25214-70-4	0.050
VI	63	Lead diazide, Lead azide*	13424-46-9	0.005
VI	64	Lead dipicrate*	6477-64-1	0.005
VI	65	Lead styphnate*	15245-44-0	0.005
VI	66	N,N-dimethylacetamide	127-19-5	0.050
VI	67	Pentazinc chromate octahydroxide*	49663-84-5	0.005
VI	68	Phenolphthalein	77-09-8	0.050
VI	69	Potassium hydroxyoctaoxodizincatedichromate*	11103-86-9	0.005
VI	70	Trilead diarsenate*	3687-31-8	0.005
VI	71	Zirconia Aluminosilicate Refractory Ceramic Fibres*	-	0.005
VII	72	[4-[[4-anilino-1-naphthyl][4-(dimethylamino)phenyl]methylene]cyclohexa-2,5-dien-1-ylidene] dimethylammonium chloride (C.I. Basic Blue 26)§	2580-56-5	0.050
VII	73	[4-[4,4'-bis(dimethylamino) benzhydrylidene]cyclohexa-2,5-dien-1-ylidene]dimethylammonium chloride (C.I. Basic Violet 3)§	548-62-9	0.050
VII	74	1,2-bis(2-methoxyethoxy)ethane (TEGDME; triglyme)	112-49-2	0.050
VII	75	1,2-dimethoxyethane; ethylene glycol dimethyl ether (EGDME)	110-71-4	0.050
VII	76	4,4'-bis(dimethylamino) benzophenone (Michler's Ketone)	90-94-8	0.050
VII	77	4,4'-bis(dimethylamino)-4''-(methylamino)trityl alcohol§	561-41-1	0.050
VII	78	Diboron trioxide*	1303-86-2	0.005

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VII	79	Formamide	75-12-7	0.050
VII	80	Lead(II) bis(methanesulfonate)*	17570-76-2	0.005
VII	81	N,N,N',N'-tetramethyl-4,4'-methylenedianiline (Michler's base)	101-61-1	0.050
VII	82	TGIC (1,3,5-tris(oxiranylmethyl)-1,3,5-triazine-2,4,6(1H,3H,5H)-trione)	2451-62-9	0.050
VII	83	α,α-Bis[4-(dimethylamino)phenyl]-4 (phenylamino)naphthalene-1-methanol (C.I. Solvent Blue 4) §	6786-83-0	0.050
VII	84	β-TGIC (1,3,5-tris[(2S and 2R)-2,3-epoxypropyl]-1,3,5-triazine-2,4,6-(1H,3H,5H)-trione)	59653-74-6	0.050
VIII	85	[Phthalato(2-)]dioxotrilead*	69011-06-9	0.005
VIII	86	1,2-Benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0	0.050
VIII	87	1,2-Diethoxyethane	629-14-1	0.050
VIII	88	1-Bromopropane	106-94-5	0.050
VIII	89	3-Ethyl-2-methyl-2-(3-methylbutyl)-1,3-oxazolidine	143860-04-2	0.050
VIII	90	4-(1,1,3,3-tetramethylbutyl)phenol, ethoxylated	-	0.050
VIII	91	4,4'-Methylenedi-o-toluidine	838-88-0	0.050
VIII	92	4,4'-Oxydianiline and its salts	101-80-4	0.050
VIII	93	4-Aminoazobenzene	60-09-3	0.050
VIII	94	4-Methyl-m-phenylenediamine	95-80-7	0.050
VIII	95	4-Nonylphenol, branched and linear	-	0.050
VIII	96	6-Methoxy-m-toluidine	120-71-8	0.050
VIII	97	Acetic acid, lead salt, basic*	51404-69-4	0.005

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VIII	98	Biphenyl-4-ylamine	92-67-1	0.050
VIII	99	Bis(pentabromophenyl) ether (DecaBDE)	1163-19-5	0.050
VIII	100	Cyclohexane-1,2-dicarboxylic anhydride, cis-cyclohexane-1,2-dicarboxylic anhydride, trans-cyclohexane-1,2-dicarboxylic anhydride	-	0.050
VIII	101	Diazene-1,2-dicarboxamide (C,C'-azodi(formamide))	123-77-3	0.050
VIII	102	Dibutyltin dichloride (DBTC)	683-18-1	0.050
VIII	103	Diethyl sulphate	64-67-5	0.050
VIII	104	Diisopentylphthalate	605-50-5	0.050
VIII	105	Dimethyl sulphate	77-78-1	0.050
VIII	106	Dinoseb	88-85-7	0.050
VIII	107	Dioxobis(stearato)trilead*	12578-12-0	0.005
VIII	108	Fatty acids, C16-18, lead salts*	91031-62-8	0.005
VIII	109	Furan	110-00-9	0.050
VIII	110	Henicosafluoroundecanoic acid	2058-94-8	0.050
VIII	111	Heptacosafluorotetradecanoic acid	376-06-7	0.050
VIII	112	Hexahydromethylphathalic anhydride, Hexahydro-4-methylphathalic anhydride, Hexahydro-1-methylphathalic anhydride, Hexahydro-3-methylphathalic anhydride	-	0.050
VIII	113	Lead bis(tetrafluoroborate)*	13814-96-5	0.005
VIII	114	Lead cyanamidate*	20837-86-9	0.005
VIII	115	Lead dinitrate*	10099-74-8	0.005
VIII	116	Lead monoxide*	1317-36-8	0.005

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VIII	117	Lead oxide sulfate*	12036-76-9	0.005
VIII	118	Lead tetroxide (orange lead)*	1314-41-6	0.005
VIII	119	Lead titanium trioxide*	12060-00-3	0.005
VIII	120	Lead titanium zirconium oxide*	12626-81-2	0.005
VIII	121	Methoxyacetic acid	625-45-6	0.050
VIII	122	Methyloxirane (Propylene oxide)	75-56-9	0.050
VIII	123	N,N-dimethylformamide	68-12-2	0.050
VIII	124	N-Methylacetamide	79-16-3	0.050
VIII	125	N-Pentyl-isopentylphthalate	776297-69-9	0.050
VIII	126	o-Aminoazotoluene	97-56-3	0.050
VIII	127	o-Toluidine	95-53-4	0.050
VIII	128	Pentacosafluorotridecanoic acid	72629-94-8	0.050
VIII	129	Pentalead tetraoxide sulphate*	12065-90-6	0.005
VIII	130	Pyrochlore, antimony lead yellow*	8012-00-8	0.005
VIII	131	Silicic acid, barium salt, lead-doped*	68784-75-8	0.005
VIII	132	Silicic acid, lead salt*	11120-22-2	0.005
VIII	133	Sulfurous acid, lead salt, dibasic*	62229-08-7	0.005
VIII	134	Tetraethyllead*	78-00-2	0.005
VIII	135	Tetralead trioxide sulphate*	12202-17-4	0.005
VIII	136	Tricosafluorododecanoic acid	307-55-1	0.050
VIII	137	Trilead bis(carbonate)dihydroxide (basic lead carbonate)*	1319-46-6	0.005

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VIII	138	Trilead dioxide phosphonate*	12141-20-7	0.005
IX	139	4-Nonylphenol, branched and linear, ethoxylated	-	0.050
IX	140	Ammonium pentadecafluorooctanoate (APFO)**	3825-26-1	0.050
IX	141	Cadmium oxide*	1306-19-0	0.005
IX	142	Cadmium*	7440-43-9	0.005
IX	143	Dipentyl phthalate (DPP)	131-18-0	0.050
IX	144	Pentadecafluorooctanoic acid (PFOA)	335-67-1	0.050
X	145	Cadmium sulphide*	1306-23-6	0.005
X	146	Dihexyl phthalate	84-75-3	0.050
X	147	Disodium 3,3'-[[1,1'-biphenyl]-4,4'-diylbis(azo)]bis(4-aminonaphthalene-1-sulphonate) (C.I. Direct Red 28)	573-58-0	0.050
X	148	Disodium 4-amino-3-[[4'-[(2,4-diaminophenyl)azo][1,1'-biphenyl]-4-yl]azo] -5-hydroxy-6-(phenylazo)naphthalene-2,7-disulphonate (C.I. Direct Black 38)	1937-37-7	0.050
X	149	Imidazolidine-2-thione; 2-imidazoline-2-thiol	96-45-7	0.050
X	150	Lead di(acetate)*	301-04-2	0.005
X	151	Trixylyl phosphate	25155-23-1	0.050
XI	152	1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4	0.050
XI	153	Cadmium chloride*	10108-64-2	0.005
XI	154	Sodium perborate; perboric acid, sodium salt*	-	0.005
XI	155	Sodium peroxometaborate*	7632-4-4	0.005

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XII	156	2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328)	25973-55-1	0.050
XII	157	2-benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320)	3846-71-7	0.050
XII	158	2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (DOTE)	15571-58-1	0.050
XII	159	Cadmium fluoride *	7790-79-6	0.005
XII	160	Cadmium sulphate *	10124-36-4/31119-53-6	0.005
XII	161	Reaction mass of 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate & 2-ethylhexyl 10-ethyl-4-[[2-[(2-ethylhexyl)oxy]-2-oxoethyl]thio]-4-octyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (reaction mass of DOTE & MOTE)	15571-58-1,27107-89-7	0.050
XIII	162	1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters; 1,2-benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters with ≥ 0.3% of dihexyl phthalate	-	0.050
XIII	163	5-sec-butyl-2-(2,4-dimethylcyclohex-3-en-1-yl)-5-methyl-1,3-dioxane [1], 5-sec-butyl-2-(4,6-dimethylcyclohex-3-en-1-yl)-5-methyl-1,3-dioxane [2] [covering any of the individual isomers of [1] and [2] or any combination thereof]	-	0.050
XIV	164	1,3-propanesultone	1120-71-4	0.050
XIV	165	2,4-di-tert-butyl-6-(5-chlorobenzotriazol-2-yl) phenol (UV-327)	3864-99-1	0.050
XIV	166	2-(2H-benzotriazol-2-yl)-4-(tert-butyl)-6-(sec-butyl) phenol (UV-350)	36437-37-3	0.050
XIV	167	Nitrobenzene	98-95-3	0.050
XIV	168	Perfluorononan-1-oic-acid and its sodium and ammonium salts	-	0.050
XV	169	Benzo[def]chrysene (Benzo[a]pyrene)	50-32-8	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XVI	170	4,4'-isopropylidenediphenol (bisphenol A)	80-05-7	0.050
XVI	171	4-Heptylphenol, branched and linear	-	0.050
XVI	172	Nonadecafluorodecanoic acid (PFDA) and its sodium and ammonium salts	-	0.050
XVI	173	p-(1,1-dimethylpropyl)phenol	80-46-6	0.050
XVII	174	Perfluorohexane-1-sulphonic acid and its salts	-	0.050
XVIII	175	1,6,7,8,9,14,15,16,17,17,18,18-Dodecachloropentacyclo[12.2.1.16,9.02,13.05,10]octadeca-7,15-diene ("Dechlorane Plus"™) [covering any of its individual anti- and syn-isomers or any combination thereof]	-	0.050
XVIII	176	Benz[a]anthracene	56-55-3	0.050
XVIII	177	Cadmium nitrate*	10325-94-7	0.005
XVIII	178	Cadmium carbonate*	513-78-0	0.005
XVIII	179	Cadmium hydroxide*	21041-95-2	0.005
XVIII	180	Chrysene	218-01-9	0.050
XVIII	181	Reaction products of 1,3,4-thiadiazolidine-2,5-dithione, formaldehyde and 4-heptylphenol, branched and linear (RP-HP) [with ≥0.1% w/w 4-heptylphenol, branched and linear]	-	0.050
XIX	182	Benzene-1,2,4-tricarboxylic acid 1,2-anhydride (trimellitic anhydride)	552-30-7	0.050
XIX	183	Benzo[ghi]perylene	191-24-2	0.050
XIX	184	Decamethylcyclopentasiloxane (D5)	541-02-6	0.050
XIX	185	Dicyclohexyl phthalate (DCHP)	84-61-7	0.050
XIX	186	Disodium octaborate*	12008-41-2	0.005
XIX	187	Dodecamethylcyclohexasiloxane (D6)	540-97-6	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XIX	188	Ethylenediamine(EDA)	107-15-3	0.050
XIX	189	Lead*	7439-92-1	0.005
XIX	190	Octamethylcyclotetrasiloxane (D4)	556-67-2	0.050
XIX	191	Terphenyl, hydrogenated	61788-32-7	0.050
XX	192	1,7,7-trimethyl-3-(phenylmethylene)bicyclo[2.2.1]heptan-2-one (3-benzylidene camphor)	15087-24-8	0.050
XX	193	2,2-bis(4'-hydroxyphenyl)-4-methylpentane	6807-17-6	0.050
XX	194	Benzo[k]fluoranthene	207-08-9	0.050
XX	195	Fluoranthene	206-44-0	0.050
XX	196	Phenanthrene	85-01-8	0.050
XX	197	Pyrene	129-00-0	0.050
XXI	198	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propionic acid, its salts and its acyl halides (covering any of their individual isomers and combinations thereof)	-	0.050
XXI	199	2-methoxyethyl acetate	110-49-6	0.050
XXI	200	4-tert-butylphenol	98-54-4	0.050
XXI	201	Tris(4-nonylphenyl, branched and linear) phosphite (TNPP) with ≥ 0.1% w/w of 4-nonylphenol, branched and linear (4-NP)	-	0.050
XXII	202	2-benzyl-2-dimethylamino-4'-morpholinobutyrophenone	119313-12-1	0.050
XXII	203	2-methyl-1-(4-methylthiophenyl)-2-morpholinopropan-1-one	71868-10-5	0.050
XXII	204	Diisohexyl phthalate	71850-09-4	0.050
XXII	205	Perfluorobutane sulfonic acid (PFBS) and its salts	-	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XXIII	206	1-vinylimidazole	1072-63-5	0.050
XXIII	207	2-methylimidazole	693-98-1	0.050
XXIII	208	Butyl 4-hydroxybenzoate	94-26-8	0.050
XXIII	209	Dibutylbis(pentane-2,4-dionato-O,O')tin**	22673-19-4	0.050
XXIV	210	bis(2-(2-methoxyethoxy)ethyl) ether	143-24-8	0.050
XXIV	211	Dioctyltin dilaurate, stannane, dioctyl-, bis(coco acyloxy) derivs., and any other stannane, dioctyl-, bis(fatty acyloxy) derivs. wherein C12 is the predominant carbon number of the fatty acyloxy moiety**	-	0.050
XXV	212	1,4-dioxane	123-91-1	0.050
XXV	213	2,2-bis(bromomethyl)propane1,3-diol (BMP) 2,2-dimethylpropan-1-ol, tribromo derivative/3-bromo-2,2-bis(bromomethyl)-1-propanol (TBNPA) 2,3-dibromo-1-propanol (2,3-DBPA)		0.050
XXV	214	2-(4-tert-butylbenzyl)propionaldehyde and its individual stereoisomers	-	0.050
XXV	215	4,4'-(1-methylpropylidene)bisphenol (bisphenol B)	77-40-7	0.050
XXV	216	Glutaral	111-30-8	0.050
XXV	217	Medium-chain chlorinated paraffins (MCCP) [UVCB substances consisting of more than or equal to 80% linear chloroalkanes with carbon chain lengths within the range from C14 to C17]	-	0.050
XXV	218	Orthoboric acid, sodium salt*	13840-56-7	0.005
XXV	219	Phenol, alkylation products (mainly in para position) with C12-rich branched alkyl chains from oligomerisation, covering any individual isomers and/ or combinations thereof (PDDP)	-	0.050
/	220	Resorcinol	108-46-3	0.050

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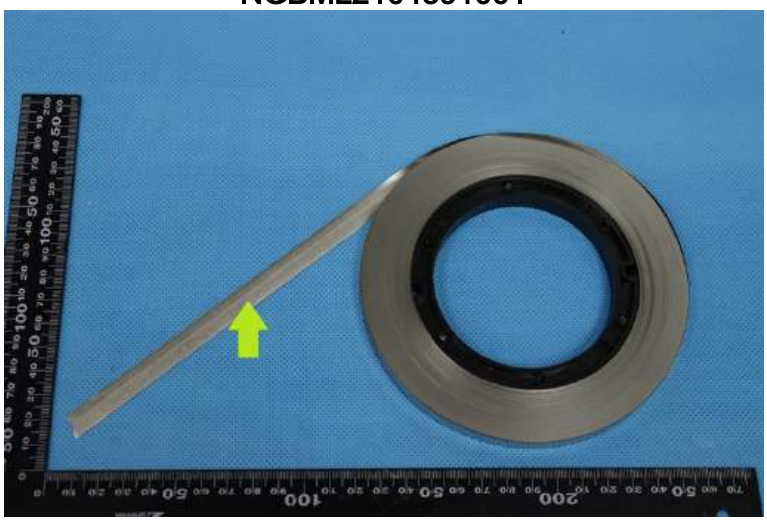
Sample photo:

NGBML2104391001



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测试报告

No. NGBML2104390602　　日期: 2021年09月08日　　第1页,共8页

浙江全瑞本科技股份有限公司
浙江省湖州南太湖产业集聚区长兴分区

以下测试之样品是由申请者所提供及确认：纳米晶带材

SGS工作编号：	NBIN2109010813PC - NB
产品规格：	12mm
材质牌号：	1K107B
制造商：	浙江全瑞本科技股份有限公司
参考编号：	NBIN2109010792ML
样品接收日期：	2021年09月02日
测试周期：	2021年09月02日 - 2021年09月08日
测试要求：	根据客户要求测试
测试方法：	请参见下一页
测试结果：	请参见下一页
结论：	基于所送样品的指定部位进行的测试，镉、铅、汞、六价铬、多溴联苯(PBBs)、多溴二苯醚(PBDEs)、邻苯二甲酸酯（如邻苯二甲酸二丁酯 (DBP)、邻苯二甲酸丁苄酯(BBP)、邻苯二甲酸二(2-乙基己基)酯(DEHP)和邻苯二甲酸二异丁酯(DIBP)）的测试结果符合欧盟RoHS指令2011/65/EU附录II的修正指令(EU) 2015/863的限值要求。

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测试结果：

测试样品描述：

样品编号	SGS样品ID	描述
SN1	NGB21-043906.001	银灰色软固体带部分

备注：

(1) 1 mg/kg = 0.0001%
(2) MDL = 方法检测限
(3) ND = 未检出 (< MDL)
(4) "-" = 未规定

RoHS 指令2011/65/EU附录II的修正指令(EU) 2015/863

测试方法： 参考IEC 62321-4:2013+AMD1:2017, IEC 62321-5:2013, IEC 62321-7-2:2017, IEC 62321-6:2015和IEC 62321-8:2017, 采用ICP-OES,UV-Vis和GC-MS进行分析.

测试项目	限值	单位	MDL	*001*
镉(Cd)	100	mg/kg	2	ND
铅(Pb)	1000	mg/kg	2	ND
汞(Hg)	1000	mg/kg	2	ND
六价铬 (Cr(VI))	1000	mg/kg	8	ND
多溴联苯(PBBs)之和	1000	mg/kg	-	ND
一溴联苯	-	mg/kg	5	ND
二溴联苯	-	mg/kg	5	ND
三溴联苯	-	mg/kg	5	ND
四溴联苯	-	mg/kg	5	ND
五溴联苯	-	mg/kg	5	ND
六溴联苯	-	mg/kg	5	ND
七溴联苯	-	mg/kg	5	ND
八溴联苯	-	mg/kg	5	ND
九溴联苯	-	mg/kg	5	ND
十溴联苯	-	mg/kg	5	ND
多溴二苯醚之和(PBDEs)	1000	mg/kg	-	ND
一溴二苯醚	-	mg/kg	5	ND
二溴二苯醚	-	mg/kg	5	ND
三溴二苯醚	-	mg/kg	5	ND
四溴二苯醚	-	mg/kg	5	ND
五溴二苯醚	-	mg/kg	5	ND
六溴二苯醚	-	mg/kg	5	ND

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测试项目	限值	单位	MDL	001
七溴二苯醚	-	mg/kg	5	ND
八溴二苯醚	-	mg/kg	5	ND
九溴二苯醚	-	mg/kg	5	ND
十溴二苯醚	-	mg/kg	5	ND
邻苯二甲酸二丁酯 (DBP)	1000	mg/kg	50	ND
邻苯二甲酸丁苄酯(BBP)	1000	mg/kg	50	ND
邻苯二甲酸二(2-乙基己基)酯(DEHP)	1000	mg/kg	50	ND
邻苯二甲酸二异丁酯(DIBP)	1000	mg/kg	50	ND

备注：

(1) 最大允许极限值引用自RoHS指令(EU) 2015/863。

(2) IEC 62321系列等同于 EN 62321系列 https://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101::::FSP_ORG_ID,FSP_LANG_ID:1258637,25。

(3) 2021年7月22号开始，DEHP, BBP, DBP 和 DIBP的限制适用于医疗器械，包括体外医疗器械，监控仪表，包括工业监测和控制仪器。

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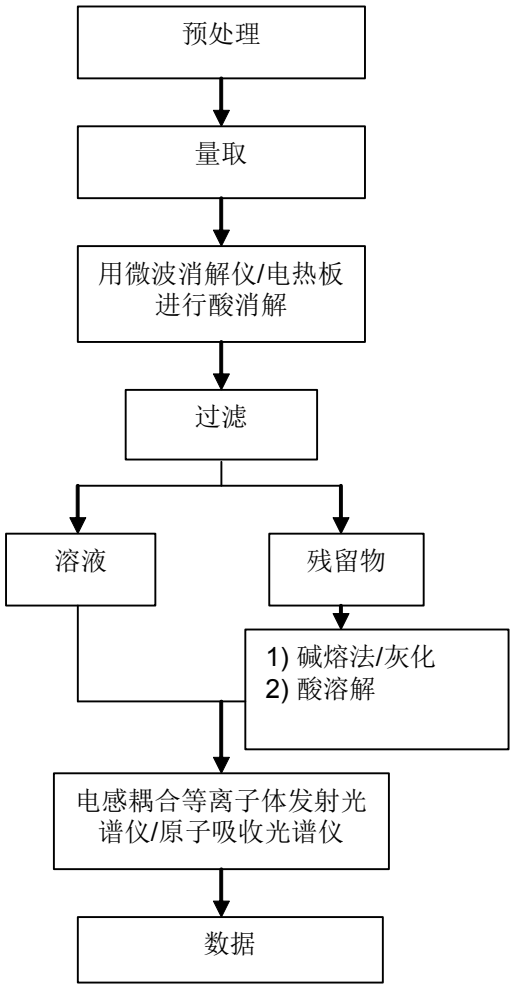
元素(IEC62321) 测试流程图

1)样品按照下述流程被完全消解



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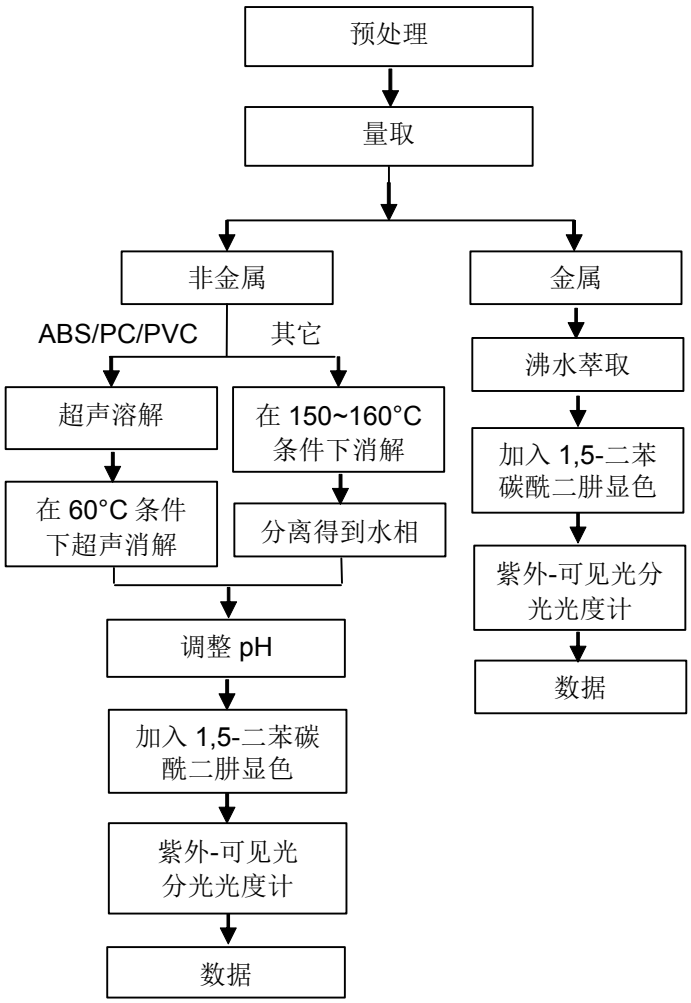
六价铬测试流程图



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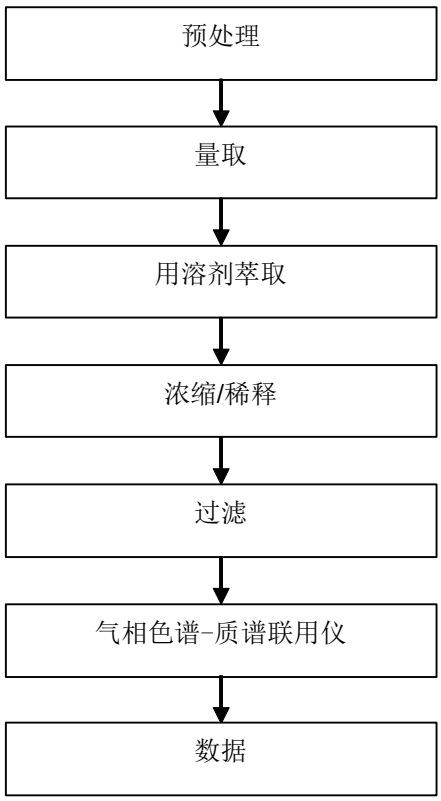
PBBs/PBDEs 测试流程图



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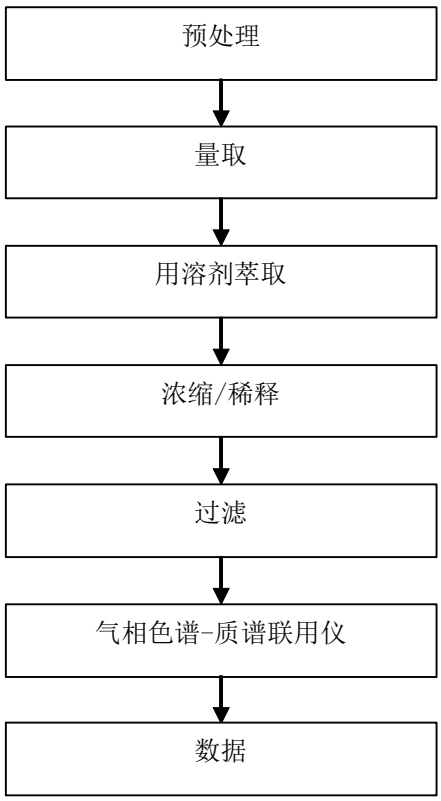
附件

Phthalates 测试流程图



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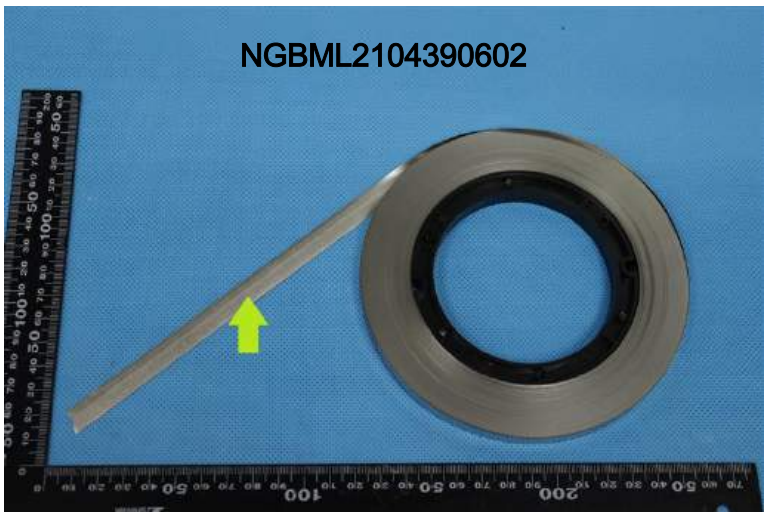
样品照片:



NGB21-043906.001

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测试报告 (SVHC)

No. NGBML2104391002　　日期: 2021年09月08日　　第1页,共17页

浙江全瑞本科技股份有限公司
浙江省湖州南太湖产业集聚区长兴分区

以下测试之样品是由申请者所提供及确认：纳米晶带材

SGS工作编号：	NBIN2109010813PC - NB
产品规格：	12mm
材质牌号：	1K107B
制造商：	浙江全瑞本科技股份有限公司
参考编号：	NBIN2109010792ML
样品接收日期：	2021年09月02日
测试周期：	2021年09月02日 - 2021年09月08日
测试要求：	根据客户要求， (i) 基于欧洲化学品管理署截止2021年7月8日公布的供授权审议的高关注物质候选清单(根据欧盟第1907/2006号REACH法规)，对219种高关注物质(SVHC)进行筛分测试。 (ii) 基于WTO 2021年6月1日的通知，对1种潜在的高关注物质(SVHC)进行筛分测试。
测试结果：	请参见下一页

总结：

根据具体的范围和筛分测试，所提交样品中SVHC测试结果≤ 0.1% (w/w)。	通过

通标标准技术服务有限公司宁波分公司
授权签名

Pearson Zhou周平勇
批准签署人

扫码查看在线报告
NGBML2104391002

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备注：

1. 本报告所涉及的关于特定高关注物质的化学分析是根据欧洲化学品管理署发布的下列文件，利用现有的分析技术完成的。
   http://echa.europa.eu/web/guest/candidate-list-table
   这些文件清单由欧洲化学品管理署评估, 将来可能会有变化。
2. REACH法规义务：
   2.1关于物品：
   告知：
   欧盟第1907/2006（EC）号法规第33条规定，含有满足第57条中的标准并根据第59条第一款被确定且质量分数大于0.1%的物质的物品的所有供应商应向物品接受者提供其可获取的充足信息，以使物品使用安全，这些信息至少包括含有的候选清单中物质的名称。

   通报：
   根据欧盟第1907/2006（EC）号法规，如果满足以下两个条件，如果物质符合第57条中的标准并根据第59条第一款被确定，物品的任何欧洲制造商或进口商应根据第7条第4款向欧盟化学品管理署进行通报：(a) 候选清单中的物质在物品中的总含量超过1吨/年/生产商或进口商；(b) 候选清单中的物质在物品中的总含量以质量分数计超过0.1% 的浓度。

   SGS采用欧盟法院对REACH物品定义的裁定，除非另有说明。详细的解释请见下列网址：
   http://www.sgs.com/-/media/global/documents/technical-documents/technical-bulletins/sgs-crs-position-statement-on-svhc-in-articles-a4-en-16-06.pdf?la=en

   2.2 关于材料：
   报告中的测试结果是基于测试样品。如样品是均一材质，当其构成成品时，此结果不能代表成品中的SVHC浓度。如样品为均一材质等比例合测，这些材质也可能来自不同的物品。

   如果样品是一种物质或混合物，并且直接出口到欧盟，客户有责任遵守欧盟第1907/2006号REACH法规第31 条供应链信息传递的义务和附件十四中的授权高关注物质授权的责任。

   2.3 关于物质和配制品：
   如果样品中高关注物质的浓度超过0.1% (w/w)和/或欧盟第1272/2008号CLP法规及其修订中设定的特殊浓度限值，建议客户根据欧盟第1907/2006号REACH法规对有关高关注物质准备安全数据表(SDS)以符合供应链通信的义务，如
   -根据欧盟第1272/2008号CLP法规被列为有害物质。
   -根据欧盟第1272/2008号CLP法规被列为有害混合物，而当中物质的浓度大于或等于欧盟第1272/2008号CLP法规列出的浓度限值;或
   -根据欧盟第1272/2008号CLP法规并未列为有害混合物，但包含：
   (a) 对人类健康或环境有害的物质，而在固体或液体混合物（即非气体混合物）中其浓度≥1%(w/w)或在气体混合物中占体积≥0.2%，或
   (b) PBT或vPvB物质，在固体或液体混合物（即非气体混合物）中个别浓度≥0.1%(w/w)，或
   (c) 授权审议的高关注物质候选清单上的物质（除上述以外的原因）在个别非气体混合物中的浓度≥0.1%(w/w)，或

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(d) 设有欧洲范围内工作场所接触限值的物质。

3. 如果样品中SVHC的测试结果超过报告限，建议客户进一步定量分析检测含有SVHC的组分并且得到SVHC物质的准确浓度。

测试样品：

测试样品描述：

样品编号	SGS样品ID	描述
SN1	NGB21-043910.001	银灰色软固体带部分

测试方法：

SGS内部方法-NBCHEM-TOP-138, NBCHEM-TOP-124，采用ICP-OES、UV-VIS、GC-MS、HPLC-DAD/MS和比色法分析。

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测试结果: (SVHC候选清单中的高关注物质)

批次	物质名称	CAS No.	001 浓度 (%)	RL (%)
III	硼酸*	-	0.039	0.005
III	无水四硼酸钠*	1303-96-4, 1330-43-4, 12179-04-3	0.032	0.005
III	水合硼酸钠*	12267-73-1	0.032	0.005
VII	三氧化二硼*	1303-86-2	0.022	0.005
XIX	氧化硼钠*	12008-41-2	0.027	0.005
XXV	原硼酸钠盐*	13840-56-7	0.080	0.005
-	其余测试的候选清单中的SVHC	-	ND	-

测试结果：(潜在的SVHC)

批次	物质名称	CAS No.	001 浓度 (%)	RL (%)
-	所有测试的潜在的SVHC	-	ND	-

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注释：

(1) 上表仅显示检出的SVHC，低于RL的SVHC没有列出。所有测试的SVHC请参见附录。
(2) RL = 报告限（当测试结果 ≥ RL时显示数据。RL不同于法规限值。）
ND = 未检出(< RL)，ND针对SVHC物质。
(3) *测试结果是由选定的元素的结果并基于最坏的情况计算得出；
** 测试结果是由选定的标记物的结果并基于最坏的情况计算得出。详细信息请参见SGS REACH网站:
http://www.sgs.com/en/Consumer-Goods-Retail/Toys-and-Juvenile-Products/Toys/REACH/Management-of-SVHC.aspx
硼化合物的结果由ICP-OES测试的总硼（液体，粉末，膏体类样品）和水提取（其他样品）的硼元素结果换算得出。
RL = 0.005% 是针对元素 (例如钴、砷 、铅 、铬 (VI) 、铝、锆、硼、锶、锌、锑、钛、钡和镉)，除了钼的RL= 0.0005%，硼的RL= 0.0025%(仅对四氟硼酸铅)。
(4) § 只有当物质包含米氏酮(CAS No.: 90-94-8)或米氏碱(CAS No.: 101-61-1)的浓度≥ 0.1%(w / w)的情况下，该物质才被提议定为SVHC
(5) / = 潜在的SVHC
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检测报告仅用于客户科研、教学、内部质量控制、产品研发等目的，仅供内部参考。

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(SVHC)

附录

所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
I	1	4,4'-二氨基二苯甲烷(MDA)	101-77-9	0.050
I	2	2,4,6-三硝基-5-叔丁基间二甲苯(二甲苯麝香)	81-15-2	0.050
I	3	C10-13 氯代烃(短链氯化石蜡)	85535-84-8	0.050
I	4	蒽	120-12-7	0.050
I	5	邻苯二甲酸丁苄酯(BBP)	85-68-7	0.050
I	6	邻苯二甲酸二(2-乙基己基)酯(DEHP)	117-81-7	0.050
I	7	氧化双三丁基锡(TBTO)	56-35-9	0.050
I	8	二氯化钴*	7646-79-9	0.005
I	9	五氧化二砷*	1303-28-2	0.005
I	10	三氧化二砷*	1327-53-3	0.005
I	11	邻苯二甲酸二丁酯(DBP)	84-74-2	0.050
I	12	六溴环十二烷(HBCDD) 及其非对映异构体(α-HBCDD, β-HBCDD, γ-HBCDD)	-	0.050
I	13	砷酸氢铅*	7784-40-9	0.005
I	14	重铬酸钠*	7789-12-0, 10588-01-9	0.005
I	15	三乙基砷酸酯*	15606-95-8	0.005
II	16	2,4-二硝基甲苯	121-14-2	0.050
II	17	丙烯酰胺	79-06-1	0.050
II	18	蒽油**	90640-80-5	0.050
II	19	蒽油，蒽糊**	90640-81-6	0.050
II	20	蒽油，蒽糊，蒽馏分**	91995-15-2	0.050

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附录

所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
II	21	蒽油，蒽糊，轻油**	91995-17-4	0.050
II	22	蒽油，含蒽量少**	90640-82-7	0.050
II	23	邻苯二甲酸二异丁酯	84-69-5	0.050
II	24	钼铬红(C.I.颜料红104)*	12656-85-8	0.005
II	25	铬酸铅*	7758-97-6	0.005
II	26	铅铬黄(C.I.颜料黄34)*	1344-37-2	0.005
II	27	沥青，煤焦油，高温**	65996-93-2	0.050
II	28	磷酸三(2-氯乙基)酯	115-96-8	0.050
III	29	重铬酸铵*	7789-09-5	0.005
III	30	硼酸*	-	0.005
III	31	无水四硼酸钠*	1303-96-4, 1330-43-4, 12179-04-3	0.005
III	32	铬酸钾*	7789-00-6	0.005
III	33	重铬酸钾*	7778-50-9	0.005
III	34	铬酸钠*	7775-11-3	0.005
III	35	水合硼酸钠*	12267-73-1	0.005
III	36	三氯乙烯	79-01-6	0.050
IV	37	乙二醇乙醚	110-80-5	0.050
IV	38	乙二醇单甲醚	109-86-4	0.050
IV	39	铬酸, 铬酸及重铬酸低聚物, 重铬酸*	-	0.005

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(SVHC)

附录

所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
IV	40	三氧化铬*	1333-82-0	0.005
IV	41	碳酸钴*	513-79-1	0.005
IV	42	乙酸钴*	71-48-7	0.005
IV	43	硝酸钴*	10141-05-6	0.005
IV	44	硫酸钴*	10124-43-3	0.005
V	45	1,2,3-三氯丙烷	96-18-4	0.050
V	46	1,2-苯二酸-二(C6-8支链)烷基酯(富C7)	71888-89-6	0.050
V	47	1,2-苯二酸-二(C7-11支链与直链)烷基(醇)酯	68515-42-4	0.050
V	48	1-甲基-2-吡咯烷酮	872-50-4	0.050
V	49	乙二醇乙醚醋酸酯	111-15-9	0.050
V	50	联氨	7803-57-8, 302-01-2	0.050
V	51	铬酸锶*	7789-06-2	0.005
VI	52	1,2-二氯乙烷	107-06-2	0.050
VI	53	4,4'-二氨基-3,3'-二氯二苯甲烷	101-14-4	0.050
VI	54	2-甲氧基苯胺	90-04-0	0.050
VI	55	对特辛基苯酚	140-66-9	0.050
VI	56	硅酸铝耐火陶瓷纤维*	-	0.005
VI	57	砷酸*	7778-39-4	0.005
VI	58	二乙二醇二甲醚	111-96-6	0.050
VI	59	邻苯二甲酸二甲氧基乙酯	117-82-8	0.050

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所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
VI	60	砷酸钙*	7778-44-1	0.005
VI	61	铬酸铬*	24613-89-6	0.005
VI	62	甲醛与苯胺的低聚物	25214-70-4	0.050
VI	63	叠氮化铅*	13424-46-9	0.005
VI	64	苦味酸铅*	6477-64-1	0.005
VI	65	史蒂芬酸铅*	15245-44-0	0.005
VI	66	N,N-二甲基乙酰胺	127-19-5	0.050
VI	67	氢氧化铬酸锌*	49663-84-5	0.005
VI	68	酚酞	77-09-8	0.050
VI	69	氢氧化铬酸锌钾*	11103-86-9	0.005
VI	70	砷酸铅*	3687-31-8	0.005
VI	71	氧化锆硅酸铝耐火陶瓷纤维*	-	0.005
VII	72	C.I.碱性蓝26§	2580-56-5	0.050
VII	73	C.I.碱性紫3§	548-62-9	0.050
VII	74	三乙二醇二甲醚(TEGDME)	112-49-2	0.050
VII	75	乙二醇二甲醚(EGDME)	110-71-4	0.050
VII	76	4,4'-二(二甲氨基)二苯甲酮(米氏酮)	90-94-8	0.050
VII	77	4,4'-二(二甲氨基)-4''-甲氨基三苯甲醇§	561-41-1	0.050
VII	78	三氧化二硼*	1303-86-2	0.005
VII	79	甲酰胺	75-12-7	0.050
VII	80	甲基磺酸铅*	17570-76-2	0.005

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批次	序号	物质名称	CAS No.	RL (%)
VII	81	N,N,N',N'-四甲基-4,4'-二氨基二苯甲烷(米氏碱)	101-61-1	0.050
VII	82	1,3,5-三(环氧乙基甲基)-1,3,5-三嗪-2,4,6-(1H, 3H,5H)-三酮(TGIC)	2451-62-9	0.050
VII	83	C.I.溶剂蓝4§	6786-83-0	0.050
VII	84	1,3,5-三-[(2S和2R)-2,3-环氧丙基]-1,3,5-三嗪-2,4,6-(1H, 3H, 5H)-三酮(β-TGIC)	59653-74-6	0.050
VIII	85	二盐基邻苯二甲酸铅*	69011-06-9	0.005
VIII	86	1,2-苯二酸-二(支链与直链)戊基酯	84777-06-0	0.050
VIII	87	乙二醇二乙醚	629-14-1	0.050
VIII	88	1-溴丙烷	106-94-5	0.050
VIII	89	3-乙基-2-甲基-2-(3-甲基丁基)-1,3-恶唑烷	143860-04-2	0.050
VIII	90	对特辛基苯酚乙氧基醚	-	0.050
VIII	91	4,4'-二氨基-3,3'-二甲基二苯甲烷	838-88-0	0.050
VIII	92	4,4'-二氨基二苯醚及其盐	101-80-4	0.050
VIII	93	4-氨基偶氮苯	60-09-3	0.050
VIII	94	2,4-二氨基甲苯	95-80-7	0.050
VIII	95	4-壬基(支链与直链)苯酚	-	0.050
VIII	96	2-甲氧基-5-甲基苯胺	120-71-8	0.050
VIII	97	碱式乙酸铅*	51404-69-4	0.005
VIII	98	4-氨基联苯	92-67-1	0.050
VIII	99	十溴二苯醚(DecaBDE)	1163-19-5	0.050
VIII	100	环己烷-1,2-二羧酸酐,顺式-环己烷-1,2-二羧酸酐,反式-环己烷-1,2-二羧酸酐	-	0.050

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批次	序号	物质名称	CAS No.	RL (%)
VIII	101	偶氮二甲酰胺	123-77-3	0.050
VIII	102	二丁基二氯化锡(DBTC)	683-18-1	0.050
VIII	103	硫酸二乙酯	64-67-5	0.050
VIII	104	邻苯二甲酸二异戊酯	605-50-5	0.050
VIII	105	硫酸二甲酯	77-78-1	0.050
VIII	106	地乐酚	88-85-7	0.050
VIII	107	双(十八酸基)二氧代三铅*	12578-12-0	0.005
VIII	108	C16-18-脂肪酸铅*	91031-62-8	0.005
VIII	109	呋喃	110-00-9	0.050
VIII	110	全氟十一烷酸	2058-94-8	0.050
VIII	111	全氟十四烷酸	376-06-7	0.050
VIII	112	甲基六氢邻苯二甲酸酐,4-甲基六氢邻苯二甲酸酐,1-甲基六氢邻苯二甲酸酐,3-甲基六氢邻苯二甲酸酐	-	0.050
VIII	113	四氟硼酸铅*	13814-96-5	0.005
VIII	114	氨基氰铅盐*	20837-86-9	0.005
VIII	115	硝酸铅*	10099-74-8	0.005
VIII	116	一氧化铅*	1317-36-8	0.005
VIII	117	碱式硫酸铅*	12036-76-9	0.005
VIII	118	四氧化三铅*	1314-41-6	0.005
VIII	119	钛酸铅*	12060-00-3	0.005
VIII	120	钛酸铅锆*	12626-81-2	0.005

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批次	序号	物质名称	CAS No.	RL (%)
VIII	121	甲氧基乙酸	625-45-6	0.050
VIII	122	1,2-环氧丙烷	75-56-9	0.050
VIII	123	N,N-二甲基甲酰胺	68-12-2	0.050
VIII	124	N-甲基乙酰胺	79-16-3	0.050
VIII	125	邻苯二甲酸正戊基异戊基酯	776297-69-9	0.050
VIII	126	邻-氨基偶氮甲苯	97-56-3	0.050
VIII	127	2-氨基甲苯	95-53-4	0.050
VIII	128	全氟十三烷酸	72629-94-8	0.050
VIII	129	硫酸四氧化五铅*	12065-90-6	0.005
VIII	130	铅锑黄*	8012-00-8	0.005
VIII	131	掺杂铅的硅酸钡*	68784-75-8	0.005
VIII	132	硅酸铅*	11120-22-2	0.005
VIII	133	二碱式亚硫酸铅*	62229-08-7	0.005
VIII	134	四乙基铅*	78-00-2	0.005
VIII	135	硫酸三氧化四铅*	12202-17-4	0.005
VIII	136	全氟十二烷酸	307-55-1	0.050
VIII	137	碱式碳酸铅*	1319-46-6	0.005
VIII	138	二碱式亚磷酸铅*	12141-20-7	0.005
IX	139	4-壬基(支链与直链)苯酚乙氧基醚	-	0.050
IX	140	全氟辛酸铵(APFO)**	3825-26-1	0.050
IX	141	氧化镉*	1306-19-0	0.005

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批次	序号	物质名称	CAS No.	RL (%)
IX	142	镉*	7440-43-9	0.005
IX	143	邻苯二甲酸二正戊酯(DPP)	131-18-0	0.050
IX	144	全氟辛酸(PFOA)	335-67-1	0.050
X	145	硫化镉*	1306-23-6	0.005
X	146	邻苯二甲酸二正己酯	84-75-3	0.050
X	147	C.I.直接红28	573-58-0	0.050
X	148	C.I.直接黑38	1937-37-7	0.050
X	149	2-巯基咪唑啉	96-45-7	0.050
X	150	乙酸铅*	301-04-2	0.005
X	151	磷酸三二甲苯酯	25155-23-1	0.050
XI	152	邻苯二甲酸二(支链与直链)己基酯	68515-50-4	0.050
XI	153	氯化镉*	10108-64-2	0.005
XI	154	水合过硼酸钠*	-	0.005
XI	155	过硼酸钠*	7632-04-4	0.005
XII	156	2-(2H-苯并三唑-2-基)-4,6-二叔戊基苯酚(UV-328)	25973-55-1	0.050
XII	157	2-苯并三唑-2-基-4,6-二叔丁基苯酚(UV-320)	3846-71-7	0.050
XII	158	二正辛基-双(2-乙基己基巯基乙酸酯)锡 (DOTE)	15571-58-1	0.050
XII	159	氟化镉 *	7790-79-6	0.005
XII	160	硫酸镉 *	10124-36-4,31119-53-6	0.005
XII	161	二正辛基-双(2-乙基己基巯基乙酸酯)锡(DOTE)和单辛基-三(2-乙基己基巯基乙酸酯)锡(MOTE)的反应物	-	0.050

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批次	序号	物质名称	CAS No.	RL (%)
XIII	162	1,2-苯二甲酸, 二(C6-10)烷基酯 / 1,2-苯二甲酸, 混合二己二辛二癸酯, 其中邻苯二甲酸二己酯含量≥0.3%	-	0.050
XIII	163	5-二级丁基-2-(2,4-二甲基环己-3-烯-1-基)-5-甲基-1,3-二恶烷[1]，5-二级丁基-2-(4,6-二甲基环己-3-烯-1-基)-5-甲基-1,3-二恶烷[2] [任何[1]和[2]或者其任意组合的单独异构体或其任何组合]	-	0.050
XIV	164	1,3-丙磺酸内酯	1120-71-4	0.050
XIV	165	2,4-二叔丁基-6-(5-氯苯并三唑-2-基)苯酚(UV-327)	3864-99-1	0.050
XIV	166	2-(2H-苯并三唑-2-基)-4-叔丁基-6-仲丁基苯酚 (UV-350)	36437-37-3	0.050
XIV	167	硝基苯	98-95-3	0.050
XIV	168	全氟壬酸及其钠盐和铵盐	-	0.050
XV	169	苯并(a)芘	50-32-8	0.050
XVI	170	4,4'-异亚丙基联苯酚 (双酚A)	80-05-7	0.050
XVI	171	4-庚基(支链与直链)苯酚	-	0.050
XVI	172	全氟癸酸 (PFDA) 及其钠盐和铵盐	-	0.050
XVI	173	对叔戊基苯酚	80-46-6	0.050
XVII	174	全氟己烷-1-磺酸及其盐	-	0.050
XVIII	175	双(六氯环戊二烯)环辛烷(包含任何顺式与反式同分异构体或其组合)	-	0.050
XVIII	176	苯并蒽(BaA)	56-55-3	0.050
XVIII	177	硝酸镉*	10325-94-7	0.005
XVIII	178	碳酸镉*	513-78-0	0.005
XVIII	179	氢氧化镉*	21041-95-2	0.005
XVIII	180	屈(CHR)	218-01-9	0.050

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附录

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批次	序号	物质名称	CAS No.	RL (%)
XVIII	181	1,3,4-噻二唑-2,5-二硫酮、甲醛与支链和直链4-庚基苯酚的反应产物(RP-HP)[含有支链和直链4-庚基苯酚重量比≥0.1%]	-	0.050
XIX	182	1,2,4-苯三酸酐(偏苯三酸酐)(TMA)	552-30-7	0.050
XIX	183	苯并(g,h,i)苝(二萘嵌苯) (BPE)	191-24-2	0.050
XIX	184	十甲基环五硅氧烷(D5)	541-02-6	0.050
XIX	185	邻苯二甲酸二环己酯(DCHP)	84-61-7	0.050
XIX	186	氧化硼钠*	12008-41-2	0.005
XIX	187	十二甲基环六硅氧烷(D6)	540-97-6	0.050
XIX	188	乙二胺(EDA)	107-15-3	0.050
XIX	189	铅*	7439-92-1	0.005
XIX	190	八甲基环四硅氧烷(D4)	556-67-2	0.050
XIX	191	氢化三联苯	61788-32-7	0.050
XX	192	1,7,7-三甲基-3-(苯基亚甲基)双环[2.2.1]庚-2-酮 (3-亚苄基樟脑)	15087-24-8	0.050
XX	193	4,4'-(1,3-二甲基丁基)二苯酚(1,3-DMBBP)	6807-17-6	0.050
XX	194	苯并 (k)荧蒽(BkF)	207-08-9	0.050
XX	195	荧蒽(FLT)	206-44-0	0.050
XX	196	菲(PHE)	85-01-8	0.050
XX	197	芘(PYR)	129-00-0	0.050
XXI	198	2,3,3,3-四氟-2-(七氟丙氧基)丙酸及其盐和酰基卤化物(包括单体和组合)(HFPO-DA)	-	0.050
XXI	199	2-甲氧基乙基乙酸酯	110-49-6	0.050
XXI	200	4-叔丁基苯酚(PTBP)	98-54-4	0.050

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所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
XXI	201	三(4-壬基苯基，支链和直链)亚磷酸酯(TNPP)(含≥0.1%的支链和直链4-壬基苯酚)	-	0.050
XXII	202	2-苄基-2-二甲基氨基-4'-吗啉基苯基丁酮	119313-12-1	0.050
XXII	203	2-甲基-1-(4-甲硫基苯基)-2-吗啉基-1-丙酮	71868-10-5	0.050
XXII	204	邻苯二甲酸二异己酯	71850-09-4	0.050
XXII	205	全氟丁烷磺酸及其盐	-	0.050
XXIII	206	1-乙烯基咪唑	1072-63-5	0.050
XXIII	207	2-甲基咪唑	693-98-1	0.050
XXIII	208	对羟基苯甲酸丁酯	94-26-8	0.050
XXIII	209	双(乙酰丙酮基)二丁基锡**	22673-19-4	0.050
XXIV	210	四乙二醇二甲醚	143-24-8	0.050
XXIV	211	二月桂酸二辛基锡及任何其他二辛基锡双(脂肪酰氧基)衍生物**	-	0.050
XXV	212	1,4-二氧六环	123-91-1	0.050
XXV	213	二溴新戊二醇(BMP); 三溴新戊醇(TBNPA); 2,3-二溴-1-丙醇(2,3-DBPA)	-	0.050
XXV	214	铃兰醛及其立体异构体	-	0.050
XXV	215	双酚B	77-40-7	0.050
XXV	216	戊二醛	111-30-8	0.050
XXV	217	中链氯化石蜡(MCCP)	-	0.050
XXV	218	原硼酸钠盐*	13840-56-7	0.005
XXV	219	对十二烷基苯酚及其异构体(PDDP)	-	0.050

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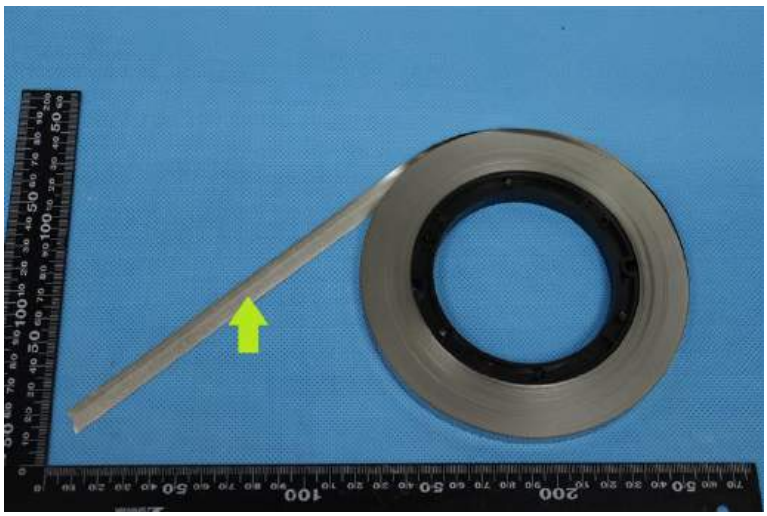
批次	序号	物质名称	CAS No.	RL (%)
/	220	间苯二酚	108-46-3	0.050

样品照片:

NGBML2104391002



NGB21-043910.001

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Test Report

No. SHAEC2123490401 Date: 02 Nov 2021

SUZHOU AIBOTE MAGENETIC INDUSTRY CO.,LTD.

NO.58 YIHE ROAD, WUJIANG DISTRICT OF SUZHOU CITY,CHINA.

The following sample(s) was/were submitted and identified on behalf of the clients as : SmCo Magnet

SGS Job No. :	SP21-033773 - SH
Date of Sample Received :	29 Oct 2021
Testing Period :	29 Oct 2021 - 02 Nov 2021
Test Requested :	Selected test(s) as requested by client.
Test Method :	Please refer to next page(s).
Test Results :	Please refer to next page(s).
Conclusion :	Based on the performed tests on submitted sample(s), the results of Cadmium, Lead, Mercury, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) and Phthalates such as Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP) comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Signed for and on behalf of
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

scan to see the report

891EAAEE

Jenny Lan

Jenny Lan
Approved Signatory

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Test Results :

Test Part Description :

Specimen No.	SGS Sample ID	Description
SN1	SHA21-234904.001	Silvery metal

Remarks :

(1) 1 mg/kg = 0.0001%

(2) MDL = Method Detection Limit

(3) ND = Not Detected (< MDL)

(4) "-" = Not Regulated

RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

Test Method : With reference to IEC 62321-4:2013+AMD1:2017, IEC62321-5:2013, IEC62321-7-1:2015, IEC 62321-6:2015 and IEC62321-8:2017, analyzed by ICP-OES, AAS, UV-Vis and GC-MS.

Test Item(s)	Limit	Unit	MDL	*001*
Cadmium (Cd)	100	mg/kg	2	ND
Lead (Pb)	1000	mg/kg	2	ND
Mercury (Hg)	1000	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))▾	-	µg/cm²	0.10	ND
Sum of PBBs	1000	mg/kg	-	ND
Monobromobiphenyl	-	mg/kg	5	ND
Dibromobiphenyl	-	mg/kg	5	ND
Tribromobiphenyl	-	mg/kg	5	ND
Tetrabromobiphenyl	-	mg/kg	5	ND
Pentabromobiphenyl	-	mg/kg	5	ND
Hexabromobiphenyl	-	mg/kg	5	ND
Heptabromobiphenyl	-	mg/kg	5	ND
Octabromobiphenyl	-	mg/kg	5	ND
Nonabromobiphenyl	-	mg/kg	5	ND
Decabromobiphenyl	-	mg/kg	5	ND
Sum of PBDEs	1000	mg/kg	-	ND
Monobromodiphenyl ether	-	mg/kg	5	ND
Dibromodiphenyl ether	-	mg/kg	5	ND
Tribromodiphenyl ether	-	mg/kg	5	ND
Tetrabromodiphenyl ether	-	mg/kg	5	ND

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Test Item(s)	Limit	Unit	MDL	*001*
Pentabromodiphenyl ether	-	mg/kg	5	ND
Hexabromodiphenyl ether	-	mg/kg	5	ND
Heptabromodiphenyl ether	-	mg/kg	5	ND
Octabromodiphenyl ether	-	mg/kg	5	ND
Nonabromodiphenyl ether	-	mg/kg	5	ND
Decabromodiphenyl ether	-	mg/kg	5	ND
Di-butyl Phthalate (DBP)	1000	mg/kg	50	ND
Benzyl Butyl Phthalate (BBP)	1000	mg/kg	50	ND
Di-2-Ethyl Hexyl Phthalate (DEHP)	1000	mg/kg	50	ND
Diisobutyl Phthalates (DIBP)	1000	mg/kg	50	ND

Notes :

(1)The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.
IEC 62321 series is equivalent to EN 62321 series
https://www.cenelec.eu/dyn/www/f?p=104:30:17422328703511O1::::FSP_ORG_ID,FSP_LANG_ID:1258637,25

(2)▼ = a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 μg/cm².
The sample coating is considered to contain CrVI
b. The sample is negative for CrVI if CrVI is ND (concentration less than 0.10 μg/cm²). The coating is considered a non-CrVI based coating
c. The result between 0.10 μg/cm² and 0.13 μg/cm² is considered to be inconclusive - unavoidable coating variations may influence the determination
Information on storage conditions and production date of the tested sample is unavailable and thus Cr(VI) results represent status of the sample at the time of testing.

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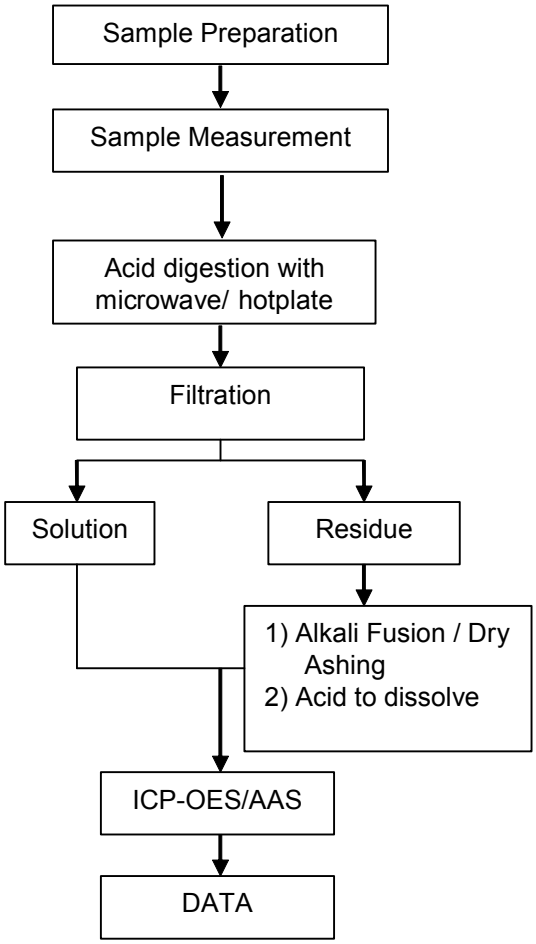
Elements (IEC62321) Testing Flow Chart

1) These samples were dissolved totally by pre-conditioning method according to below flow chart.



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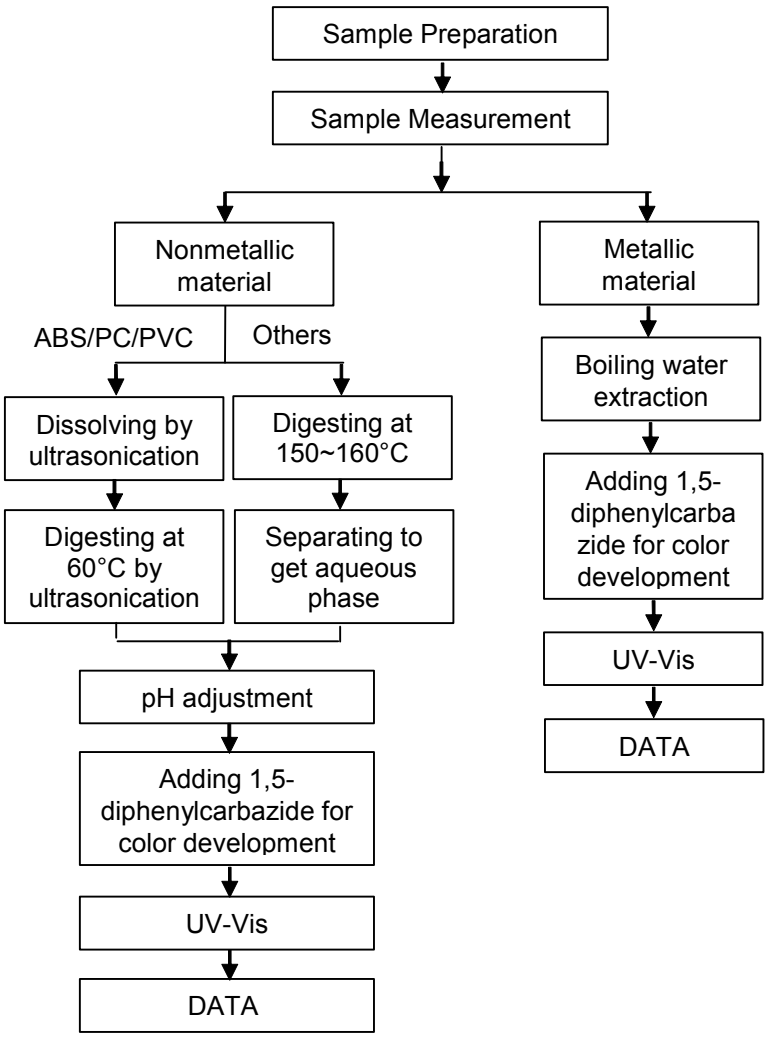
Hexavalent Chromium (Cr(VI)) Testing Flow Chart



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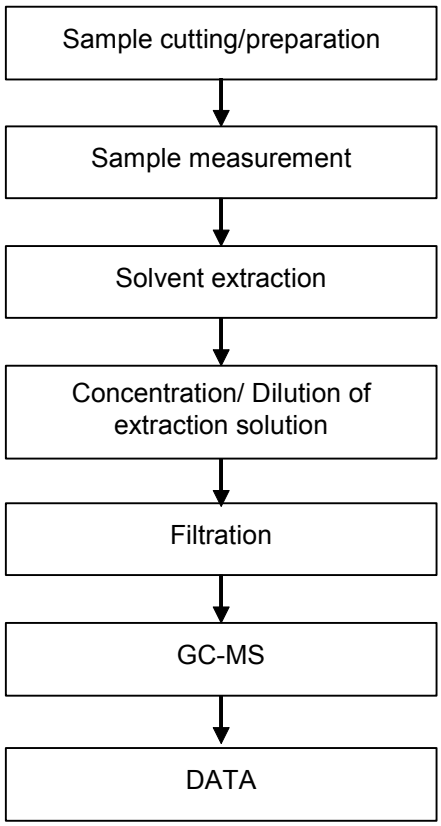
PBBs/PBDEs Testing Flow Chart



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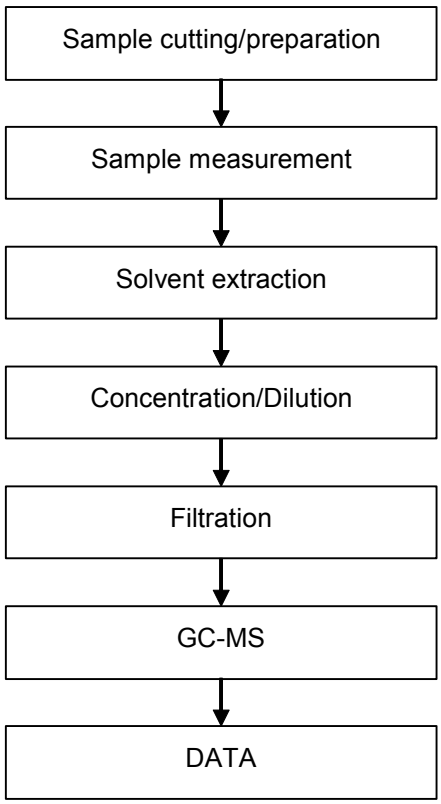
ATTACHMENTS

Phthalates Testing Flow Chart



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Sample photo:



SHA21-234904.001

SGS authenticate the photo on original report only

*** End of Report ***

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检测报告

报告编号 A22200023701010001C　　第 1 页　共 7 页

报告抬头公司名称 苏州市纳世吉金属有限公司

地　　址 苏州市相城区渭塘镇爱格豪路52号

以下测试之样品及样品信息由申请者提供并确认

样品名称	大森不锈钢丝
材料名称	304
样品接收日期	2022.01.04
样品检测日期	2022.01.04-2022.01.08

检测要求 根据客户要求，对所提交样品中的铅(Pb)，镉(Cd)，汞(Hg)，六价铬(Cr(VI))，多溴联苯(PBBs)，多溴二苯醚(PBDEs)，邻苯二甲酸酯(DBP，BBP，DEHP，DIBP)进行测试。

检测依据 请参见下页。

检测结果 请参见下页。

主检　吴树强　　审　核　江宏

批　准　宋岩　　日　期　2022.01.08

宋岩

技术经理

苏州市华测检测技术有限公司

No. R375301719

江苏省苏州市相城区澄阳路3286号

检测报告

检测依据

测试项目	测试方法	测试仪器
铅(Pb)	IEC 62321-5:2013	ICP-OES
镉(Cd)	IEC 62321-5:2013	ICP-OES
汞(Hg)	IEC 62321-4:2013+AMD1:2017 CSV	ICP-OES
六价铬(Cr(VI))	IEC 62321-7-1:2015	UV-Vis
多溴联苯(PBBs)	IEC 62321-6:2015	GC-MS
多溴二苯醚(PBDEs)	IEC 62321-6:2015	GC-MS
邻苯二甲酸酯(DBP, BBP, DEHP, DIBP)	IEC 62321-8:2017	GC-MS

检测报告

检测结果

测试项目	结果	方法检出限
铅(Pb)	N.D.	2 mg/kg
镉(Cd)	N.D.	2 mg/kg
汞(Hg)	N.D.	2 mg/kg
六价铬(Cr(VI))	N.D. ▼	0.10 μg/cm² (LOQ)

测试项目	结果	方法检出限
多溴联苯(PBBs)		
一溴联苯	N.D.	5 mg/kg
二溴联苯	N.D.	5 mg/kg
三溴联苯	N.D.	5 mg/kg
四溴联苯	N.D.	5 mg/kg
五溴联苯	N.D.	5 mg/kg
六溴联苯	N.D.	5 mg/kg
七溴联苯	N.D.	5 mg/kg
八溴联苯	N.D.	5 mg/kg
九溴联苯	N.D.	5 mg/kg
十溴联苯	N.D.	5 mg/kg

测试项目	结果	方法检出限
多溴二苯醚(PBDEs)		
一溴二苯醚	N.D.	5 mg/kg
二溴二苯醚	N.D.	5 mg/kg
三溴二苯醚	N.D.	5 mg/kg
四溴二苯醚	N.D.	5 mg/kg
五溴二苯醚	N.D.	5 mg/kg
六溴二苯醚	N.D.	5 mg/kg
七溴二苯醚	N.D.	5 mg/kg
八溴二苯醚	N.D.	5 mg/kg
九溴二苯醚	N.D.	5 mg/kg
十溴二苯醚	N.D.	5 mg/kg

检测报告

检测结果

测试项目	结果	方法检出限
邻苯二甲酸酯(DBP, BBP, DEHP, DIBP)		
邻苯二甲酸二丁酯(DBP) CAS#:84-74-2	N.D.	50 mg/kg
邻苯二甲酸丁基苄基酯(BBP) CAS#:85-68-7	N.D.	50 mg/kg
邻苯二甲酸二(2-乙基)己酯(DEHP) CAS#:117-81-7	N.D.	50 mg/kg
邻苯二甲酸二异丁酯(DIBP) CAS#:84-69-5	N.D.	50 mg/kg

样品/部位描述 银灰色金属丝

备注： **对于检测铅，镉，汞之样品已消解完全。**

-N.D. = 未检出 (小于方法检出限或定量限)

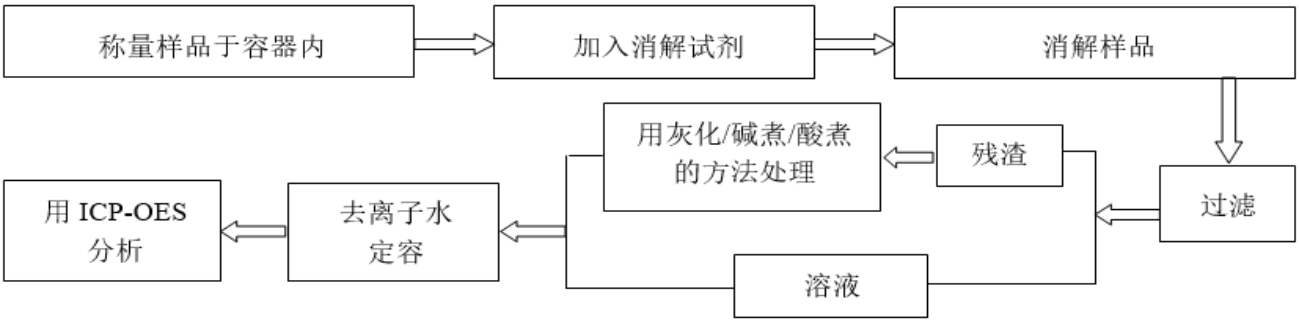
-mg/kg = ppm = 百万分之一

-LOQ = 定量限，六价铬的定量限为0.10 μg/cm²

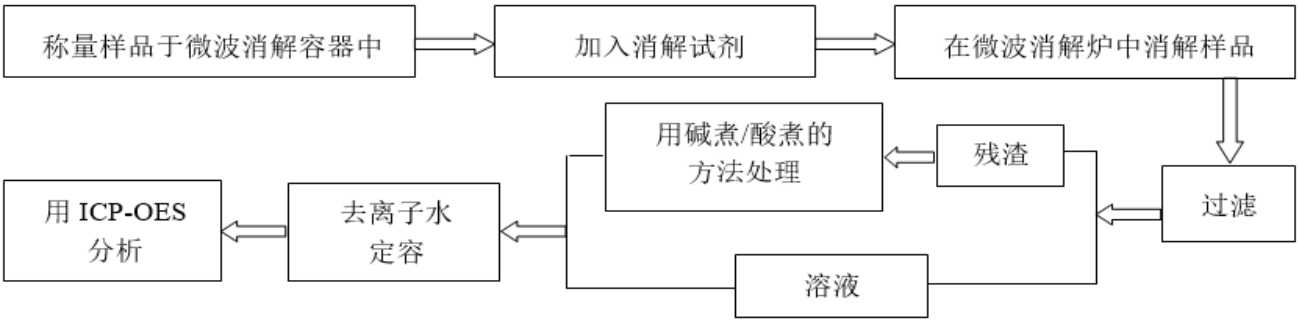
-▼六价铬浓度小于0.10 μg/cm², 样品未检出六价铬

检测流程

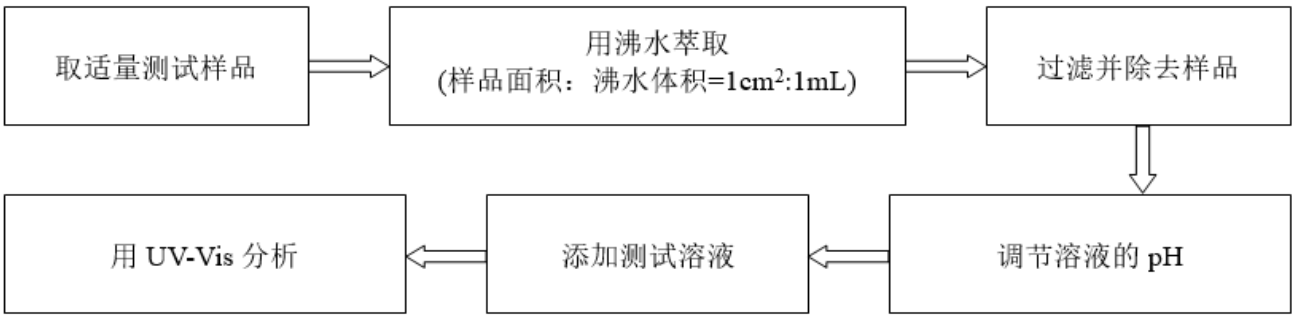
1. **铅(Pb)， 镉(Cd)**



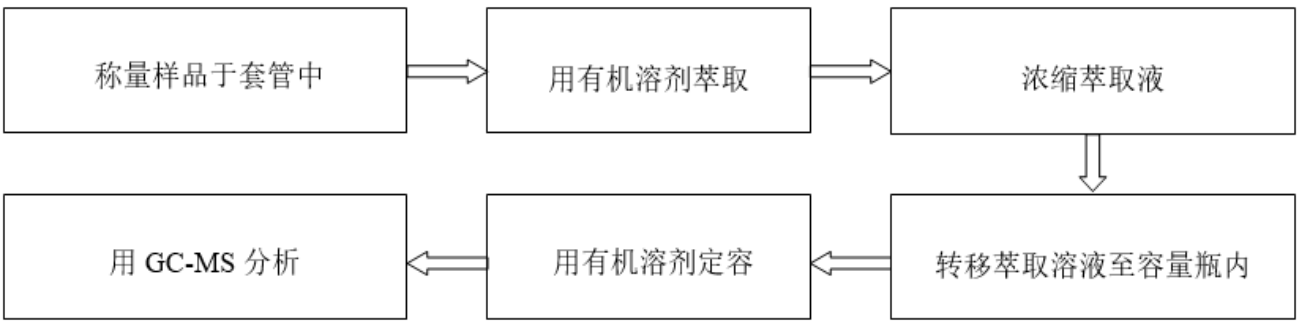
2. **汞(Hg)**



3. **六价铬(Cr(VI))**



4. **多溴联苯(PBBs)， 多溴二苯醚(PBDEs)**



检测报告

5. 邻苯二甲酸酯(DBP, BBP, DEHP, DIBP)



检测报告

样品图片



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4. 未经CTI书面同意，不得部分复制本报告。

*** 报告结束 ***

SGS

Verification Report

No. SZXEC2103346601 Date: 18 Nov 2021

KAIHONG ELECTRIC CO.,LTD

ROOM 301,NO.155 BA XIN ROAD,WANJIANG STREET,DONGGUAN

Sample Name :	DC MOTOR
SGS Job No. :	RP21-025825 - SZ
Date of Sample Received :	01 Nov 2021
Verification Period :	01 Nov 2021 - 16 Nov 2021
Verification Requested :	With reference to RoHS Directive (EU) 2015/863 amending 2011/65/EU.
Verification Method :	Please refer to next page(s).
Verification Result :	Please refer to next page(s).
Verification Conclusion :	Based on the verification results of the submitted samples, the results of Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) and Phthalates such as Bis(2-ethylhexyl) phthalate (DEHP) , Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) , and Diisobutyl phthalate (DIBP) comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Signed for and on behalf of
SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

Tina

Tina Fan
Approved Signatory

scan to see the report

48C86513

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Verification Method :

1. With reference to IEC 62321-2:2013, review was performed for the samples disjointed from the submitted articles.
2. With reference to IEC 62321-1:2013, tests were performed for the samples indicated by the photos in this report
(1) With reference to IEC 62321-3-1:2013, screening by EDXRF spectroscopy.
(2) Wet chemical test method: With reference to IEC 62321-4:2013+A1:2017, IEC62321-5:2013, IEC 62321-7-1:2015, IEC 62321-7-2:2017, ISO 17075-1:2017, IEC 62321-6:2015 and IEC62321-8:2017, analyzed by ICP-OES,UV-Vis and GC-MS.

In accordance with the result of material risk assessment, the following disjointed parts in the submitted sample have been verified.

Part No.	Part Description	Restricted Substances	Results of EDXRF(1)	Screening Result of PHTH(2)	Result of Wet Chemical Testing (3)(mg/kg)	Conclusion	Sample Submitted / Resubmitted Date
1	Golden metal part	Pb	OL	---	28080▲	Comply	01 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	---	---	---	---	
		PBDEs	---	---	---	---	
		DBP	---	---	---	---	
		BBP	---	---	---	---	
		DEHP	---	---	---	---	
		DIBP	---	---	---	---	
2	Silvery metal shell	Pb	BL	---	---	Comply	01 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	---	---	---	---	
		PBDEs	---	---	---	---	
		DBP	---	---	---	---	
		BBP	---	---	---	---	
		DEHP	---	---	---	---	
		DIBP	---	---	---	---	

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Part No.	Part Description	Restricted Substances	Results of EDXRF(1)	Screening Result of PHTH(2)	Result of Wet Chemical Testing (3)(mg/kg)	Conclusion	Sample Submitted / Resubmitted Date
3	Cream plastic part	Pb	BL	---	---	Comply	01 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▾	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	---	ND	Comply	
		BBP	---	---	ND	Comply	
		DEHP	---	---	ND	Comply	
		DIBP	---	---	ND	Comply	
4	Black magnet	Pb	BL	---	---	Comply	01 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▾	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	---	---	---	
		BBP	---	---	---	---	
		DEHP	---	---	---	---	
		DIBP	---	---	---	---	
5	Dull silvery metal part	Pb	BL	---	---	Comply	01 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▾	BL	---	---	Comply	
		PBBs	---	---	---	---	
		PBDEs	---	---	---	---	
		DBP	---	---	---	---	

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Part No.	Part Description	Restricted Substances	Results of EDXRF(1)	Screening Result of PHTH(2)	Result of Wet Chemical Testing (3)(mg/kg)	Conclusion	Sample Submitted / Resubmitted Date
		BBP	---	---	---	---	
		DEHP	---	---	---	---	
		DIBP	---	---	---	---	
6	Silvery metal washer	Pb	BL	---	---	Comply	01 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▾	BL	---	---	Comply	
		PBBs	---	---	---	---	
		PBDEs	---	---	---	---	
		DBP	---	---	---	---	
		BBP	---	---	---	---	
		DEHP	---	---	---	---	
		DIBP	---	---	---	---	
7	Coppery metal part	Pb	BL	---	---	Comply	01 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▾	BL	---	---	Comply	
		PBBs	---	---	---	---	
		PBDEs	---	---	---	---	
		DBP	---	---	---	---	
		BBP	---	---	---	---	
		DEHP	---	---	---	---	
		DIBP	---	---	---	---	

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Part No.	Part Description	Restricted Substances	Results of EDXRF(1)	Screening Result of PHTH(2)	Result of Wet Chemical Testing (3)(mg/kg)	Conclusion	Sample Submitted / Resubmitted Date
8	Silvery metal part	Pb	BL	---	---	Comply	01 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▾	IN	---	ND	Comply	
		PBBs	---	---	---	---	
		PBDEs	---	---	---	---	
		DBP	---	---	---	---	
		BBP	---	---	---	---	
		DEHP	---	---	---	---	
		DIBP	---	---	---	---	
9	Silvery metal shaft	Pb	BL	---	---	Comply	01 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▾	BL	---	---	Comply	
		PBBs	---	---	---	---	
		PBDEs	---	---	---	---	
		DBP	---	---	---	---	
		BBP	---	---	---	---	
		DEHP	---	---	---	---	
		DIBP	---	---	---	---	
10	Red plastic washer	Pb	BL	---	---	Comply	01 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▾	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	---	<600*	Comply	

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Part No.	Part Description	Restricted Substances	Results of EDXRF(1)	Screening Result of PHTH(2)	Result of Wet Chemical Testing (3)(mg/kg)	Conclusion	Sample Submitted / Resubmitted Date
		BBP	---	---	<600*	Comply	
		DEHP	---	---	<600*	Comply	
		DIBP	---	---	<600*	Comply	
11	Black ceramic with silvery surface	Pb	BL	---	---	Comply	01 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▾	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	---	ND	Comply	
		BBP	---	---	ND	Comply	
		DEHP	---	---	ND	Comply	
		DIBP	---	---	ND	Comply	
12	Silvery metal solder	Pb	IN	---	249	Comply	01 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▾	BL	---	---	Comply	
		PBBs	---	---	---	---	
		PBDEs	---	---	---	---	
		DBP	---	---	---	---	
		BBP	---	---	---	---	
		DEHP	---	---	---	---	
		DIBP	---	---	---	---	

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Part No.	Part Description	Restricted Substances	Results of EDXRF(1)	Screening Result of PHTH(2)	Result of Wet Chemical Testing (3)(mg/kg)	Conclusion	Sample Submitted / Resubmitted Date
13	Cream plastic part	Pb	BL	---	---	Comply	01 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▾	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	---	ND	Comply	
		BBP	---	---	ND	Comply	
		DEHP	---	---	ND	Comply	
		DIBP	---	---	ND	Comply	
14	White plastic part	Pb	BL	---	---	Comply	01 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▾	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	---	ND	Comply	
		BBP	---	---	ND	Comply	
		DEHP	---	---	ND	Comply	
		DIBP	---	---	ND	Comply	
15	Coppery enameled wire	Pb	BL	---	---	Comply	01 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▾	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	---	ND	Comply	

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Part No.	Part Description	Restricted Substances	Results of EDXRF(1)	Screening Result of PHTH(2)	Result of Wet Chemical Testing (3)(mg/kg)	Conclusion	Sample Submitted / Resubmitted Date
		BBP	---	---	ND	Comply	
		DEHP	---	---	ND	Comply	
		DIBP	---	---	ND	Comply	
16	Golden metal part	Pb	BL	---	---	Comply	01 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▾	BL	---	---	Comply	
		PBBs	---	---	---	---	
		PBDEs	---	---	---	---	
		DBP	---	---	---	---	
		BBP	---	---	---	---	
		DEHP	---	---	---	---	
		DIBP	---	---	---	---	
17	Silvery metal part	Pb	BL	---	---	Comply	01 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▾	BL	---	---	Comply	
		PBBs	---	---	---	---	
		PBDEs	---	---	---	---	
		DBP	---	---	---	---	
		BBP	---	---	---	---	
		DEHP	---	---	---	---	
		DIBP	---	---	---	---	

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Part No.	Part Description	Restricted Substances	Results of EDXRF(1)	Screening Result of PHTH(2)	Result of Wet Chemical Testing (3)(mg/kg)	Conclusion	Sample Submitted / Resubmitted Date
18	Coppery metal part	Pb	BL	---	---	Comply	01 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▾	BL	---	---	Comply	
		PBBs	---	---	---	---	
		PBDEs	---	---	---	---	
		DBP	---	---	---	---	
		BBP	---	---	---	---	
		DEHP	---	---	---	---	
		DIBP	---	---	---	---	
19	Coppery convex part	Pb	BL	---	---	Comply	01 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▾	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	---	---	---	
		BBP	---	---	---	---	
		DEHP	---	---	---	---	
		DIBP	---	---	---	---	
20	White plastic washer	Pb	BL	---	---	Comply	01 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▾	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	---	ND	Comply	

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Part No.	Part Description	Restricted Substances	Results of EDXRF(1)	Screening Result of PHTH(2)	Result of Wet Chemical Testing (3)(mg/kg)	Conclusion	Sample Submitted / Resubmitted Date
		BBP	---	---	ND	Comply	
		DEHP	---	---	ND	Comply	
		DIBP	---	---	ND	Comply	

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Remark

(1) (a) There are the results on total Br while test items on restricted substances are PBBs and PBDEs. There is the result on total Cr while test item on restricted substances is Cr(VI).

(b) Results are obtained by EDXRF for primary screening, and further chemical testing by ICP-OES (for Cd, Pb, Hg), UV-Vis (for Cr(VI)) and GC-MS (for PBBs, PBDEs) is recommended to be performed if the concentration exceeds the below warning value according to IEC62321-3-1:2013 (unit: mg/kg).

Element	Polymer	Metal	Composite Materials
Cd	BL≤(70-3σ)<X<(130+3σ)≤OL	BL≤(70-3σ)<X<(130+3σ)≤OL	LOD<X<(150+3σ)≤OL
Pb	BL≤(700-3σ)<X<(1300+3σ)≤OL	BL≤(700-3σ)<X<(1300+3σ)≤OL	BL≤(500-3σ)<X<(1500+3σ)≤OL
Hg	BL≤(700-3σ)<X<(1300+3σ)≤OL	BL≤(700-3σ)<X<(1300+3σ)≤OL	BL≤(500-3σ)<X<(1500+3σ)≤OL
Br	BL≤(300-3σ)<X	Not Applicable	BL≤(250-3σ)<X
Cr	BL≤(700-3σ)<X	BL≤(700-3σ)<X	BL≤(500-3σ)<X

(c) BL = Below Limit, OL = Over Limit, IN = Inconclusive, LOD = Limit of Detection

(d) The XRF screening test for RoHS elements – The reading may be different to the actual content in the sample be of non-uniformity composition.

(2) Screening results of PHTH are for primary screening, and further chemical testing by GC-MS (for DBP, BBP, DEHP and DIBP) are recommended to be performed if the concentration exceeds the below warning value(unit: mg/kg).

Compound	Polymer
DBP	BL ≤ 600< X
BBP	BL ≤ 600< X
DEHP	BL ≤ 600< X
DIBP	BL ≤ 600< X

(3) (a) mg/kg = 0.0001%, MDL=Method detection Limit, ND = Not Detected (<MDL), --- = Not Applicable, - = Without BOM.

(b) Unit and MDL in wet chemical test

Test Item	Pb	Cd	Hg	DBP	BBP	DEHP	DIBP
Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
MDL	10	10	10	100	100	100	100

The MDL for single compound of PBBs and PBDEs is 100 mg/kg,
MDL of Cr(VI) for polymer, composite and leather sample is 10 mg/kg.
MDL of Cr(VI) for metal sample is 0.10μg/cm².

(c) ▼ =Metal sample

a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13 μg/cm². The sample coating is considered to contain Cr(VI)

b. The sample is negative for Cr(VI) if Cr(VI) is ND (concentration less than 0.10 μg/cm²). The coating is considered a non-Cr(VI) based coating

c. The result between 0.10 μg/cm² and 0.13 μg/cm² is considered to be inconclusive - unavoidable coating variations may influence the determination

Information on storage conditions and production date of the tested sample is unavailable and thus Cr(VI) results represent status of the sample at the time of testing.

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(4) Restricted substances and maximum concentration values tolerated by weight in homogeneous materials under RoHS Directive: Cd: 0.01%, Pb/Hg/Cr(VI)/PBBs/PBDEs/DEHP/DBP/BBP/DIBP: 0.1%. The limit is quoted from RoHS Directive (EU) 2015/863.

(5) IEC 62321 series is equivalent to EN 62321 series.
https://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101::::FSP_ORG_ID,FSP_LANG_ID:1258637,25

(6) ▲=According to the declaration from the client, Lead (Pb) in No.1 is exempted by EU RoHS directive 2011/65/EU based on |ANNEX III 6(c)|: Copper alloy containing up to 4 % lead by weight.

(7) ☆ = Considering insufficient sample amount, the Method Detection Limit (MDL) is raised appropriately.

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Sample photo:

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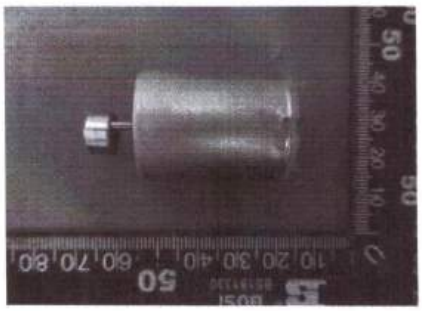

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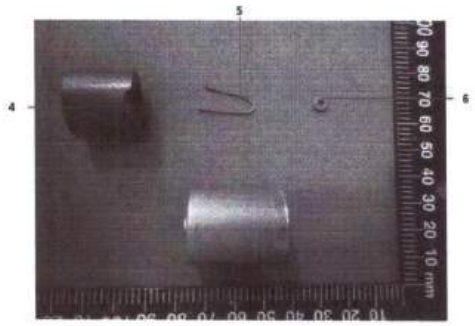

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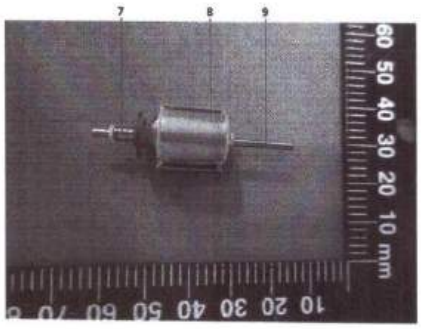

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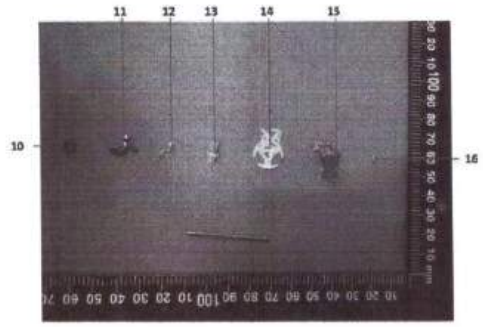

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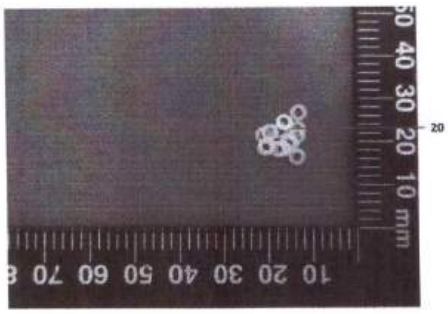

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检测报告
Test Report

报告编号 A2210470886101007E
Report No. A2210470886101007E

报告抬头公司名称 深圳市达源塑胶有限公司
Company Name shown on Report SHENZHEN DAYUAN SUJIAO CO.,LTD.
地 址 深圳市宝安区沙井民主西部工业园G区B1栋
Address BUILDING B1,AREA G,MINZHU WESTERN LNDUSTRIAL PARK ,SHAJING,BAOAN .

以下测试之样品及样品信息由申请者提供并确认
The following sample(s) and sample information was/were submitted and identified by/on the behalf of the applicant

样品名称	PVC胶粒
Sample Name	PVC胶粒
样品接收日期	2021.11.11
Sample Received Date	Nov. 11, 2021
样品检测日期	2021.11.11-2021.11.15
Testing Period	Nov. 11, 2021 to Nov. 15, 2021

检测要求 根据客户要求，对所提交样品中的铅(Pb)，镉(Cd)，汞(Hg)，六价铬(Cr(VI))，多溴联苯(PBBs)，多溴二苯醚(PBDEs)，邻苯二甲酸酯(DBP，BBP，DEHP，DIBP)进行测试。
Test Requested As specified by client, to test Lead (Pb), Cadmium (Cd), Mercury (Hg), Hexavalent Chromium (Cr(VI)), Polybrominated Biphenyls (PBBs), Polybrominated Diphenyl Ethers (PBDEs), Phthalates (DBP, BBP, DEHP, DIBP) in the submitted sample(s).

检测依据/检测结果 请参见下页。
Test Method/Test Result(s) Please refer to the following page(s).

主 检
Tested by 廖红月

审 核
Reviewed by

批 准
Approved by 刘琳慧

日 期
Date 2021.11.15

刘琳慧
授权签字人 Lab Authorized Signatory

No. R393381424

检测报告
Test Report

检测依据 Test Method

测试项目 Test Item(s)	测试方法 Test Method	测试仪器 Measured Equipment(s)
铅 Lead (Pb)	IEC 62321-5:2013	ICP-OES
镉 Cadmium (Cd)	IEC 62321-5:2013	ICP-OES
汞 Mercury (Hg)	IEC 62321-4:2013+AMD1:2017 CSV	ICP-OES
六价铬 Hexavalent Chromium (Cr(VI))	IEC 62321-7-2:2017和/或IEC 62321-5:2013测试总铬含量 IEC 62321-7-2:2017 and/or determination of Total Chromium by IEC 62321-5:2013	UV-Vis/ICP-OES
多溴联苯 Polybrominated Biphenyls (PBBs)	IEC 62321-6:2015	GC-MS
多溴二苯醚 Polybrominated Diphenyl Ethers (PBDEs)	IEC 62321-6:2015	GC-MS
邻苯二甲酸酯 Phthalates (DBP, BBP, DEHP, DIBP)	IEC 62321-8:2017	GC-MS

检测报告
Test Report

检测结果 Test Result(s)

测试项目 Tested Item(s)	结果 Result	方法检出限 MDL
铅 Lead (Pb)	N.D.	2 mg/kg
镉 Cadmium (Cd)	N.D.	2 mg/kg
汞 Mercury (Hg)	N.D.	2 mg/kg
六价铬 Hexavalent Chromium (Cr(VI))	N.D.	8 mg/kg

测试项目 Tested Item(s)	结果 Result	方法检出限 MDL
多溴联苯 Polybrominated Biphenyls (PBBs)		
一溴联苯 Monobromobiphenyl	N.D.	5 mg/kg
二溴联苯 Dibromobiphenyl	N.D.	5 mg/kg
三溴联苯 Tribromobiphenyl	N.D.	5 mg/kg
四溴联苯 Tetrabromobiphenyl	N.D.	5 mg/kg
五溴联苯 Pentabromobiphenyl	N.D.	5 mg/kg
六溴联苯 Hexabromobiphenyl	N.D.	5 mg/kg
七溴联苯 Heptabromobiphenyl	N.D.	5 mg/kg
八溴联苯 Octabromobiphenyl	N.D.	5 mg/kg
九溴联苯 Nonabromobiphenyl	N.D.	5 mg/kg
十溴联苯 Decabromobiphenyl	N.D.	5 mg/kg

测试项目 Tested Item(s)	结果 Result	方法检出限 MDL
多溴二苯醚 Polybrominated Diphenyl Ethers (PBDEs)		
一溴二苯醚 Monobromodiphenyl ether	N.D.	5 mg/kg
二溴二苯醚 Dibromodiphenyl ether	N.D.	5 mg/kg
三溴二苯醚 Tribromodiphenyl ether	N.D.	5 mg/kg
四溴二苯醚 Tetrabromodiphenyl ether	N.D.	5 mg/kg
五溴二苯醚 Pentabromodiphenyl ether	N.D.	5 mg/kg
六溴二苯醚 Hexabromodiphenyl ether	N.D.	5 mg/kg
七溴二苯醚 Heptabromodiphenyl ether	N.D.	5 mg/kg
八溴二苯醚 Octabromodiphenyl ether	N.D.	5 mg/kg
九溴二苯醚 Nonabromodiphenyl ether	N.D.	5 mg/kg
十溴二苯醚 Decabromodiphenyl ether	N.D.	5 mg/kg

检测报告
Test Report

报告编号 A2210470886101007E
Report No. A2210470886101007E

检测结果 Test Result(s)

测试项目 Tested Item(s)	结果 Result	方法检出限 MDL
邻苯二甲酸酯 Phthalates (DBP, BBP, DEHP, DIBP)		
邻苯二甲酸二丁酯 Dibutyl phthalate (DBP) CAS#:84-74-2	N.D.	50 mg/kg
邻苯二甲酸丁基苄基酯 Butyl benzyl phthalate (BBP) CAS#:85-68-7	N.D.	50 mg/kg
邻苯二甲酸二(2-乙基)己酯 Di-(2-ethylhexyl) phthalate (DEHP) CAS#:117-81-7	102 mg/kg	50 mg/kg
邻苯二甲酸二异丁酯 Diisobutyl phthalate (DIBP) CAS#:84-69-5	N.D.	50 mg/kg

样品/部位描述 黑色塑料颗粒
Sample/Part Description Black plastic grains

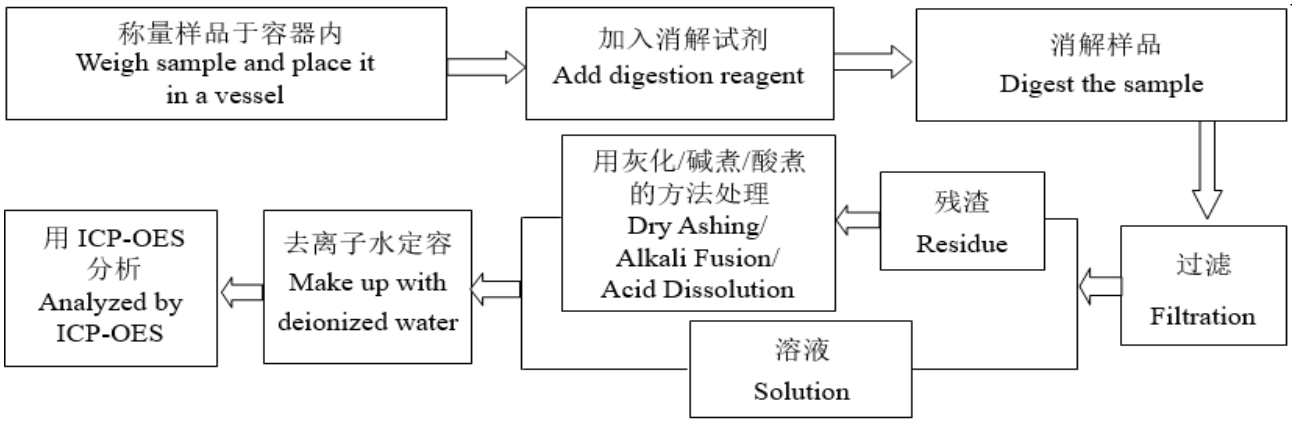
备注: **对于检测铅，镉，汞之样品已完全溶解。**
-N.D. = 未检出（小于方法检出限）
-mg/kg = ppm = 百万分之一

Remark: **The sample(s) had been dissolved totally tested for Lead, Cadmium, Mercury.**
-MDL = Method Detection Limit
-N.D. = Not Detected (<MDL)
-mg/kg = ppm = parts per million

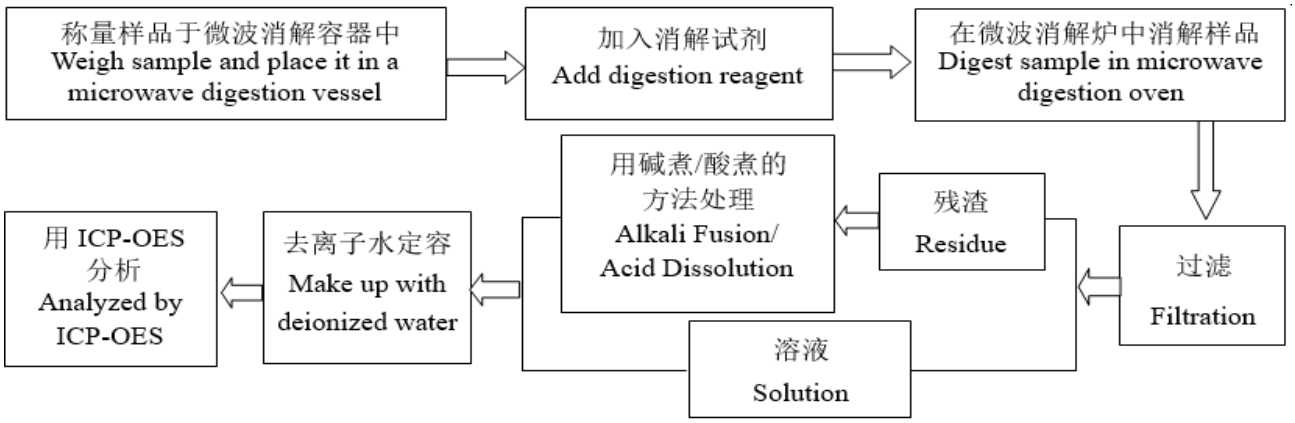
检测报告
Test Report

检测流程 Test Process

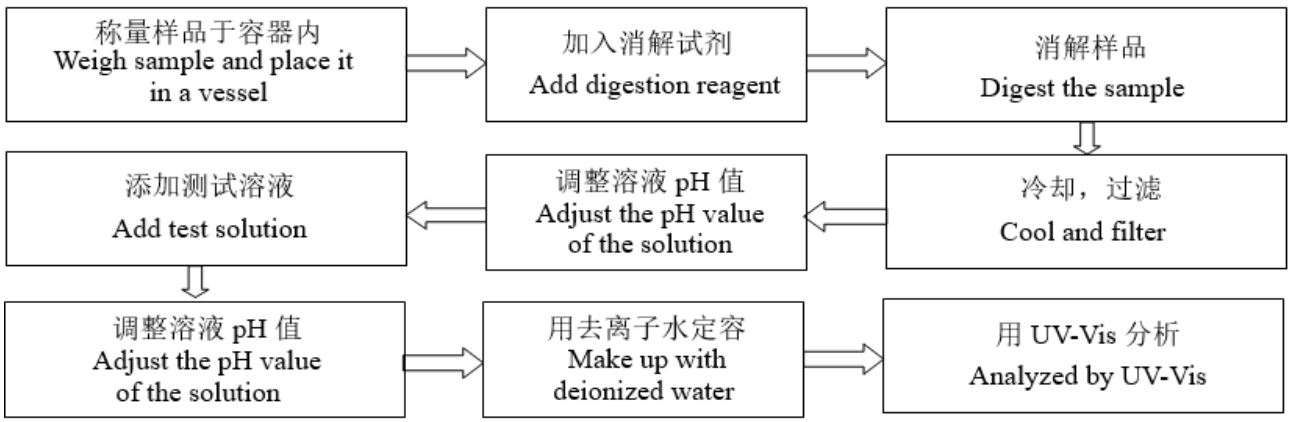
1. 铅(Pb)，镉(Cd)，铬(Cr)
   Lead (Pb), Cadmium (Cd), Chromium (Cr)



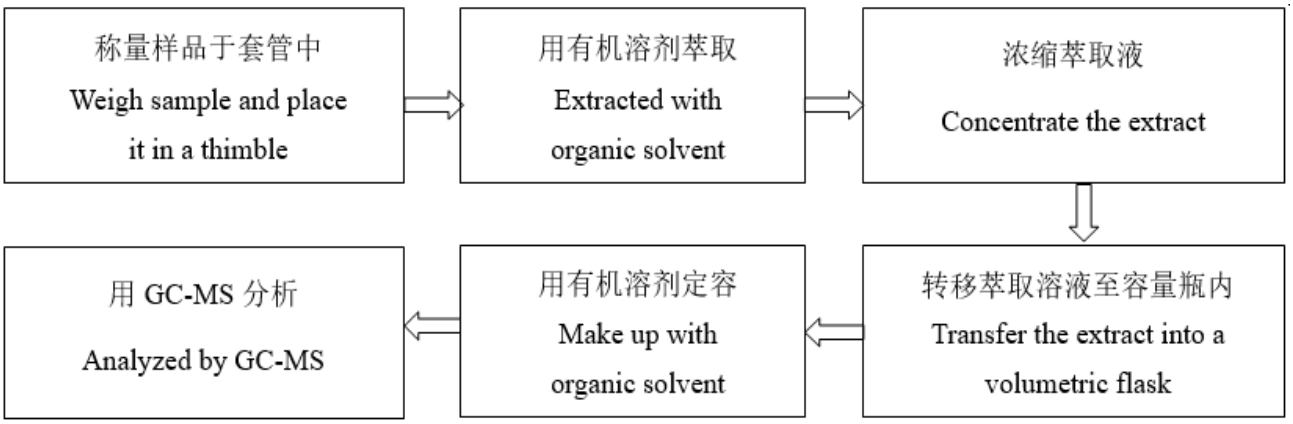
2. 汞(Hg)
   Mercury (Hg)



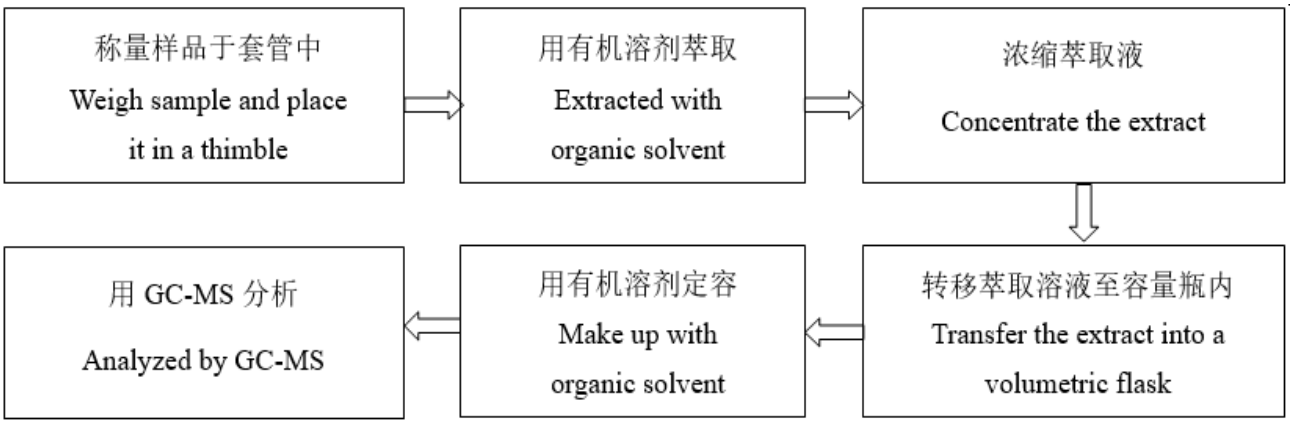
3. 六价铬(Cr(VI))
   Hexavalent Chromium (Cr(VI))



4. 多溴联苯(PBBs)， 多溴二苯醚(PBDEs)
Polybrominated Biphenyls (PBBs), Polybrominated Diphenyl Ethers (PBDEs)



5. 邻苯二甲酸酯(DBP, BBP, DEHP, DIBP)
Phthalates (DBP, BBP, DEHP, DIBP)



检测报告
Test Report

样品图片
Photo(s) of the sample(s)



声明Statement：

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   The Company Name shown on Report and Address, the sample(s) and sample information was/were provided by the applicant who should be responsible for the authenticity which CTI hasn’t verified;
3. 本报告检测结果仅对受测样品负责；
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报告结束
*** End of report ***

检测报告
Test Report

报告编号 A2210470886101009E
Report No. A2210470886101009E

报告抬头公司名称 深圳市达源塑胶有限公司
Company Name shown on Report SHENZHEN DAYUAN SUJIAO CO.,LTD.
地 址 深圳市宝安区沙井民主西部工业园G区B1栋
Address BUILDING B1,AREA G,MINZHU WESTERN LNDUSTRIAL PARK ,SHAJING,BAOAN .

以下测试之样品及样品信息由申请者提供并确认
The following sample(s) and sample information was/were submitted and identified by/on the behalf of the applicant

样品名称	PVC胶粒
Sample Name	PVC胶粒
样品接收日期	2021.11.11
Sample Received Date	Nov. 11, 2021
样品检测日期	2021.11.11-2021.11.15
Testing Period	Nov. 11, 2021 to Nov. 15, 2021

检测要求 根据客户要求，对所提交样品中的铅(Pb)，镉(Cd)，汞(Hg)，六价铬(Cr(VI))，多溴联苯(PBBs)，多溴二苯醚(PBDEs)，邻苯二甲酸酯(DBP，BBP，DEHP，DIBP)进行测试。
Test Requested As specified by client, to test Lead (Pb), Cadmium (Cd), Mercury (Hg), Hexavalent Chromium (Cr(VI)), Polybrominated Biphenyls (PBBs), Polybrominated Diphenyl Ethers (PBDEs), Phthalates (DBP, BBP, DEHP, DIBP) in the submitted sample(s).

检测依据/检测结果 请参见下页。
Test Method/Test Result(s) Please refer to the following page(s).

主 检
Tested by 廖红月

批 准
Approved by 刘琳慧

刘琳慧
授权签字人 Lab Authorized Signatory

审 核
Reviewed by

日 期
Date 2021.11.15

No. R393381424

华测检测认证集团股份有限公司
Centre Testing International Group Co.,Ltd.
广东省深圳市宝安区新安街道兴东社区华测检测大楼
CTI Building, Xing Dong Community, Xin'an Sub-district, Bao'an District, Shenzhen City, Guangdong Province, P.R. China

检测报告
Test Report

检测依据 Test Method

测试项目 Test Item(s)	测试方法 Test Method	测试仪器 Measured Equipment(s)
铅 Lead (Pb)	IEC 62321-5:2013	ICP-OES
镉 Cadmium (Cd)	IEC 62321-5:2013	ICP-OES
汞 Mercury (Hg)	IEC 62321-4:2013+AMD1:2017 CSV	ICP-OES
六价铬 Hexavalent Chromium (Cr(VI))	IEC 62321-7-2:2017和/或IEC 62321-5:2013测试总铬含量 IEC 62321-7-2:2017 and/or determination of Total Chromium by IEC 62321-5:2013	UV-Vis/ICP-OES
多溴联苯 Polybrominated Biphenyls (PBBs)	IEC 62321-6:2015	GC-MS
多溴二苯醚 Polybrominated Diphenyl Ethers (PBDEs)	IEC 62321-6:2015	GC-MS
邻苯二甲酸酯 Phthalates (DBP, BBP, DEHP, DIBP)	IEC 62321-8:2017	GC-MS

检测报告
Test Report

检测结果 Test Result(s)

测试项目 Tested Item(s)	结果 Result	方法检出限 MDL
铅 Lead (Pb)	N.D.	2 mg/kg
镉 Cadmium (Cd)	N.D.	2 mg/kg
汞 Mercury (Hg)	N.D.	2 mg/kg
六价铬 Hexavalent Chromium (Cr(VI))	N.D.	8 mg/kg

测试项目 Tested Item(s)	结果 Result	方法检出限 MDL
多溴联苯 Polybrominated Biphenyls (PBBs)		
一溴联苯 Monobromobiphenyl	N.D.	5 mg/kg
二溴联苯 Dibromobiphenyl	N.D.	5 mg/kg
三溴联苯 Tribromobiphenyl	N.D.	5 mg/kg
四溴联苯 Tetrabromobiphenyl	N.D.	5 mg/kg
五溴联苯 Pentabromobiphenyl	N.D.	5 mg/kg
六溴联苯 Hexabromobiphenyl	N.D.	5 mg/kg
七溴联苯 Heptabromobiphenyl	N.D.	5 mg/kg
八溴联苯 Octabromobiphenyl	N.D.	5 mg/kg
九溴联苯 Nonabromobiphenyl	N.D.	5 mg/kg
十溴联苯 Decabromobiphenyl	N.D.	5 mg/kg

测试项目 Tested Item(s)	结果 Result	方法检出限 MDL
多溴二苯醚 Polybrominated Diphenyl Ethers (PBDEs)		
一溴二苯醚 Monobromodiphenyl ether	N.D.	5 mg/kg
二溴二苯醚 Dibromodiphenyl ether	N.D.	5 mg/kg
三溴二苯醚 Tribromodiphenyl ether	N.D.	5 mg/kg
四溴二苯醚 Tetrabromodiphenyl ether	N.D.	5 mg/kg
五溴二苯醚 Pentabromodiphenyl ether	N.D.	5 mg/kg
六溴二苯醚 Hexabromodiphenyl ether	N.D.	5 mg/kg
七溴二苯醚 Heptabromodiphenyl ether	N.D.	5 mg/kg
八溴二苯醚 Octabromodiphenyl ether	N.D.	5 mg/kg
九溴二苯醚 Nonabromodiphenyl ether	N.D.	5 mg/kg
十溴二苯醚 Decabromodiphenyl ether	N.D.	5 mg/kg

检测报告
Test Report

检测结果 Test Result(s)

测试项目 Tested Item(s)	结果 Result	方法检出限 MDL
邻苯二甲酸酯 Phthalates (DBP, BBP, DEHP, DIBP)		
邻苯二甲酸二丁酯 Dibutyl phthalate (DBP) CAS#:84-74-2	N.D.	50 mg/kg
邻苯二甲酸丁基苄基酯 Butyl benzyl phthalate (BBP) CAS#:85-68-7	N.D.	50 mg/kg
邻苯二甲酸二(2-乙基)己酯 Di-(2-ethylhexyl) phthalate (DEHP) CAS#:117-81-7	N.D.	50 mg/kg
邻苯二甲酸二异丁酯 Diisobutyl phthalate (DIBP) CAS#:84-69-5	N.D.	50 mg/kg

样品/部位描述 红色塑料颗粒
Sample/Part Description Red plastic grains

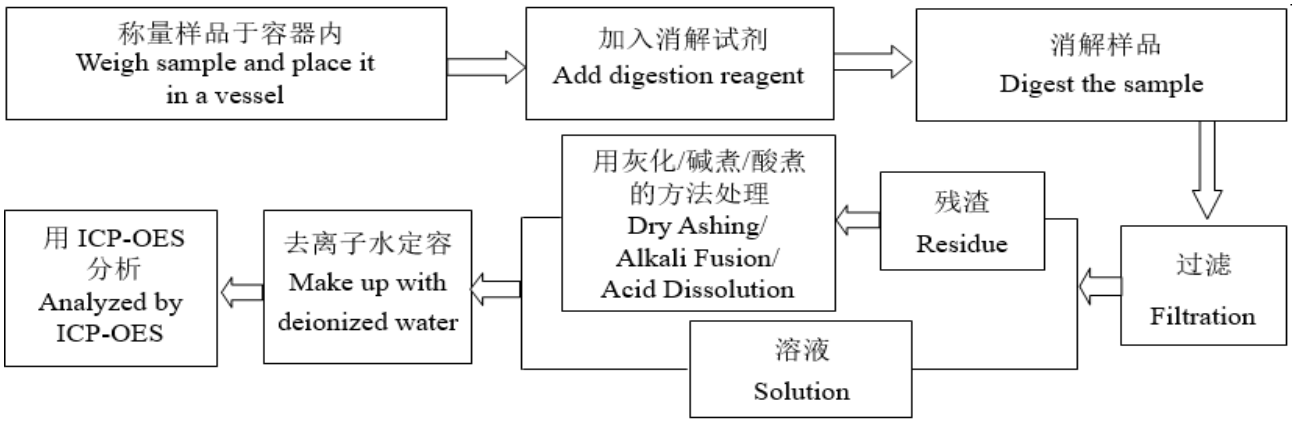
备注: **对于检测铅，镉，汞之样品已完全溶解。**
-N.D. = 未检出（小于方法检出限）
-mg/kg = ppm = 百万分之一

Remark: **The sample(s) had been dissolved totally tested for Lead, Cadmium, Mercury.**
-MDL = Method Detection Limit
-N.D. = Not Detected (<MDL)
-mg/kg = ppm = parts per million

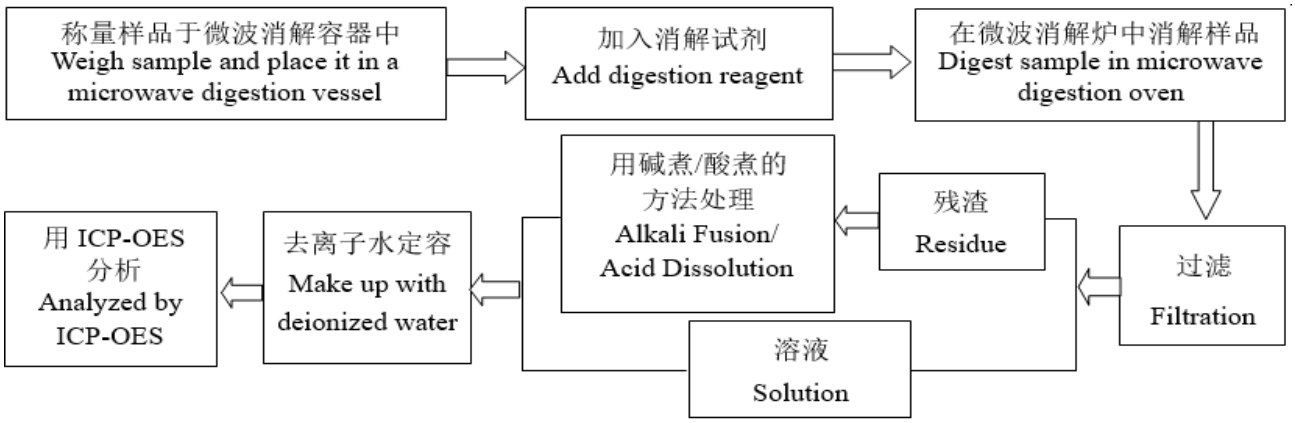
检测报告
Test Report

检测流程 Test Process

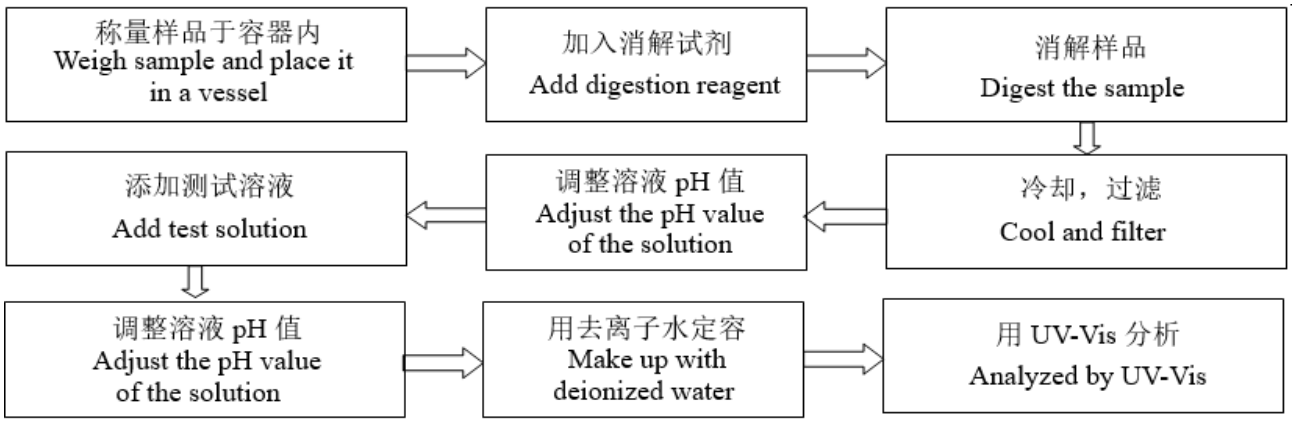
1. 铅(Pb)，镉(Cd)，铬(Cr)
   Lead (Pb), Cadmium (Cd), Chromium (Cr)



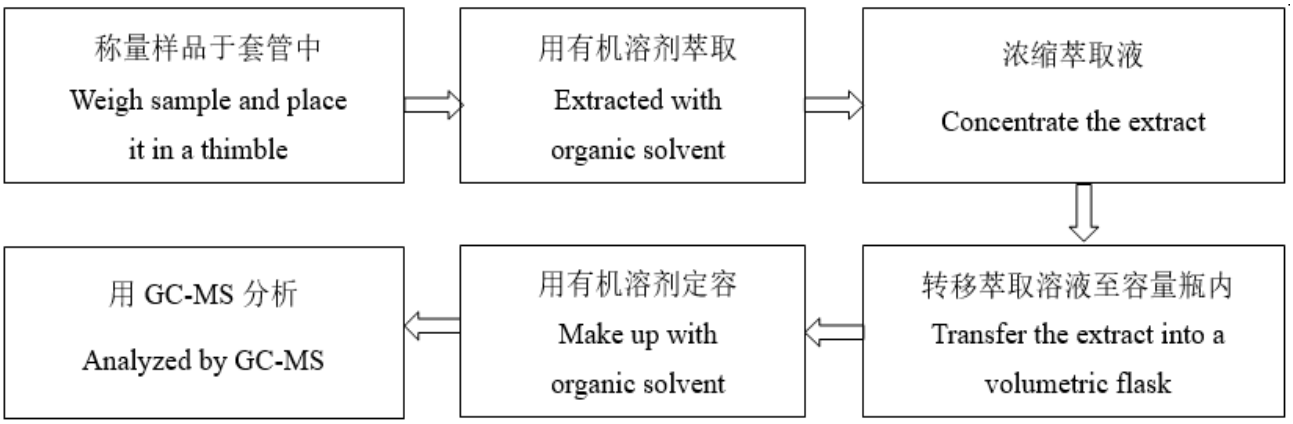
2. 汞(Hg)
   Mercury (Hg)



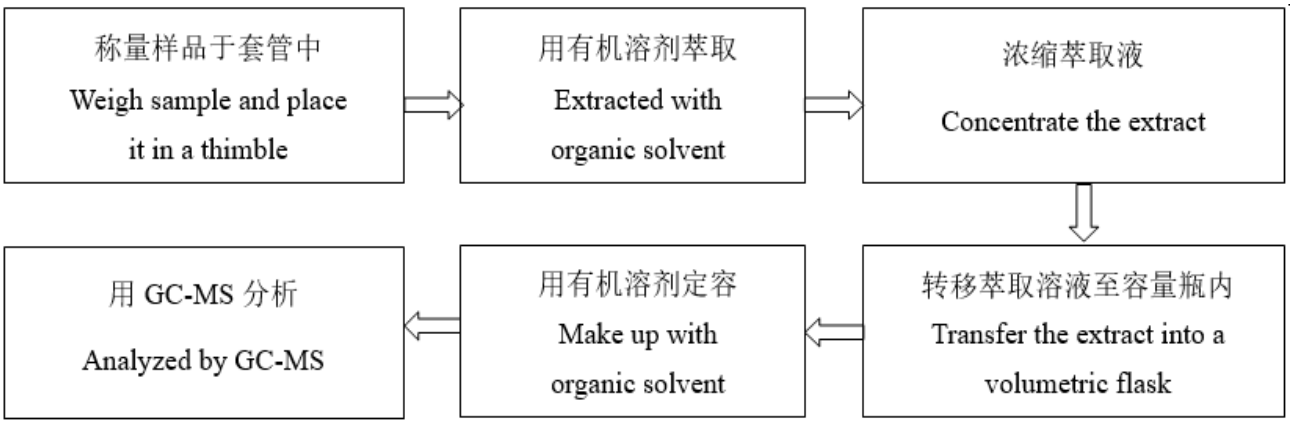
3. 六价铬(Cr(VI))
   Hexavalent Chromium (Cr(VI))



4. 多溴联苯(PBBs)， 多溴二苯醚(PBDEs)
Polybrominated Biphenyls (PBBs), Polybrominated Diphenyl Ethers (PBDEs)



5. 邻苯二甲酸酯(DBP, BBP, DEHP, DIBP)
Phthalates (DBP, BBP, DEHP, DIBP)



检测报告
Test Report

样品图片
Photo(s) of the sample(s)



声明Statement：

1. 检测报告无批准人签字、“专用章”及报告骑缝章无效；
   This report is considered invalid without approved signature, special seal and the seal on the perforation;
2. 报告抬头公司名称及地址、样品及样品信息由申请者提供，申请者应对其真实性负责，CTI未核实其真实性；
   The Company Name shown on Report and Address, the sample(s) and sample information was/were provided by the applicant who should be responsible for the authenticity which CTI hasn’t verified;
3. 本报告检测结果仅对受测样品负责；
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报告结束
*** End of report ***

Test Report

Client Name : SHENZHEN SAN XIN FLAT TECHNOLOGY CO.,LTD

Client Address : 208, FLOOR 2, HEPING INDUSTRIAL PARK, HEPING ROAD, YUCUI COMMUNITY, LONGHUA STREET, LONGHUA DISTRICT, SHENZHEN

Sample Name : Red Ink

Client Ref. Info. : YM-31730 YM-30730 YM-302 YM- 30380 YM- 30397

The above sample(s) and information were provided by the client.

SGS Job No. : CP22-015063 - SZ

Date of Sample Received : 30 Mar 2022

Testing Period : 30 Mar 2022 - 08 Apr 2022

Test Requested : Selected test(s) as requested by the client.

Test Method(s) : Please refer to next page(s).

Test Result(s) : Please refer to next page(s).

Conclusion : Based on the performed tests on submitted sample(s), the results of Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) and Phthalates such as Bis(2-ethylhexyl) phthalate (DEHP) , Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) , and Diisobutyl phthalate (DIBP) comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Signed for and on behalf of
SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch

Jany Zhong

Jany Zhong

scan to see the report

B62E8023

SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch Testing Center Chemical Laboratory

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Test Result(s) :

Test Part Description :

Specimen No.	SGS Sample ID	Description
SN1	CAN22-052665.004	Red Ink

Remarks :

(1) 1 mg/kg = 1 ppm = 0.0001%

(2) MDL = Method Detection Limit

(3) ND = Not Detected (< MDL)

(4) "-" = Not Regulated

RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

Test Method : With reference to IEC 62321-4:2013+A1:2017, IEC 62321-5:2013, IEC 62321-7-2:2017 , IEC 62321-6:2015 and IEC 62321-8:2017, analyzed by ICP-OES , UV-Vis and GC-MS .

Test Item(s)	Limit	Unit	MDL	*004*
Cadmium (Cd)	100	mg/kg	2	ND
Lead (Pb)	1,000	mg/kg	2	ND
Mercury (Hg)	1,000	mg/kg	2	ND
Hexavalent Chromium (CrVI)	1,000	mg/kg	8	ND
Sum of PBBs	1,000	mg/kg	-	ND
Monobromobiphenyl	-	mg/kg	5	ND
Dibromobiphenyl	-	mg/kg	5	ND
Tribromobiphenyl	-	mg/kg	5	ND
Tetrabromobiphenyl	-	mg/kg	5	ND
Pentabromobiphenyl	-	mg/kg	5	ND
Hexabromobiphenyl	-	mg/kg	5	ND
Heptabromobiphenyl	-	mg/kg	5	ND
Octabromobiphenyl	-	mg/kg	5	ND
Nonabromobiphenyl	-	mg/kg	5	ND
Decabromobiphenyl	-	mg/kg	5	ND
Sum of PBDEs	1,000	mg/kg	-	ND
Monobromodiphenyl ether	-	mg/kg	5	ND
Dibromodiphenyl ether	-	mg/kg	5	ND
Tribromodiphenyl ether	-	mg/kg	5	ND
Tetrabromodiphenyl ether	-	mg/kg	5	ND
Pentabromodiphenyl ether	-	mg/kg	5	ND

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Test Item(s)	Limit	Unit	MDL	*004*
Hexabromodiphenyl ether	-	mg/kg	5	ND
Heptabromodiphenyl ether	-	mg/kg	5	ND
Octabromodiphenyl ether	-	mg/kg	5	ND
Nonabromodiphenyl ether	-	mg/kg	5	ND
Decabromodiphenyl ether	-	mg/kg	5	ND
Dibutyl phthalate (DBP)	1,000	mg/kg	50	ND
Butyl benzyl phthalate (BBP)	1,000	mg/kg	50	ND
Bis (2-ethylhexyl) phthalate (DEHP)	1,000	mg/kg	50	ND
Diisobutyl Phthalates (DIBP)	1,000	mg/kg	50	ND

Notes :

(1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.
(2) IEC 62321 series is equivalent to EN 62321 series
https://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101::::FSP_ORG_ID,FSP_LANG_ID:1258637,25
(3) The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, from 22 July 2021.
Unless otherwise stated, the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule (w =0) stated in ILAC-G8:09/2019.

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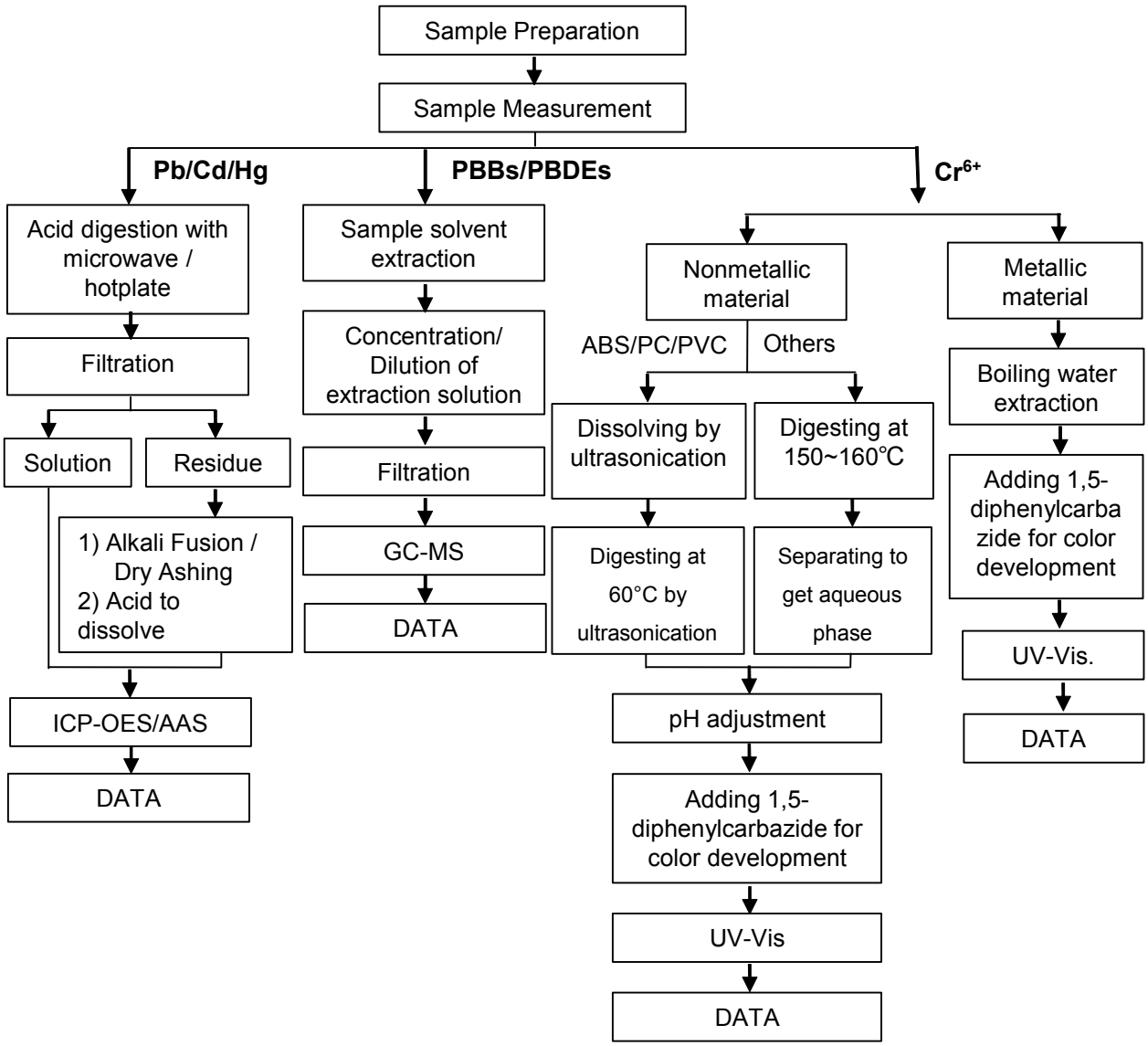
Pb/Cd/Hg/Cr^{6+}/PBBs/PBDEs Testing Flow Chart

1) These samples were dissolved totally by pre -conditioning method according to below flow chart. (Cr^{6+} and PBBs/PBDEs test method excluded).



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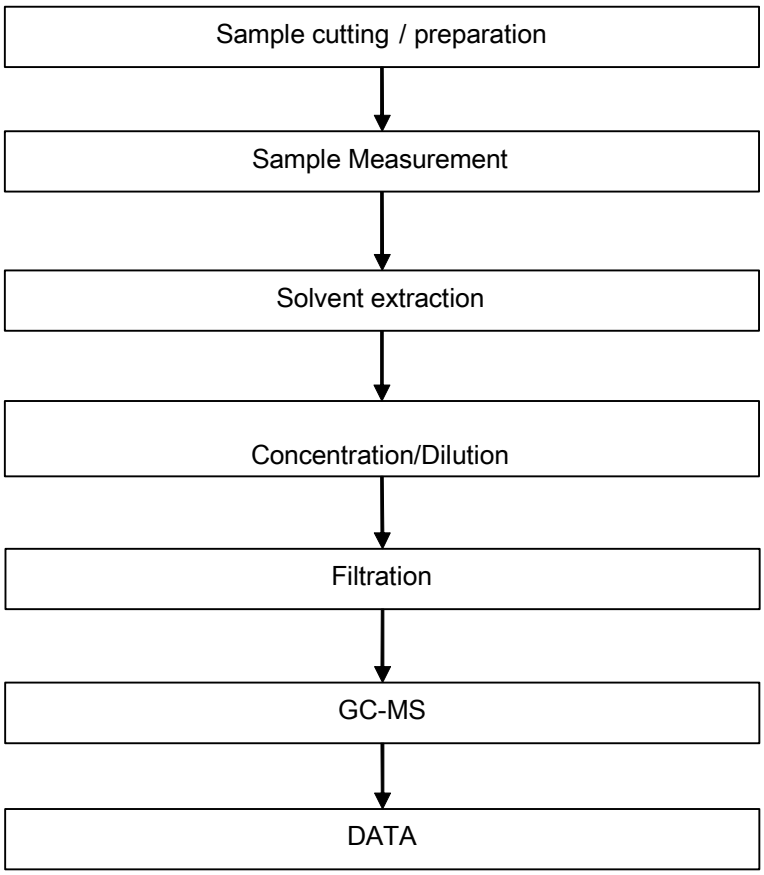
Phthalates Testing Flow Chart



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Sample photo:



CAN22-052665.004

SGS authenticate the photo on original report only

*** End of Report ***

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Test Report

No. CANEC2205266513 Date: 11 Apr 2022 Page 1 of 6

Client Name : SHENZHEN SAN XIN FLAT TECHNOLOGY CO.,LTD

Client Address : 208, FLOOR 2, HEPING INDUSTRIAL PARK, HEPING ROAD, YUCUI COMMUNITY, LONGHUA STREET, LONGHUA DISTRICT, SHENZHEN

Sample Name : Black ink

The above sample(s) and information were provided by the client.

SGS Job No. :	CP22-015063 - SZ
Date of Sample Received :	30 Mar 2022
Testing Period :	30 Mar 2022 - 08 Apr 2022
Test Requested :	Selected test(s) as requested by the client.
Test Method(s) :	Please refer to next page(s).
Test Result(s) :	Please refer to next page(s).
Conclusion :	Based on the performed tests on submitted sample(s), the results of Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) and Phthalates such as Bis(2-ethylhexyl) phthalate (DEHP) , Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) , and Diisobutyl phthalate (DIBP) comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Signed for and on behalf of
SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch

Jany Zhong

Jany Zhong

scan to see the report

C31A2060

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Test Result(s) :

Test Part Description :

Specimen No.	SGS Sample ID	Description
SN1	CAN22-052665.005	Black ink

Remarks :

(1) 1 mg/kg = 1 ppm = 0.0001%

(2) MDL = Method Detection Limit

(3) ND = Not Detected (< MDL)

(4) "-" = Not Regulated

RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

Test Method : With reference to IEC 62321-4:2013+A1:2017, IEC 62321-5:2013, IEC 62321-7-2:2017 , IEC 62321-6:2015 and IEC 62321-8:2017, analyzed by ICP-OES , UV-Vis and GC-MS .

Test Item(s)	Limit	Unit	MDL	*005*
Cadmium (Cd)	100	mg/kg	2	ND
Lead (Pb)	1,000	mg/kg	2	4
Mercury (Hg)	1,000	mg/kg	2	ND
Hexavalent Chromium (CrVI)	1,000	mg/kg	8	ND
Sum of PBBs	1,000	mg/kg	-	ND
Monobromobiphenyl	-	mg/kg	5	ND
Dibromobiphenyl	-	mg/kg	5	ND
Tribromobiphenyl	-	mg/kg	5	ND
Tetrabromobiphenyl	-	mg/kg	5	ND
Pentabromobiphenyl	-	mg/kg	5	ND
Hexabromobiphenyl	-	mg/kg	5	ND
Heptabromobiphenyl	-	mg/kg	5	ND
Octabromobiphenyl	-	mg/kg	5	ND
Nonabromobiphenyl	-	mg/kg	5	ND
Decabromobiphenyl	-	mg/kg	5	ND
Sum of PBDEs	1,000	mg/kg	-	ND
Monobromodiphenyl ether	-	mg/kg	5	ND
Dibromodiphenyl ether	-	mg/kg	5	ND
Tribromodiphenyl ether	-	mg/kg	5	ND
Tetrabromodiphenyl ether	-	mg/kg	5	ND
Pentabromodiphenyl ether	-	mg/kg	5	ND

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Test Item(s)	Limit	Unit	MDL	*005*
Hexabromodiphenyl ether	-	mg/kg	5	ND
Heptabromodiphenyl ether	-	mg/kg	5	ND
Octabromodiphenyl ether	-	mg/kg	5	ND
Nonabromodiphenyl ether	-	mg/kg	5	ND
Decabromodiphenyl ether	-	mg/kg	5	ND
Dibutyl phthalate (DBP)	1,000	mg/kg	50	ND
Butyl benzyl phthalate (BBP)	1,000	mg/kg	50	ND
Bis (2-ethylhexyl) phthalate (DEHP)	1,000	mg/kg	50	ND
Diisobutyl Phthalates (DIBP)	1,000	mg/kg	50	ND

Notes :

(1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.
(2) IEC 62321 series is equivalent to EN 62321 series
https://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101::::FSP_ORG_ID,FSP_LANG_ID:1258637,25
(3) The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, from 22 July 2021.
Unless otherwise stated, the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule (w =0) stated in ILAC-G8:09/2019.

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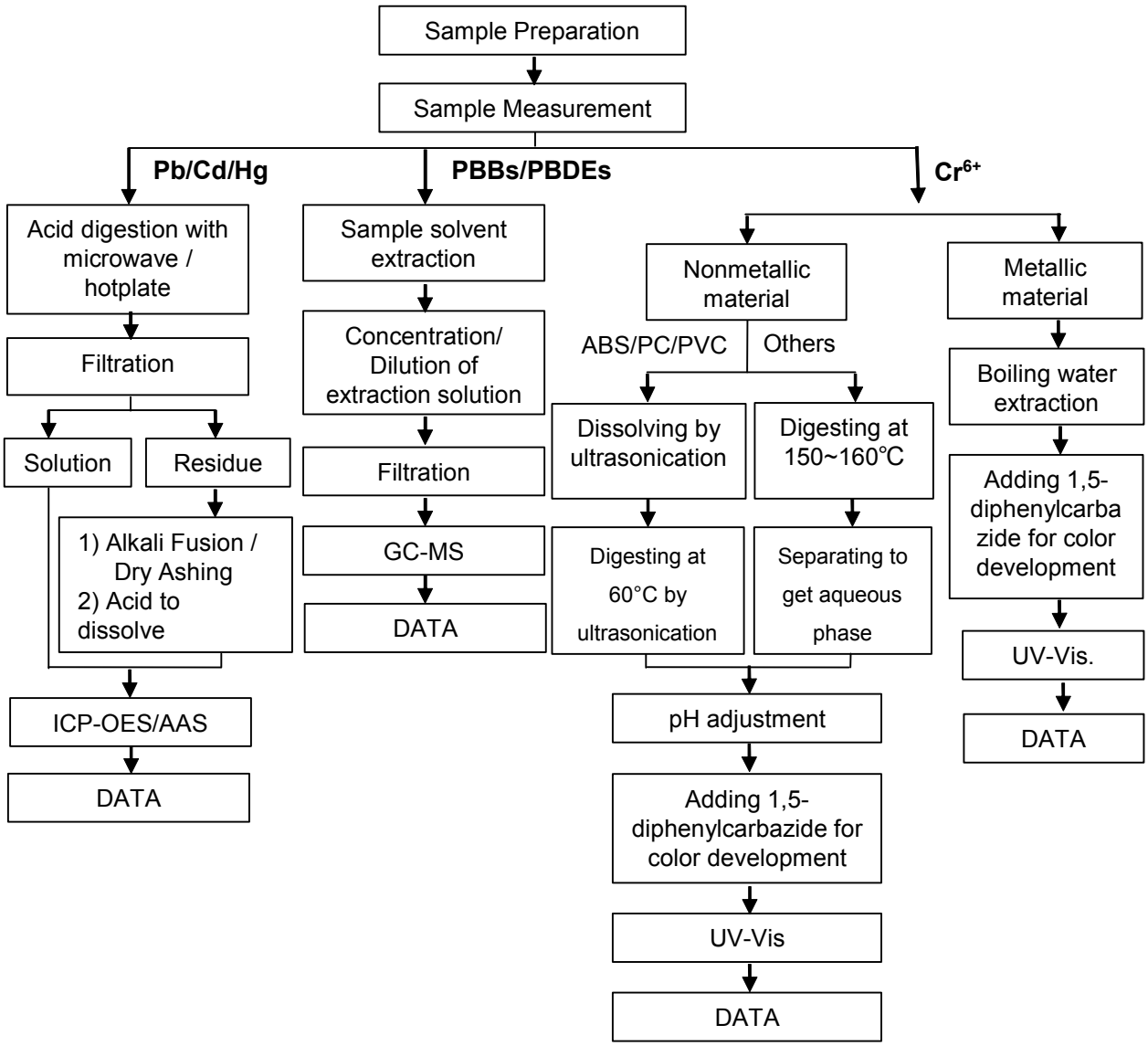
Pb/Cd/Hg/Cr^{6+}/PBBs/PBDEs Testing Flow Chart

1) These samples were dissolved totally by pre -conditioning method according to below flow chart. (Cr^{6+} and PBBs/PBDEs test method excluded).



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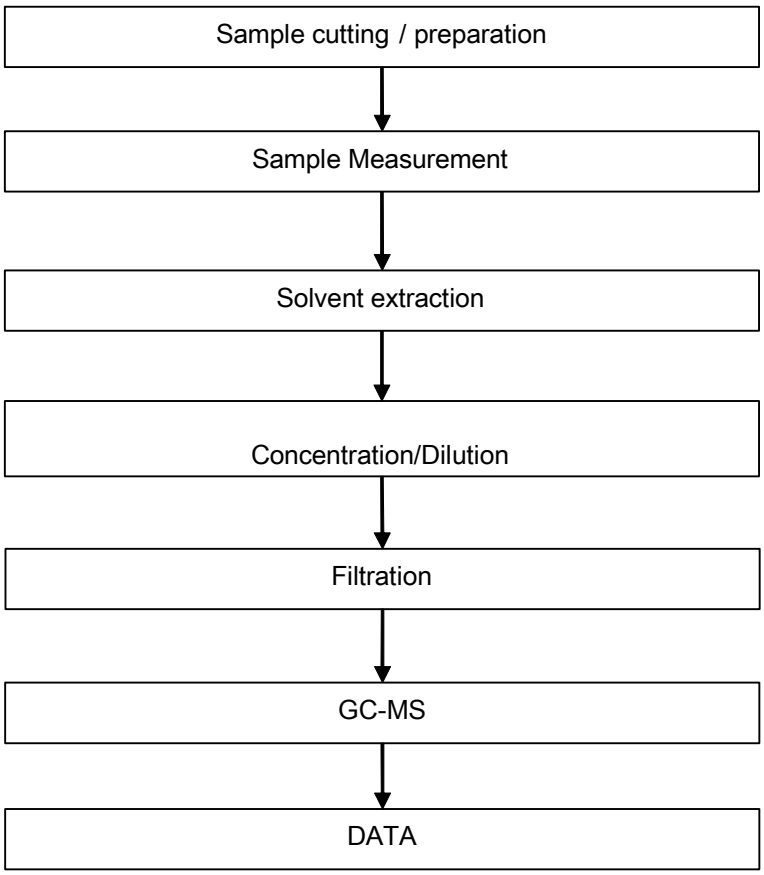
Phthalates Testing Flow Chart



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Sample photo:



CAN22-052665.005

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198 Kezhu Road,Scientech Park Guangzhou Economic & Technology Development District,Guangzhou,China 510663 t (86-20) 82155555 www.sgsgroup.com.cn
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Test Report

No. SZXEC2200843601 Date: 08 Apr 2022 Page 1 of 6

Client Name : SHENZHEN DING SHENG TONG YE CO.,LTD.

Client Address : SHENZHEN BAOAN ARET SHAJING PARK INDUSTRIAL MINZHU XIBU AREA G BLDG B1

Sample Name : Tin plated copper

The above sample(s) and information were provided by the client.

SGS Job No. :	RP22-006204 - SZ
Date of Sample Received :	01 Apr 2022
Testing Period :	01 Apr 2022 - 08 Apr 2022
Test Requested :	Selected test(s) as requested by the client.
Test Method(s) :	Please refer to next page(s).
Test Result(s) :	Please refer to next page(s).
Conclusion :	Based on the performed tests on submitted sample(s), the results of Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) and Phthalates such as Bis(2-ethylhexyl) phthalate (DEHP) , Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP) comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Signed for and on behalf of
SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

scan to see the report

9B8D24EC

Tina Fan
Approved Signatory

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Test Result(s) :

Test Part Description :

Specimen No.	SGS Sample ID	Description
SN1	SZX22-008436.001	Silver-gray plated metal wire

Remarks :

(1) 1 mg/kg = 1 ppm = 0.0001%

(2) MDL = Method Detection Limit

(3) ND = Not Detected (< MDL)

(4) "-" = Not Regulated

RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

Test Method : With reference to IEC 62321-4:2013+AMD1:2017, IEC62321-5:2013, IEC 62321-7-1:2015, IEC 62321-6:2015 and IEC 62321-8:2017, analyzed by ICP-OES, UV-Vis and GC-MS.

Test Item(s)	Limit	Unit	MDL	*001*
Cadmium (Cd)	100	mg/kg	2	ND
Lead (Pb)	1,000	mg/kg	2	ND
Mercury (Hg)	1,000	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))▾	-	μg/cm²	0.10	ND
Sum of PBBs	1,000	mg/kg	-	ND
Monobromobiphenyl	-	mg/kg	5	ND
Dibromobiphenyl	-	mg/kg	5	ND
Tribromobiphenyl	-	mg/kg	5	ND
Tetrabromobiphenyl	-	mg/kg	5	ND
Pentabromobiphenyl	-	mg/kg	5	ND
Hexabromobiphenyl	-	mg/kg	5	ND
Heptabromobiphenyl	-	mg/kg	5	ND
Octabromobiphenyl	-	mg/kg	5	ND
Nonabromobiphenyl	-	mg/kg	5	ND
Decabromobiphenyl	-	mg/kg	5	ND
Sum of PBDEs	1,000	mg/kg	-	ND
Monobromodiphenyl ether	-	mg/kg	5	ND
Dibromodiphenyl ether	-	mg/kg	5	ND
Tribromodiphenyl ether	-	mg/kg	5	ND
Tetrabromodiphenyl ether	-	mg/kg	5	ND
Pentabromodiphenyl ether	-	mg/kg	5	ND

检验检测专用章 Inspection & Testing Services
SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch Testing Center Electrical Laboratory

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Test Item(s)	Limit	Unit	MDL	*001*
Hexabromodiphenyl ether	-	mg/kg	5	ND
Heptabromodiphenyl ether	-	mg/kg	5	ND
Octabromodiphenyl ether	-	mg/kg	5	ND
Nonabromodiphenyl ether	-	mg/kg	5	ND
Decabromodiphenyl ether	-	mg/kg	5	ND
Dibutyl phthalate (DBP)	1000	mg/kg	50	ND
Butyl benzyl Phthalate (BBP)	1000	mg/kg	50	ND
Bis(2-ethylhexyl) Phthalate (DEHP)	1000	mg/kg	50	ND
Diisobutyl Phthalate (DIBP)	1000	mg/kg	50	ND

Notes :

(1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.
(2) IEC 62321 series is equivalent to EN 62321 series
https://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101::::FSP_ORG_ID,FSP_LANG_ID:1258637,25
(3) ▼= a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 µg/cm2. The sample coating is considered to contain CrVI
b. The sample is negative for CrVI if CrVI is ND (concentration less than 0.10 µg/cm2). The coating is considered a non-CrVI based coating
c. The result between 0.10 µg/cm2 and 0.13 µg/cm2 is considered to be inconclusive - unavoidable coating variations may influence the determination.

Information on storage conditions and production date of the tested sample is unavailable and thus Cr(VI) results represent status of the sample at the time of testing.
Unless otherwise stated, the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule (w =0) stated in ILAC-G8:09/2019.

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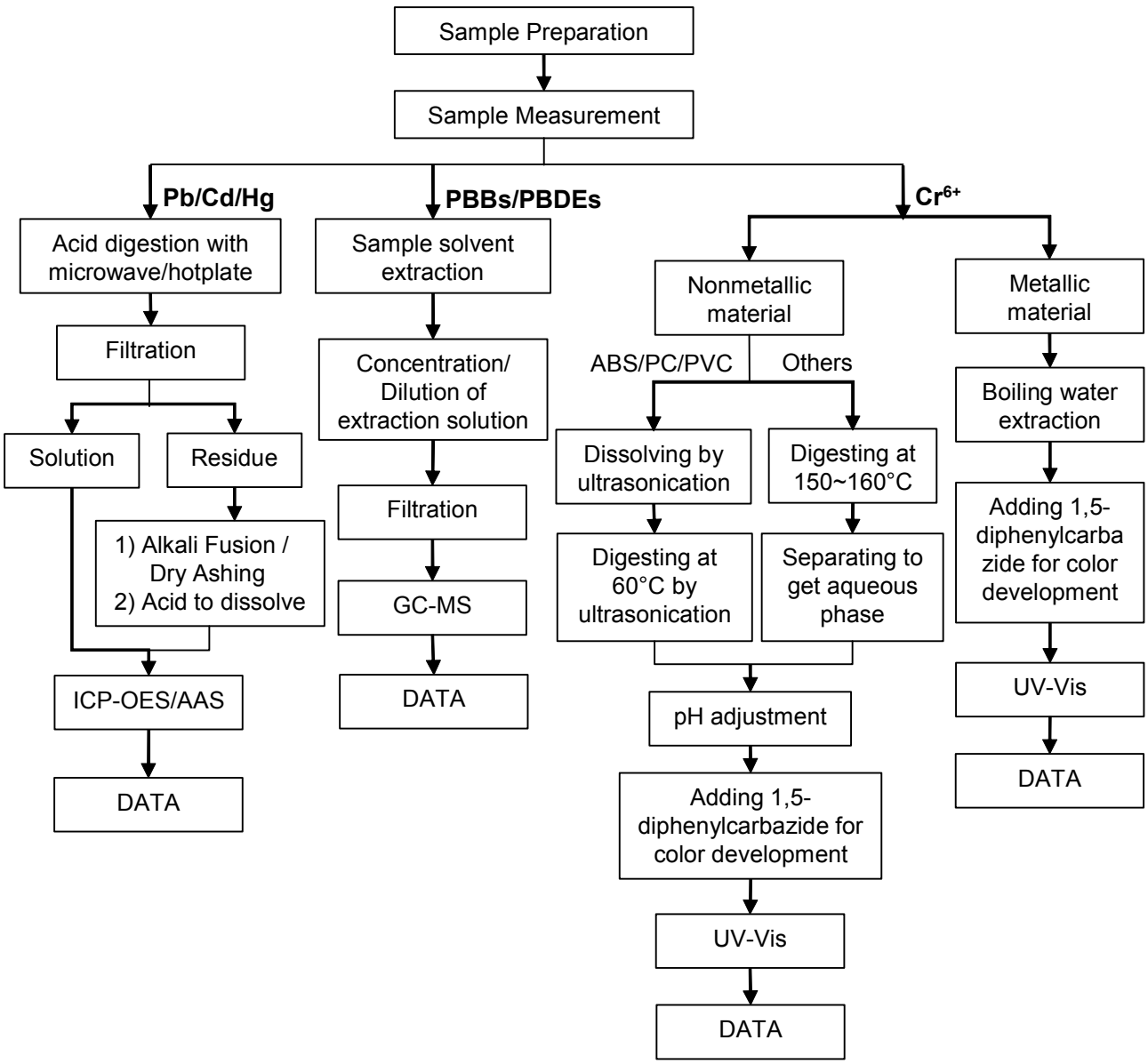
Pb/Cd/Hg/Cr^{6+}/PBBs/PBDEs Testing Flow Chart

1)These samples were dissolved totally by pre -conditioning method according to below flow chart. (Cr^{6+} and PBBs/PBDEs test method excluded).



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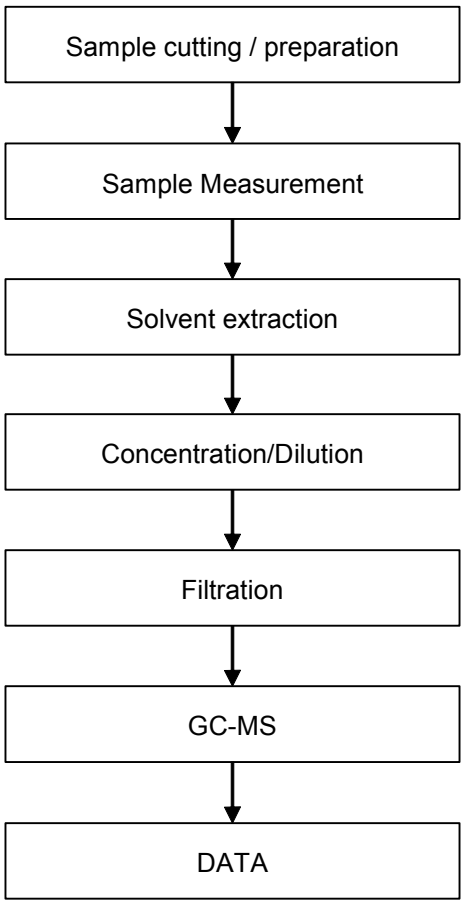
Phthalates Testing Flow Chart



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Sample photo:



SZX22-008436.001

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Material Safety Data Sheet

物質安全資料表

一、物品與廠商資料/Product and Company Identification

物品名稱： 纳米晶带材 Product Name：Nanocrystalline ribbon
物品編號： **1k107** Product Code：1k107
製造商或供應商名稱：安泰科技股份有限公司永丰纳米晶制品分公司 Name of Manufacturer or Agent： Advanced Technology& Materials Co.,Ltd Yongfeng Nanocrystalline Products Branch
地址：北京市海淀区永丰产业基地永澄北路 10 号 B 区 Address：Zone B ,No.10 Yongchengbeilu,Yongfeng Industrial Base Haidian,Beijing China

電話：010-58712641 Tel：010-58712641	傳真電話：010-58712642 Fax：010-58712642

二、成分辨識資料/Composition, Information on Ingredients

成分名稱 Component Chemical Name	分子式 Equation	濃度(成分百比) Concentration (Percentage)%	化學文摘社登記號碼 CAS No.
硅	Si	7-8%	7440-21-3
硼	B	1-2%	7440-42-8
铁	Fe	> 80%	7439-89-6
铜	Cu	1-2%	7440-50-8
铌	Nb	5-6%	7440-03-1

三、危害辨識資料/ Hazard Identification

最重要危害效應 Most Important Health Hazards and Reactions	健康危害效應/Health Hazards and Reactions：无
	環境影響/Environmental Impact：无
	物理性及化學性危害/Physical and Chemical Hazards：无
	特殊危害/Specific Hazards：无
主要症狀/Cardinal Symptoms：长期接触无危害	
物品危害分類/Hazard Classification：无	

四、急救措施/ First Aid Measures

不同暴露途徑之急救方法/ First Aid Measures for Different Kinds of Exposures：

- 吸入/Inhalation：无。
- 皮膚接觸/Skin Contact：砸伤、割伤

· 眼睛接觸/Eye Contact：无 · 食入/Ingestion：无
最重要症狀及危害效應/Most Important Symptoms and Hazard Reactions：无
對急救人員之防護/Protection to First-Aid Attendants：无
對醫師之提示/Suggestions to Doctors：无

五、滅火措施/ Fire Fighting Measures

適用滅火劑/Suitable Extinguishing Media：干粉
滅火時可能遭遇之特殊危害/Special Hazards in Fire：无资料
特殊滅火程序/Special Fire-Fighting Procedures：无资料
消防人員之特殊防護設備/Required Special Protective Equipment for Fire-Fighters： 无

六、洩漏處理方法/ Accidental Release Measures

個人應注意事項/ Personal Precautions：无
環境注意事項/Environmental Precautions：
清理方法/Methods for Cleaning：收集回收

七、安全處置與儲存方法/ Handling and Storage

處置/Handling：做好整理整顿等
儲存/ Storage：储存于阴凉、通风的库房。

八、暴露預防措施/ Exposure Controls, Personal Protection

工程控制/ Engineering Measures：**提供良好的自然通风条件**等
控制參數/ Control Parameters： · 八小時日時量平均容許濃度(TWA)/短時間時量平均容許濃度(STEL)/最高容許濃度(CEILING)： · 生物指標/ BEIs：
個人防護設備/ Personal Protection Equipment： · 呼吸防護/Respiration：一般**佩戴口罩。** · 手部防護/Hand：**一般戴作业防护手套** · 眼睛防護/Eye：**一般**配戴**防护眼镜。** · 皮膚及身體防護/Skin & Body：**穿一般作业防护服**
衛生措施/Hygiene Measures： **工作现场严禁吸烟。保持良好的卫生习惯**

九、物理及化學性質/ Physical and Chemical Properties

物質狀態/ State of Substance： 固体	形狀/Appearance：环形
顏色/Color：银色	氣味/Odor： 物质无气味
pH 值/pH Value： 中性	沸點/沸點範圍/Boiling Point：
分解溫度/Decomposing Temperature：无资料数据	
自燃溫度/Self-Igniting Temperature： 无资料数据	爆炸界限/Explosion Limits： 无资料数据
密度/Density：无资料数据	溶解度/Dissolution：无资料数据

十、安定性及反應性/Stability and Reactivity

错误！未指定书签。安定性/Stability： 高
特殊狀況下可能之危害反應/Possible Hazard Reaction Under Special Conditions： 无
應避免之物質/Materials to Avoid：无
危害分解物/Hazardous Decomposition Products： 无

十一、毒性資料/ Toxicological Information

急毒性/Acute Toxicity： 无
局部效應/Local Reactions： 无
致敏感性/Sensitivity： 无
慢毒性或長期毒性/Chronic or Long Term Toxicity： 无
特殊效應/Special Reactions：无资料

十二、生態資料/ Ecological information

可能之環境影響/環境流佈/Possible Environmental Impact/Environmental Run-offs：否

十三、廢棄處置方法/Disposal considerations

廢棄處置方法/Disposal Methods： 回收再利用

十四、運送資料/Transport information

運送規定 Transportation Regulations： 按合同约定
特殊運送方法及注意事項/Special Transportation Methods and Precautions： 按客户要求等

十五、法規資料/Regulatory information

適用法規/Applicable Regulation：

十六、其他資料/Other information

參考文獻 Ref. Document		
製表單 Department	名稱/Dept. Name： 品质管理部	
	地址 Address.：北京海淀区永丰基地永澄北路	
	電話 Tel：58712667	
製 表 人 Made By	職稱/Title：	姓名(簽章) Name(Signature)：崔晓敏
製表日期 Date Prepared	2013/3/7	

测试报告

No. TSNEC2101697202　　日期: 2021年08月25日　第1页,共11页

安泰科技股份有限公司非晶制品分公司
北京市海淀区永丰产业基地永澄北路10号B区

以下测试之样品是由申请者所提供及确认：纳米晶带材

SGS工作编号：	TP21-005853 - TJ
型号：	1K107B
客户参考信息：	其他型号：1K107BW 1K107H 1K107O 1K107L 1K107L-2
主要成份：	Fe Cu Nb Si B
样品接收日期：	2021年08月19日
测试周期：	2021年08月19日 - 2021年08月25日
测试要求：	根据客户要求测试
测试方法：	请参见下一页
测试结果：	请参见下一页
结论：	基于所送样品进行的测试，镉、铅、汞、六价铬、多溴联苯(PBBs)、多溴二苯醚(PBDEs)、邻苯二甲酸酯（如邻苯二甲酸二丁酯 (DBP)、邻苯二甲酸丁苄酯(BBP)、邻苯二甲酸二(2-乙基已基)酯(DEHP)和邻苯二甲酸二异丁酯(DIBP)）的测试结果符合欧盟RoHS指令2011/65/EU附录II的修正指令(EU) 2015/863的限值要求。

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TSNEC2101697202

Reabeca Zhou周艳
批准签署人

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测试结果 :

测试样品描述 :

样品编号	SGS样品ID	描述
SN1	TSN21-016972.001	银色金属带

备注 :

(1) 1 mg/kg = 0.0001%

(2) MDL = 方法检测限

(3) ND = 未检出 (< MDL)

(4) "-" = 未规定

RoHS 指令2011/65/EU附录II的修正指令(EU) 2015/863

测试方法 : 参考IEC 62321-5:2013, IEC 62321-4:2013+AMD1:2017, IEC 62321-7-1:2015, IEC 62321-6:2015和IEC 62321-8:2017, 采用ICP-OES,UV-Vis和GC-MS进行分析.

测试项目	限值	单位	MDL	*001*
镉(Cd)	100	mg/kg	2	ND
铅(Pb)	1000	mg/kg	2	ND
汞(Hg)	1000	mg/kg	2	ND
六价铬(Cr(VI))▼	-	μg/cm²	0.10	ND
多溴联苯之和(PBBs)	1000	mg/kg	-	ND
一溴联苯	-	mg/kg	5	ND
二溴联苯	-	mg/kg	5	ND
三溴联苯	-	mg/kg	5	ND
四溴联苯	-	mg/kg	5	ND
五溴联苯	-	mg/kg	5	ND
六溴联苯	-	mg/kg	5	ND
七溴联苯	-	mg/kg	5	ND
八溴联苯	-	mg/kg	5	ND
九溴联苯	-	mg/kg	5	ND
十溴联苯	-	mg/kg	5	ND
多溴二苯醚之和(PBDEs)	1000	mg/kg	-	ND
一溴二苯醚	-	mg/kg	5	ND
二溴二苯醚	-	mg/kg	5	ND
三溴二苯醚	-	mg/kg	5	ND
四溴二苯醚	-	mg/kg	5	ND

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测试项目	限值	单位	MDL	*001*
五溴二苯醚	-	mg/kg	5	ND
六溴二苯醚	-	mg/kg	5	ND
七溴二苯醚	-	mg/kg	5	ND
八溴二苯醚	-	mg/kg	5	ND
九溴二苯醚	-	mg/kg	5	ND
十溴二苯醚	-	mg/kg	5	ND
邻苯二甲酸二丁酯(DBP)	1000	mg/kg	50	ND
邻苯二甲酸丁苄酯(BBP)	1000	mg/kg	50	ND
邻苯二甲酸二(2-乙基已基)酯(DEHP)	1000	mg/kg	50	ND
邻苯二甲酸二异丁酯(DIBP)	1000	mg/kg	50	ND

备注 :

(1) 最大允许极限值引用自RoHS指令(EU) 2015/863.
IEC 62321系列等同于 EN 62321系列
https://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101::::FSP_ORG_ID,FSP_LANG_ID:1258637,25

(2) ▼=a. 当六价铬的浓度高于0.13 μg/cm²时, 样品为阳性, 即含有六价铬;
b. 当六价铬的浓度为ND(低于0.10 μg/cm²)时, 样品为阴性, 即未检测到六价铬;
c. 当六价铬的浓度介于0.10 μg/cm²与0.13 μg/cm²之间时, 无法直接判定是否检测到六价铬, 因不同个体的样品表面差异可能会影响测定结果;

由于未获知样品的存储条件和生产日期, 样品的六价铬测试结果仅能代表测试时样品含六价铬的状态.

卤素

测试方法 : 参照EN 14582:2016方法测定, 采用IC进行分析.

测试项目	单位	MDL	*001*
氯(Cl)	mg/kg	50	ND
溴(Br)	mg/kg	50	ND

元素分析

测试方法 : SGS 内部方法-TJChemLab-TOP-004-2 (参照US EPA 3052:1996、US EPA 3051A:2007、US EPA 6010C:2007)，采用ICP-OES进行分析.

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测试项目	单位	MDL	*001*
锑 (Sb)	mg/kg	10	ND
铍 (Be)	mg/kg	5	ND

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检测报告仅用于客户科研、教学、内部质量控制、产品研发等目的，仅供内部参考。

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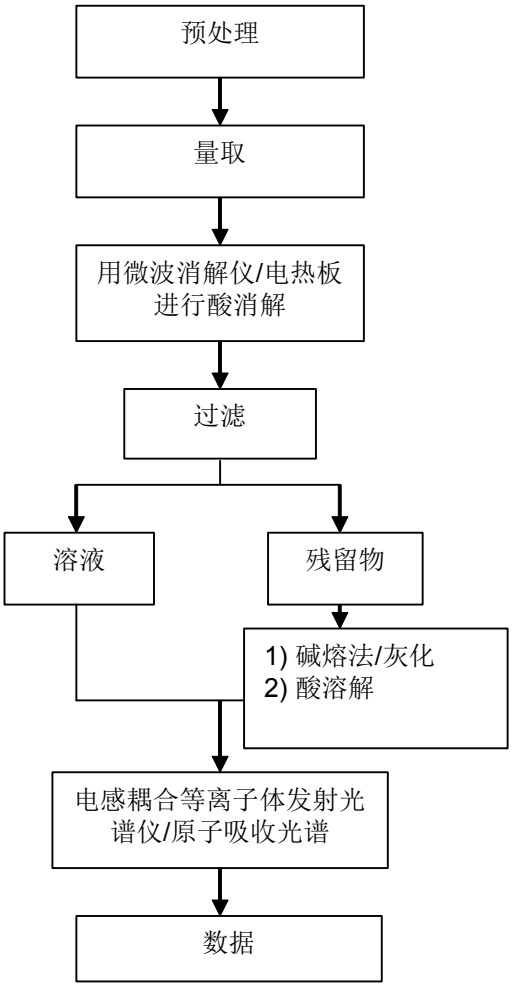
附件

元素(IEC62321) 测试流程图

1)样品按照下述流程被完全消解



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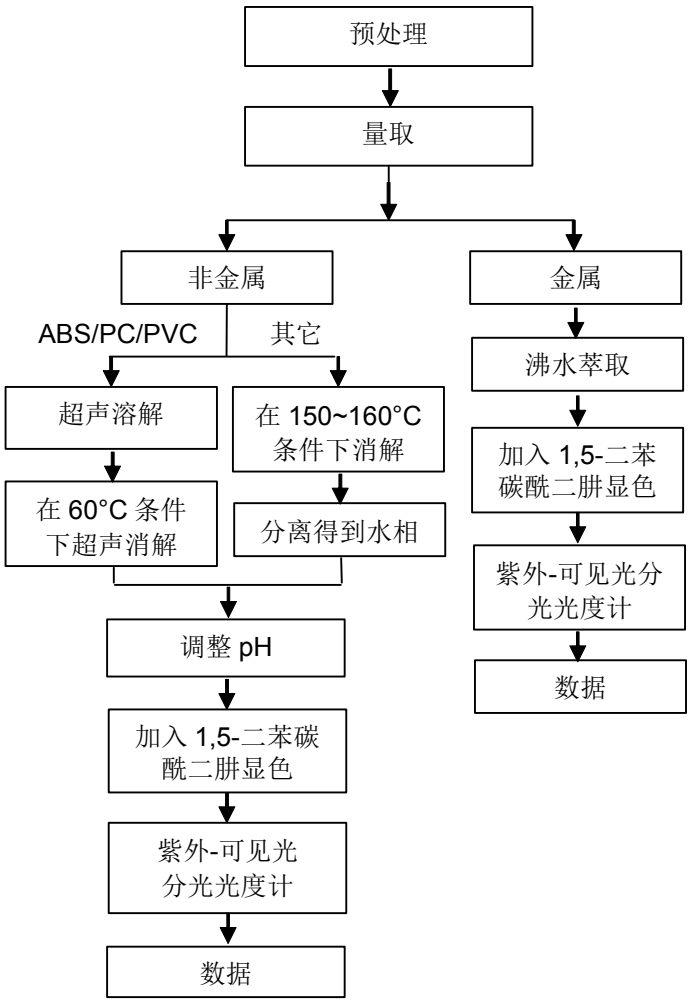
六价铬测试流程图



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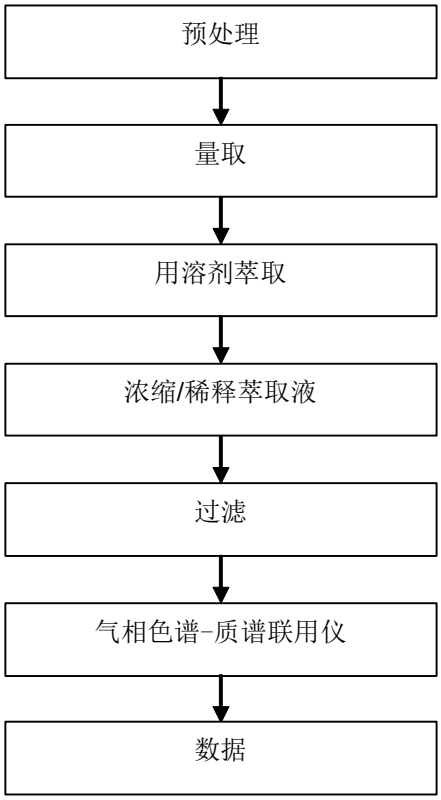
阻燃剂测试流程图



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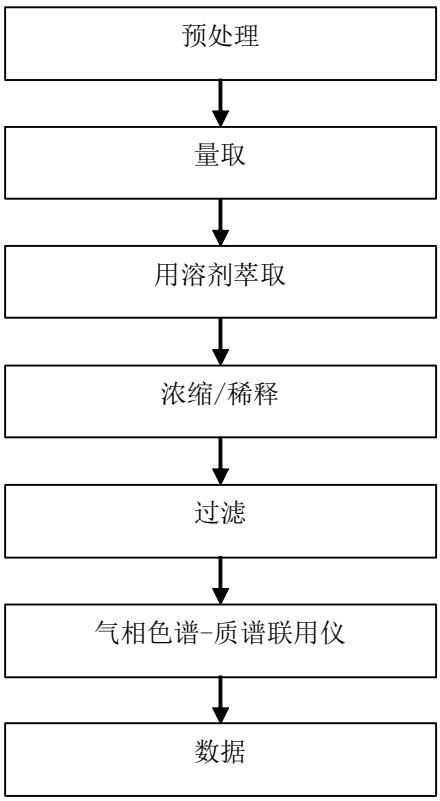
邻苯二甲酸酯测试流程图



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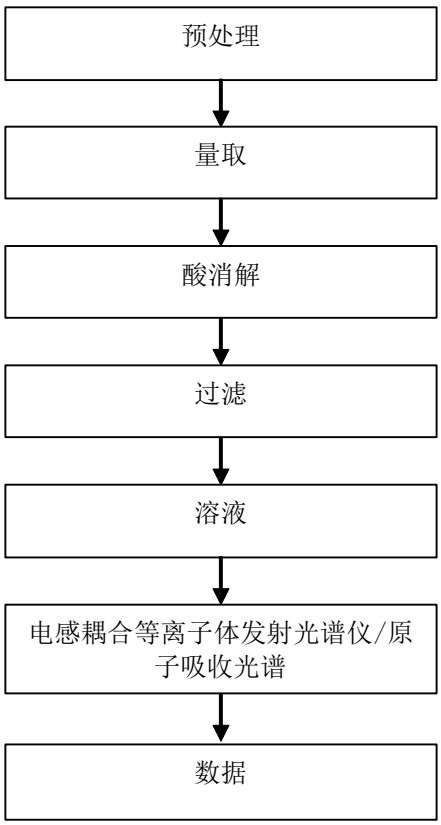
元素测试流程图



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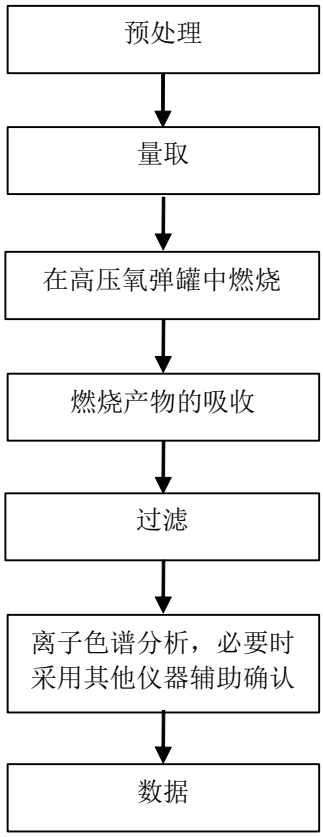

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样品照片:



TSN21-016972.001

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测试报告

No. SZXML2200164707　　日期: 2022年01月24日　　第1页,共4页

华丰五金电镀厂

深圳宝安松岗街道碧头第三工业区誉升恒A1栋

以下测试之样品是由申请者所提供及确认：环保叻

SGS工作编号：	SZIN2201000764PC - SZ
样品接收日期：	2022年01月18日
测试周期：	2022年01月18日 - 2022年01月24日
测试要求：	根据客户要求测试
测试方法：	请参见下一页
测试结果：	请参见下一页
结论：	基于所送样品进行的测试，镉、铅、汞、六价铬的测试结果符合欧盟RoHS指令2011/65/EU附录II的修正指令(EU) 2015/863的限值要求。

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Andy Ni倪磊
批准签署人

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测试结果 :

测试样品描述 :

样品编号	SGS样品ID	描述
SN1	SZX22-001647.006	带银色镀层的金属

备注 :

(1) 1 mg/kg = 1 ppm = 0.0001%

(2) MDL = 检测极限值

(3) ND = 未检出 (< MDL)

(4) "-" = 未规定

RoHS指令2011/65/EU附录II的修正指令(EU) 2015/863

测试方法 : 参考IEC 62321-4:2013+AMD1:2017, IEC 62321-5:2013 和IEC 62321-7-1:2015, 采用ICP-OES和UV-Vis 进行分析.

测试项目	限值	单位	MDL	*006*
镉 (Cd)	100	mg/kg	2	ND
铅 (Pb)	1,000	mg/kg	2	ND
汞 (Hg)	1,000	mg/kg	2	ND
六价铬(Cr(VI))▾	-	μg/cm²	0.10	ND

备注 :

(1) 最大允许极限值引用自RoHS指令(EU) 2015/863。

(2) IEC 62321 系列等同于 EN 62321 系列
https://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101::::FSP_ORG_ID,FSP_LANG_ID:1258637,25

(3) ▾= a. 当六价铬的浓度高于0.13 μg/cm2时，样品为阳性，即含有六价铬；
b. 当六价铬的浓度为ND(低于0.10 μg/cm2)时，样品为阴性，即未检测到六价铬；
c. 当六价铬的浓度介于0.10 μg/cm2与0.13 μg/cm2之间时，无法直接判定是否检测到六价铬，因不同个体的样品表面差异可能会影响测定结果；

由于未获知样品的存储条件和生产日期，样品的六价铬测试结果仅能代表测试时样品含六价铬的状态。

除非另有说明，此报告结果仅对测试的样品负责。本报告未经本公司书面许可，不可部分复制。
检测报告仅用于客户科研、教学、内部质量控制、产品研发等目的，仅供内部参考。

检验检测专用章 Inspection & Testing Services
SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

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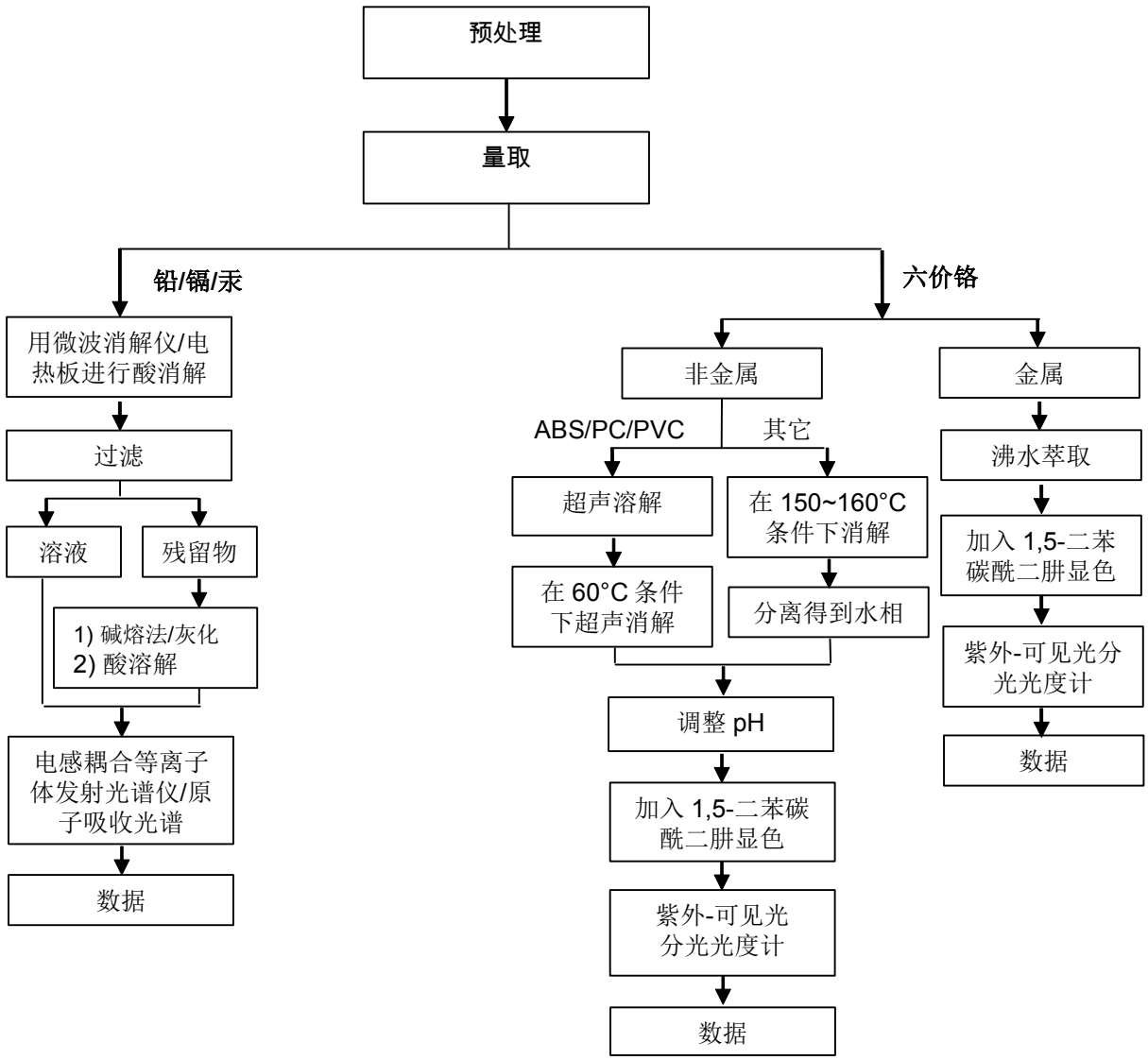
附件

Pb/Cd/Hg/Cr^{6+} 测试流程图

1）样品按照下述流程被完全消解（六价铬测试除外）。



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样品照片:



SZX22-001647.006

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*** 报告完 ***

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检测
TESTING
CNAS L4321

检测报告

报告编号 A22103205071010001C

报告抬头公司名称 青田铄桓铝业有限公司

地　　址 浙江省青田县腊口镇坑口村下井

以下测试之样品及样品信息由申请者提供并确认

样品名称	5052铝丝
样品接收日期	2021.08.10
样品检测日期	2021.08.10-2021.08.12
检测要求	根据客户要求，对所提交样品中的铅(Pb)，镉(Cd)，汞(Hg)，六价铬(Cr(VI))进行测试。
检测依据	请参见下页。
检测结果	请参见下页。

宁波市华测检测技术有限公司 CENTRE TESTING INTERNATIONAL (NINGBO) CO.,LTD 检验检测专用章 Inspection & Testing Services

主　　检 蒋春庆

审　　核 郭世荣

批　　准 张琳

日　　期 2021.08.12

张琳

技术经理

No. R465021151

宁波市华测检测技术有限公司　　宁波高新区菁华路76号厂区东首第一、二层

检测报告

检测依据

测试项目	测试方法	测试仪器
铅(Pb)	IEC 62321-5:2013	ICP-OES
镉(Cd)	IEC 62321-5:2013	ICP-OES
汞(Hg)	IEC 62321-4:2013+AMD1:2017 CSV	ICP-OES
六价铬(Cr(VI))	IEC 62321-7-1:2015	UV-vis

检测结果

测试项目	结果	方法检出限
铅(Pb)	N.D.	2 mg/kg
镉(Cd)	N.D.	2 mg/kg
汞(Hg)	N.D.	2 mg/kg
六价铬(Cr(VI))	N.D. ▼	0.10 μg/cm² (LOQ)

样品/部位描述 银色金属

备注： **对于检测铅，镉，汞之样品已完全溶解。**

-N.D. = 未检出 (小于方法检出限或定量限)

-mg/kg = ppm = 百万分之一

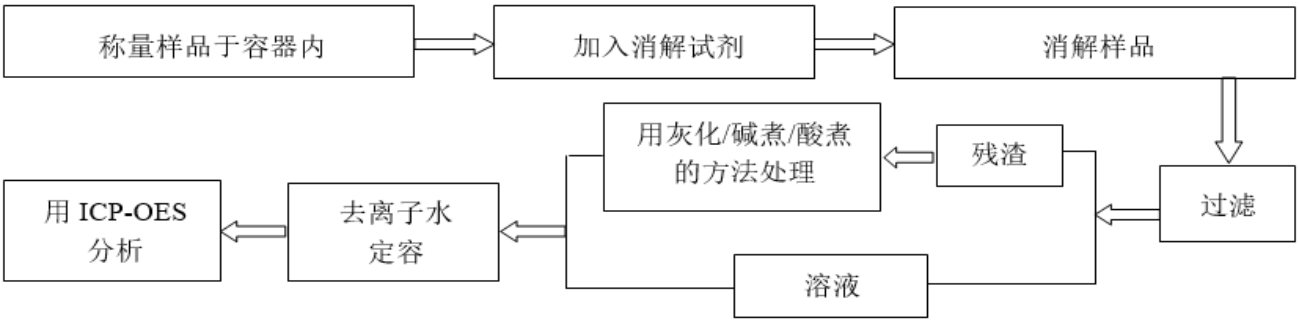
-LOQ = 定量限，六价铬的定量限为0.10 μg/cm²

-▼六价铬浓度小于0.10 μg/cm², 样品未检出六价铬

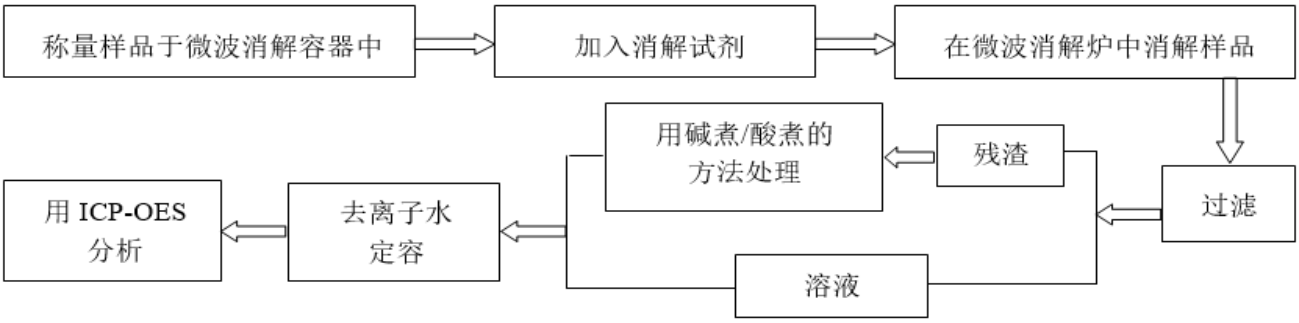
检测报告

检测流程

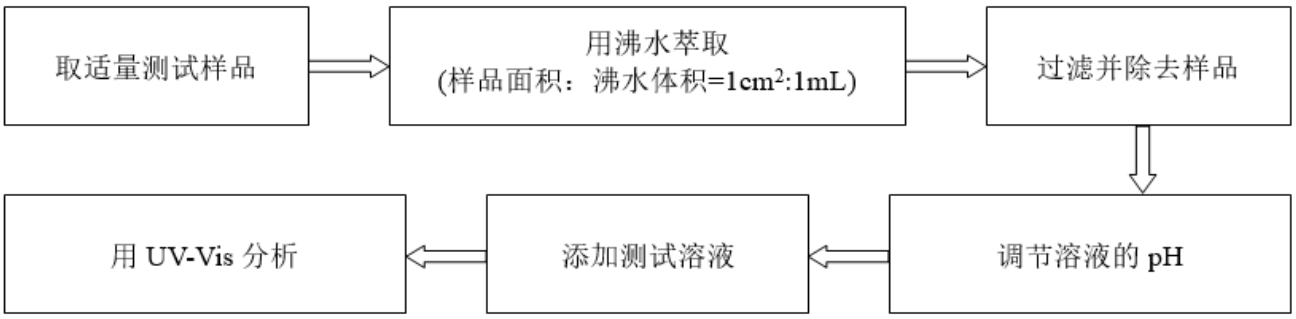
1. **铅(Pb)， 镉(Cd)**



2. **汞(Hg)**

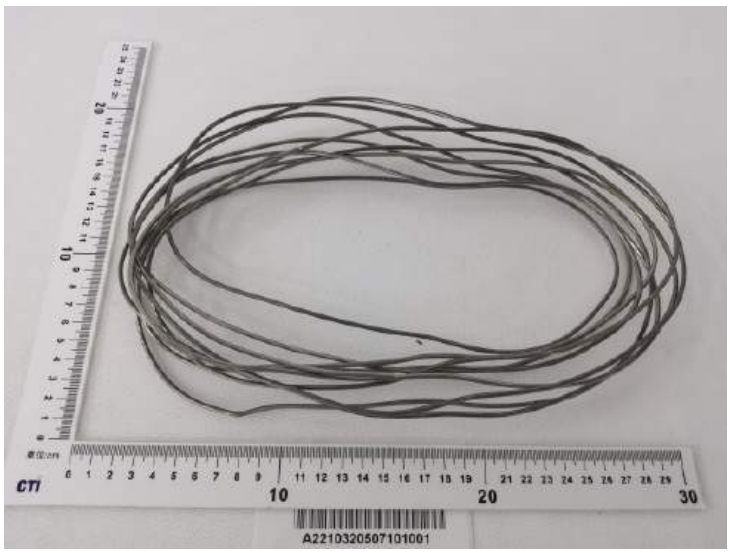


3. **六价铬(Cr(VI))**



检测报告

样品图片



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2. 报告抬头公司名称及地址、样品及样品信息由申请者提供，申请者应对其真实性负责，CTI未核实其真实性；
3. 本报告检测结果仅对受测样品负责；
4. 未经CTI书面同意，不得部分复制本报告。

*** 报告结束 ***

测试报告

No. TSNEC2101103109　　日期: 2021年06月16日　第1页,共8页

福建青拓特钢技术研究有限公司
福建省宁德市福安市湾坞镇青拓集团

以下测试之样品是由申请者所提供及确认 : 304B

SGS工作编号 :	TP21-003981 - TJ
样品接收日期 :	2021年06月10日
测试周期 :	2021年06月10日 - 2021年06月16日
测试要求 :	根据客户要求测试
测试方法 :	请参见下一页
测试结果 :	请参见下一页
结论 :	基于所送样品进行的测试，镉、铅、汞、六价铬、多溴联苯(PBBs)、多溴二苯醚(PBDEs)、邻苯二甲酸酯（如邻苯二甲酸二丁酯 (DBP)、邻苯二甲酸丁苄酯(BBP)、邻苯二甲酸二(2-乙基已基)酯(DEHP)和邻苯二甲酸二异丁酯(DIBP)）的测试结果符合欧盟RoHS指令2011/65/EU附录II的修正指令(EU) 2015/863的限值要求。

通标标准技术服务（天津）有限公司
授权签名

scan to see the report

TSNEC2101103109

Aimy Wang王会芳
批准签署人

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测试结果 :

测试样品描述 :

样品编号	SGS样品ID	描述
SN1	TSN21-011031.009	灰色金属棒

备注 :

(1) 1 mg/kg = 0.0001%

(2) MDL = 方法检测限

(3) ND = 未检出 (< MDL)

(4) "-" = 未规定

RoHS 指令2011/65/EU附录II的修正指令(EU) 2015/863

测试方法 : 参考IEC 62321-5:2013, IEC 62321-4:2013+AMD1:2017, IEC 62321-7-1:2015, IEC 62321-6:2015和IEC 62321-8:2017, 采用ICP-OES,UV-Vis和GC-MS进行分析.

测试项目	限值	单位	MDL	*009*
镉(Cd)	100	mg/kg	2	ND
铅(Pb)	1000	mg/kg	2	ND
汞(Hg)	1000	mg/kg	2	ND
六价铬(Cr(VI))▼	-	μg/cm²	0.10	ND
多溴联苯之和(PBBs)	1000	mg/kg	-	ND
一溴联苯	-	mg/kg	5	ND
二溴联苯	-	mg/kg	5	ND
三溴联苯	-	mg/kg	5	ND
四溴联苯	-	mg/kg	5	ND
五溴联苯	-	mg/kg	5	ND
六溴联苯	-	mg/kg	5	ND
七溴联苯	-	mg/kg	5	ND
八溴联苯	-	mg/kg	5	ND
九溴联苯	-	mg/kg	5	ND
十溴联苯	-	mg/kg	5	ND
多溴二苯醚之和(PBDEs)	1000	mg/kg	-	ND
一溴二苯醚	-	mg/kg	5	ND
二溴二苯醚	-	mg/kg	5	ND
三溴二苯醚	-	mg/kg	5	ND
四溴二苯醚	-	mg/kg	5	ND

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测试项目	限值	单位	MDL	*009*
五溴二苯醚	-	mg/kg	5	ND
六溴二苯醚	-	mg/kg	5	ND
七溴二苯醚	-	mg/kg	5	ND
八溴二苯醚	-	mg/kg	5	ND
九溴二苯醚	-	mg/kg	5	ND
十溴二苯醚	-	mg/kg	5	ND
邻苯二甲酸二丁酯(DBP)	1000	mg/kg	50	ND
邻苯二甲酸丁苄酯(BBP)	1000	mg/kg	50	ND
邻苯二甲酸二(2-乙基己基)酯(DEHP)	1000	mg/kg	50	ND
邻苯二甲酸二异丁酯(DIBP)	1000	mg/kg	50	ND

备注：

(1) 最大允许极限值引用自RoHS指令(EU) 2015/863.
IEC 62321系列等同于 EN 62321系列
https://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101::::FSP_ORG_ID,FSP_LANG_ID:1258637,25

(2) ▼=a. 当六价铬的浓度高于0.13 μg/cm²时, 样品为阳性, 即含有六价铬;
b. 当六价铬的浓度为ND(低于0.10 μg/cm²)时, 样品为阴性, 即未检测到六价铬;
c. 当六价铬的浓度介于0.10 μg/cm²与0.13 μg/cm²之间时, 无法直接判定是否检测到六价铬, 因不同个体的样品表面差异可能会影响测定结果;

由于未获知样品的存储条件和生产日期, 样品的六价铬测试结果仅能代表测试时样品含六价铬的状态.
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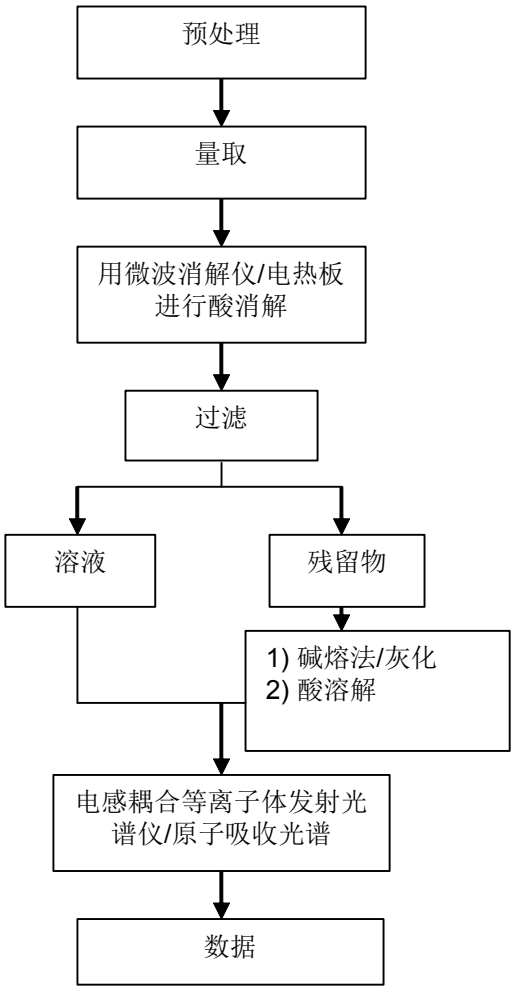
附件

元素(IEC62321) 测试流程图

1)样品按照下述流程被完全消解



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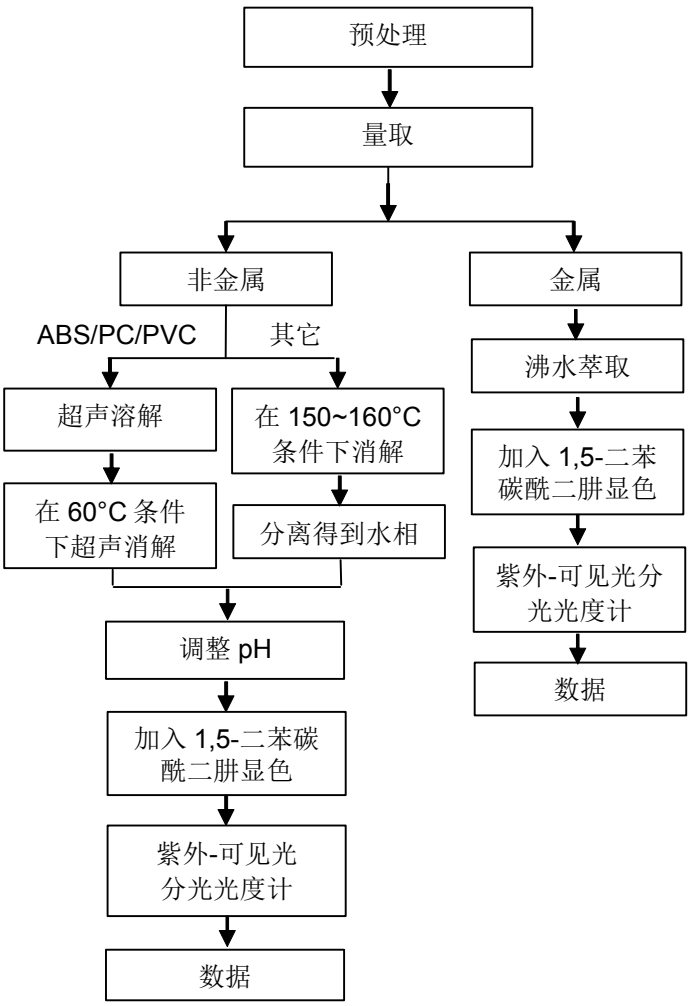
附件

六价铬测试流程图



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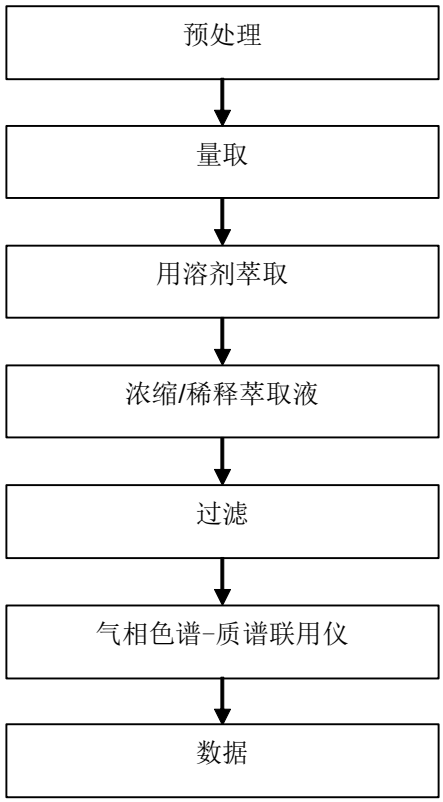
附件

阻燃剂测试流程图



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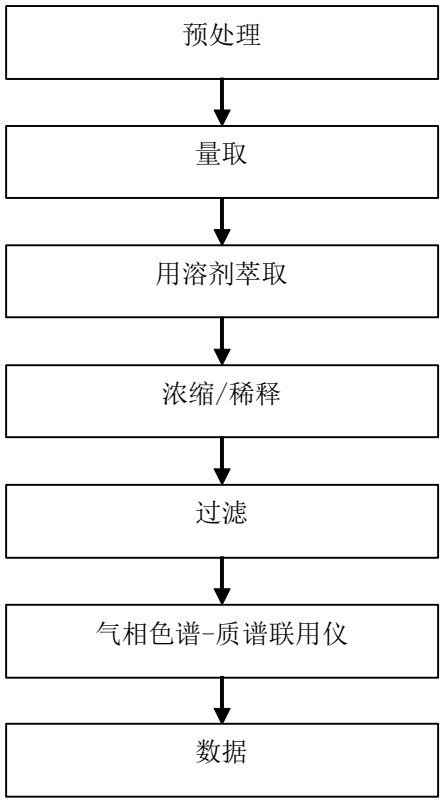
邻苯二甲酸酯测试流程图



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样品照片:



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*** 报告完 ***

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检测报告
Test Report

报告编号 A2210063175102002E　　第 1 页 共 10 页
Report No. A2210063175102002E　　Page 1 of 10

报告抬头公司名称	深圳市海联通科技有限公司
Company Name shown on Report	SHENZHEN HILETON TECHNOLOGY CO.,LTD
地　　址	深圳市光明新区公明办事处将石社区石围大田洋区 H 栋三楼
Address	SHENZHEN GUANGMING NEW DISTRICT, GONGMING OFFICE WILL BE A STONE COMMUNITY STONE WAI FIELD H, A THIRD FLOOR

以下测试之样品及样品信息由申请者提供并确认
The following sample(s) and sample information was/were submitted and identified by/on the behalf of the applicant

样品名称	RG 系列同轴线缆/ RF 系列同轴线缆
Sample Name	RG series coaxial cable/RF series coaxial cable
样品颜色	黑色、白色、灰色、蓝色、红色、棕色、绿色、橙色
Color	黑色、白色、灰色、蓝色、红色、棕色、绿色、橙色
样品接收日期	2021.03.05
Sample Received Date	Mar. 5, 2021
样品检测日期	2021.03.05-2021.03.12
Testing Period	Mar. 5, 2021 to Mar. 12, 2021
检测要求	根据客户要求，参照法规(EC) No 1907/2006(REACH)，对所提交样品中 71 种高关注物质(SVHC)进行筛选测试。
Test Requested	As specified by client, to screen the 71 substances of very high concern (SVHC) under Regulation(EC) No 1907/2006 of REACH in the submitted sample(s).
检测依据/检测结果	请参见下页。
Test Method/Test Result(s)	Please refer to the following page(s).
摘要	根据分析结果，所提交样品中 71 种 SVHC 物质的浓度均小于 0.1%(w/w)。
Summary	According to the analytical results, concentrations of 71 SVHC substances are all less than 0.1%(w/w) in the submitted sample(s).

主　检 Tested by: 刘芳　　审　核 Reviewed by: 方煜松

批　准 Approved by: 郑晴涛　　日　期 Date: 2021.03.12

郑晴涛
技术经理 Technical Manager

No. R393387931

华测检测认证集团股份有限公司　　广东省深圳市宝安区新安街道兴东社区华测检测大楼
Centre Testing International Group Co.,Ltd.
CTI Building, Xing Dong Community, Xin'an Sub-district, Bao'an District, Shenzhen City, Guangdong Province, P.R. China

检测报告
Test Report

检测结果 Test Result(s)

批次 Batch	序号 No.	物质名称 Substance Name(s)	CAS 号 CAS No.	EC 号 EC No.	浓度 Concentration (%)	报告检出限 Report Limit (%)
-	-	所有 SVHC 物质（见候选清单） All tested SVHC (See the candidate list)	-	-	N.D.	-

检测依据 Test Method:

参考 US EPA3052:1996, US EPA 3050B:1996, US EPA3060A:1996, EN 14582:2016 进行样品预处理。

Refer to US EPA3052:1996, US EPA 3050B:1996, US EPA3060A:1996, EN 14582:2016 for sample pretreatment.

采用 ICP-OES, UV-Vis, PLM, SEM 及 IC 分析。

Analyzed by ICP-OES, UV-Vis, PLM, SEM and IC.

样品/部位描述 混测，银白色和银色金属线

Sample/Part Description Mixed test, silver-white and silvery metal wire

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注释 Note:

1. 结果仅显示检出的 SVHC 物质，低于报告检出限的 SVHC 物质没有列出。所有测试的 SVHC 物质见下页的 SVHC 候选清单。The table of tested result(s) only shows detected SVHC, and SVHC that below Report Limit are not reported. Please refer to the Candidate List of SVHC on next pages.
2. w/w % = 重量百分比 weight by weight; 0.1% = 1000mg/kg = 1000ppm
3. N.D. = 未检出 Not Detected (小于报告检出限<report limit)
4. *: 该物质的浓度值是由物质中的特征元素测试结果换算而来。Concentration value of the substance by the conversion from the test results of certain elements.
5. **: 在化学物质及其混合物的分类，标记与包装法规，即 CLP 法规(法规(EC)No 1272/2008)的附录 VI 中，索引号 650-017-00-8 适用于所有的耐火陶瓷纤维材料。All refractory ceramic fibres are covered by index number 650-017-00-8 in Annex VI of the Regulation on Classification, Labeling and Packaging of chemical substances and mixtures, the so called CLP Regulation (Regulation (EC) No 1272/2008).
6. ***: C.I.:颜料索引号 Colour Index
7. *****: 四硼酸钠，无水和四硼酸钠，水合物的浓度均由四硼酸钠浓度表示，没有考虑结晶水。
过硼酸钠，水合物；过硼酸钠盐和过硼酸钠，无水的浓度均由过硼酸钠浓度表示，没有考虑结晶水。
Concentration value of Disodium tetraborate, anhydrous and Tetraboron disodium heptaoxide, hydrate is evaluated by Disodium tetraborate, with no consider of the hydrate.
Concentration value of Sodium perborate; perboric acid, sodium salt; Sodium peroxometaborate is evaluated by Sodium perborate, with no consider of the hydrate.
8. ①: 由于这些物质是 UVCB 物质(未知成分或可变成分的，复杂反应物或生物材料的物质)，由各种不同的成分组成，所以这些物质的测试结果是由选定的具有代表性的物质的主要组成成分的测试结果换算而来的。当其测试结果≥0.1% w/w 时，对于该物质是否存在于样品中需核查相应物料的 MSDS 或向供应商进行确认。In view of the substances are established as UVCB substances(substances of unknown or variable composition, complex reaction products or biological materials) consisting of different and variable constituents, the test results are calculated based on the main constituents of the representative compounds for substances. When the content of the representative substances is equal to or higher than 0.1% (w/w), the presence of the substance in the sample need to be further confirmed by checking MSDS or requesting from suppliers.
9. ②:由于此物质含有多种物质，测试结果是基于此物质中最具有代表性的主要组成化合物的含量，其主要组成化合物的测试结果是基于特征元素的浓度换算而来。
In view of the substance contain variable substances, the test results are calculated based on main constituents of the representative compounds for the substances, and the test results of the representative compounds are calculated based on the result of specified heavy metal elements.
10. 根据客户要求，对样品进行混合测试，测试结果不代表混合测试样品中任何一种单一材质的含量。
As specified by client, the test was conducted by mixing several samples together. The result(s) shown on this report may be different from the content of any homogeneous material.

备注 Remark:

本报告中的数据结果供科研、教学、企业内部质量控制、企业产品研发等目的用。

The testing data and result(s) in this report is(are) just for scientific research, education, internal quality control and product development etc.

检测报告
Test Report

SVHC候选清单Candidate List of SVHC

批次 Batch	序号 No.	物质名称 Substance Name(s)	CAS 号 CAS No.	EC 号 EC No.	报告检出限 Report Limit (%)
I	1	二氯化钴 Cobalt dichloride*	7646-79-9	231-589-4	0.01
I	2	五氧化二砷 Diarsenic pentaoxide*	1303-28-2	215-116-9	0.01
I	3	三氧化二砷 Diarsenic trioxide*	1327-53-3	215-481-4	0.01
I	4	重铬酸钠 Sodium dichromate*	7789-12-0 10588-01-9	234-190-3	0.01
I	5	砷酸氢铅 Lead hydrogen arsenate*	7784-40-9	232-064-2	0.01
I	6	三乙基砷酸酯 Triethyl arsenate*	15606-95-8	427-700-2	0.01
II	7	②铬酸铅 Lead chromate	7758-97-6	231-846-0	0.05
II	8	②钼铬红(C.I.颜料红 104) Lead chromate molybdate sulphate red (C.I. Pigment Red 104)***	12656-85-8	235-759-9	0.05
II	9	②铅铬黄(C.I.颜料黄 34) Lead sulfochromate yellow(C.I. Pigment Yellow 34)***	1344-37-2	215-693-7	0.05
III	10	硼酸 Boric acid*	10043-35-3 11113-50-1	233-139-2 234-343-4	0.01
III	11	②四硼酸钠，无水 Disodium tetraborate, anhydrous*****	1330-43-4 12179-04-3 1303-96-4	215-540-4	0.01
III	12	②四硼酸钠，水合物 Tetraboron disodium heptaoxide, hydrate*****	12267-73-1	235-541-3	0.01
III	13	铬酸钠 Sodium chromate*	7775-11-3	231-889-5	0.01
III	14	铬酸钾 Potassium chromate*	7789-00-6	232-140-5	0.01
III	15	重铬酸铵 Ammonium dichromate*	7789-09-5	232-143-1	0.01
III	16	重铬酸钾 Potassium dichromate*	7778-50-9	231-906-6	0.01
IV	17	硫酸钴 Cobalt(Ⅱ) sulphate*	10124-43-3	233-334-2	0.01
IV	18	硝酸钴 Cobalt(Ⅱ) dinitrate*	10141-05-6	233-402-1	0.01
IV	19	碳酸钴 Cobalt(Ⅱ) carbonate*	513-79-1	208-169-4	0.01
IV	20	醋酸钴 Cobalt(Ⅱ) diacetate*	71-48-7	200-755-8	0.01
IV	21	三氧化铬Chromium trioxide*	1333-82-0	215-607-8	0.01

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Test Report

批次 Batch	序号 No.	物质名称 Substance Name(s)	CAS 号 CAS No.	EC 号 EC No.	报告检出限 Report Limit (%)
IV	22	①从三氧化铬产生的酸类以及它们的齐聚物：铬酸、重铬酸、铬酸和重铬酸的齐聚物Acids generated from chromium trioxide and their oligomers: Chromic acid, Dichromic acid, Oligomers of chromic acid and dichromic acid*	7738-94-5 13530-68-2	231-801-5 236-881-5	0.01
V	23	铬酸锶 Strontium chromate*	7789-06-2	232-142-6	0.01
VI	24	铬酸铬 Dichromium tris(chromate)*	24613-89-6	246-356-2	0.01
VI	25	氢氧化铬酸锌钾 Potassium hydroxyoctaoxodizincatedichromate*	11103-86-9	234-329-8	0.01
VI	26	氢氧化铬酸锌 Pentazinc chromate octahydroxide*	49663-84-5	256-418-0	0.01
VI	27	②硅酸铝耐火陶瓷纤维 Aluminosilicate Refractory Ceramic Fibres (RCF) **	-	-	0.05
VI	28	②氧化锆硅酸铝耐火陶瓷纤维 Zirconia Aluminosilicate Refractory Ceramic Fibres (Zr-RCF) **	-	-	0.05
VI	29	砷酸 Arsenic acid*	7778-39-4	231-901-9	0.01
VI	30	砷酸钙 Calcium arsenate*	7778-44-1	231-904-5	0.01
VI	31	砷酸铅 Trilead diarsenate*	3687-31-8	222-979-5	0.01
VI	32	叠氮化铅 Lead diazide, Lead azide*	13424-46-9	236-542-1	0.01
VI	33	2,4,6-三硝基间苯二酚铅 (别名：收敛酸铅) Lead styphnate*	15245-44-0	239-290-0	0.01
VI	34	苦味酸铅 Lead dipicrate*	6477-64-1	229-335-2	0.01
VII	35	三氧化二硼 Diboron trioxide*	1303-86-2	215-125-8	0.01
VII	36	甲基磺酸铅 Lead(II) bis(methanesulfonate)*	17570-76-2	401-750-5	0.01
VIII	37	氧化铅与硫酸铅的复合物 Pentalead tetraoxide sulphate*	12065-90-6	235-067-7	0.01
VIII	38	双(十八酸基)二氧代三铅 Dioxobis(stearato)trilead*	12578-12-0	235-702-8	0.01
VIII	39	硝酸铅 Lead dinitrate*	10099-74-8	233-245-9	0.01
VIII	40	三碱式硫酸铅 Tetralead trioxide sulphate*	12202-17-4	235-380-9	0.01

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批次 Batch	序号 No.	物质名称 Substance Name(s)	CAS 号 CAS No.	EC 号 EC No.	报告检出限 Report Limit (%)
VIII	41	氧化铅 Lead monoxide (lead oxide)*	1317-36-8	215-267-0	0.01
VIII	42	钛酸铅 Lead titanium trioxide*	12060-00-3	235-038-9	0.01
VIII	43	碱式乙酸铅 Acetic acid, lead salt, basic*	51404-69-4	257-175-3	0.01
VIII	44	颜料黄 41 Pyrochlore, antimony lead yellow*	8012-00-8	232-382-1	0.01
VIII	45	四乙基铅 Tetraethyllead*	78-00-2	201-075-4	0.01
VIII	46	二盐基邻苯二甲酸铅 [Phthalato(2-)]dioxotrilead*	69011-06-9	273-688-5	0.01
VIII	47	氨基氰铅盐 Lead cyanamidate*	20837-86-9	244-073-9	0.01
VIII	48	掺杂铅的硅酸钡 Silicic acid ($H_2Si_2O_5$), barium salt (1:1), lead-doped*	68784-75-8	272-271-5	0.01
VIII	49	磷酸氧化铅 Trilead dioxide phosphonate*	12141-20-7	235-252-2	0.01
VIII	50	钛酸铅锆 Lead titanium zirconium oxide*	12626-81-2	235-727-4	0.01
VIII	51	碱式碳酸铅 Trilead bis(carbonate)dihydroxide*	1319-46-6	215-290-6	0.01
VIII	52	C16-18-脂肪酸铅盐 Fatty acids, C16-18, lead salts*	91031-62-8	292-966-7	0.01
VIII	53	四氧化三铅 Orange lead (lead tetroxide)*	1314-41-6	215-235-6	0.01
VIII	54	二碱式亚硫酸铅(II) Sulfurous acid, lead salt, dibasic*	62229-08-7	263-467-1	0.01
VIII	55	碱式硫酸铅 Lead oxide sulfate*	12036-76-9	234-853-7	0.01
VIII	56	四氟硼酸铅 Lead bis(tetrafluoroborate)*	13814-96-5	237-486-0	0.01
VIII	57	硅酸铅 Silicic acid, lead salt*	11120-22-2	234-363-3	0.01
IX	58	镉 Cadmium	7440-43-9	231-152-8	0.01
IX	59	氧化镉 Cadmium oxide*	1306-19-0	215-146-2	0.01
X	60	硫化镉 Cadmium sulphide*	1306-23-6	215-147-8	0.01
X	61	醋酸铅(Ⅱ) Lead di(acetate)*	301-04-2	206-104-4	0.01
XI	62	氯化镉 Cadmium chloride *	10108-64-2	233-296-7	0.01

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批次 Batch	序号 No.	物质名称 Substance Name(s)	CAS 号 CAS No.	EC 号 EC No.	报告检出限 Report Limit (%)
XI	63	②过硼酸钠，水合物；过硼酸钠盐 Sodium perborate; perboric acid, sodium salt *****	15120-21-5 11138-47-9	239-172-9 234-390-0	0.01
XI	64	②过硼酸钠，无水 Sodium peroxometaborate *****	7632-04-4	231-556-4	0.01
XII	65	氟化镉 Cadmium fluoride*	7790-79-6	232-222-0	0.01
XII	66	硫酸镉 Cadmium sulphate*	10124-36-4 31119-53-6	233-331-6	0.01
XVIII	67	硝酸镉 Cadmium nitrate*	10325-94-7	233-710-6	0.01
XVIII	68	碳酸镉 Cadmium carbonate*	513-78-0	208-168-9	0.01
XVIII	69	氢氧化镉 Cadmium hydroxide*	21041-95-2	244-168-5	0.01
XIX	70	铅 Lead	7439-92-1	231-100-4	0.01
XIX	71	八硼酸二钠 Disodium octaborate*	12008-41-2	234-541-0	0.01

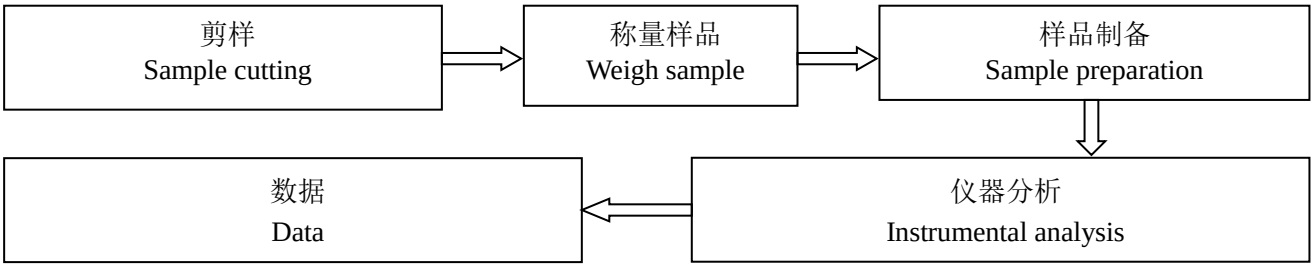
检测报告
Test Report

附加信息 Appendix:

1. 根据欧盟 REACH 法规（编号 1907/2006）第 33 条款之规定，物品类产品如果含有候选列表上的高度关注物质且在物品中的质量百分比超过 0.1%时，物品供应方需履行相关信息传递义务:
   Any supplier of an article containing a substance that is included in the Candidate List in a concentration above 0.1 % weight by weight (w/w) has the duty to communicate information in accordance with Article 33 of European Union regulation concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH).
   1) 物品供应方应提供给接收方关于产品的足够信息以确保物品的安全使用，至少需提供所含高度关注物质的名称。Any supplier shall provide the recipient of the article with sufficient information to allow safe use of the article including, as a minimum, the name of that substance.
   2) 应消费者请求，物品供应方应在 45 天内免费提供关于产品的足够信息以确保物品的安全使用，至少需提供所含高度关注物质的名称。On request by a consumer any supplier shall provide the consumer with sufficient information to allow safe use of the article including, as a minimum, the name of that substance within 45 days of receipt of the request, free of charge.
2. 根据欧盟 REACH 法规（编号 1907/2006）第 31 条款及附件 2 之规定，提供高度关注物质的物质类产品供应方，应免费提供接收方该物质的安全数据表。The supplier of a substance that is included in the Candidate List on their own shall provide the recipient of the substance with a safety data sheet for free compiled in accordance with Article 3 and Annex II of REACH.
3. 根据欧盟 REACH 法规（编号 1907/2006）第 31、32 条款及附件 2 之规定，提供含有高度关注物质的混合物产品供应方需传递相关信息:
   The supplier of a mixture that containing a substance that is included in the Candidate List shall exchange information in accordance with Article 31, Article 32, and Annex II of REACH.
   1) 如果混合物产品按照 1999/45/EC 被判定为危险品时，供应方应免费提供产品的安全数据表。Any supplier shall provide the recipient of the mixture with a safety data sheet for free where a preparation meets the criteria for classification as dangerous in accordance with Directives 1999/45/EC.
   2) 如果混合物产品按照 1999/45/EC 判定并非危险品，但是任一高度关注物质在非气体混合物中质量分数超过 0.1%或在气体混合物中体积分数超过 0.2%，供应方也应免费提供产品的安全数据表。Any supplier shall provide the recipient of the mixture with a safety data sheet for free where a preparation does not meet the criteria for classification as dangerous in accordance with Directive 1999/45/EC, but contains any substance that is included in the Candidate List in an individual concentration of ≥ 0.1 % by weight for non-gaseous mixtures or ≥ 0.2 % by volume for gaseous mixtures.

检测报告
Test Report

检测流程 Test Process



检测报告
Test Report

样品图片

Photo(s) of the sample(s)



声明 Statement：

1. 检测报告无批准人签字、“专用章”及报告骑缝章无效；
   This report is considered invalid without approved signature, special seal and the seal on the perforation;
2. 报告抬头公司名称及地址、样品及样品信息由申请者提供，申请者应对其真实性负责，CTI 未核实其真实性；
   The Company Name shown on Report and Address, the sample(s) and sample information was/were provided by the applicant who should be responsible for the authenticity which CTI hasn’t verified;
3. 本报告检测结果仅对受测样品负责；
   The result(s) shown in this report refer(s) only to the sample(s) tested;
4. 未经 CTI 书面同意，不得部分复制本报告；
   Without written approval of CTI, this report can’t be reproduced except in full;
5. 如检测报告中的英文内容与中文内容有差异，以中文为准。
   In case of any discrepancy between the English version and Chinese version of the testing reports (if generated), the Chinese version shall prevail.

*** 报告结束 ***
*** End of Report ***

附录 Appendix

客户参考信息 Client Reference Information

RG178/RG179/RG316/RG142/RG303/RG141/RG400/RG086/RF0.81/RF1.13/RF1.32/RF1.37/RF1.50/RF0.64

声明 Statement:

附录内容由申请者提供，申请者应对其真实性负责，CTI 未核实其真实性。

The Appendix Information was/were provided by the applicant who should be responsible for the authenticity which CTI hasn't verified.

Test Report

No. SHAMLP2200391001 Date: 12 Jan 2022

Lihuayi Weiyuan Chemical Co.,Ltd.

No.208,Lishi Road,Lijin County,Dongying City,Shandong Province

The following sample(s) was/were submitted and identified on behalf of the clients as : Polycarbonate

SGS Job No. :	SHIN2201000745PC - SH
Product Specification :	WY-106BR
Date of Sample Received :	07 Jan 2022
Testing Period :	07 Jan 2022 - 12 Jan 2022
Test Requested :	Selected test(s) as requested by client.
Test Method :	Please refer to next page(s).
Test Results :	Please refer to next page(s).

Result Summary :

Test Requested	Conclusion
US FDA 21 CFR 177.1580- Total extractives	PASS

Signed for and on behalf of
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

scan to see the report

SHAMLP2200391001

Lancy Liu
Approved Signatory

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Test Results :

Test Part Description :

Specimen No.	SGS Sample ID	Description	Material (claimed by the client)
SN1	SHA22-003910.001	Transparent plastic sheet	PC

Remarks :

(1) mg/dm² = milligram per square decimeter
(2) mg/kg = milligram per kilogram
(3) ℃= degree Celsius
(4) < = less than
(5) MDL = Method Detection Limit
(6) ND = Not Detected (< MDL)

US FDA 21 CFR 177.1580- Total extractives

Test Method : With reference to US FDA 21 CFR 177.1580.

Simulant Used	Time	Temperature	Max. Permissible Limit	Result of 001 Total extractives	Conclusion
50% Ethanol	6hr(s)	Reflux Temperature	0.15% (w/w)	0.12% (w/w)	PASS
n-Heptane	6hr(s)	Reflux Temperature	0.15% (w/w)	<0.02% (w/w)	PASS
Distilled water	6hr(s)	Reflux Temperature	0.15% (w/w)	0.03% (w/w)	PASS

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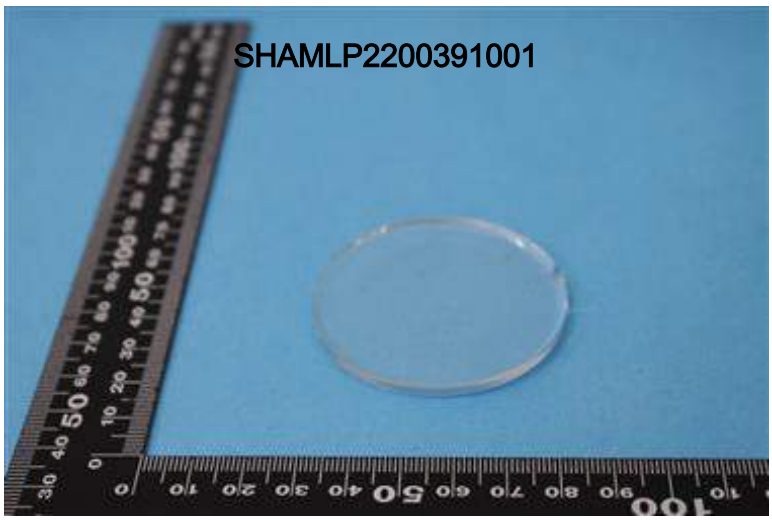
Sample photo:



SHA22-003910.001

SGS authenticate the photo on original report only

*** End of Report ***

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测试报告

No. SHAMLP2200391002　　日期: 2022年01月12日　　第1页,共3页

利华益维远化学股份有限公司
山东省东营市利津县利十路208号

以下测试之样品是由申请者所提供及确认：聚碳酸酯

SGS工作编号：	SHIN2201000745PC - SH
产品规格：	WY-106BR
样品接收日期：	2022年01月07日
测试周期：	2022年01月07日 - 2022年01月12日
测试要求：	根据客户要求测试
测试方法：	请参见下一页
测试结果：	请参见下一页

测试结果概要：

测试要求	结论
US FDA 21 CFR 177.1580- 总提取物	符合

通标标准技术服务（上海）有限公司
授权签名

刘香梅

Lancy Liu刘香梅
批准签署人

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SHAMLP2200391002

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测试结果 :

测试样品描述 :

样品编号	SGS样品ID	描述	材质 (客户提供)
SN1	SHA22-003910.001	透明塑料片	PC

备注：

(1) mg/dm² = 毫克每平方分米
(2) mg/kg = 毫克每千克
(3) ℃= 摄氏度
(4) < = 小于
(5) MDL = 方法检测限
(6) ND = 未检出 (< MDL)

US FDA 21 CFR 177.1580-总提取物

测试方法 : 参考US FDA 21 CFR 177.1580.

常用模拟液	时间	温度	最大允许限值	样品001 总提取物	结论
50%乙醇	6hr(s)	回流温度	0.15% (w/w)	0.12% (w/w)	符合
正庚烷	6hr(s)	回流温度	0.15% (w/w)	<0.02% (w/w)	符合
蒸馏水	6hr(s)	回流温度	0.15% (w/w)	0.03% (w/w)	符合

除非另有说明，此报告结果仅对测试的样品负责。本报告未经本公司书面许可，不可部分复制。检测报告仅用于客户科研、教学、内部质量控制、产品研发等目的，仅供内部参考。

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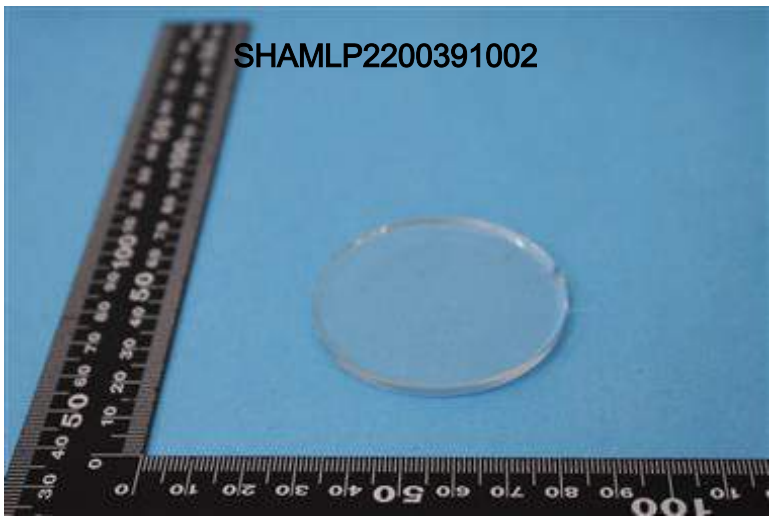
样品照片:



SHA22-003910.001

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*** 报告完 ***

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测试报告 (SVHC)

No. SHAMLP2200387414　　日期: 2022年01月13日　第1页,共17页

利华益维远化学股份有限公司
山东省东营市利津县利十路208号

以下测试之样品是由申请者所提供及确认：聚碳酸酯

SGS工作编号：	SHIN2201000745PC - SH
产品规格：	WY-106BR
样品接收日期：	2022年01月07日
测试周期：	2022年01月07日 - 2022年01月13日
测试要求：	根据客户要求， (i) 基于欧洲化学品管理署截止2021年7月8日公布的供授权审议的高关注物质候选清单(根据欧盟第1907/2006号REACH法规)，对219种高关注物质(SVHC)进行筛分测试。 (ii) 基于WTO 2021年6月1日的通知，对1种潜在的高关注物质(SVHC)进行筛分测试。 (iii) 基于欧洲化学品管理署截止2021年9月3日公布的潜在的高关注物质咨询清单(根据欧盟第1907/2006号REACH法规)，对4种高关注物质(SVHC)进行筛分测试。
测试结果：	请参见下一页

总结：

根据具体的范围和筛分测试，所提交样品中SVHC测试结果≤ 0.1% (w/w)。	通过

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授权签名

Lilac Wei魏文凤
批准签署人

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SHAMLP2200387414

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备注：

1. 本报告所涉及的关于特定高关注物质的化学分析是根据欧洲化学品管理署发布的下列文件，利用现有的分析技术完成的。
   http://echa.europa.eu/web/guest/candidate-list-table
   这些文件清单由欧洲化学品管理署评估, 将来可能会有变化。
2. REACH法规义务：
   2.1关于物品：
   告知：
   欧盟第1907/2006（EC）号法规第33条规定，含有满足第57条中的标准并根据第59条第一款被确定且质量分数大于0.1%的物质的物品的所有供应商应向物品接受者提供其可获取的充足信息，以使物品使用安全，这些信息至少包括含有的候选清单中物质的名称。

   通报：
   根据欧盟第1907/2006（EC）号法规，如果满足以下两个条件，如果物质符合第57条中的标准并根据第59条第一款被确定，物品的任何欧洲制造商或进口商应根据第7条第4款向欧盟化学品管理署进行通报：(a) 候选清单中的物质在物品中的总含量超过1吨/年/生产商或进口商；(b) 候选清单中的物质在物品中的总含量以质量分数计超过0.1% 的浓度。

   SGS采用欧盟法院对REACH物品定义的裁定，除非另有说明。详细的解释请见下列网址：
   http://www.sgs.com/-/media/global/documents/technical-documents/technical-bulletins/sgs-crs-position-statement-on-svhc-in-articles-a4-en-16-06.pdf?la=en

   2.2 关于材料：
   报告中的测试结果是基于测试样品。如样品是均一材质，当其构成成品时，此结果不能代表成品中的SVHC浓度。如样品为均一材质等比例合测，这些材质也可能来自不同的物品。

   如果样品是一种物质或混合物，并且直接出口到欧盟，客户有责任遵守欧盟第1907/2006号REACH法规第31 条供应链信息传递的义务和附件十四中的授权高关注物质授权的责任。

   2.3 关于物质和配制品：
   如果样品中高关注物质的浓度超过0.1% (w/w)和/或欧盟第1272/2008号CLP法规及其修订中设定的特殊浓度限值，建议客户根据欧盟第1907/2006号REACH法规对有关高关注物质准备安全数据表(SDS)以符合供应链通信的义务，如
   -根据欧盟第1272/2008号CLP法规被列为有害物质。
   -根据欧盟第1272/2008号CLP法规被列为有害混合物，而当中物质的浓度大于或等于欧盟第1272/2008号CLP法规列出的浓度限值;或
   -根据欧盟第1272/2008号CLP法规并未列为有害混合物，但包含：
   (a) 对人类健康或环境有害的物质，而在固体或液体混合物（即非气体混合物）中其浓度≥1%(w/w)或在气体混合物中占体积≥0.2%，或
   (b) PBT或vPvB物质，在固体或液体混合物（即非气体混合物）中个别浓度≥0.1%(w/w)，或
   (c) 授权审议的高关注物质候选清单上的物质（除上述以外的原因）在个别非气体混合物中的浓度≥0.1%(w/w)，或

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(d) 设有欧洲范围内工作场所接触限值的物质。

3. 如果样品中SVHC的测试结果超过报告限，建议客户进一步定量分析检测含有SVHC的组分并且得到SVHC物质的准确浓度。

测试样品：

测试样品描述：

样品编号	SGS样品ID	描述
SN1	SHA22-003874.007	透明塑料颗粒

测试方法：

SGS内部方法-SHTC-CHEM-SOP-97-T, SHTC-CHEM-SOP-302-T ，采用ICP-OES、UV-VIS、GC-MS、HPLC-DAD/MS和比色法分析。

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(SVHC)

测试结果: (SVHC候选清单中的高关注物质)

批次	物质名称	CAS No.	007 浓度 (%)	RL (%)
-	所有测试的候选清单中的SVHC	-	ND	-

测试结果：(潜在的SVHC)

批次	物质名称	CAS No.	007 浓度 (%)	RL (%)
-	所有测试的潜在的SVHC	-	ND	-

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注释：

(1) 上表仅显示检出的SVHC，低于RL的SVHC没有列出。所有测试的SVHC请参见附录。
(2) RL = 报告限(当测试结果 ≥ RL时显示数据。RL不同于法规限值。)
ND = 未检出(< RL)，ND针对SVHC物质。
(3) *测试结果是由选定的元素的结果并基于最坏的情况计算得出；
** 测试结果是由选定的标记物的结果并基于最坏的情况计算得出。
硼化合物的结果由ICP-OES测试的水提取硼元素结果换算得出。
RL = 0.005% 是针对元素 (例如钴、砷 、铅 、铬 (VI) 、铝、锆、硼、锶、锌、锑、钛、钡、镉)，除了钼的RL= 0.0005%，硼的RL= 0.0025%(仅对四氟硼酸铅)。
(4) § 只有当物质包含米氏酮(CAS No.: 90-94-8) 或米氏碱(CAS No.: 101-61-1) 的浓度≥ 0.1%(w / w) 的情况下，该物质才被提议定为SVHC
(5) / = 潜在的SVHC
除非另有说明，此报告结果仅对测试的样品负责。本报告未经本公司书面许可，不可部分复制。
检测报告仅用于客户科研、教学、内部质量控制、产品研发等目的，仅供内部参考。

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所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
I	1	4,4'-二氨基二苯甲烷(MDA)	101-77-9	0.050
I	2	2,4,6-三硝基-5-叔丁基间二甲苯(二甲苯麝香)	81-15-2	0.050
I	3	C10-13 氯代烃(短链氯化石蜡)	85535-84-8	0.050
I	4	蒽	120-12-7	0.050
I	5	邻苯二甲酸丁苄酯(BBP)	85-68-7	0.050
I	6	邻苯二甲酸二(2-乙基己基)酯(DEHP)	117-81-7	0.050
I	7	氧化双三丁基锡(TBTO)	56-35-9	0.050
I	8	二氯化钴*	7646-79-9	0.005
I	9	五氧化二砷*	1303-28-2	0.005
I	10	三氧化二砷*	1327-53-3	0.005
I	11	邻苯二甲酸二丁酯(DBP)	84-74-2	0.050
I	12	六溴环十二烷(HBCDD) 及其非对映异构体(α-HBCDD, β-HBCDD, γ-HBCDD)	-	0.050
I	13	砷酸氢铅*	7784-40-9	0.005
I	14	重铬酸钠*	7789-12-0, 10588-01-9	0.005
I	15	三乙基砷酸酯*	15606-95-8	0.005
II	16	2,4-二硝基甲苯	121-14-2	0.050
II	17	丙烯酰胺	79-06-1	0.050
II	18	蒽油**	90640-80-5	0.050
II	19	蒽油，蒽糊**	90640-81-6	0.050
II	20	蒽油，蒽糊，蒽馏分**	91995-15-2	0.050

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批次	序号	物质名称	CAS No.	RL (%)
II	21	蒽油，蒽糊，轻油**	91995-17-4	0.050
II	22	蒽油，含蒽量少**	90640-82-7	0.050
II	23	邻苯二甲酸二异丁酯	84-69-5	0.050
II	24	钼铬红(C.I.颜料红104)*	12656-85-8	0.005
II	25	铬酸铅*	7758-97-6	0.005
II	26	铅铬黄(C.I.颜料黄34)*	1344-37-2	0.005
II	27	沥青，煤焦油，高温**	65996-93-2	0.050
II	28	磷酸三(2-氯乙基)酯	115-96-8	0.050
III	29	重铬酸铵*	7789-09-5	0.005
III	30	硼酸*	-	0.005
III	31	无水四硼酸钠*	1303-96-4, 1330-43-4, 12179-04-3	0.005
III	32	铬酸钾*	7789-00-6	0.005
III	33	重铬酸钾*	7778-50-9	0.005
III	34	铬酸钠*	7775-11-3	0.005
III	35	水合硼酸钠*	12267-73-1	0.005
III	36	三氯乙烯	79-01-6	0.050
IV	37	乙二醇乙醚	110-80-5	0.050
IV	38	乙二醇单甲醚	109-86-4	0.050
IV	39	铬酸, 铬酸及重铬酸低聚物, 重铬酸*	-	0.005

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批次	序号	物质名称	CAS No.	RL (%)
IV	40	三氧化铬*	1333-82-0	0.005
IV	41	碳酸钴*	513-79-1	0.005
IV	42	乙酸钴*	71-48-7	0.005
IV	43	硝酸钴*	10141-05-6	0.005
IV	44	硫酸钴*	10124-43-3	0.005
V	45	1,2,3-三氯丙烷	96-18-4	0.050
V	46	1,2-苯二酸-二(C6-8支链)烷基酯(富C7)	71888-89-6	0.050
V	47	1,2-苯二酸-二(C7-11支链与直链)烷基(醇)酯	68515-42-4	0.050
V	48	1-甲基-2-吡咯烷酮	872-50-4	0.050
V	49	乙二醇乙醚醋酸酯	111-15-9	0.050
V	50	联氨	7803-57-8, 302-01-2	0.050
V	51	铬酸锶*	7789-06-2	0.005
VI	52	1,2-二氯乙烷	107-06-2	0.050
VI	53	4,4'-二氨基-3,3'-二氯二苯甲烷	101-14-4	0.050
VI	54	2-甲氧基苯胺	90-04-0	0.050
VI	55	对特辛基苯酚	140-66-9	0.050
VI	56	硅酸铝耐火陶瓷纤维*	-	0.005
VI	57	砷酸*	7778-39-4	0.005
VI	58	二乙二醇二甲醚	111-96-6	0.050
VI	59	邻苯二甲酸二甲氧基乙酯	117-82-8	0.050

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批次	序号	物质名称	CAS No.	RL (%)
VI	60	砷酸钙*	7778-44-1	0.005
VI	61	铬酸铬*	24613-89-6	0.005
VI	62	甲醛与苯胺的低聚物	25214-70-4	0.050
VI	63	叠氮化铅*	13424-46-9	0.005
VI	64	苦味酸铅*	6477-64-1	0.005
VI	65	史蒂芬酸铅*	15245-44-0	0.005
VI	66	N,N-二甲基乙酰胺	127-19-5	0.050
VI	67	氢氧化铬酸锌*	49663-84-5	0.005
VI	68	酚酞	77-09-8	0.050
VI	69	氢氧化铬酸锌钾*	11103-86-9	0.005
VI	70	砷酸铅*	3687-31-8	0.005
VI	71	氧化锆硅酸铝耐火陶瓷纤维*	-	0.005
VII	72	C.I.碱性蓝26§	2580-56-5	0.050
VII	73	C.I.碱性紫3§	548-62-9	0.050
VII	74	三乙二醇二甲醚(TEGDME)	112-49-2	0.050
VII	75	乙二醇二甲醚(EGDME)	110-71-4	0.050
VII	76	4,4'-二(二甲氨基)二苯甲酮(米氏酮)	90-94-8	0.050
VII	77	4,4'-二(二甲氨基)-4''-甲氨基三苯甲醇§	561-41-1	0.050
VII	78	三氧化二硼*	1303-86-2	0.005
VII	79	甲酰胺	75-12-7	0.050
VII	80	甲基磺酸铅*	17570-76-2	0.005

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所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
VII	81	N,N,N',N'-四甲基-4,4'-二氨基二苯甲烷(米氏碱)	101-61-1	0.050
VII	82	1,3,5-三(环氧乙基甲基)-1,3,5-三嗪-2,4,6-(1H, 3H,5H)-三酮(TGIC)	2451-62-9	0.050
VII	83	C.I.溶剂蓝4§	6786-83-0	0.050
VII	84	1,3,5-三-[(2S和2R)-2,3-环氧丙基]-1,3,5-三嗪-2,4,6-(1H, 3H, 5H)-三酮(β-TGIC)	59653-74-6	0.050
VIII	85	二盐基邻苯二甲酸铅*	69011-06-9	0.005
VIII	86	1,2-苯二酸-二(支链与直链)戊基酯	84777-06-0	0.050
VIII	87	乙二醇二乙醚	629-14-1	0.050
VIII	88	1-溴丙烷	106-94-5	0.050
VIII	89	3-乙基-2-甲基-2-(3-甲基丁基)-1,3-恶唑烷	143860-04-2	0.050
VIII	90	对特辛基苯酚乙氧基醚	-	0.050
VIII	91	4,4'-二氨基-3,3'-二甲基二苯甲烷	838-88-0	0.050
VIII	92	4,4'-二氨基二苯醚及其盐	101-80-4	0.050
VIII	93	4-氨基偶氮苯	60-09-3	0.050
VIII	94	2,4-二氨基甲苯	95-80-7	0.050
VIII	95	4-壬基(支链与直链)苯酚	-	0.050
VIII	96	2-甲氧基-5-甲基苯胺	120-71-8	0.050
VIII	97	碱式乙酸铅*	51404-69-4	0.005
VIII	98	4-氨基联苯	92-67-1	0.050
VIII	99	十溴二苯醚(DecaBDE)	1163-19-5	0.050
VIII	100	环己烷-1,2-二羧酸酐,顺式-环己烷-1,2-二羧酸酐,反式-环己烷-1,2-二羧酸酐	-	0.050

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(SVHC)

附录

所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
VIII	101	偶氮二甲酰胺	123-77-3	0.050
VIII	102	二丁基二氯化锡(DBTC)	683-18-1	0.050
VIII	103	硫酸二乙酯	64-67-5	0.050
VIII	104	邻苯二甲酸二异戊酯	605-50-5	0.050
VIII	105	硫酸二甲酯	77-78-1	0.050
VIII	106	地乐酚	88-85-7	0.050
VIII	107	双(十八酸基)二氧代三铅*	12578-12-0	0.005
VIII	108	C16-18-脂肪酸铅*	91031-62-8	0.005
VIII	109	呋喃	110-00-9	0.050
VIII	110	全氟十一烷酸	2058-94-8	0.050
VIII	111	全氟十四烷酸	376-06-7	0.050
VIII	112	甲基六氢邻苯二甲酸酐,4-甲基六氢邻苯二甲酸酐,1-甲基六氢邻苯二甲酸酐,3-甲基六氢邻苯二甲酸酐	-	0.050
VIII	113	四氟硼酸铅*	13814-96-5	0.005
VIII	114	氨基氰铅盐*	20837-86-9	0.005
VIII	115	硝酸铅*	10099-74-8	0.005
VIII	116	一氧化铅*	1317-36-8	0.005
VIII	117	碱式硫酸铅*	12036-76-9	0.005
VIII	118	四氧化三铅*	1314-41-6	0.005
VIII	119	钛酸铅*	12060-00-3	0.005
VIII	120	钛酸铅锆*	12626-81-2	0.005

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批次	序号	物质名称	CAS No.	RL (%)
VIII	121	甲氧基乙酸	625-45-6	0.050
VIII	122	1,2-环氧丙烷	75-56-9	0.050
VIII	123	N,N-二甲基甲酰胺	68-12-2	0.050
VIII	124	N-甲基乙酰胺	79-16-3	0.050
VIII	125	邻苯二甲酸正戊基异戊基酯	776297-69-9	0.050
VIII	126	邻-氨基偶氮甲苯	97-56-3	0.050
VIII	127	2-氨基甲苯	95-53-4	0.050
VIII	128	全氟十三烷酸	72629-94-8	0.050
VIII	129	硫酸四氧化五铅*	12065-90-6	0.005
VIII	130	铅锑黄*	8012-00-8	0.005
VIII	131	掺杂铅的硅酸钡*	68784-75-8	0.005
VIII	132	硅酸铅*	11120-22-2	0.005
VIII	133	二碱式亚硫酸铅*	62229-08-7	0.005
VIII	134	四乙基铅*	78-00-2	0.005
VIII	135	硫酸三氧化四铅*	12202-17-4	0.005
VIII	136	全氟十二烷酸	307-55-1	0.050
VIII	137	碱式碳酸铅*	1319-46-6	0.005
VIII	138	二碱式亚磷酸铅*	12141-20-7	0.005
IX	139	4-壬基(支链与直链)苯酚乙氧基醚	-	0.050
IX	140	全氟辛酸铵(APFO)**	3825-26-1	0.050
IX	141	氧化镉*	1306-19-0	0.005

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批次	序号	物质名称	CAS No.	RL (%)
IX	142	镉	7440-43-9	0.005
IX	143	邻苯二甲酸二正戊酯(DPP)	131-18-0	0.050
IX	144	全氟辛酸(PFOA)	335-67-1	0.050
X	145	硫化镉*	1306-23-6	0.005
X	146	邻苯二甲酸二正己酯	84-75-3	0.050
X	147	C.I.直接红28	573-58-0	0.050
X	148	C.I.直接黑38	1937-37-7	0.050
X	149	2-巯基咪唑啉	96-45-7	0.050
X	150	乙酸铅*	301-04-2	0.005
X	151	磷酸三二甲苯酯	25155-23-1	0.050
XI	152	邻苯二甲酸二(支链与直链)己基酯	68515-50-4	0.050
XI	153	氯化镉*	10108-64-2	0.005
XI	154	水合过硼酸钠*	-	0.005
XI	155	过硼酸钠*	7632-04-4	0.005
XII	156	2-(2H-苯并三唑-2-基)-4,6-二叔戊基苯酚(UV-328)	25973-55-1	0.050
XII	157	2-苯并三唑-2-基-4,6-二叔丁基苯酚(UV-320)	3846-71-7	0.050
XII	158	二正辛基-双(2-乙基己基巯基乙酸酯)锡 (DOTE)	15571-58-1	0.050
XII	159	氟化镉 *	7790-79-6	0.005
XII	160	硫酸镉 *	10124-36-4,31119-53-6	0.005
XII	161	二正辛基-双(2-乙基己基巯基乙酸酯)锡(DOTE)和单辛基-三(2-乙基己基巯基乙酸酯)锡(MOTE)的反应物	-	0.050

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批次	序号	物质名称	CAS No.	RL (%)
XIII	162	1,2-苯二甲酸, 二(C6-10)烷基酯 / 1,2-苯二甲酸, 混合二己二辛二癸酯, 其中邻苯二甲酸二己酯含量≥0.3%	-	0.050
XIII	163	5-二级丁基-2-(2,4-二甲基环己-3-烯-1-基)-5-甲基-1,3-二恶烷[1]，5-二级丁基-2-(4,6-二甲基环己-3-烯-1-基)-5-甲基-1,3-二恶烷[2] [任何[1]和[2]或者其任意组合的单独异构体或其任何组合]	-	0.050
XIV	164	1,3-丙磺酸内酯	1120-71-4	0.050
XIV	165	2,4-二叔丁基-6-(5-氯苯并三唑-2-基)苯酚(UV-327)	3864-99-1	0.050
XIV	166	2-(2H-苯并三唑-2-基)-4-叔丁基-6-仲丁基苯酚 (UV-350)	36437-37-3	0.050
XIV	167	硝基苯	98-95-3	0.050
XIV	168	全氟壬酸及其钠盐和铵盐	-	0.050
XV	169	苯并(a)芘	50-32-8	0.050
XVI	170	4,4'-异亚丙基联苯酚 (双酚A)	80-05-7	0.050
XVI	171	4-庚基(支链与直链)苯酚	-	0.050
XVI	172	全氟癸酸 (PFDA) 及其钠盐和铵盐	-	0.050
XVI	173	对叔戊基苯酚	80-46-6	0.050
XVII	174	全氟己烷-1-磺酸及其盐	-	0.050
XVIII	175	双(六氯环戊二烯)环辛烷(包含任何顺式与反式同分异构体或其组合)	-	0.050
XVIII	176	苯并蒽(BaA)	56-55-3	0.050
XVIII	177	硝酸镉*	10325-94-7	0.005
XVIII	178	碳酸镉*	513-78-0	0.005
XVIII	179	氢氧化镉*	21041-95-2	0.005
XVIII	180	屈(CHR)	218-01-9	0.050

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批次	序号	物质名称	CAS No.	RL (%)
XVIII	181	1,3,4-噻二唑-2,5-二硫酮、甲醛与支链和直链4-庚基苯酚的反应产物(RP-HP)[含有支链和直链4-庚基苯酚重量比≥0.1%]	-	0.050
XIX	182	1,2,4-苯三酸酐(偏苯三酸酐)(TMA)	552-30-7	0.050
XIX	183	苯并(g,h,i)苝(二萘嵌苯) (BPE)	191-24-2	0.050
XIX	184	十甲基环五硅氧烷(D5)	541-02-6	0.050
XIX	185	邻苯二甲酸二环己酯(DCHP)	84-61-7	0.050
XIX	186	氧化硼钠*	12008-41-2	0.005
XIX	187	十二甲基环六硅氧烷(D6)	540-97-6	0.050
XIX	188	乙二胺(EDA)	107-15-3	0.050
XIX	189	铅	7439-92-1	0.005
XIX	190	八甲基环四硅氧烷(D4)	556-67-2	0.050
XIX	191	氢化三联苯	61788-32-7	0.050
XX	192	1,7,7-三甲基-3-(苯基亚甲基)双环[2.2.1]庚-2-酮 (3-亚苄基樟脑)	15087-24-8	0.050
XX	193	4,4'-(1,3-二甲基丁基)二苯酚(1,3-DMBBP)	6807-17-6	0.050
XX	194	苯并 (k)荧蒽(BkF)	207-08-9	0.050
XX	195	荧蒽(FLT)	206-44-0	0.050
XX	196	菲(PHE)	85-01-8	0.050
XX	197	芘(PYR)	129-00-0	0.050
XXI	198	2,3,3,3-四氟-2-(七氟丙氧基)丙酸及其盐和酰基卤化物(包括单体和组合)(HFPO-DA)	-	0.050
XXI	199	2-甲氧基乙基乙酸酯	110-49-6	0.050
XXI	200	4-叔丁基苯酚(PTBP)	98-54-4	0.050

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批次	序号	物质名称	CAS No.	RL (%)
XXI	201	三(4-壬基苯基，支链和直链)亚磷酸酯(TNPP)(含≥0.1%的支链和直链4-壬基苯酚)	-	0.050
XXII	202	2-苄基-2-二甲基氨基-4'-吗啉基苯基丁酮	119313-12-1	0.050
XXII	203	2-甲基-1-(4-甲硫基苯基)-2-吗啉基-1-丙酮	71868-10-5	0.050
XXII	204	邻苯二甲酸二异己酯	71850-09-4	0.050
XXII	205	全氟丁烷磺酸及其盐	-	0.050
XXIII	206	1-乙烯基咪唑	1072-63-5	0.050
XXIII	207	2-甲基咪唑	693-98-1	0.050
XXIII	208	对羟基苯甲酸丁酯	94-26-8	0.050
XXIII	209	双(乙酰丙酮基)二丁基锡**	22673-19-4	0.050
XXIV	210	四乙二醇二甲醚	143-24-8	0.050
XXIV	211	二月桂酸二辛基锡及任何其他二辛基锡双(脂肪酰氧基)衍生物**	-	0.050
XXV	212	1,4-二氧六环	123-91-1	0.050
XXV	213	二溴新戊二醇(BMP); 三溴新戊醇(TBNPA); 2,3-二溴-1-丙醇(2,3-DBPA)	-	0.050
XXV	214	铃兰醛及其立体异构体	-	0.050
XXV	215	双酚B	77-40-7	0.050
XXV	216	戊二醛	111-30-8	0.050
XXV	217	中链氯化石蜡(MCCP)	-	0.050
XXV	218	原硼酸钠盐*	13840-56-7	0.005
XXV	219	对十二烷基苯酚及其异构体(PDDP)	-	0.050

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批次	序号	物质名称	CAS No.	RL (%)
/	220	间苯二酚	108-46-3	0.050
/	221	(±)-1,7,7-三甲基-3-[(4-甲基苯基)亚甲基]二环[2.2.1]庚-2-酮，包括各个异构体和/或其组合(4-MBC)	-	0.050
/	222	2,2'-亚甲基双-(4-甲基-6-叔丁基苯酚) (DBMC)	119-47-1	0.050
/	223	S-(三环[5.2.1.0'2,6]癸-3-烯-8(或9)-基) O-(异丙基或异丁基或2-乙基己基) O-(异丙基或异丁基或2-乙基己基)二硫代磷酸酯	255881-94-8	0.050
/	224	乙烯基-三(2-甲氧基乙氧基)硅烷	1067-53-4	0.050

样品照片:

SHAMLP2200387414



SHA22-003874.007

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*** 报告完 ***

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Test Report (SVHC)

Lihuayi Weiyuan Chemical Co.,Ltd.
No.208,Lishi Road,Lijin County,Dongying City,Shandong Province

The following sample(s) was/were submitted and identified on behalf of the clients as : Polycarbonate

SGS Job No. :	SHIN2201000745PC - SH
Product Specification :	WY-106BR
Date of Sample Received :	07 Jan 2022
Testing Period :	07 Jan 2022 - 13 Jan 2022
Test Requested :	As requested by client, SVHC screening is performed according to: (i) Two hundred and nineteen (219) substances in the Candidate List of Substances of Very High Concern (SVHC) for authorization published by European Chemicals Agency (ECHA) on and before Jul 8, 2021 regarding Regulation (EC) No 1907/2006 concerning the REACH. (ii) One (1) potential Substances of Very High Concern (SVHC) in the notification of WTO on Jun 1, 2021. (iii) Four (4) substances in the Public Consultation List of potential Substances of Very High Concern (SVHC) published by European Chemicals Agency (ECHA) on and before Sep 3, 2021 regarding Regulation (EC) No 1907/2006 concerning the REACH.
Test Results :	Please refer to next page(s).

Summary :

According to the specified scope and evaluation screening, the test results of SVHC are ≤ 0.1% (w/w) in the submitted sample.	PASS

Signed for and on behalf of
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

scan to see the report
SHAMLP2200387413

Lilac Wei
Approved Signatory

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Remark :

1. The chemical analysis of specified SVHC is performed by means of currently available analytical techniques against the following SVHC related documents published by ECHA:
   http://echa.europa.eu/web/guest/candidate-list-table
   These lists are under evaluation by ECHA and may subject to change in the future.
2. REACH obligation:
   2.1 Concerning article(s):
   Communication:
   Article 33 of Regulation (EC) No 1907/2006 requires supplier of an article containing a substance meeting the criteria in Article 57 and identified in accordance with Article 59(1) in a concentration above 0.1% weight by weight (w/w) shall provide the recipient of the article with sufficient information, available to the supplier, to allow safe use of the article including, as a minimum, the name of that substance in the Candidate List.

   Notification:
   In accordance with Regulation (EC) No 1907/2006, any EU producer or importer of articles shall notify ECHA, in accordance with paragraph 4 of Article 7, if a substance meets the criteria in Article 57 and is identified in accordance with Article 59(1) of the Regulation, if (a) the substance in the Candidate List is present in those articles in quantities totaling over one tonne per producer or importer per year; and (b) the substance in the Candidate List is present in those articles above a concentration of 0.1% weight by weight (w/w).

   SGS adopts the ruling of the Court of Justice of the European Union on the definition of an article under REACH unless indicated otherwise. Detail explanation is available at the following link:
   http://www.sgs.com/-/media/global/documents/technical-documents/technical-bulletins/sgs-crs-position-statement-on-svhc-in-articles-a4-en-16-06.pdf?la=en

   2.2 Concerning material(s):
   Test results in this report are based on the tested sample. This report refers to testing result of tested sample submitted as homogenous material(s). In case such material is being used to compose an article, the results indicated in this report may not represent SVHC concentration in such article. If this report refers to testing result of composite material group by equal weight proportion, the material in each composite test group may come from more than one article.

   If the sample is a substance or mixture, and it directly exports to EU, client has the obligation to comply with the supply chain communication obligation under Article 31 of Regulation (EC) No. 1907/2006 and the conditions of Authorization of substance of very high concern included in the Annex XIV of the Regulation (EC) No. 1907/2006.

   2.3 Concerning substance and preparation:
   If a SVHC is found over 0.1% (w/w) and/or the specific concentration limit which is set in Regulation (EC) No 1272/2008 and its amendments, client is suggested to prepare a Safety

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Data Sheet (SDS) against the SVHC to comply with the supply chain communication obligation under Regulation (EC) No 1907/2006, in which:
- a substance that is classified as hazardous under the CLP Regulation (EC) No 1272/2008.
- a mixture that is classified as hazardous under the CLP Regulation (EC) No 1272/2008, when it contains a substance with concentration equal to, or greater than the classification limit as set in Regulation (EC) No. 1272/2008; or
- a mixture is not classified as hazardous under the CLP Regulation (EC) No 1272/2008, but contains either:
(a) a substance posing human health or environmental hazards in an individual concentration of ≥ 1 % by weight for mixtures that are solid or liquids (i.e., non-gaseous mixtures) or ≥ 0.2 % by volume for gaseous mixtures; or
(b) a substance that is PBT, or vPvB in an individual concentration of ≥ 0.1 % by weight for mixtures that are solid or liquids (i.e., non-gaseous mixtures); or
(c) a substance on the SVHC candidate list (for reasons other than those listed above), in an individual concentration of ≥ 0.1 % by weight for non-gaseous mixtures; or
(d) a substance for which there are Europe-wide workplace exposure limits.

3. If a SVHC is found over the reporting limit, client is suggested to identify the composite component which contains the SVHC and the exact concentration of the SVHC by requesting further quantitative analysis from the laboratory.

Test Sample :

Sample Description :

Specimen No.	SGS Sample ID	Description
SN1	SHA22-003874.007	Transparent plastic particles

Test Method :

SGS In-House method-SHTC-CHEM-SOP-97-T, SHTC-CHEM-SOP-302-T, Analyzed by ICP-OES, UV-VIS, GC-MS, HPLC-DAD/MS and Colorimetric Method.

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(SVHC)

Test Result: (Substances in the Candidate List of SVHC)

Batch	Substance Name	CAS No.	007 Concentration (%)	RL (%)
-	All tested SVHC in candidate list	-	ND	-

Test Result: (Potential SVHC)

Batch	Substance Name	CAS No.	007 Concentration (%)	RL (%)
-	All tested Potential SVHC	-	ND	-

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Notes :

(1)The table above only shows detected SVHC, and SVHC that below RL are not reported. Please refer to Appendix for the full list of tested SVHC.

(2) RL = Reporting Limit (Test data will be shown if it ≥ RL. RL is not regulatory limit.)
ND = Not detected (lower than RL), ND is denoted on the SVHC substance.

(3) * The test result is based on the calculation of selected element(s) and to the worst-case scenario.
** The test result is based on the calculation of selected marker(s) and to the worst-case scenario.
Calculated concentration of boric compounds are based on water extractive boron detected by ICP-OES.
RL = 0.005% is evaluated for element (i.e. cobalt, arsenic, lead, chromium (VI), aluminum, zirconium, boron, strontium, zinc, antimony, titanium, barium, cadmium respectively), except molybdenum RL=0.0005%, boron RL=0.0025% (only for Lead bis(tetrafluoroborate)).

(4) § The substance is proposed for the identification as SVHC only where it contains Michler's ketone (CAS Number: 90-94-8) or Michler's base (CAS Number: 101-61-1) ≥0.1% (w/w).

(5) / = Potential SVHC

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
I	1	4,4' -Diaminodiphenylmethane(MDA)	101-77-9	0.050
I	2	5-tert-butyl-2,4,6-trinitro-m-xylene (musk xylene)	81-15-2	0.050
I	3	Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins)	85535-84-8	0.050
I	4	Anthracene	120-12-7	0.050
I	5	Benzyl butyl phthalate (BBP)	85-68-7	0.050
I	6	Bis (2-ethylhexyl)phthalate (DEHP)	117-81-7	0.050
I	7	Bis(tributyltin)oxide (TBTO)	56-35-9	0.050
I	8	Cobalt dichloride*	7646-79-9	0.005
I	9	Diarsenic pentaoxide*	1303-28-2	0.005
I	10	Diarsenic trioxide*	1327-53-3	0.005
I	11	Dibutyl phthalate (DBP)	84-74-2	0.050
I	12	Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α-HBCDD, β-HBCDD, γ-HBCDD)	-	0.050
I	13	Lead hydrogen arsenate*	7784-40-9	0.005
I	14	Sodium dichromate*	7789-12-0, 10588-01-9	0.005
I	15	Triethyl arsenate*	15606-95-8	0.005
II	16	2,4-Dinitrotoluene	121-14-2	0.050
II	17	Acrylamide	79-06-1	0.050
II	18	Anthracene oil**	90640-80-5	0.050
II	19	Anthracene oil, anthracene paste**	90640-81-6	0.050
II	20	Anthracene oil, anthracene paste, anthracene fraction**	91995-15-2	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
II	21	Anthracene oil, anthracene paste, distn. lights**	91995-17-4	0.050
II	22	Anthracene oil, anthracene-low**	90640-82-7	0.050
II	23	Diisobutyl phthalate	84-69-5	0.050
II	24	Lead chromate molybdate sulphate red (C.I. Pigment Red 104)*	12656-85-8	0.005
II	25	Lead chromate*	7758-97-6	0.005
II	26	Lead sulfochromate yellow (C.I. Pigment Yellow 34)*	1344-37-2	0.005
II	27	Pitch, coal tar, high temp.**	65996-93-2	0.050
II	28	Tris(2-chloroethyl)phosphate	115-96-8	0.050
III	29	Ammonium dichromate*	7789-09-5	0.005
III	30	Boric acid*	-	0.005
III	31	Disodium tetraborate, anhydrous*	1303-96-4, 1330-43-4, 12179-04-3	0.005
III	32	Potassium chromate*	7789-00-6	0.005
III	33	Potassium dichromate*	7778-50-9	0.005
III	34	Sodium chromate*	7775-11-3	0.005
III	35	Tetraboron disodium heptaoxide, hydrate*	12267-73-1	0.005
III	36	Trichloroethylene	79-01-6	0.050
IV	37	2-Ethoxyethanol	110-80-5	0.050
IV	38	2-Methoxyethanol	109-86-4	0.050
IV	39	Chromic acid, Oligomers of chromic acid and dichromic acid, Dichromic acid*	-	0.005

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
IV	40	Chromium trioxide*	1333-82-0	0.005
IV	41	Cobalt(II) carbonate*	513-79-1	0.005
IV	42	Cobalt(II) diacetate*	71-48-7	0.005
IV	43	Cobalt(II) dinitrate*	10141-05-6	0.005
IV	44	Cobalt(II) sulphate*	10124-43-3	0.005
V	45	1,2,3-trichloropropane	96-18-4	0.050
V	46	1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich	71888-89-6	0.050
V	47	1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters	68515-42-4	0.050
V	48	1-methyl-2-pyrrolidone	872-50-4	0.050
V	49	2-ethoxyethyl acetate	111-15-9	0.050
V	50	Hydrazine	7803-57-8, 302-01-2	0.050
V	51	Strontium chromate*	7789-06-2	0.005
VI	52	1,2-Dichloroethane	107-06-2	0.050
VI	53	2,2'-dichloro-4,4'-methylenedianiline	101-14-4	0.050
VI	54	2-Methoxyaniline; o-Anisidine	90-04-0	0.050
VI	55	4-(1,1,3,3-tetramethylbutyl)phenol	140-66-9	0.050
VI	56	Aluminosilicate Refractory Ceramic Fibres*	-	0.005
VI	57	Arsenic acid*	7778-39-4	0.005
VI	58	Bis(2-methoxyethyl) ether	111-96-6	0.050
VI	59	Bis(2-methoxyethyl) phthalate	117-82-8	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VI	60	Calcium arsenate*	7778-44-1	0.005
VI	61	Dichromium tris(chromate) *	24613-89-6	0.005
VI	62	Formaldehyde, oligomeric reaction products with aniline	25214-70-4	0.050
VI	63	Lead diazide, Lead azide*	13424-46-9	0.005
VI	64	Lead dipicrate*	6477-64-1	0.005
VI	65	Lead styphnate*	15245-44-0	0.005
VI	66	N,N-dimethylacetamide	127-19-5	0.050
VI	67	Pentazinc chromate octahydroxide*	49663-84-5	0.005
VI	68	Phenolphthalein	77-09-8	0.050
VI	69	Potassium hydroxyoctaoxodizincatedichromate*	11103-86-9	0.005
VI	70	Trilead diarsenate*	3687-31-8	0.005
VI	71	Zirconia Aluminosilicate Refractory Ceramic Fibres*	-	0.005
VII	72	[4-[[4-anilino-1-naphthyl][4-(dimethylamino)phenyl]methylene]cyclohexa-2,5-dien-1-ylidene] dimethylammonium chloride (C.I. Basic Blue 26)§	2580-56-5	0.050
VII	73	[4-[4,4'-bis(dimethylamino) benzhydrylidene]cyclohexa-2,5-dien-1-ylidene]dimethylammonium chloride (C.I. Basic Violet 3)§	548-62-9	0.050
VII	74	1,2-bis(2-methoxyethoxy)ethane (TEGDME; triglyme)	112-49-2	0.050
VII	75	1,2-dimethoxyethane; ethylene glycol dimethyl ether (EGDME)	110-71-4	0.050
VII	76	4,4'-bis(dimethylamino) benzophenone (Michler's Ketone)	90-94-8	0.050
VII	77	4,4'-bis(dimethylamino)-4''-(methylamino)trityl alcohol§	561-41-1	0.050
VII	78	Diboron trioxide*	1303-86-2	0.005

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VII	79	Formamide	75-12-7	0.050
VII	80	Lead(II) bis(methanesulfonate)*	17570-76-2	0.005
VII	81	N,N,N',N'-tetramethyl-4,4'-methylenedianiline (Michler's base)	101-61-1	0.050
VII	82	TGIC (1,3,5-tris (oxiranylmethyl) -1,3,5-triazine-2,4,6(1H,3H,5H)-trione)	2451-62-9	0.050
VII	83	α,α-Bis[4-(dimethylamino)phenyl]-4 (phenylamino)naphthalene-1-methanol (C.I. Solvent Blue 4) §	6786-83-0	0.050
VII	84	β-TGIC (1,3,5-tris[(2S and 2R)-2,3-epoxypropyl]-1,3,5-triazine-2,4,6-(1H,3H,5H)-trione)	59653-74-6	0.050
VIII	85	[Phthalato(2-)]dioxotrilead*	69011-06-9	0.005
VIII	86	1,2-Benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0	0.050
VIII	87	1,2-Diethoxyethane	629-14-1	0.050
VIII	88	1-Bromopropane	106-94-5	0.050
VIII	89	3-Ethyl-2-methyl-2-(3-methylbutyl)-1,3-oxazolidine	143860-04-2	0.050
VIII	90	4-(1,1,3,3-tetramethylbutyl)phenol, ethoxylated	-	0.050
VIII	91	4,4'-Methylenedi-o-toluidine	838-88-0	0.050
VIII	92	4,4'-Oxydianiline and its salts	101-80-4	0.050
VIII	93	4-Aminoazobenzene	60-09-3	0.050
VIII	94	4-Methyl-m-phenylenediamine	95-80-7	0.050
VIII	95	4-Nonylphenol, branched and linear	-	0.050
VIII	96	6-Methoxy-m-toluidine	120-71-8	0.050
VIII	97	Acetic acid, lead salt, basic*	51404-69-4	0.005

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VIII	98	Biphenyl-4-ylamine	92-67-1	0.050
VIII	99	Bis(pentabromophenyl) ether (DecaBDE)	1163-19-5	0.050
VIII	100	Cyclohexane-1,2-dicarboxylic anhydride, cis-cyclohexane-1,2-dicarboxylic anhydride, trans-cyclohexane-1,2-dicarboxylic anhydride	-	0.050
VIII	101	Diazene-1,2-dicarboxamide (C,C'-azodi(formamide))	123-77-3	0.050
VIII	102	Dibutyltin dichloride (DBTC)	683-18-1	0.050
VIII	103	Diethyl sulphate	64-67-5	0.050
VIII	104	Diisopentylphthalate	605-50-5	0.050
VIII	105	Dimethyl sulphate	77-78-1	0.050
VIII	106	Dinoseb	88-85-7	0.050
VIII	107	Dioxobis(stearato)trilead*	12578-12-0	0.005
VIII	108	Fatty acids, C16-18, lead salts*	91031-62-8	0.005
VIII	109	Furan	110-00-9	0.050
VIII	110	Henicosafluoroundecanoic acid	2058-94-8	0.050
VIII	111	Heptacosafluorotetradecanoic acid	376-06-7	0.050
VIII	112	Hexahydromethylphathalic anhydride, Hexahydro-4-methylphathalic anhydride, Hexahydro-1-methylphathalic anhydride, Hexahydro-3-methylphathalic anhydride	-	0.050
VIII	113	Lead bis(tetrafluoroborate)*	13814-96-5	0.005
VIII	114	Lead cyanamidate*	20837-86-9	0.005
VIII	115	Lead dinitrate*	10099-74-8	0.005
VIII	116	Lead monoxide*	1317-36-8	0.005

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Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VIII	117	Lead oxide sulfate*	12036-76-9	0.005
VIII	118	Lead tetroxide (orange lead)*	1314-41-6	0.005
VIII	119	Lead titanium trioxide*	12060-00-3	0.005
VIII	120	Lead titanium zirconium oxide*	12626-81-2	0.005
VIII	121	Methoxyacetic acid	625-45-6	0.050
VIII	122	Methyloxirane (Propylene oxide)	75-56-9	0.050
VIII	123	N,N-dimethylformamide	68-12-2	0.050
VIII	124	N-Methylacetamide	79-16-3	0.050
VIII	125	N-Pentyl-isopentylphthalate	776297-69-9	0.050
VIII	126	o-Aminoazotoluene	97-56-3	0.050
VIII	127	o-Toluidine	95-53-4	0.050
VIII	128	Pentacosafluorotridecanoic acid	72629-94-8	0.050
VIII	129	Pentalead tetraoxide sulphate*	12065-90-6	0.005
VIII	130	Pyrochlore, antimony lead yellow*	8012-00-8	0.005
VIII	131	Silicic acid, barium salt, lead-doped*	68784-75-8	0.005
VIII	132	Silicic acid, lead salt*	11120-22-2	0.005
VIII	133	Sulfurous acid, lead salt, dibasic*	62229-08-7	0.005
VIII	134	Tetraethyllead*	78-00-2	0.005
VIII	135	Tetralead trioxide sulphate*	12202-17-4	0.005
VIII	136	Tricosafluorododecanoic acid	307-55-1	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VIII	137	Trilead bis(carbonate)dihydroxide (basic lead carbonate)*	1319-46-6	0.005
VIII	138	Trilead dioxide phosphonate*	12141-20-7	0.005
IX	139	4-Nonylphenol, branched and linear, ethoxylated	-	0.050
IX	140	Ammonium pentadecafluorooctanoate (APFO)**	3825-26-1	0.050
IX	141	Cadmium oxide*	1306-19-0	0.005
IX	142	Cadmium	7440-43-9	0.005
IX	143	Dipentyl phthalate (DPP)	131-18-0	0.050
IX	144	Pentadecafluorooctanoic acid (PFOA)	335-67-1	0.050
X	145	Cadmium sulphide*	1306-23-6	0.005
X	146	Dihexyl phthalate	84-75-3	0.050
X	147	Disodium 3,3'-[[1,1'-biphenyl] -4,4'-diylbis (azo)] bis(4-aminonaphthalene- 1-sulphonate) (C.I. Direct Red 28)	573-58-0	0.050
X	148	Disodium 4-amino-3-[[4'-[(2,4-diaminophenyl) azo] [1,1'-biphenyl]-4-yl] azo] -5-hydroxy-6-(phenylazo) naphthalene-2,7-disulphonate (C.I. Direct Black 38)	1937-37-7	0.050
X	149	Imidazolidine-2-thione; (2-imidazoline-2-thiol)	96-45-7	0.050
X	150	Lead di(acetate)*	301-04-2	0.005
X	151	Trixylyl phosphate	25155-23-1	0.050
XI	152	1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XI	153	Cadmium chloride*	10108-64-2	0.005
XI	154	Sodium perborate; perboric acid, sodium salt*	-	0.005
XI	155	Sodium peroxometaborate*	7632-04-4	0.005
XII	156	2- (2H-benzotriazol-2-yl) -4,6-ditertpentylphenol (UV-328)	25973-55-1	0.050
XII	157	2-benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320)	3846-71-7	0.050
XII	158	2-ethylhexyl 10-ethyl-4,4-dioctyl- 7-oxo-8-oxa-3,5-dithia- 4-stannatetradecanoate (DOTE)	15571-58-1	0.050
XII	159	Cadmium fluoride*	7790-79-6	0.005
XII	160	Cadmium sulphate*	10124-36-4,31119-53-6	0.005
XII	161	Reaction mass of 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate & 2-ethylhexyl 10-ethyl-4-[[2-[(2-ethylhexyl)oxy]-2-oxoethyl]thio]-4-octyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (reaction mass of DOTE & MOTE)	-	0.050
XIII	162	1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters; 1,2-benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters with ≥ 0.3% of dihexyl phthalate	-	0.050
XIII	163	5-sec-butyl-2-(2,4-dimethylcyclohex-3-en-1-yl)-5-methyl-1,3-dioxane [1], 5-sec-butyl-2-(4,6-dimethylcyclohex-3-en-1-yl)-5-methyl-1,3-dioxane [2] [covering any of the individual isomers of [1] and [2] or any combination thereof]	-	0.050
XIV	164	1,3-propanesultone	1120-71-4	0.050
XIV	165	2,4-di-tert-butyl-6-(5-chlorobenzotriazol-2-yl) phenol (UV-327)	3864-99-1	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XIV	166	2-(2H-benzotriazol-2-yl)-4-(tert-butyl)-6-(sec-butyl)phenol (UV-350)	36437-37-3	0.050
XIV	167	Nitrobenzene	98-95-3	0.050
XIV	168	Perfluorononan-1-oic-acid and its sodium and ammonium salts	-	0.050
XV	169	Benzo[def]chrysene (Benzo[a]pyrene)	50-32-8	0.050
XVI	170	4,4'-isopropylidenediphenol (bisphenol A)	80-05-7	0.050
XVI	171	4-Heptylphenol, branched and linear	-	0.050
XVI	172	Nonadecafluorodecanoic acid (PFDA) and its sodium and ammonium salts	-	0.050
XVI	173	p-(1,1-dimethylpropyl)phenol	80-46-6	0.050
XVII	174	Perfluorohexane-1-sulphonic acid and its salts	-	0.050
XVIII	175	1,6,7,8,9,14,15,16,17,17,18,18-Dodecachloropentacyclo[12.2.1.16,9.02,13.05,10]octadeca-7,15-diene ("Dechlorane Plus"™) [covering any of its individual anti- and syn-isomers or any combination thereof]	-	0.050
XVIII	176	Benz[a]anthracene	56-55-3	0.050
XVIII	177	Cadmium nitrate*	10325-94-7	0.005
XVIII	178	Cadmium carbonate*	513-78-0	0.005
XVIII	179	Cadmium hydroxide*	21041-95-2	0.005
XVIII	180	Chrysene	218-01-9	0.050
XVIII	181	Reaction products of 1,3,4-thiadiazolidine-2,5-dithione, formaldehyde and 4-heptylphenol, branched and linear (RP-HP) [with ≥0.1% w/w 4-heptylphenol, branched and linear]	-	0.050
XIX	182	Benzene-1,2,4-tricarboxylic acid 1,2-anhydride (trimellitic anhydride)	552-30-7	0.050

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Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XIX	183	Benzo[ghi]perylene	191-24-2	0.050
XIX	184	Decamethylcyclopentasiloxane (D5)	541-02-6	0.050
XIX	185	Dicyclohexyl phthalate (DCHP)	84-61-7	0.050
XIX	186	Disodium octaborate*	12008-41-2	0.005
XIX	187	Dodecamethylcyclohexasiloxane (D6)	540-97-6	0.050
XIX	188	Ethylenediamine (EDA)	107-15-3	0.050
XIX	189	Lead	7439-92-1	0.005
XIX	190	Octamethylcyclotetrasiloxane (D4)	556-67-2	0.050
XIX	191	Terphenyl, hydrogenated	61788-32-7	0.050
XX	192	1,7,7-trimethyl-3-(phenylmethylene)bicyclo [2.2.1]heptan-2-one (3-benzylidene camphor)	15087-24-8	0.050
XX	193	2,2-bis(4'-hydroxyphenyl)-4-methylpentane	6807-17-6	0.050
XX	194	Benzo[k]fluoranthene	207-08-9	0.050
XX	195	Fluoranthene	206-44-0	0.050
XX	196	Phenanthrene	85-01-8	0.050
XX	197	Pyrene	129-00-0	0.050
XXI	198	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propionic acid, its salts and its acyl halides (covering any of their individual isomers and combinations thereof)	-	0.050
XXI	199	2-methoxyethyl acetate	110-49-6	0.050
XXI	200	4-tert-butylphenol (PTBP)	98-54-4	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XXI	201	Tris(4-nonylphenyl, branched and linear) phosphite (TNPP) with ≥ 0.1% w/w of 4-nonylphenol, branched and linear (4-NP)	-	0.050
XXII	202	2-benzyl-2-dimethylamino-4'-morpholinobutyrophenone	119313-12-1	0.050
XXII	203	2-methyl-1-(4-methylthiophenyl)-2-morpholinopropan-1-one	71868-10-5	0.050
XXII	204	Diisohexyl phthalate	71850-09-4	0.050
XXII	205	Perfluorobutane sulfonic acid (PFBS) and its salts	-	0.050
XXIII	206	1-vinylimidazole	1072-63-5	0.050
XXIII	207	2-methylimidazole	693-98-1	0.050
XXIII	208	Butyl 4-hydroxybenzoate	94-26-8	0.050
XXIII	209	Dibutylbis(pentane-2,4-dionato-O,O') tin**	22673-19-4	0.050
XXIV	210	bis(2-(2-methoxyethoxy)ethyl) ether	143-24-8	0.050
XXIV	211	Dioctyltin dilaurate, stannane, dioctyl-, bis(coco acyloxy) derivs., and any other stannane, dioctyl-, bis(fatty acyloxy) derivs. wherein C12 is the predominant carbon number of the fatty acyloxy moiety**	-	0.050
XXV	212	1,4-dioxane	123-91-1	0.050
XXV	213	2,2-bis(bromomethyl)propane1,3-diol (BMP); 2,2-dimethylpropan-1-ol, tribromo derivative/3-bromo-2,2-bis(bromomethyl)-1-propanol (TBNPA); 2,3-dibromo-1-propanol (2,3-DBPA)	-	0.050
XXV	214	2-(4-tert-butylbenzyl)propionaldehyde and its individual stereoisomers	-	0.050
XXV	215	4,4'-(1-methylpropylidene)bisphenol (bisphenol B)	77-40-7	0.050
XXV	216	Glutaral	111-30-8	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XXV	217	Medium-chain chlorinated paraffins (MCCP) [UVCB substances consisting of more than or equal to 80% linear chloroalkanes with carbon chain lengths within the range from C14 to C17]	-	0.050
XXV	218	Orthoboric acid, sodium salt*	13840-56-7	0.005
XXV	219	Phenol, alkylation products (mainly in para position) with C12-rich branched alkyl chains from oligomerisation, covering any individual isomers and/ or combinations thereof (PDDP)	-	0.050
/	220	Resorcinol	108-46-3	0.050
/	221	(±)-1,7,7-trimethyl-3-[(4-methylphenyl)methylene]bicyclo[2.2.1]heptan-2-one covering any of the individual isomers and/or combinations thereof (4-MBC)	-	0.050
/	222	6,6'-di-tert-butyl-2,2'-methylenedi-p-cresol (DBMC)	119-47-1	0.050
/	223	S-(tricyclo[5.2.1.0'2,6]deca-3-en-8(or 9)-yl) O-(isopropyl or isobutyl or 2-ethylhexyl) O-(isopropyl or isobutyl or 2-ethylhexyl) phosphorodithioate	255881-94-8	0.050
/	224	Tris(2-methoxyethoxy)vinylsilane	1067-53-4	0.050

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Test Report

Lihuayi Weiyuan Chemical Co.,Ltd.

No.208,Lishi Road,Lijin County,Dongying City,Shandong Province

The following sample(s) was/were submitted and identified on behalf of the clients as : Polycarbonate

SGS Job No. :	SHIN2201000745PC - SH
Product Specification :	WY-106BR
Date of Sample Received :	07 Jan 2022
Testing Period :	07 Jan 2022 - 12 Jan 2022
Test Requested :	Selected test(s) as requested by client.
Test Method :	Please refer to next page(s).
Test Results :	Please refer to next page(s).
Conclusion :	Based on the performed tests on submitted sample(s), the results of Cadmium, Lead, Mercury, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) and Phthalates such as Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP) comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Signed for and on behalf of
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

scan to see the report

SHAMLP2200343913

Lilac Wei
Approved Signatory

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Test Results :

Test Part Description :

Specimen No.	SGS Sample ID	Description
SN1	SHA22-003439.007	Transparent plastic particles

Remarks :

(1) 1 mg/kg = 0.0001%

(2) MDL = Method Detection Limit

(3) ND = Not Detected (< MDL)

(4) "-" = Not Regulated

RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

Test Method : With reference to IEC 62321-4:2013+AMD1:2017, IEC62321-5:2013, IEC62321-7-2:2017, IEC 62321-6:2015 and IEC62321-8:2017, analyzed by ICP-OES, UV-Vis and GC-MS.

Test Item(s)	Limit	Unit	MDL	*007*
Cadmium (Cd)	100	mg/kg	2	ND
Lead (Pb)	1000	mg/kg	2	ND
Mercury (Hg)	1000	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))	1000	mg/kg	8	ND
Sum of PBBs	1000	mg/kg	-	ND
Monobromobiphenyl	-	mg/kg	5	ND
Dibromobiphenyl	-	mg/kg	5	ND
Tribromobiphenyl	-	mg/kg	5	ND
Tetrabromobiphenyl	-	mg/kg	5	ND
Pentabromobiphenyl	-	mg/kg	5	ND
Hexabromobiphenyl	-	mg/kg	5	ND
Heptabromobiphenyl	-	mg/kg	5	ND
Octabromobiphenyl	-	mg/kg	5	ND
Nonabromobiphenyl	-	mg/kg	5	ND
Decabromobiphenyl	-	mg/kg	5	ND
Sum of PBDEs	1000	mg/kg	-	ND
Monobromodiphenyl ether	-	mg/kg	5	ND
Dibromodiphenyl ether	-	mg/kg	5	ND
Tribromodiphenyl ether	-	mg/kg	5	ND
Tetrabromodiphenyl ether	-	mg/kg	5	ND

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Test Item(s)	Limit	Unit	MDL	*007*
Pentabromodiphenyl ether	-	mg/kg	5	ND
Hexabromodiphenyl ether	-	mg/kg	5	ND
Heptabromodiphenyl ether	-	mg/kg	5	ND
Octabromodiphenyl ether	-	mg/kg	5	ND
Nonabromodiphenyl ether	-	mg/kg	5	ND
Decabromodiphenyl ether	-	mg/kg	5	ND
Di-butyl Phthalate (DBP)	1000	mg/kg	50	ND
Benzyl Butyl Phthalate (BBP)	1000	mg/kg	50	ND
Di-2-Ethyl Hexyl Phthalate (DEHP)	1000	mg/kg	50	ND
Diisobutyl Phthalates (DIBP)	1000	mg/kg	50	ND

Notes :

(1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.
IEC 62321 series is equivalent to EN 62321 series
https://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101::::FSP_ORG_ID,FSP_LANG_ID:1258637,25

(2) The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments,including industrial monitoring and control instruments, from 22 July 2021.

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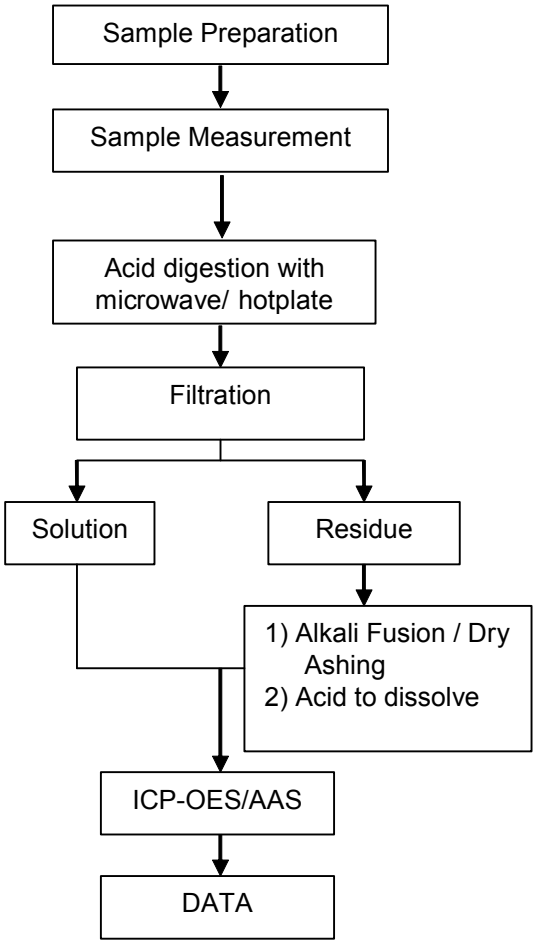
Elements (IEC62321) Testing Flow Chart

1) These samples were dissolved totally by pre-conditioning method according to below flow chart.



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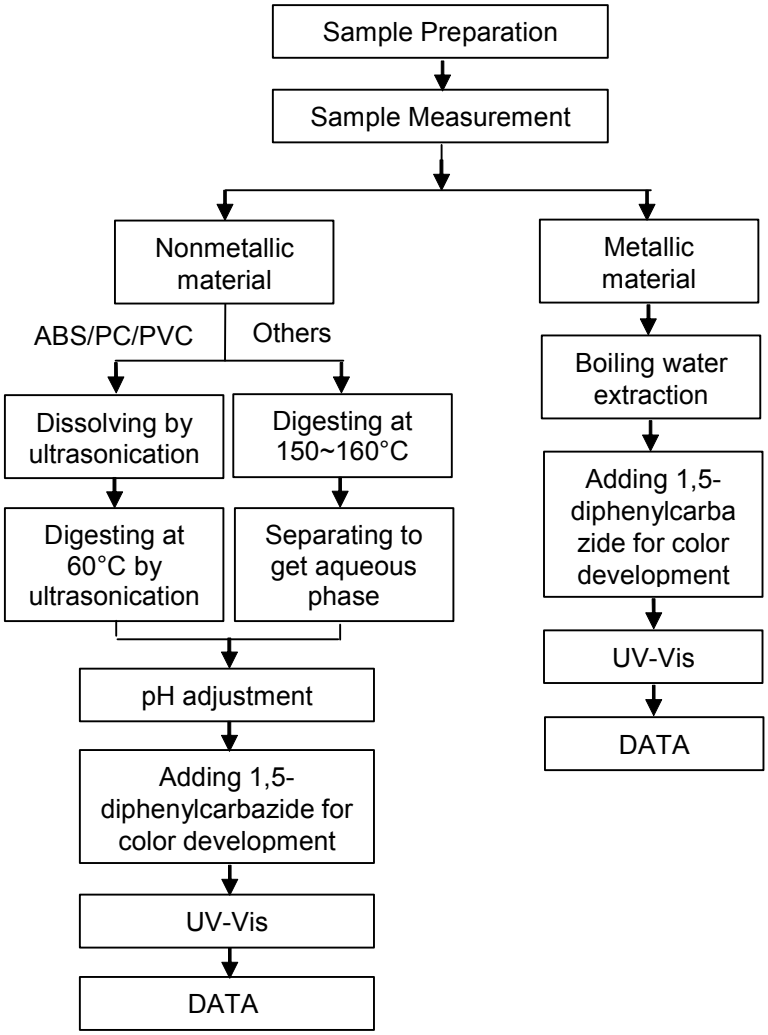
Hexavalent Chromium (Cr(VI)) Testing Flow Chart



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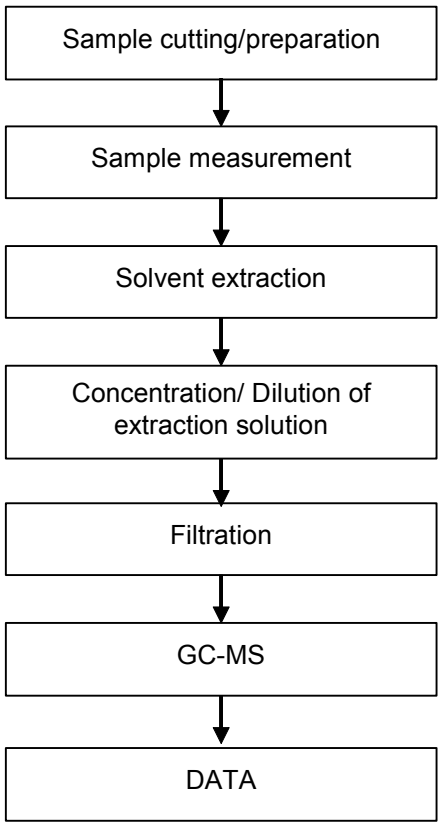
PBBs/PBDEs Testing Flow Chart



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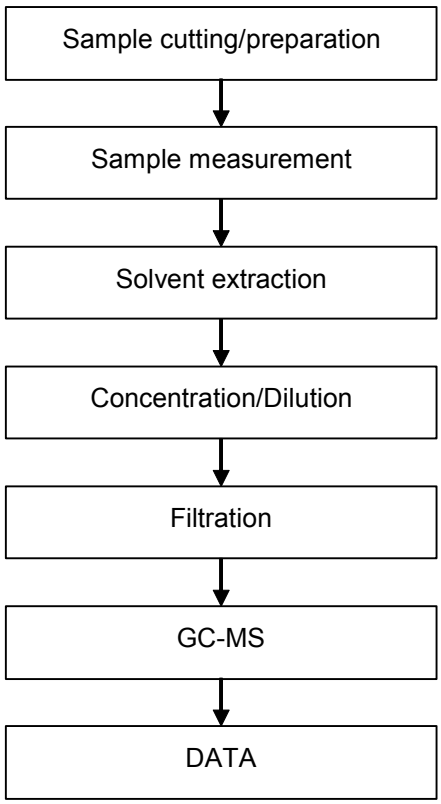
Phthalates Testing Flow Chart



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测试报告

No. SHAMLP2200343914　　日期: 2022年01月12日　第1页,共8页

利华益维远化学股份有限公司
山东省东营市利津县利十路208号

以下测试之样品是由申请者所提供及确认：聚碳酸酯

SGS工作编号：	SHIN2201000745PC - SH
产品规格：	WY-106BR
样品接收日期：	2022年01月07日
测试周期：	2022年01月07日 - 2022年01月12日
测试要求：	根据客户要求测试
测试方法：	请参见下一页
测试结果：	请参见下一页
结论：	基于所送样品进行的测试，镉、铅、汞、六价铬、多溴联苯(PBBs)、多溴二苯醚(PBDEs)、邻苯二甲酸酯(如邻苯二甲酸二丁酯 (DBP)、邻苯二甲酸丁苄酯(BBP)、邻苯二甲酸二(2-乙基已基)酯(DEHP)和邻苯二甲酸二异丁酯(DIBP))的测试结果符合欧盟RoHS指令2011/65/EU附录II的修正指令(EU) 2015/863的限值要求。

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授权签名

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SHAMLP2200343914

Lilac Wei魏文凤
批准签署人

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测试结果 :

测试样品描述 :

样品编号	SGS样品ID	描述
SN1	SHA22-003439.007	透明塑料颗粒

备注 :

(1) 1 mg/kg = 0.0001%

(2) MDL = 方法检测限

(3) ND = 未检出 (< MDL)

(4) "-" = 未规定

RoHS指令2011/65/EU附录II的修正指令(EU) 2015/863

测试方法 : 参考IEC 62321-4:2013+AMD1:2017， IEC 62321-5:2013，IEC 62321-7-2:2017，IEC 62321-6:2015和IEC 62321-8:2017，采用ICP-OES，UV-Vis和GC-MS进行分析。

测试项目	限值	单位	MDL	*007*
镉(Cd)	100	mg/kg	2	ND
铅(Pb)	1000	mg/kg	2	ND
汞(Hg)	1000	mg/kg	2	ND
六价铬 (Cr(VI))	1000	mg/kg	8	ND
多溴联苯之和(PBBs)	1000	mg/kg	-	ND
一溴联苯	-	mg/kg	5	ND
二溴联苯	-	mg/kg	5	ND
三溴联苯	-	mg/kg	5	ND
四溴联苯	-	mg/kg	5	ND
五溴联苯	-	mg/kg	5	ND
六溴联苯	-	mg/kg	5	ND
七溴联苯	-	mg/kg	5	ND
八溴联苯	-	mg/kg	5	ND
九溴联苯	-	mg/kg	5	ND
十溴联苯	-	mg/kg	5	ND
多溴二苯醚之和(PBDEs)	1000	mg/kg	-	ND
一溴二苯醚	-	mg/kg	5	ND
二溴二苯醚	-	mg/kg	5	ND
三溴二苯醚	-	mg/kg	5	ND
四溴二苯醚	-	mg/kg	5	ND

检验检测专用章 Inspection & Testing Services

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测试项目	限值	单位	MDL	007
五溴二苯醚	-	mg/kg	5	ND
六溴二苯醚	-	mg/kg	5	ND
七溴二苯醚	-	mg/kg	5	ND
八溴二苯醚	-	mg/kg	5	ND
九溴二苯醚	-	mg/kg	5	ND
十溴二苯醚	-	mg/kg	5	ND
邻苯二甲酸二丁酯 (DBP)	1000	mg/kg	50	ND
邻苯二甲酸丁苄酯(BBP)	1000	mg/kg	50	ND
邻苯二甲酸二(2-乙基己基)酯(DEHP)	1000	mg/kg	50	ND
邻苯二甲酸二异丁酯(DIBP)	1000	mg/kg	50	ND

备注：

(1) 最大允许极限值引用自RoHS指令(EU) 2015/863 。
IEC 62321系列等同于 EN 62321系列
https://www.cenelec.eu/dyn/www/f?p=104:30:17422328703511101::::FSP_ORG_ID,FSP_LANG_ID:1258637,25

(2) 2021年7月22号开始，DEHP, BBP, DBP 和 DIBP的限制适用于医疗器械，包括体外医疗器械，监控仪表，包括工业监测和控制仪器。

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检测报告仅用于客户科研、教学、内部质量控制、产品研发等目的，仅供内部参考。

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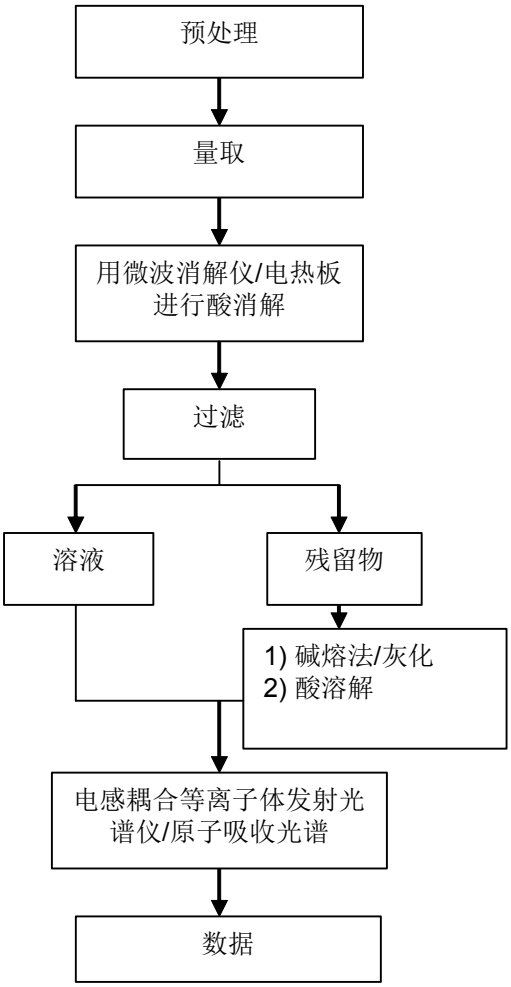
附件

元素(IEC62321) 测试流程图

1)样品按照下述流程被完全消解



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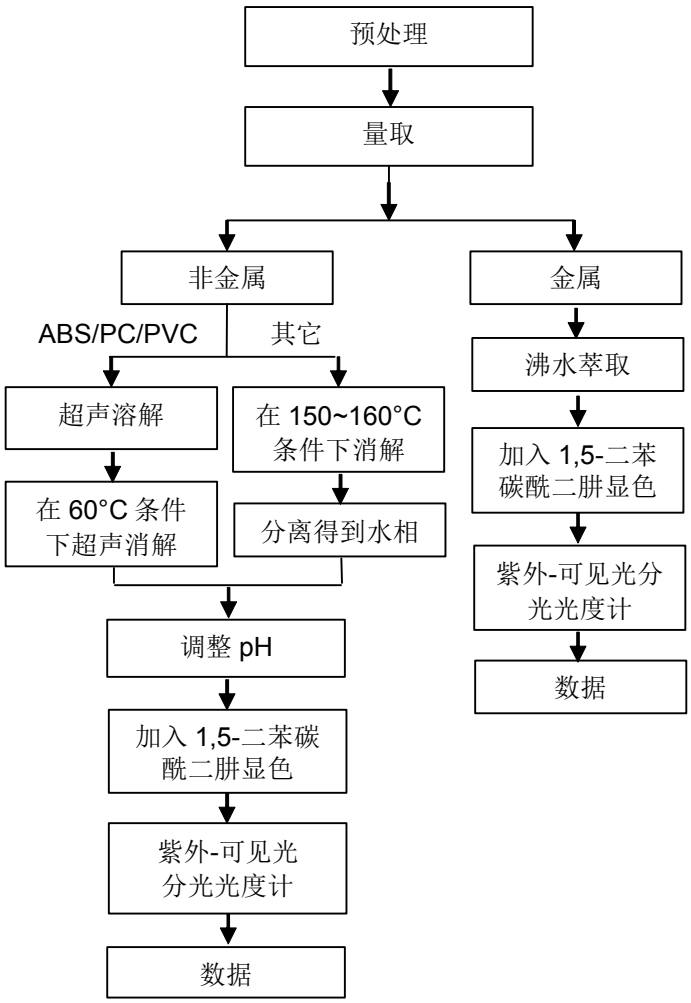
六价铬测试流程图



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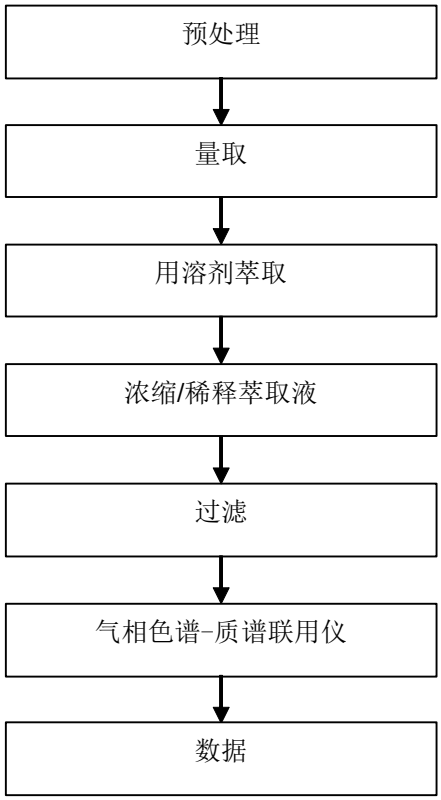
PBBs/PBDEs 测试流程图



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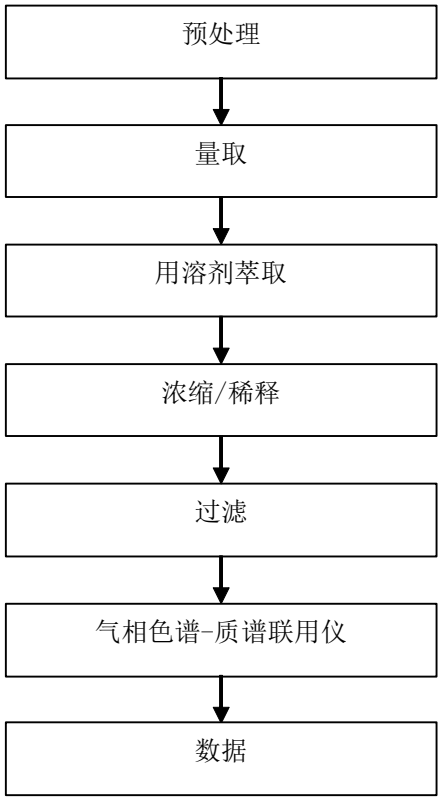
Phthalates 测试流程图



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样品照片:



SHA22-003439.007

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Test Report

No. SHAMLP2200391003 Date: 12 Jan 2022

Lihuayi Weiyuan Chemical Co.,Ltd.

No.208,Lishi Road,Lijin County,Dongying City,Shandong Province

The following sample(s) was/were submitted and identified on behalf of the clients as : Polycarbonate

SGS Job No. :	SHIN2201000745PC - SH
Product Specification :	WY-111BR
Date of Sample Received :	07 Jan 2022
Testing Period :	07 Jan 2022 - 12 Jan 2022
Test Requested :	Selected test(s) as requested by client.
Test Method :	Please refer to next page(s).
Test Results :	Please refer to next page(s).

Result Summary :

Test Requested	Conclusion
US FDA 21 CFR 177.1580- Total extractives	PASS

Signed for and on behalf of
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

Lancy Liu
Approved Signatory

scan to see the report
SHAMLP2200391003

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Test Results :

Test Part Description :

Specimen No.	SGS Sample ID	Description	Material (claimed by the client)
SN1	SHA22-003910.002	Transparent plastic sheet	PC

Remarks :

(1) mg/dm² = milligram per square decimeter
(2) mg/kg = milligram per kilogram
(3) ℃= degree Celsius
(4) < = less than
(5) MDL = Method Detection Limit
(6) ND = Not Detected (< MDL)

US FDA 21 CFR 177.1580- Total extractives

Test Method : With reference to US FDA 21 CFR 177.1580.

Simulant Used	Time	Temperature	Max. Permissible Limit	Result of 002 Total extractives	Conclusion
50% Ethanol	6hr(s)	Reflux Temperature	0.15% (w/w)	0.13% (w/w)	PASS
n-Heptane	6hr(s)	Reflux Temperature	0.15% (w/w)	<0.02% (w/w)	PASS
Distilled water	6hr(s)	Reflux Temperature	0.15% (w/w)	<0.02% (w/w)	PASS

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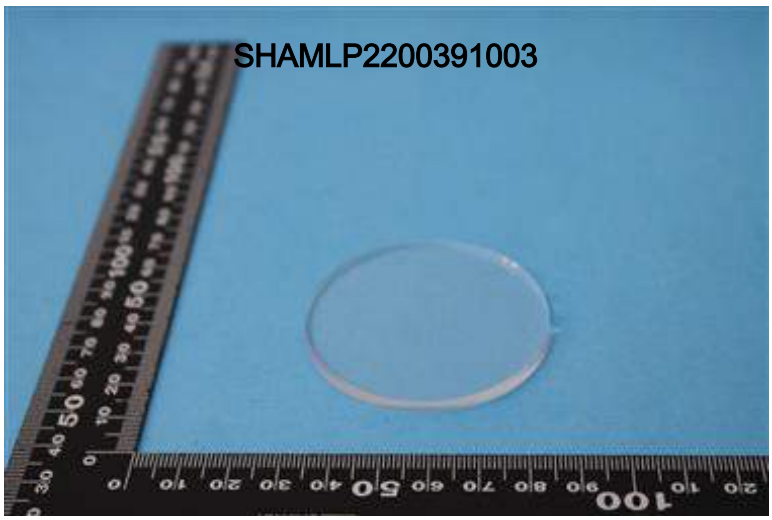
Sample photo:



SHA22-003910.002

SGS authenticate the photo on original report only

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测试报告

No. SHAMLP2200391004　　日期: 2022年01月12日　　第1页,共3页

利华益维远化学股份有限公司
山东省东营市利津县利十路208号

以下测试之样品是由申请者所提供及确认：聚碳酸酯

SGS工作编号：	SHIN2201000745PC - SH
产品规格：	WY-111BR
样品接收日期：	2022年01月07日
测试周期：	2022年01月07日 - 2022年01月12日
测试要求：	根据客户要求测试
测试方法：	请参见下一页
测试结果：	请参见下一页

测试结果概要：

测试要求	结论
US FDA 21 CFR 177.1580- 总提取物	符合

通标标准技术服务（上海）有限公司
授权签名

刘香梅

Lancy Liu刘香梅
批准签署人

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SHAMLP2200391004

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测试结果 :

测试样品描述 :

样品编号	SGS样品ID	描述	材质 (客户提供)
SN1	SHA22-003910.002	透明塑料片	PC

备注:

(1) mg/dm² = 毫克每平方分米
(2) mg/kg = 毫克每千克
(3) ℃= 摄氏度
(4) < = 小于
(5) MDL = 方法检测限
(6) ND = 未检出 (< MDL)

US FDA 21 CFR 177.1580-总提取物

测试方法 : 参考US FDA 21 CFR 177.1580.

常用模拟液	时间	温度	最大允许限值	样品002 总提取物	结论
50%乙醇	6hr(s)	回流温度	0.15% (w/w)	0.13% (w/w)	符合
正庚烷	6hr(s)	回流温度	0.15% (w/w)	<0.02% (w/w)	符合
蒸馏水	6hr(s)	回流温度	0.15% (w/w)	<0.02% (w/w)	符合

除非另有说明，此报告结果仅对测试的样品负责。本报告未经本公司书面许可，不可部分复制。检测报告仅用于客户科研、教学、内部质量控制、产品研发等目的，仅供内部参考。

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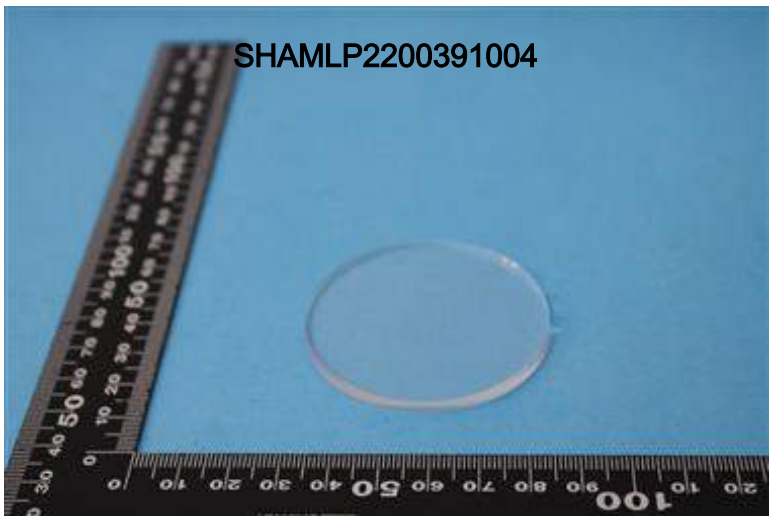
样品照片:



SHA22-003910.002

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测试报告 (SVHC)

No. SHAMLP2200387416　　日期: 2022年01月13日　第1页,共17页

利华益维远化学股份有限公司
山东省东营市利津县利十路208号

以下测试之样品是由申请者所提供及确认：聚碳酸酯

SGS工作编号：	SHIN2201000745PC - SH
产品规格：	WY-111BR
样品接收日期：	2022年01月07日
测试周期：	2022年01月07日 - 2022年01月13日
测试要求：	根据客户要求， (i) 基于欧洲化学品管理署截止2021年7月8日公布的供授权审议的高关注物质候选清单(根据欧盟第1907/2006号REACH法规)，对219种高关注物质(SVHC)进行筛分测试。 (ii) 基于WTO 2021年6月1日的通知，对1种潜在的高关注物质(SVHC)进行筛分测试。 (iii) 基于欧洲化学品管理署截止2021年9月3日公布的潜在的高关注物质咨询清单(根据欧盟第1907/2006号REACH法规)，对4种高关注物质(SVHC)进行筛分测试。
测试结果：	请参见下一页

总结：

根据具体的范围和筛分测试，所提交样品中SVHC测试结果≤ 0.1% (w/w)。	通过

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Lilac Wei魏文凤
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备注：

1. 本报告所涉及的关于特定高关注物质的化学分析是根据欧洲化学品管理署发布的下列文件，利用现有的分析技术完成的。
   http://echa.europa.eu/web/guest/candidate-list-table
   这些文件清单由欧洲化学品管理署评估, 将来可能会有变化。
2. REACH法规义务：
   2.1关于物品：
   告知：
   欧盟第1907/2006（EC）号法规第33条规定，含有满足第57条中的标准并根据第59条第一款被确定且质量分数大于0.1%的物质的物品的所有供应商应向物品接受者提供其可获取的充足信息，以使物品使用安全，这些信息至少包括含有的候选清单中物质的名称。

   通报：
   根据欧盟第1907/2006（EC）号法规，如果满足以下两个条件，如果物质符合第57条中的标准并根据第59条第一款被确定，物品的任何欧洲制造商或进口商应根据第7条第4款向欧盟化学品管理署进行通报：(a) 候选清单中的物质在物品中的总含量超过1吨/年/生产商或进口商；(b) 候选清单中的物质在物品中的总含量以质量分数计超过0.1% 的浓度。

   SGS采用欧盟法院对REACH物品定义的裁定，除非另有说明。详细的解释请见下列网址：
   http://www.sgs.com/-/media/global/documents/technical-documents/technical-bulletins/sgs-crs-position-statement-on-svhc-in-articles-a4-en-16-06.pdf?la=en

   2.2 关于材料：
   报告中的测试结果是基于测试样品。如样品是均一材质，当其构成成品时，此结果不能代表成品中的SVHC浓度。如样品为均一材质等比例合测，这些材质也可能来自不同的物品。

   如果样品是一种物质或混合物，并且直接出口到欧盟，客户有责任遵守欧盟第1907/2006号REACH法规第31 条供应链信息传递的义务和附件十四中的授权高关注物质授权的责任。

   2.3 关于物质和配制品：
   如果样品中高关注物质的浓度超过0.1% (w/w)和/或欧盟第1272/2008号CLP法规及其修订中设定的特殊浓度限值，建议客户根据欧盟第1907/2006号REACH法规对有关高关注物质准备安全数据表(SDS)以符合供应链通信的义务，如
   -根据欧盟第1272/2008号CLP法规被列为有害物质。
   -根据欧盟第1272/2008号CLP法规被列为有害混合物，而当中物质的浓度大于或等于欧盟第1272/2008号CLP法规列出的浓度限值;或
   -根据欧盟第1272/2008号CLP法规并未列为有害混合物，但包含：
   (a) 对人类健康或环境有害的物质，而在固体或液体混合物（即非气体混合物）中其浓度≥1%(w/w)或在气体混合物中占体积≥0.2%，或
   (b) PBT或vPvB物质，在固体或液体混合物（即非气体混合物）中个别浓度≥0.1%(w/w)，或
   (c) 授权审议的高关注物质候选清单上的物质（除上述以外的原因）在个别非气体混合物中的浓度≥0.1%(w/w)，或

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(d) 设有欧洲范围内工作场所接触限值的物质。

3. 如果样品中SVHC的测试结果超过报告限，建议客户进一步定量分析检测含有SVHC的组分并且得到SVHC物质的准确浓度。

测试样品：

测试样品描述：

样品编号	SGS样品ID	描述
SN1	SHA22-003874.008	透明塑料颗粒

测试方法：

SGS内部方法-SHTC-CHEM-SOP-97-T, SHTC-CHEM-SOP-302-T ，采用ICP-OES、UV-VIS、GC-MS、HPLC-DAD/MS和比色法分析。

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(SVHC)

测试结果: (SVHC候选清单中的高关注物质)

批次	物质名称	CAS No.	008 浓度 (%)	RL (%)
-	所有测试的候选清单中的SVHC	-	ND	-

测试结果：(潜在的SVHC)

批次	物质名称	CAS No.	008 浓度 (%)	RL (%)
-	所有测试的潜在的SVHC	-	ND	-

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注释：

(1) 上表仅显示检出的SVHC，低于RL的SVHC没有列出。所有测试的SVHC请参见附录。
(2) RL = 报告限(当测试结果 ≥ RL时显示数据。RL不同于法规限值。)
ND = 未检出(< RL)，ND针对SVHC物质。
(3) *测试结果是由选定的元素的结果并基于最坏的情况计算得出；
** 测试结果是由选定的标记物的结果并基于最坏的情况计算得出。
硼化合物的结果由ICP-OES测试的水提取硼元素结果换算得出。
RL = 0.005% 是针对元素 (例如钴、砷 、铅 、铬 (VI) 、铝、锆、硼、锶、锌、锑、钛、钡、镉)，除了钼的RL= 0.0005%，硼的RL= 0.0025%(仅对四氟硼酸铅)。
(4) § 只有当物质包含米氏酮(CAS No.: 90-94-8) 或米氏碱(CAS No.: 101-61-1) 的浓度≥ 0.1%(w / w) 的情况下，该物质才被提议定为SVHC
(5) / = 潜在的SVHC
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(SVHC)

附录

所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
I	1	4,4'-二氨基二苯甲烷(MDA)	101-77-9	0.050
I	2	2,4,6-三硝基-5-叔丁基间二甲苯(二甲苯麝香)	81-15-2	0.050
I	3	C10-13 氯代烃(短链氯化石蜡)	85535-84-8	0.050
I	4	蒽	120-12-7	0.050
I	5	邻苯二甲酸丁苄酯(BBP)	85-68-7	0.050
I	6	邻苯二甲酸二(2-乙基己基)酯(DEHP)	117-81-7	0.050
I	7	氧化双三丁基锡(TBTO)	56-35-9	0.050
I	8	二氯化钴*	7646-79-9	0.005
I	9	五氧化二砷*	1303-28-2	0.005
I	10	三氧化二砷*	1327-53-3	0.005
I	11	邻苯二甲酸二丁酯(DBP)	84-74-2	0.050
I	12	六溴环十二烷(HBCDD) 及其非对映异构体(α-HBCDD, β-HBCDD, γ-HBCDD)	-	0.050
I	13	砷酸氢铅*	7784-40-9	0.005
I	14	重铬酸钠*	7789-12-0, 10588-01-9	0.005
I	15	三乙基砷酸酯*	15606-95-8	0.005
II	16	2,4-二硝基甲苯	121-14-2	0.050
II	17	丙烯酰胺	79-06-1	0.050
II	18	蒽油**	90640-80-5	0.050
II	19	蒽油，蒽糊**	90640-81-6	0.050
II	20	蒽油，蒽糊，蒽馏分**	91995-15-2	0.050

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所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
II	21	蒽油，蒽糊，轻油**	91995-17-4	0.050
II	22	蒽油，含蒽量少**	90640-82-7	0.050
II	23	邻苯二甲酸二异丁酯	84-69-5	0.050
II	24	钼铬红(C.I.颜料红104)*	12656-85-8	0.005
II	25	铬酸铅*	7758-97-6	0.005
II	26	铅铬黄(C.I.颜料黄34)*	1344-37-2	0.005
II	27	沥青，煤焦油，高温**	65996-93-2	0.050
II	28	磷酸三(2-氯乙基)酯	115-96-8	0.050
III	29	重铬酸铵*	7789-09-5	0.005
III	30	硼酸*	-	0.005
III	31	无水四硼酸钠*	1303-96-4, 1330-43-4, 12179-04-3	0.005
III	32	铬酸钾*	7789-00-6	0.005
III	33	重铬酸钾*	7778-50-9	0.005
III	34	铬酸钠*	7775-11-3	0.005
III	35	水合硼酸钠*	12267-73-1	0.005
III	36	三氯乙烯	79-01-6	0.050
IV	37	乙二醇乙醚	110-80-5	0.050
IV	38	乙二醇单甲醚	109-86-4	0.050
IV	39	铬酸, 铬酸及重铬酸低聚物, 重铬酸*	-	0.005

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所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
IV	40	三氧化铬*	1333-82-0	0.005
IV	41	碳酸钴*	513-79-1	0.005
IV	42	乙酸钴*	71-48-7	0.005
IV	43	硝酸钴*	10141-05-6	0.005
IV	44	硫酸钴*	10124-43-3	0.005
V	45	1,2,3-三氯丙烷	96-18-4	0.050
V	46	1,2-苯二酸-二(C6-8支链)烷基酯(富C7)	71888-89-6	0.050
V	47	1,2-苯二酸-二(C7-11支链与直链)烷基(醇)酯	68515-42-4	0.050
V	48	1-甲基-2-吡咯烷酮	872-50-4	0.050
V	49	乙二醇乙醚醋酸酯	111-15-9	0.050
V	50	联氨	7803-57-8, 302-01-2	0.050
V	51	铬酸锶*	7789-06-2	0.005
VI	52	1,2-二氯乙烷	107-06-2	0.050
VI	53	4,4'-二氨基-3,3'-二氯二苯甲烷	101-14-4	0.050
VI	54	2-甲氧基苯胺	90-04-0	0.050
VI	55	对特辛基苯酚	140-66-9	0.050
VI	56	硅酸铝耐火陶瓷纤维*	-	0.005
VI	57	砷酸*	7778-39-4	0.005
VI	58	二乙二醇二甲醚	111-96-6	0.050
VI	59	邻苯二甲酸二甲氧基乙酯	117-82-8	0.050

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批次	序号	物质名称	CAS No.	RL (%)
VI	60	砷酸钙*	7778-44-1	0.005
VI	61	铬酸铬*	24613-89-6	0.005
VI	62	甲醛与苯胺的低聚物	25214-70-4	0.050
VI	63	叠氮化铅*	13424-46-9	0.005
VI	64	苦味酸铅*	6477-64-1	0.005
VI	65	史蒂芬酸铅*	15245-44-0	0.005
VI	66	N,N-二甲基乙酰胺	127-19-5	0.050
VI	67	氢氧化铬酸锌*	49663-84-5	0.005
VI	68	酚酞	77-09-8	0.050
VI	69	氢氧化铬酸锌钾*	11103-86-9	0.005
VI	70	砷酸铅*	3687-31-8	0.005
VI	71	氧化锆硅酸铝耐火陶瓷纤维*	-	0.005
VII	72	C.I.碱性蓝26§	2580-56-5	0.050
VII	73	C.I.碱性紫3§	548-62-9	0.050
VII	74	三乙二醇二甲醚(TEGDME)	112-49-2	0.050
VII	75	乙二醇二甲醚(EGDME)	110-71-4	0.050
VII	76	4,4'-二(二甲氨基)二苯甲酮(米氏酮)	90-94-8	0.050
VII	77	4,4'-二(二甲氨基)-4''-甲氨基三苯甲醇§	561-41-1	0.050
VII	78	三氧化二硼*	1303-86-2	0.005
VII	79	甲酰胺	75-12-7	0.050
VII	80	甲基磺酸铅*	17570-76-2	0.005

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批次	序号	物质名称	CAS No.	RL (%)
VII	81	N,N,N',N'-四甲基-4,4'-二氨基二苯甲烷(米氏碱)	101-61-1	0.050
VII	82	1,3,5-三(环氧乙基甲基)-1,3,5-三嗪-2,4,6-(1H, 3H,5H)-三酮(TGIC)	2451-62-9	0.050
VII	83	C.I.溶剂蓝4§	6786-83-0	0.050
VII	84	1,3,5-三-[(2S和2R)-2,3-环氧丙基]-1,3,5-三嗪-2,4,6-(1H, 3H, 5H)-三酮(β-TGIC)	59653-74-6	0.050
VIII	85	二盐基邻苯二甲酸铅*	69011-06-9	0.005
VIII	86	1,2-苯二酸-二(支链与直链)戊基酯	84777-06-0	0.050
VIII	87	乙二醇二乙醚	629-14-1	0.050
VIII	88	1-溴丙烷	106-94-5	0.050
VIII	89	3-乙基-2-甲基-2-(3-甲基丁基)-1,3-恶唑烷	143860-04-2	0.050
VIII	90	对特辛基苯酚乙氧基醚	-	0.050
VIII	91	4,4'-二氨基-3,3'-二甲基二苯甲烷	838-88-0	0.050
VIII	92	4,4'-二氨基二苯醚及其盐	101-80-4	0.050
VIII	93	4-氨基偶氮苯	60-09-3	0.050
VIII	94	2,4-二氨基甲苯	95-80-7	0.050
VIII	95	4-壬基(支链与直链)苯酚	-	0.050
VIII	96	2-甲氧基-5-甲基苯胺	120-71-8	0.050
VIII	97	碱式乙酸铅*	51404-69-4	0.005
VIII	98	4-氨基联苯	92-67-1	0.050
VIII	99	十溴二苯醚(DecaBDE)	1163-19-5	0.050
VIII	100	环己烷-1,2-二羧酸酐,顺式-环己烷-1,2-二羧酸酐,反式-环己烷-1,2-二羧酸酐	-	0.050

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批次	序号	物质名称	CAS No.	RL (%)
VIII	101	偶氮二甲酰胺	123-77-3	0.050
VIII	102	二丁基二氯化锡(DBTC)	683-18-1	0.050
VIII	103	硫酸二乙酯	64-67-5	0.050
VIII	104	邻苯二甲酸二异戊酯	605-50-5	0.050
VIII	105	硫酸二甲酯	77-78-1	0.050
VIII	106	地乐酚	88-85-7	0.050
VIII	107	双(十八酸基)二氧代三铅*	12578-12-0	0.005
VIII	108	C16-18-脂肪酸铅*	91031-62-8	0.005
VIII	109	呋喃	110-00-9	0.050
VIII	110	全氟十一烷酸	2058-94-8	0.050
VIII	111	全氟十四烷酸	376-06-7	0.050
VIII	112	甲基六氢邻苯二甲酸酐,4-甲基六氢邻苯二甲酸酐,1-甲基六氢邻苯二甲酸酐,3-甲基六氢邻苯二甲酸酐	-	0.050
VIII	113	四氟硼酸铅*	13814-96-5	0.005
VIII	114	氨基氰铅盐*	20837-86-9	0.005
VIII	115	硝酸铅*	10099-74-8	0.005
VIII	116	一氧化铅*	1317-36-8	0.005
VIII	117	碱式硫酸铅*	12036-76-9	0.005
VIII	118	四氧化三铅*	1314-41-6	0.005
VIII	119	钛酸铅*	12060-00-3	0.005
VIII	120	钛酸铅锆*	12626-81-2	0.005

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批次	序号	物质名称	CAS No.	RL (%)
VIII	121	甲氧基乙酸	625-45-6	0.050
VIII	122	1,2-环氧丙烷	75-56-9	0.050
VIII	123	N,N-二甲基甲酰胺	68-12-2	0.050
VIII	124	N-甲基乙酰胺	79-16-3	0.050
VIII	125	邻苯二甲酸正戊基异戊基酯	776297-69-9	0.050
VIII	126	邻-氨基偶氮甲苯	97-56-3	0.050
VIII	127	2-氨基甲苯	95-53-4	0.050
VIII	128	全氟十三烷酸	72629-94-8	0.050
VIII	129	硫酸四氧化五铅*	12065-90-6	0.005
VIII	130	铅锑黄*	8012-00-8	0.005
VIII	131	掺杂铅的硅酸钡*	68784-75-8	0.005
VIII	132	硅酸铅*	11120-22-2	0.005
VIII	133	二碱式亚硫酸铅*	62229-08-7	0.005
VIII	134	四乙基铅*	78-00-2	0.005
VIII	135	硫酸三氧化四铅*	12202-17-4	0.005
VIII	136	全氟十二烷酸	307-55-1	0.050
VIII	137	碱式碳酸铅*	1319-46-6	0.005
VIII	138	二碱式亚磷酸铅*	12141-20-7	0.005
IX	139	4-壬基(支链与直链)苯酚乙氧基醚	-	0.050
IX	140	全氟辛酸铵(APFO)**	3825-26-1	0.050
IX	141	氧化镉*	1306-19-0	0.005

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批次	序号	物质名称	CAS No.	RL (%)
IX	142	镉	7440-43-9	0.005
IX	143	邻苯二甲酸二正戊酯(DPP)	131-18-0	0.050
IX	144	全氟辛酸(PFOA)	335-67-1	0.050
X	145	硫化镉*	1306-23-6	0.005
X	146	邻苯二甲酸二正己酯	84-75-3	0.050
X	147	C.I.直接红28	573-58-0	0.050
X	148	C.I.直接黑38	1937-37-7	0.050
X	149	2-巯基咪唑啉	96-45-7	0.050
X	150	乙酸铅*	301-04-2	0.005
X	151	磷酸三二甲苯酯	25155-23-1	0.050
XI	152	邻苯二甲酸二(支链与直链)己基酯	68515-50-4	0.050
XI	153	氯化镉*	10108-64-2	0.005
XI	154	水合过硼酸钠*	-	0.005
XI	155	过硼酸钠*	7632-04-4	0.005
XII	156	2-(2H-苯并三唑-2-基)-4,6-二叔戊基苯酚(UV-328)	25973-55-1	0.050
XII	157	2-苯并三唑-2-基-4,6-二叔丁基苯酚(UV-320)	3846-71-7	0.050
XII	158	二正辛基-双(2-乙基己基巯基乙酸酯)锡 (DOTE)	15571-58-1	0.050
XII	159	氟化镉 *	7790-79-6	0.005
XII	160	硫酸镉 *	10124-36-4,31119-53-6	0.005
XII	161	二正辛基-双(2-乙基己基巯基乙酸酯)锡(DOTE)和单辛基-三(2-乙基己基巯基乙酸酯)锡(MOTE)的反应物	-	0.050

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(SVHC)

附录

所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
XIII	162	1,2-苯二甲酸, 二(C6-10)烷基酯 / 1,2-苯二甲酸, 混合二己二辛二癸酯, 其中邻苯二甲酸二己酯含量≥0.3%	-	0.050
XIII	163	5-二级丁基-2-(2,4-二甲基环己-3-烯-1-基)-5-甲基-1,3-二恶烷[1]，5-二级丁基-2-(4,6-二甲基环己-3-烯-1-基)-5-甲基-1,3-二恶烷[2] [任何[1]和[2]或者其任意组合的单独异构体或其任何组合]	-	0.050
XIV	164	1,3-丙磺酸内酯	1120-71-4	0.050
XIV	165	2,4-二叔丁基-6-(5-氯苯并三唑-2-基)苯酚(UV-327)	3864-99-1	0.050
XIV	166	2-(2H-苯并三唑-2-基)-4-叔丁基-6-仲丁基苯酚 (UV-350)	36437-37-3	0.050
XIV	167	硝基苯	98-95-3	0.050
XIV	168	全氟壬酸及其钠盐和铵盐	-	0.050
XV	169	苯并(a)芘	50-32-8	0.050
XVI	170	4,4'-异亚丙基联苯酚 (双酚A)	80-05-7	0.050
XVI	171	4-庚基(支链与直链)苯酚	-	0.050
XVI	172	全氟癸酸 (PFDA) 及其钠盐和铵盐	-	0.050
XVI	173	对叔戊基苯酚	80-46-6	0.050
XVII	174	全氟己烷-1-磺酸及其盐	-	0.050
XVIII	175	双(六氯环戊二烯)环辛烷(包含任何顺式与反式同分异构体或其组合)	-	0.050
XVIII	176	苯并蒽(BaA)	56-55-3	0.050
XVIII	177	硝酸镉*	10325-94-7	0.005
XVIII	178	碳酸镉*	513-78-0	0.005
XVIII	179	氢氧化镉*	21041-95-2	0.005
XVIII	180	屈(CHR)	218-01-9	0.050

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所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
XVIII	181	1,3,4-噻二唑-2,5-二硫酮、甲醛与支链和直链4-庚基苯酚的反应产物(RP-HP)[含有支链和直链4-庚基苯酚重量比≥0.1%]	-	0.050
XIX	182	1,2,4-苯三酸酐(偏苯三酸酐)(TMA)	552-30-7	0.050
XIX	183	苯并(g,h,i)苝(二萘嵌苯) (BPE)	191-24-2	0.050
XIX	184	十甲基环五硅氧烷(D5)	541-02-6	0.050
XIX	185	邻苯二甲酸二环己酯(DCHP)	84-61-7	0.050
XIX	186	氧化硼钠*	12008-41-2	0.005
XIX	187	十二甲基环六硅氧烷(D6)	540-97-6	0.050
XIX	188	乙二胺(EDA)	107-15-3	0.050
XIX	189	铅	7439-92-1	0.005
XIX	190	八甲基环四硅氧烷(D4)	556-67-2	0.050
XIX	191	氢化三联苯	61788-32-7	0.050
XX	192	1,7,7-三甲基-3-(苯基亚甲基)双环[2.2.1]庚-2-酮 (3-亚苄基樟脑)	15087-24-8	0.050
XX	193	4,4'-(1,3-二甲基丁基)二苯酚(1,3-DMBBP)	6807-17-6	0.050
XX	194	苯并 (k)荧蒽(BkF)	207-08-9	0.050
XX	195	荧蒽(FLT)	206-44-0	0.050
XX	196	菲(PHE)	85-01-8	0.050
XX	197	芘(PYR)	129-00-0	0.050
XXI	198	2,3,3,3-四氟-2-(七氟丙氧基)丙酸及其盐和酰基卤化物(包括单体和组合)(HFPO-DA)	-	0.050
XXI	199	2-甲氧基乙基乙酸酯	110-49-6	0.050
XXI	200	4-叔丁基苯酚(PTBP)	98-54-4	0.050

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批次	序号	物质名称	CAS No.	RL (%)
XXI	201	三(4-壬基苯基，支链和直链)亚磷酸酯(TNPP)(含≥0.1%的支链和直链4-壬基苯酚)	-	0.050
XXII	202	2-苄基-2-二甲基氨基-4'-吗啉基苯基丁酮	119313-12-1	0.050
XXII	203	2-甲基-1-(4-甲硫基苯基)-2-吗啉基-1-丙酮	71868-10-5	0.050
XXII	204	邻苯二甲酸二异己酯	71850-09-4	0.050
XXII	205	全氟丁烷磺酸及其盐	-	0.050
XXIII	206	1-乙烯基咪唑	1072-63-5	0.050
XXIII	207	2-甲基咪唑	693-98-1	0.050
XXIII	208	对羟基苯甲酸丁酯	94-26-8	0.050
XXIII	209	双(乙酰丙酮基)二丁基锡**	22673-19-4	0.050
XXIV	210	四乙二醇二甲醚	143-24-8	0.050
XXIV	211	二月桂酸二辛基锡及任何其他二辛基锡双(脂肪酰氧基)衍生物**	-	0.050
XXV	212	1,4-二氧六环	123-91-1	0.050
XXV	213	二溴新戊二醇(BMP); 三溴新戊醇(TBNPA); 2,3-二溴-1-丙醇(2,3-DBPA)	-	0.050
XXV	214	铃兰醛及其立体异构体	-	0.050
XXV	215	双酚B	77-40-7	0.050
XXV	216	戊二醛	111-30-8	0.050
XXV	217	中链氯化石蜡(MCCP)	-	0.050
XXV	218	原硼酸钠盐*	13840-56-7	0.005
XXV	219	对十二烷基苯酚及其异构体(PDDP)	-	0.050

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批次	序号	物质名称	CAS No.	RL (%)
/	220	间苯二酚	108-46-3	0.050
/	221	(±)-1,7,7-三甲基-3-[(4-甲基苯基)亚甲基]二环[2.2.1]庚-2-酮，包括各个异构体和/或其组合(4-MBC)	-	0.050
/	222	2,2'-亚甲基双-(4-甲基-6-叔丁基苯酚) (DBMC)	119-47-1	0.050
/	223	S-(三环[5.2.1.0'2,6]癸-3-烯-8(或9)-基) O-(异丙基或异丁基或2-乙基己基) O-(异丙基或异丁基或2-乙基己基)二硫代磷酸酯	255881-94-8	0.050
/	224	乙烯基-三(2-甲氧基乙氧基)硅烷	1067-53-4	0.050

样品照片:

SHAMLP2200387416



SHA22-003874.008

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*** 报告完 ***

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Test Report (SVHC)

Lihuayi Weiyuan Chemical Co.,Ltd.
No.208,Lishi Road,Lijin County,Dongying City,Shandong Province

The following sample(s) was/were submitted and identified on behalf of the clients as : Polycarbonate

SGS Job No. :	SHIN2201000745PC - SH
Product Specification :	WY-111BR
Date of Sample Received :	07 Jan 2022
Testing Period :	07 Jan 2022 - 13 Jan 2022
Test Requested :	As requested by client, SVHC screening is performed according to: (i) Two hundred and nineteen (219) substances in the Candidate List of Substances of Very High Concern (SVHC) for authorization published by European Chemicals Agency (ECHA) on and before Jul 8, 2021 regarding Regulation (EC) No 1907/2006 concerning the REACH. (ii) One (1) potential Substances of Very High Concern (SVHC) in the notification of WTO on Jun 1, 2021. (iii) Four (4) substances in the Public Consultation List of potential Substances of Very High Concern (SVHC) published by European Chemicals Agency (ECHA) on and before Sep 3, 2021 regarding Regulation (EC) No 1907/2006 concerning the REACH.
Test Results :	Please refer to next page(s).

Summary :

According to the specified scope and evaluation screening, the test results of SVHC are ≤ 0.1% (w/w) in the submitted sample.	PASS

Signed for and on behalf of
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

Lilac Wei
Approved Signatory

scan to see the report
SHAMLP2200387415

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Remark :

1. The chemical analysis of specified SVHC is performed by means of currently available analytical techniques against the following SVHC related documents published by ECHA: http://echa.europa.eu/web/guest/candidate-list-table
   These lists are under evaluation by ECHA and may subject to change in the future.
2. REACH obligation:
   2.1 Concerning article(s):
   Communication:
   Article 33 of Regulation (EC) No 1907/2006 requires supplier of an article containing a substance meeting the criteria in Article 57 and identified in accordance with Article 59(1) in a concentration above 0.1% weight by weight (w/w) shall provide the recipient of the article with sufficient information, available to the supplier, to allow safe use of the article including, as a minimum, the name of that substance in the Candidate List.

   Notification:
   In accordance with Regulation (EC) No 1907/2006, any EU producer or importer of articles shall notify ECHA, in accordance with paragraph 4 of Article 7, if a substance meets the criteria in Article 57 and is identified in accordance with Article 59(1) of the Regulation, if (a) the substance in the Candidate List is present in those articles in quantities totaling over one tonne per producer or importer per year; and (b) the substance in the Candidate List is present in those articles above a concentration of 0.1% weight by weight (w/w).

   SGS adopts the ruling of the Court of Justice of the European Union on the definition of an article under REACH unless indicated otherwise. Detail explanation is available at the following link:
   http://www.sgs.com/-/media/global/documents/technical-documents/technical-bulletins/sgs-crs-position-statement-on-svhc-in-articles-a4-en-16-06.pdf?la=en

   2.2 Concerning material(s):
   Test results in this report are based on the tested sample. This report refers to testing result of tested sample submitted as homogenous material(s). In case such material is being used to compose an article, the results indicated in this report may not represent SVHC concentration in such article. If this report refers to testing result of composite material group by equal weight proportion, the material in each composite test group may come from more than one article.

   If the sample is a substance or mixture, and it directly exports to EU, client has the obligation to comply with the supply chain communication obligation under Article 31 of Regulation (EC) No. 1907/2006 and the conditions of Authorization of substance of very high concern included in the Annex XIV of the Regulation (EC) No. 1907/2006.

   2.3 Concerning substance and preparation:
   If a SVHC is found over 0.1% (w/w) and/or the specific concentration limit which is set in Regulation (EC) No 1272/2008 and its amendments, client is suggested to prepare a Safety

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Data Sheet (SDS) against the SVHC to comply with the supply chain communication obligation under Regulation (EC) No 1907/2006, in which:
- a substance that is classified as hazardous under the CLP Regulation (EC) No 1272/2008.
- a mixture that is classified as hazardous under the CLP Regulation (EC) No 1272/2008, when it contains a substance with concentration equal to, or greater than the classification limit as set in Regulation (EC) No. 1272/2008; or
- a mixture is not classified as hazardous under the CLP Regulation (EC) No 1272/2008, but contains either:
(a) a substance posing human health or environmental hazards in an individual concentration of ≥ 1 % by weight for mixtures that are solid or liquids (i.e., non-gaseous mixtures) or ≥ 0.2 % by volume for gaseous mixtures; or
(b) a substance that is PBT, or vPvB in an individual concentration of ≥ 0.1 % by weight for mixtures that are solid or liquids (i.e., non-gaseous mixtures); or
(c) a substance on the SVHC candidate list (for reasons other than those listed above), in an individual concentration of ≥ 0.1 % by weight for non-gaseous mixtures; or
(d) a substance for which there are Europe-wide workplace exposure limits.

3. If a SVHC is found over the reporting limit, client is suggested to identify the composite component which contains the SVHC and the exact concentration of the SVHC by requesting further quantitative analysis from the laboratory.

Test Sample :

Sample Description :

Specimen No.	SGS Sample ID	Description
SN1	SHA22-003874.008	Transparent plastic particles

Test Method :

SGS In-House method-SHTC-CHEM-SOP-97-T, SHTC-CHEM-SOP-302-T, Analyzed by ICP-OES, UV-VIS, GC-MS, HPLC-DAD/MS and Colorimetric Method.

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(SVHC)

Test Result: (Substances in the Candidate List of SVHC)

Batch	Substance Name	CAS No.	008 Concentration (%)	RL (%)
-	All tested SVHC in candidate list	-	ND	-

Test Result: (Potential SVHC)

Batch	Substance Name	CAS No.	008 Concentration (%)	RL (%)
-	All tested Potential SVHC	-	ND	-

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Notes :

(1)The table above only shows detected SVHC, and SVHC that below RL are not reported. Please refer to Appendix for the full list of tested SVHC.

(2) RL = Reporting Limit (Test data will be shown if it ≥ RL. RL is not regulatory limit.)
ND = Not detected (lower than RL), ND is denoted on the SVHC substance.

(3) * The test result is based on the calculation of selected element(s) and to the worst-case scenario.
** The test result is based on the calculation of selected marker(s) and to the worst-case scenario.
Calculated concentration of boric compounds are based on water extractive boron detected by ICP-OES.
RL = 0.005% is evaluated for element (i.e. cobalt, arsenic, lead, chromium (VI), aluminum, zirconium, boron, strontium, zinc, antimony, titanium, barium, cadmium respectively), except molybdenum RL=0.0005%, boron RL=0.0025% (only for Lead bis(tetrafluoroborate)).

(4) § The substance is proposed for the identification as SVHC only where it contains Michler's ketone (CAS Number: 90-94-8) or Michler's base (CAS Number: 101-61-1) ≥0.1% (w/w).

(5) / = Potential SVHC

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
I	1	4,4' -Diaminodiphenylmethane(MDA)	101-77-9	0.050
I	2	5-tert-butyl-2,4,6-trinitro-m-xylene (musk xylene)	81-15-2	0.050
I	3	Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins)	85535-84-8	0.050
I	4	Anthracene	120-12-7	0.050
I	5	Benzyl butyl phthalate (BBP)	85-68-7	0.050
I	6	Bis (2-ethylhexyl)phthalate (DEHP)	117-81-7	0.050
I	7	Bis(tributyltin)oxide (TBTO)	56-35-9	0.050
I	8	Cobalt dichloride*	7646-79-9	0.005
I	9	Diarsenic pentaoxide*	1303-28-2	0.005
I	10	Diarsenic trioxide*	1327-53-3	0.005
I	11	Dibutyl phthalate (DBP)	84-74-2	0.050
I	12	Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α-HBCDD, β-HBCDD, γ-HBCDD)	-	0.050
I	13	Lead hydrogen arsenate*	7784-40-9	0.005
I	14	Sodium dichromate*	7789-12-0, 10588-01-9	0.005
I	15	Triethyl arsenate*	15606-95-8	0.005
II	16	2,4-Dinitrotoluene	121-14-2	0.050
II	17	Acrylamide	79-06-1	0.050
II	18	Anthracene oil**	90640-80-5	0.050
II	19	Anthracene oil, anthracene paste**	90640-81-6	0.050
II	20	Anthracene oil, anthracene paste, anthracene fraction**	91995-15-2	0.050

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Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
II	21	Anthracene oil, anthracene paste, distn. lights**	91995-17-4	0.050
II	22	Anthracene oil, anthracene-low**	90640-82-7	0.050
II	23	Diisobutyl phthalate	84-69-5	0.050
II	24	Lead chromate molybdate sulphate red (C.I. Pigment Red 104)*	12656-85-8	0.005
II	25	Lead chromate*	7758-97-6	0.005
II	26	Lead sulfochromate yellow (C.I. Pigment Yellow 34)*	1344-37-2	0.005
II	27	Pitch, coal tar, high temp.**	65996-93-2	0.050
II	28	Tris(2-chloroethyl)phosphate	115-96-8	0.050
III	29	Ammonium dichromate*	7789-09-5	0.005
III	30	Boric acid*	-	0.005
III	31	Disodium tetraborate, anhydrous*	1303-96-4, 1330-43-4, 12179-04-3	0.005
III	32	Potassium chromate*	7789-00-6	0.005
III	33	Potassium dichromate*	7778-50-9	0.005
III	34	Sodium chromate*	7775-11-3	0.005
III	35	Tetraboron disodium heptaoxide, hydrate*	12267-73-1	0.005
III	36	Trichloroethylene	79-01-6	0.050
IV	37	2-Ethoxyethanol	110-80-5	0.050
IV	38	2-Methoxyethanol	109-86-4	0.050
IV	39	Chromic acid, Oligomers of chromic acid and dichromic acid, Dichromic acid*	-	0.005

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(SVHC)

Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
IV	40	Chromium trioxide*	1333-82-0	0.005
IV	41	Cobalt(II) carbonate*	513-79-1	0.005
IV	42	Cobalt(II) diacetate*	71-48-7	0.005
IV	43	Cobalt(II) dinitrate*	10141-05-6	0.005
IV	44	Cobalt(II) sulphate*	10124-43-3	0.005
V	45	1,2,3-trichloropropane	96-18-4	0.050
V	46	1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich	71888-89-6	0.050
V	47	1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters	68515-42-4	0.050
V	48	1-methyl-2-pyrrolidone	872-50-4	0.050
V	49	2-ethoxyethyl acetate	111-15-9	0.050
V	50	Hydrazine	7803-57-8, 302-01-2	0.050
V	51	Strontium chromate*	7789-06-2	0.005
VI	52	1,2-Dichloroethane	107-06-2	0.050
VI	53	2,2'-dichloro-4,4'-methylenedianiline	101-14-4	0.050
VI	54	2-Methoxyaniline; o-Anisidine	90-04-0	0.050
VI	55	4-(1,1,3,3-tetramethylbutyl)phenol	140-66-9	0.050
VI	56	Aluminosilicate Refractory Ceramic Fibres*	-	0.005
VI	57	Arsenic acid*	7778-39-4	0.005
VI	58	Bis(2-methoxyethyl) ether	111-96-6	0.050
VI	59	Bis(2-methoxyethyl) phthalate	117-82-8	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VI	60	Calcium arsenate*	7778-44-1	0.005
VI	61	Dichromium tris(chromate) *	24613-89-6	0.005
VI	62	Formaldehyde, oligomeric reaction products with aniline	25214-70-4	0.050
VI	63	Lead diazide, Lead azide*	13424-46-9	0.005
VI	64	Lead dipicrate*	6477-64-1	0.005
VI	65	Lead styphnate*	15245-44-0	0.005
VI	66	N,N-dimethylacetamide	127-19-5	0.050
VI	67	Pentazinc chromate octahydroxide*	49663-84-5	0.005
VI	68	Phenolphthalein	77-09-8	0.050
VI	69	Potassium hydroxyoctaoxodizincatedichromate*	11103-86-9	0.005
VI	70	Trilead diarsenate*	3687-31-8	0.005
VI	71	Zirconia Aluminosilicate Refractory Ceramic Fibres*	-	0.005
VII	72	[4-[[4-anilino-1-naphthyl][4-(dimethylamino)phenyl]methylene]cyclohexa-2,5-dien-1-ylidene] dimethylammonium chloride (C.I. Basic Blue 26)§	2580-56-5	0.050
VII	73	[4-[4,4'-bis(dimethylamino) benzhydrylidene]cyclohexa-2,5-dien-1-ylidene]dimethylammonium chloride (C.I. Basic Violet 3)§	548-62-9	0.050
VII	74	1,2-bis(2-methoxyethoxy)ethane (TEGDME; triglyme)	112-49-2	0.050
VII	75	1,2-dimethoxyethane; ethylene glycol dimethyl ether (EGDME)	110-71-4	0.050
VII	76	4,4'-bis(dimethylamino) benzophenone (Michler's Ketone)	90-94-8	0.050
VII	77	4,4'-bis(dimethylamino)-4''-(methylamino)trityl alcohol§	561-41-1	0.050
VII	78	Diboron trioxide*	1303-86-2	0.005

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Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VII	79	Formamide	75-12-7	0.050
VII	80	Lead(II) bis(methanesulfonate)*	17570-76-2	0.005
VII	81	N,N,N',N'-tetramethyl-4,4'-methylenedianiline (Michler's base)	101-61-1	0.050
VII	82	TGIC (1,3,5-tris (oxiranylmethyl) -1,3,5-triazine-2,4,6(1H,3H,5H)-trione)	2451-62-9	0.050
VII	83	α,α-Bis[4-(dimethylamino)phenyl]-4 (phenylamino)naphthalene-1-methanol (C.I. Solvent Blue 4) §	6786-83-0	0.050
VII	84	β-TGIC (1,3,5-tris[(2S and 2R)-2,3-epoxypropyl]-1,3,5-triazine-2,4,6-(1H,3H,5H)-trione)	59653-74-6	0.050
VIII	85	[Phthalato(2-)]dioxotrilead*	69011-06-9	0.005
VIII	86	1,2-Benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0	0.050
VIII	87	1,2-Diethoxyethane	629-14-1	0.050
VIII	88	1-Bromopropane	106-94-5	0.050
VIII	89	3-Ethyl-2-methyl-2-(3-methylbutyl)-1,3-oxazolidine	143860-04-2	0.050
VIII	90	4-(1,1,3,3-tetramethylbutyl)phenol, ethoxylated	-	0.050
VIII	91	4,4'-Methylenedi-o-toluidine	838-88-0	0.050
VIII	92	4,4'-Oxydianiline and its salts	101-80-4	0.050
VIII	93	4-Aminoazobenzene	60-09-3	0.050
VIII	94	4-Methyl-m-phenylenediamine	95-80-7	0.050
VIII	95	4-Nonylphenol, branched and linear	-	0.050
VIII	96	6-Methoxy-m-toluidine	120-71-8	0.050
VIII	97	Acetic acid, lead salt, basic*	51404-69-4	0.005

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VIII	98	Biphenyl-4-ylamine	92-67-1	0.050
VIII	99	Bis(pentabromophenyl) ether (DecaBDE)	1163-19-5	0.050
VIII	100	Cyclohexane-1,2-dicarboxylic anhydride, cis-cyclohexane-1,2-dicarboxylic anhydride, trans-cyclohexane-1,2-dicarboxylic anhydride	-	0.050
VIII	101	Diazene-1,2-dicarboxamide (C,C'-azodi(formamide))	123-77-3	0.050
VIII	102	Dibutyltin dichloride (DBTC)	683-18-1	0.050
VIII	103	Diethyl sulphate	64-67-5	0.050
VIII	104	Diisopentylphthalate	605-50-5	0.050
VIII	105	Dimethyl sulphate	77-78-1	0.050
VIII	106	Dinoseb	88-85-7	0.050
VIII	107	Dioxobis(stearato)trilead*	12578-12-0	0.005
VIII	108	Fatty acids, C16-18, lead salts*	91031-62-8	0.005
VIII	109	Furan	110-00-9	0.050
VIII	110	Henicosafluoroundecanoic acid	2058-94-8	0.050
VIII	111	Heptacosafluorotetradecanoic acid	376-06-7	0.050
VIII	112	Hexahydromethylphathalic anhydride, Hexahydro-4-methylphathalic anhydride, Hexahydro-1-methylphathalic anhydride, Hexahydro-3-methylphathalic anhydride	-	0.050
VIII	113	Lead bis(tetrafluoroborate)*	13814-96-5	0.005
VIII	114	Lead cyanamidate*	20837-86-9	0.005
VIII	115	Lead dinitrate*	10099-74-8	0.005
VIII	116	Lead monoxide*	1317-36-8	0.005

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VIII	117	Lead oxide sulfate*	12036-76-9	0.005
VIII	118	Lead tetroxide (orange lead)*	1314-41-6	0.005
VIII	119	Lead titanium trioxide*	12060-00-3	0.005
VIII	120	Lead titanium zirconium oxide*	12626-81-2	0.005
VIII	121	Methoxyacetic acid	625-45-6	0.050
VIII	122	Methyloxirane (Propylene oxide)	75-56-9	0.050
VIII	123	N,N-dimethylformamide	68-12-2	0.050
VIII	124	N-Methylacetamide	79-16-3	0.050
VIII	125	N-Pentyl-isopentylphthalate	776297-69-9	0.050
VIII	126	o-Aminoazotoluene	97-56-3	0.050
VIII	127	o-Toluidine	95-53-4	0.050
VIII	128	Pentacosafluorotridecanoic acid	72629-94-8	0.050
VIII	129	Pentalead tetraoxide sulphate*	12065-90-6	0.005
VIII	130	Pyrochlore, antimony lead yellow*	8012-00-8	0.005
VIII	131	Silicic acid, barium salt, lead-doped*	68784-75-8	0.005
VIII	132	Silicic acid, lead salt*	11120-22-2	0.005
VIII	133	Sulfurous acid, lead salt, dibasic*	62229-08-7	0.005
VIII	134	Tetraethyllead*	78-00-2	0.005
VIII	135	Tetralead trioxide sulphate*	12202-17-4	0.005
VIII	136	Tricosafluorododecanoic acid	307-55-1	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VIII	137	Trilead bis(carbonate)dihydroxide (basic lead carbonate)*	1319-46-6	0.005
VIII	138	Trilead dioxide phosphonate*	12141-20-7	0.005
IX	139	4-Nonylphenol, branched and linear, ethoxylated	-	0.050
IX	140	Ammonium pentadecafluorooctanoate (APFO)**	3825-26-1	0.050
IX	141	Cadmium oxide*	1306-19-0	0.005
IX	142	Cadmium	7440-43-9	0.005
IX	143	Dipentyl phthalate (DPP)	131-18-0	0.050
IX	144	Pentadecafluorooctanoic acid (PFOA)	335-67-1	0.050
X	145	Cadmium sulphide*	1306-23-6	0.005
X	146	Dihexyl phthalate	84-75-3	0.050
X	147	Disodium 3,3'-[[1,1'-biphenyl] -4,4'-diylbis (azo)] bis(4-aminonaphthalene- 1-sulphonate) (C.I. Direct Red 28)	573-58-0	0.050
X	148	Disodium 4-amino-3-[[4'-[(2,4-diaminophenyl) azo] [1,1'-biphenyl]-4-yl] azo] -5-hydroxy-6-(phenylazo) naphthalene-2,7-disulphonate (C.I. Direct Black 38)	1937-37-7	0.050
X	149	Imidazolidine-2-thione; (2-imidazoline-2-thiol)	96-45-7	0.050
X	150	Lead di(acetate)*	301-04-2	0.005
X	151	Trixylyl phosphate	25155-23-1	0.050
XI	152	1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4	0.050

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Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XI	153	Cadmium chloride*	10108-64-2	0.005
XI	154	Sodium perborate; perboric acid, sodium salt*	-	0.005
XI	155	Sodium peroxometaborate*	7632-04-4	0.005
XII	156	2- (2H-benzotriazol-2-yl) -4,6-ditertpentylphenol (UV-328)	25973-55-1	0.050
XII	157	2-benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320)	3846-71-7	0.050
XII	158	2-ethylhexyl 10-ethyl-4,4-dioctyl- 7-oxo-8-oxa-3,5-dithia- 4-stannatetradecanoate (DOTE)	15571-58-1	0.050
XII	159	Cadmium fluoride*	7790-79-6	0.005
XII	160	Cadmium sulphate*	10124-36-4,31119-53-6	0.005
XII	161	Reaction mass of 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate & 2-ethylhexyl 10-ethyl-4-[[2-[(2-ethylhexyl)oxy]-2-oxoethyl]thio]-4-octyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (reaction mass of DOTE & MOTE)	-	0.050
XIII	162	1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters; 1,2-benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters with ≥ 0.3% of dihexyl phthalate	-	0.050
XIII	163	5-sec-butyl-2-(2,4-dimethylcyclohex-3-en-1-yl)-5-methyl-1,3-dioxane [1], 5-sec-butyl-2-(4,6-dimethylcyclohex-3-en-1-yl)-5-methyl-1,3-dioxane [2] [covering any of the individual isomers of [1] and [2] or any combination thereof]	-	0.050
XIV	164	1,3-propanesultone	1120-71-4	0.050
XIV	165	2,4-di-tert-butyl-6-(5-chlorobenzotriazol-2-yl) phenol (UV-327)	3864-99-1	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XIV	166	2-(2H-benzotriazol-2-yl)-4-(tert-butyl)-6-(sec-butyl)phenol (UV-350)	36437-37-3	0.050
XIV	167	Nitrobenzene	98-95-3	0.050
XIV	168	Perfluorononan-1-oic-acid and its sodium and ammonium salts	-	0.050
XV	169	Benzo[def]chrysene (Benzo[a]pyrene)	50-32-8	0.050
XVI	170	4,4'-isopropylidenediphenol (bisphenol A)	80-05-7	0.050
XVI	171	4-Heptylphenol, branched and linear	-	0.050
XVI	172	Nonadecafluorodecanoic acid (PFDA) and its sodium and ammonium salts	-	0.050
XVI	173	p-(1,1-dimethylpropyl)phenol	80-46-6	0.050
XVII	174	Perfluorohexane-1-sulphonic acid and its salts	-	0.050
XVIII	175	1,6,7,8,9,14,15,16,17,17,18,18-Dodecachloropentacyclo[12.2.1.16,9.02,13.05,10]octadeca-7,15-diene ("Dechlorane Plus"™) [covering any of its individual anti- and syn-isomers or any combination thereof]	-	0.050
XVIII	176	Benz[a]anthracene	56-55-3	0.050
XVIII	177	Cadmium nitrate*	10325-94-7	0.005
XVIII	178	Cadmium carbonate*	513-78-0	0.005
XVIII	179	Cadmium hydroxide*	21041-95-2	0.005
XVIII	180	Chrysene	218-01-9	0.050
XVIII	181	Reaction products of 1,3,4-thiadiazolidine-2,5-dithione, formaldehyde and 4-heptylphenol, branched and linear (RP-HP) [with ≥0.1% w/w 4-heptylphenol, branched and linear]	-	0.050
XIX	182	Benzene-1,2,4-tricarboxylic acid 1,2-anhydride (trimellitic anhydride)	552-30-7	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XIX	183	Benzo[ghi]perylene	191-24-2	0.050
XIX	184	Decamethylcyclopentasiloxane (D5)	541-02-6	0.050
XIX	185	Dicyclohexyl phthalate (DCHP)	84-61-7	0.050
XIX	186	Disodium octaborate*	12008-41-2	0.005
XIX	187	Dodecamethylcyclohexasiloxane (D6)	540-97-6	0.050
XIX	188	Ethylenediamine (EDA)	107-15-3	0.050
XIX	189	Lead	7439-92-1	0.005
XIX	190	Octamethylcyclotetrasiloxane (D4)	556-67-2	0.050
XIX	191	Terphenyl, hydrogenated	61788-32-7	0.050
XX	192	1,7,7-trimethyl-3-(phenylmethylene)bicyclo [2.2.1]heptan-2-one (3-benzylidene camphor)	15087-24-8	0.050
XX	193	2,2-bis(4'-hydroxyphenyl)-4-methylpentane	6807-17-6	0.050
XX	194	Benzo[k]fluoranthene	207-08-9	0.050
XX	195	Fluoranthene	206-44-0	0.050
XX	196	Phenanthrene	85-01-8	0.050
XX	197	Pyrene	129-00-0	0.050
XXI	198	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propionic acid, its salts and its acyl halides (covering any of their individual isomers and combinations thereof)	-	0.050
XXI	199	2-methoxyethyl acetate	110-49-6	0.050
XXI	200	4-tert-butylphenol (PTBP)	98-54-4	0.050

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Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XXI	201	Tris(4-nonylphenyl, branched and linear) phosphite (TNPP) with ≥ 0.1% w/w of 4-nonylphenol, branched and linear (4-NP)	-	0.050
XXII	202	2-benzyl-2-dimethylamino-4'-morpholinobutyrophenone	119313-12-1	0.050
XXII	203	2-methyl-1-(4-methylthiophenyl)-2-morpholinopropan-1-one	71868-10-5	0.050
XXII	204	Diisohexyl phthalate	71850-09-4	0.050
XXII	205	Perfluorobutane sulfonic acid (PFBS) and its salts	-	0.050
XXIII	206	1-vinylimidazole	1072-63-5	0.050
XXIII	207	2-methylimidazole	693-98-1	0.050
XXIII	208	Butyl 4-hydroxybenzoate	94-26-8	0.050
XXIII	209	Dibutylbis(pentane-2,4-dionato-O,O') tin**	22673-19-4	0.050
XXIV	210	bis(2-(2-methoxyethoxy)ethyl) ether	143-24-8	0.050
XXIV	211	Dioctyltin dilaurate, stannane, dioctyl-, bis(coco acyloxy) derivs., and any other stannane, dioctyl-, bis(fatty acyloxy) derivs. wherein C12 is the predominant carbon number of the fatty acyloxy moiety**	-	0.050
XXV	212	1,4-dioxane	123-91-1	0.050
XXV	213	2,2-bis(bromomethyl)propane1,3-diol (BMP); 2,2-dimethylpropan-1-ol, tribromo derivative/3-bromo-2,2-bis(bromomethyl)-1-propanol (TBNPA); 2,3-dibromo-1-propanol (2,3-DBPA)	-	0.050
XXV	214	2-(4-tert-butylbenzyl)propionaldehyde and its individual stereoisomers	-	0.050
XXV	215	4,4'-(1-methylpropylidene)bisphenol (bisphenol B)	77-40-7	0.050
XXV	216	Glutaral	111-30-8	0.050

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(SVHC)

Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XXV	217	Medium-chain chlorinated paraffins (MCCP) [UVCB substances consisting of more than or equal to 80% linear chloroalkanes with carbon chain lengths within the range from C14 to C17]	-	0.050
XXV	218	Orthoboric acid, sodium salt*	13840-56-7	0.005
XXV	219	Phenol, alkylation products (mainly in para position) with C12-rich branched alkyl chains from oligomerisation, covering any individual isomers and/ or combinations thereof (PDDP)	-	0.050
/	220	Resorcinol	108-46-3	0.050
/	221	(±)-1,7,7-trimethyl-3-[(4-methylphenyl)methylene]bicyclo[2.2.1]heptan-2-one covering any of the individual isomers and/or combinations thereof (4-MBC)	-	0.050
/	222	6,6'-di-tert-butyl-2,2'-methylenedi-p-cresol (DBMC)	119-47-1	0.050
/	223	S-(tricyclo[5.2.1.0'2,6]deca-3-en-8(or 9)-yl) O-(isopropyl or isobutyl or 2-ethylhexyl) O-(isopropyl or isobutyl or 2-ethylhexyl) phosphorodithioate	255881-94-8	0.050
/	224	Tris(2-methoxyethoxy)vinylsilane	1067-53-4	0.050

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Sample photo:

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SHA22-003874.008

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Test Report

Lihuayi Weiyuan Chemical Co.,Ltd.

No.208,Lishi Road,Lijin County,Dongying City,Shandong Province

The following sample(s) was/were submitted and identified on behalf of the clients as : Polycarbonate

SGS Job No. :	SHIN2201000745PC - SH
Product Specification :	WY-111BR
Date of Sample Received :	07 Jan 2022
Testing Period :	07 Jan 2022 - 12 Jan 2022
Test Requested :	Selected test(s) as requested by client.
Test Method :	Please refer to next page(s).
Test Results :	Please refer to next page(s).
Conclusion :	Based on the performed tests on submitted sample(s), the results of Cadmium, Lead, Mercury, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) and Phthalates such as Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP) comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Signed for and on behalf of
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

scan to see the report

SHAMLP2200343915

Lilac Wei
Approved Signatory

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Test Results :

Test Part Description :

Specimen No.	SGS Sample ID	Description
SN1	SHA22-003439.008	Transparent plastic particles

Remarks :

(1) 1 mg/kg = 0.0001%

(2) MDL = Method Detection Limit

(3) ND = Not Detected (< MDL)

(4) "-" = Not Regulated

RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

Test Method : With reference to IEC 62321-4:2013+AMD1:2017, IEC62321-5:2013, IEC62321-7-2:2017, IEC 62321-6:2015 and IEC62321-8:2017, analyzed by ICP-OES, UV-Vis and GC-MS.

Test Item(s)	Limit	Unit	MDL	*008*
Cadmium (Cd)	100	mg/kg	2	ND
Lead (Pb)	1000	mg/kg	2	ND
Mercury (Hg)	1000	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))	1000	mg/kg	8	ND
Sum of PBBs	1000	mg/kg	-	ND
Monobromobiphenyl	-	mg/kg	5	ND
Dibromobiphenyl	-	mg/kg	5	ND
Tribromobiphenyl	-	mg/kg	5	ND
Tetrabromobiphenyl	-	mg/kg	5	ND
Pentabromobiphenyl	-	mg/kg	5	ND
Hexabromobiphenyl	-	mg/kg	5	ND
Heptabromobiphenyl	-	mg/kg	5	ND
Octabromobiphenyl	-	mg/kg	5	ND
Nonabromobiphenyl	-	mg/kg	5	ND
Decabromobiphenyl	-	mg/kg	5	ND
Sum of PBDEs	1000	mg/kg	-	ND
Monobromodiphenyl ether	-	mg/kg	5	ND
Dibromodiphenyl ether	-	mg/kg	5	ND
Tribromodiphenyl ether	-	mg/kg	5	ND
Tetrabromodiphenyl ether	-	mg/kg	5	ND

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Test Item(s)	Limit	Unit	MDL	*008*
Pentabromodiphenyl ether	-	mg/kg	5	ND
Hexabromodiphenyl ether	-	mg/kg	5	ND
Heptabromodiphenyl ether	-	mg/kg	5	ND
Octabromodiphenyl ether	-	mg/kg	5	ND
Nonabromodiphenyl ether	-	mg/kg	5	ND
Decabromodiphenyl ether	-	mg/kg	5	ND
Di-butyl Phthalate (DBP)	1000	mg/kg	50	ND
Benzyl Butyl Phthalate (BBP)	1000	mg/kg	50	ND
Di-2-Ethyl Hexyl Phthalate (DEHP)	1000	mg/kg	50	ND
Diisobutyl Phthalates (DIBP)	1000	mg/kg	50	ND

Notes :

(1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.
IEC 62321 series is equivalent to EN 62321 series
https://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101::::FSP_ORG_ID,FSP_LANG_ID:1258637,25

(2) The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments,including industrial monitoring and control instruments, from 22 July 2021.

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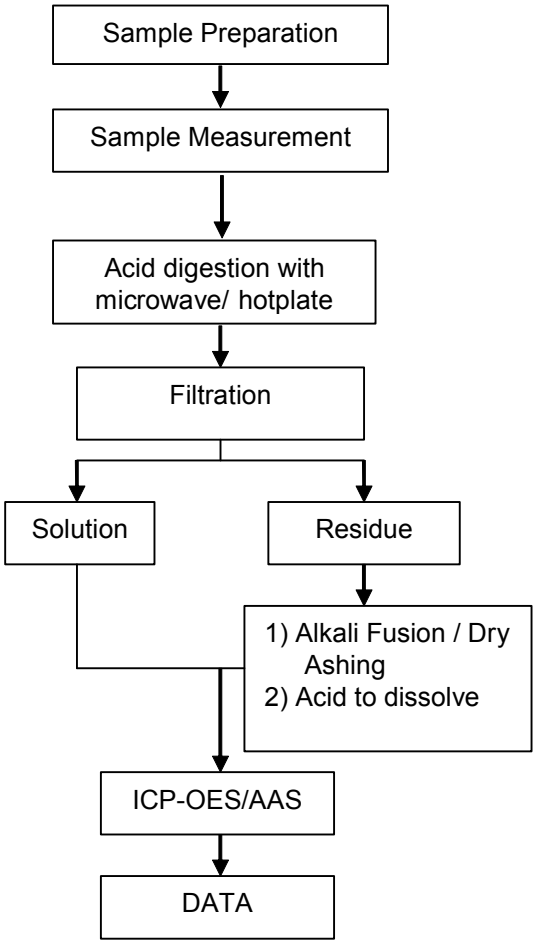
Elements (IEC62321) Testing Flow Chart

1) These samples were dissolved totally by pre-conditioning method according to below flow chart.



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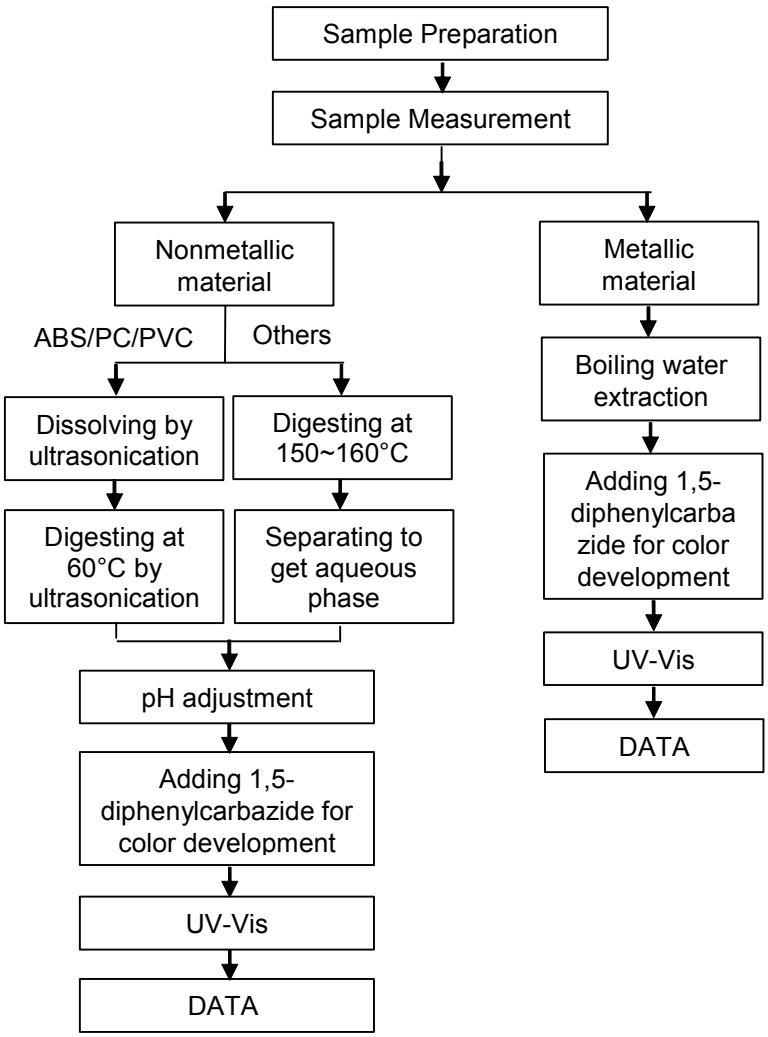
Hexavalent Chromium (Cr(VI)) Testing Flow Chart



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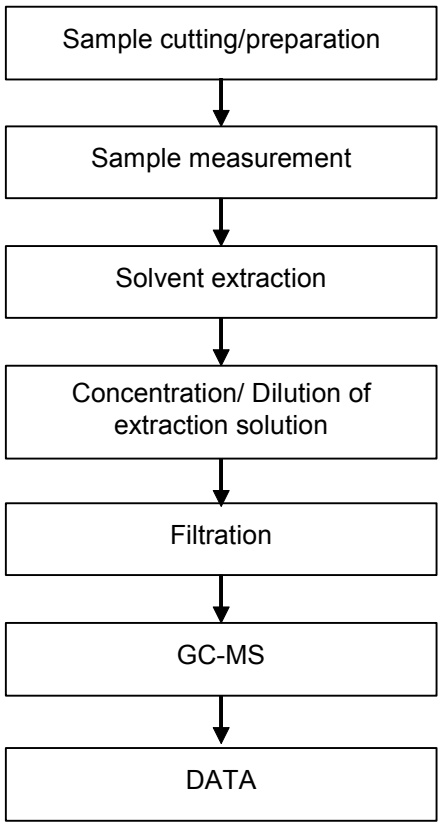
PBBs/PBDEs Testing Flow Chart



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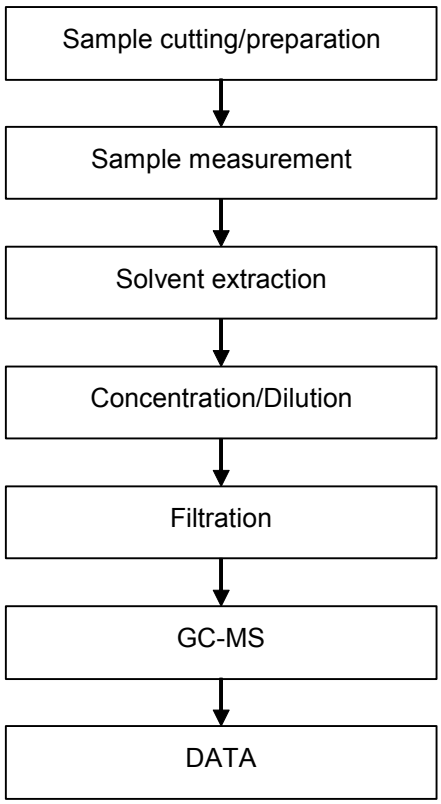
Phthalates Testing Flow Chart



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Sample photo:



SHA22-003439.008

SGS authenticate the photo on original report only

*** End of Report ***

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测试报告

No. SHAMLP2200343916　　日期: 2022年01月12日　　第1页,共8页

利华益维远化学股份有限公司
山东省东营市利津县利十路208号

以下测试之样品是由申请者所提供及确认：聚碳酸酯

SGS工作编号：	SHIN2201000745PC - SH
产品规格：	WY-111BR
样品接收日期：	2022年01月07日
测试周期：	2022年01月07日 - 2022年01月12日
测试要求：	根据客户要求测试
测试方法：	请参见下一页
测试结果：	请参见下一页
结论：	基于所送样品进行的测试，镉、铅、汞、六价铬、多溴联苯(PBBs)、多溴二苯醚(PBDEs)、邻苯二甲酸酯(如邻苯二甲酸二丁酯 (DBP)、邻苯二甲酸丁苄酯(BBP)、邻苯二甲酸二(2-乙基已基)酯(DEHP)和邻苯二甲酸二异丁酯(DIBP))的测试结果符合欧盟RoHS指令2011/65/EU附录II的修正指令(EU) 2015/863的限值要求。

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测试结果 :

测试样品描述 :

样品编号	SGS样品ID	描述
SN1	SHA22-003439.008	透明塑料颗粒

备注 :

(1) 1 mg/kg = 0.0001%

(2) MDL = 方法检测限

(3) ND = 未检出 (< MDL)

(4) "-" = 未规定

RoHS指令2011/65/EU附录II的修正指令(EU) 2015/863

测试方法 : 参考IEC 62321-4:2013+AMD1:2017， IEC 62321-5:2013，IEC 62321-7-2:2017，IEC 62321-6:2015和IEC 62321-8:2017，采用ICP-OES，UV-Vis和GC-MS进行分析。

测试项目	限值	单位	MDL	*008*
镉(Cd)	100	mg/kg	2	ND
铅(Pb)	1000	mg/kg	2	ND
汞(Hg)	1000	mg/kg	2	ND
六价铬 (Cr(VI))	1000	mg/kg	8	ND
多溴联苯之和(PBBs)	1000	mg/kg	-	ND
一溴联苯	-	mg/kg	5	ND
二溴联苯	-	mg/kg	5	ND
三溴联苯	-	mg/kg	5	ND
四溴联苯	-	mg/kg	5	ND
五溴联苯	-	mg/kg	5	ND
六溴联苯	-	mg/kg	5	ND
七溴联苯	-	mg/kg	5	ND
八溴联苯	-	mg/kg	5	ND
九溴联苯	-	mg/kg	5	ND
十溴联苯	-	mg/kg	5	ND
多溴二苯醚之和(PBDEs)	1000	mg/kg	-	ND
一溴二苯醚	-	mg/kg	5	ND
二溴二苯醚	-	mg/kg	5	ND
三溴二苯醚	-	mg/kg	5	ND
四溴二苯醚	-	mg/kg	5	ND

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测试项目	限值	单位	MDL	*008*
五溴二苯醚	-	mg/kg	5	ND
六溴二苯醚	-	mg/kg	5	ND
七溴二苯醚	-	mg/kg	5	ND
八溴二苯醚	-	mg/kg	5	ND
九溴二苯醚	-	mg/kg	5	ND
十溴二苯醚	-	mg/kg	5	ND
邻苯二甲酸二丁酯 (DBP)	1000	mg/kg	50	ND
邻苯二甲酸丁苄酯(BBP)	1000	mg/kg	50	ND
邻苯二甲酸二(2-乙基己基)酯(DEHP)	1000	mg/kg	50	ND
邻苯二甲酸二异丁酯(DIBP)	1000	mg/kg	50	ND

备注：

(1) 最大允许极限值引用自RoHS指令(EU) 2015/863 。
IEC 62321系列等同于 EN 62321系列
https://www.cenelec.eu/dyn/www/f?p=104:30:17422328703511101::::FSP_ORG_ID,FSP_LANG_ID:1258637,25

(2) 2021年7月22号开始，DEHP, BBP, DBP 和 DIBP的限制适用于医疗器械，包括体外医疗器械，监控仪表，包括工业监测和控制仪器。

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检测报告仅用于客户科研、教学、内部质量控制、产品研发等目的，仅供内部参考。

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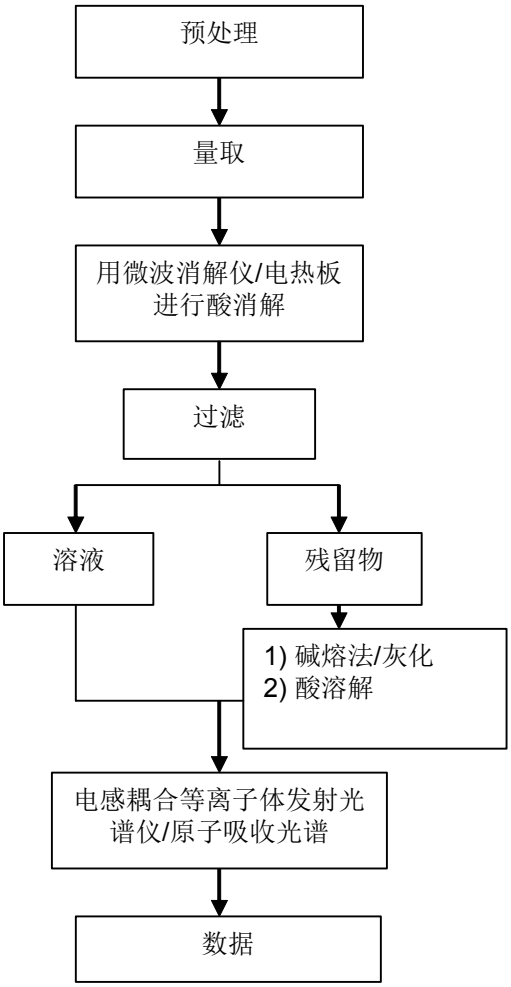
附件

元素(IEC62321) 测试流程图

1)样品按照下述流程被完全消解



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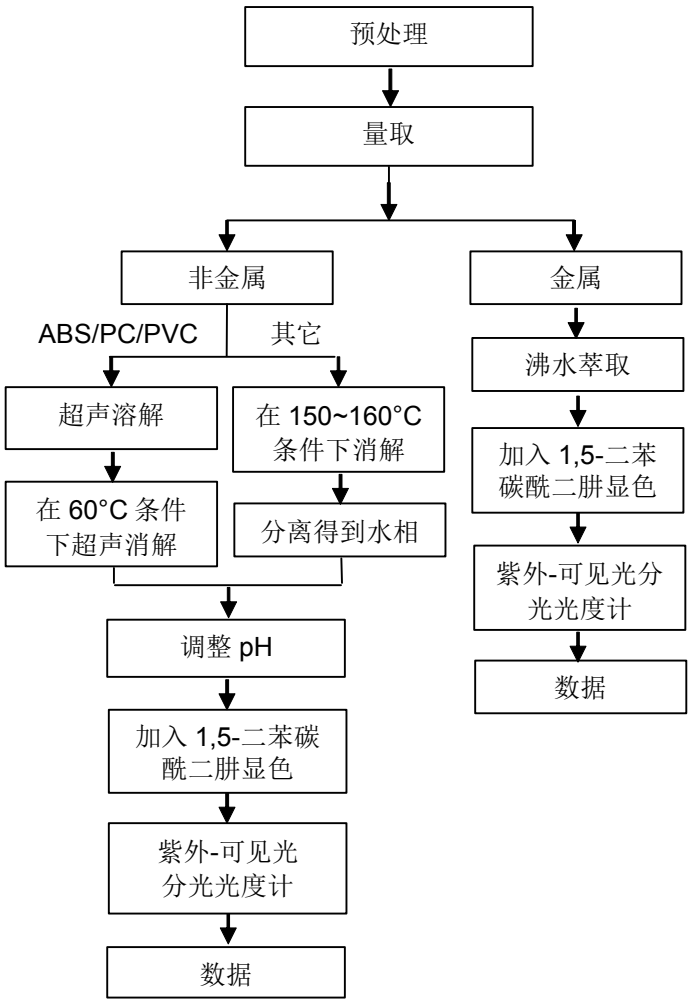
附件

六价铬测试流程图



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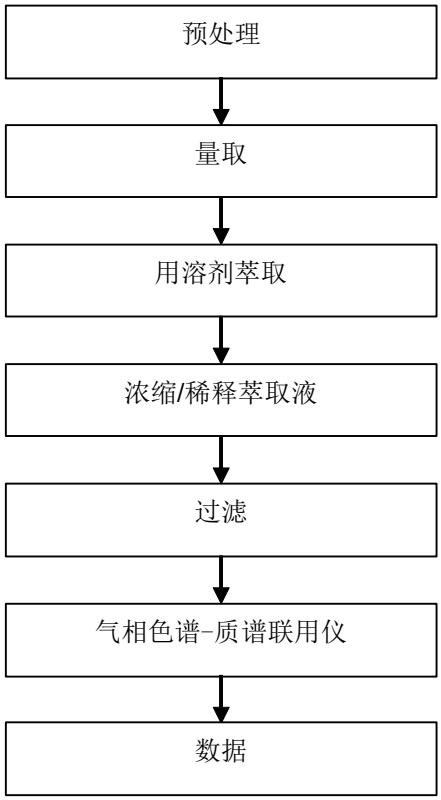
PBBs/PBDEs 测试流程图



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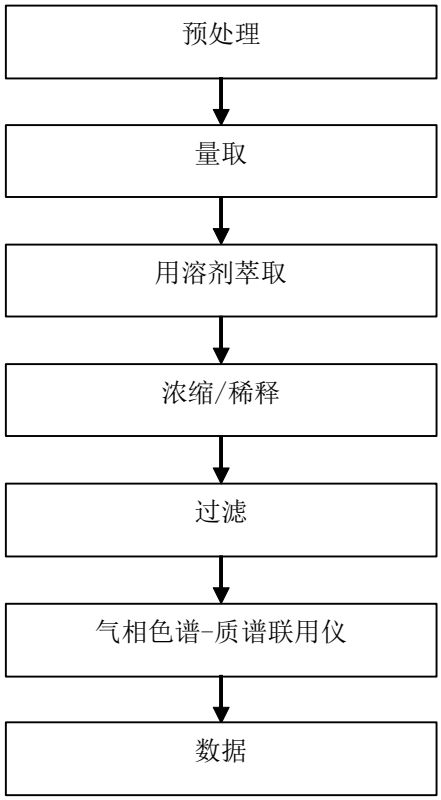
Phthalates 测试流程图



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样品照片:



SHA22-003439.008

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Test Report

No. SHAMLP2200391005 Date: 12 Jan 2022

Lihuayi Weiyuan Chemical Co.,Ltd.

No.208,Lishi Road,Lijin County,Dongying City,Shandong Province

The following sample(s) was/were submitted and identified on behalf of the clients as : Polycarbonate

SGS Job No. :	SHIN2201000745PC - SH
Product Specification :	WY-117BR
Date of Sample Received :	07 Jan 2022
Testing Period :	07 Jan 2022 - 12 Jan 2022
Test Requested :	Selected test(s) as requested by client.
Test Method :	Please refer to next page(s).
Test Results :	Please refer to next page(s).

Result Summary :

Test Requested	Conclusion
US FDA 21 CFR 177.1580- Total extractives	FAIL

Signed for and on behalf of
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

Lancy Liu
Approved Signatory

scan to see the report
SHAMLP2200391005

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Test Results :

Test Part Description :

Specimen No.	SGS Sample ID	Description	Material (claimed by the client)
SN1	SHA22-003910.003	Transparent plastic sheet	PC

Remarks :

(1) mg/dm² = milligram per square decimeter
(2) mg/kg = milligram per kilogram
(3) ℃= degree Celsius
(4) < = less than
(5) MDL = Method Detection Limit
(6) ND = Not Detected (< MDL)

US FDA 21 CFR 177.1580- Total extractives

Test Method : With reference to US FDA 21 CFR 177.1580.

Simulant Used	Time	Temperature	Max. Permissible Limit	Result of 003 Total extractives	Conclusion
50% Ethanol	6hr(s)	Reflux Temperature	0.15% (w/w)	0.19% (w/w)#	FAIL
n-Heptane	6hr(s)	Reflux Temperature	0.15% (w/w)	<0.02% (w/w)	PASS
Distilled water	6hr(s)	Reflux Temperature	0.15% (w/w)	0.08% (w/w)	PASS

Notes :

#=Exceed the limit

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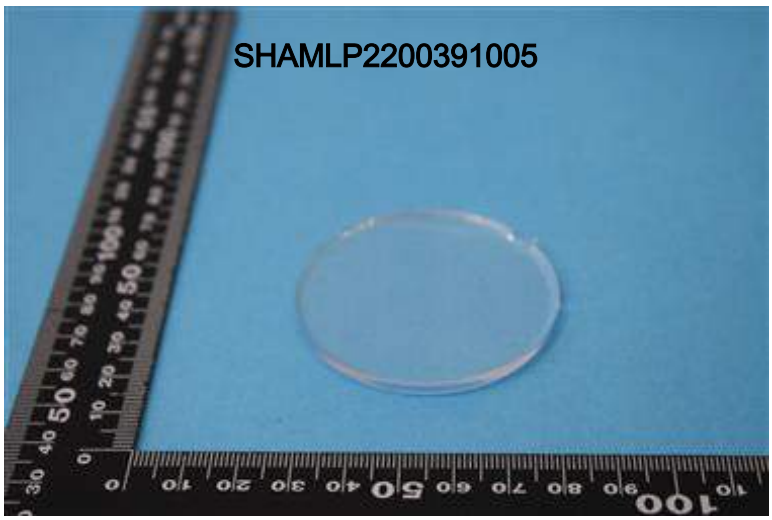
Sample photo:



SHA22-003910.003

SGS authenticate the photo on original report only

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测试报告

No. SHAMLP2200391006　　日期: 2022年01月12日　　第1页,共3页

利华益维远化学股份有限公司
山东省东营市利津县利十路208号

以下测试之样品是由申请者所提供及确认：聚碳酸酯

SGS工作编号：	SHIN2201000745PC - SH
产品规格：	WY-117BR
样品接收日期：	2022年01月07日
测试周期：	2022年01月07日 - 2022年01月12日
测试要求：	根据客户要求测试
测试方法：	请参见下一页
测试结果：	请参见下一页

测试结果概要：

测试要求	结论
US FDA 21 CFR 177.1580- 总提取物	不符合

通标标准技术服务（上海）有限公司
授权签名

刘香梅

Lancy Liu刘香梅
批准签署人

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SHAMLP2200391006

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测试结果 :

测试样品描述 :

样品编号	SGS样品ID	描述	材质 (客户提供)
SN1	SHA22-003910.003	透明塑料片	PC

备注：

(1) mg/dm² = 毫克每平方分米
(2) mg/kg = 毫克每千克
(3) ℃= 摄氏度
(4) < = 小于
(5) MDL = 方法检测限
(6) ND = 未检出 (< MDL)

US FDA 21 CFR 177.1580-总提取物

测试方法 : 参考US FDA 21 CFR 177.1580.

常用模拟液	时间	温度	最大允许限值	样品003 总提取物	结论
50%乙醇	6hr(s)	回流温度	0.15% (w/w)	0.19% (w/w)#	不符合
正庚烷	6hr(s)	回流温度	0.15% (w/w)	<0.02% (w/w)	符合
蒸馏水	6hr(s)	回流温度	0.15% (w/w)	0.08% (w/w)	符合

备注 :

#=超出限值

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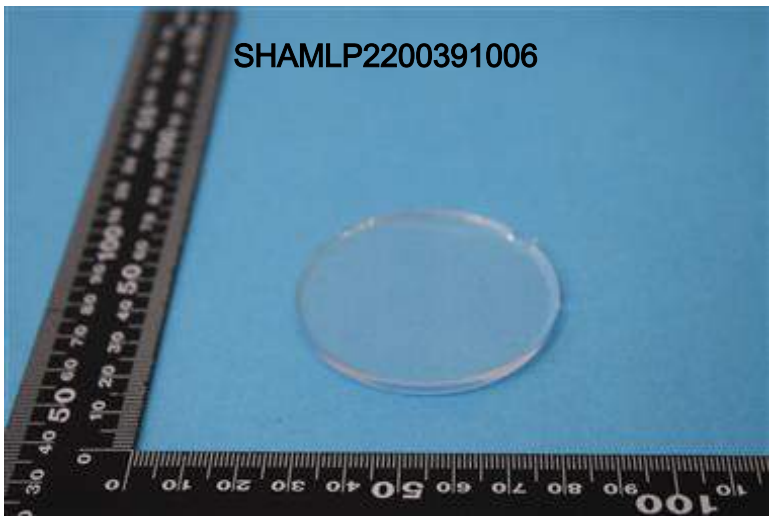

SHA22-003910.003

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测试报告 (SVHC)

No. SHAMLP2200387418　　日期: 2022年01月13日　第1页,共17页

利华益维远化学股份有限公司
山东省东营市利津县利十路208号

以下测试之样品是由申请者所提供及确认：聚碳酸酯

SGS工作编号：	SHIN2201000745PC - SH
产品规格：	WY-117BR
样品接收日期：	2022年01月07日
测试周期：	2022年01月07日 - 2022年01月13日
测试要求：	根据客户要求， (i) 基于欧洲化学品管理署截止2021年7月8日公布的供授权审议的高关注物质候选清单(根据欧盟第1907/2006号REACH法规)，对219种高关注物质(SVHC)进行筛分测试。 (ii) 基于WTO 2021年6月1日的通知，对1种潜在的高关注物质(SVHC)进行筛分测试。 (iii) 基于欧洲化学品管理署截止2021年9月3日公布的潜在的高关注物质咨询清单(根据欧盟第1907/2006号REACH法规)，对4种高关注物质(SVHC)进行筛分测试。
测试结果：	请参见下一页

总结：

根据具体的范围和筛分测试，所提交样品中SVHC测试结果≤ 0.1% (w/w)。	通过

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SHAMLP2200387418

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备注：

1. 本报告所涉及的关于特定高关注物质的化学分析是根据欧洲化学品管理署发布的下列文件，利用现有的分析技术完成的。
   http://echa.europa.eu/web/guest/candidate-list-table
   这些文件清单由欧洲化学品管理署评估, 将来可能会有变化。
2. REACH法规义务：
   2.1关于物品：
   告知：
   欧盟第1907/2006（EC）号法规第33条规定，含有满足第57条中的标准并根据第59条第一款被确定且质量分数大于0.1%的物质的物品的所有供应商应向物品接受者提供其可获取的充足信息，以使物品使用安全，这些信息至少包括含有的候选清单中物质的名称。

   通报：
   根据欧盟第1907/2006（EC）号法规，如果满足以下两个条件，如果物质符合第57条中的标准并根据第59条第一款被确定，物品的任何欧洲制造商或进口商应根据第7条第4款向欧盟化学品管理署进行通报：(a) 候选清单中的物质在物品中的总含量超过1吨/年/生产商或进口商；(b) 候选清单中的物质在物品中的总含量以质量分数计超过0.1% 的浓度。

   SGS采用欧盟法院对REACH物品定义的裁定，除非另有说明。详细的解释请见下列网址：
   http://www.sgs.com/-/media/global/documents/technical-documents/technical-bulletins/sgs-crs-position-statement-on-svhc-in-articles-a4-en-16-06.pdf?la=en

   2.2 关于材料：
   报告中的测试结果是基于测试样品。如样品是均一材质，当其构成成品时，此结果不能代表成品中的SVHC浓度。如样品为均一材质等比例合测，这些材质也可能来自不同的物品。

   如果样品是一种物质或混合物，并且直接出口到欧盟，客户有责任遵守欧盟第1907/2006号REACH法规第31 条供应链信息传递的义务和附件十四中的授权高关注物质授权的责任。

   2.3 关于物质和配制品：
   如果样品中高关注物质的浓度超过0.1% (w/w)和/或欧盟第1272/2008号CLP法规及其修订中设定的特殊浓度限值，建议客户根据欧盟第1907/2006号REACH法规对有关高关注物质准备安全数据表(SDS)以符合供应链通信的义务，如
   -根据欧盟第1272/2008号CLP法规被列为有害物质。
   -根据欧盟第1272/2008号CLP法规被列为有害混合物，而当中物质的浓度大于或等于欧盟第1272/2008号CLP法规列出的浓度限值;或
   -根据欧盟第1272/2008号CLP法规并未列为有害混合物，但包含：
   (a) 对人类健康或环境有害的物质，而在固体或液体混合物（即非气体混合物）中其浓度≥1%(w/w)或在气体混合物中占体积≥0.2%，或
   (b) PBT或vPvB物质，在固体或液体混合物（即非气体混合物）中个别浓度≥0.1%(w/w)，或
   (c) 授权审议的高关注物质候选清单上的物质（除上述以外的原因）在个别非气体混合物中的浓度≥0.1%(w/w)，或

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(d) 设有欧洲范围内工作场所接触限值的物质。

3. 如果样品中SVHC的测试结果超过报告限，建议客户进一步定量分析检测含有SVHC的组分并且得到SVHC物质的准确浓度。

测试样品：

测试样品描述：

样品编号	SGS样品ID	描述
SN1	SHA22-003874.009	透明塑料颗粒

测试方法：

SGS内部方法-SHTC-CHEM-SOP-97-T, SHTC-CHEM-SOP-302-T ，采用ICP-OES、UV-VIS、GC-MS、HPLC-DAD/MS和比色法分析。

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(SVHC)

测试结果: (SVHC候选清单中的高关注物质)

批次	物质名称	CAS No.	009 浓度 (%)	RL (%)
-	所有测试的候选清单中的SVHC	-	ND	-

测试结果：(潜在的SVHC)

批次	物质名称	CAS No.	009 浓度 (%)	RL (%)
-	所有测试的潜在的SVHC	-	ND	-

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注释：

(1) 上表仅显示检出的SVHC，低于RL的SVHC没有列出。所有测试的SVHC请参见附录。
(2) RL = 报告限(当测试结果 ≥ RL时显示数据。RL不同于法规限值。)
ND = 未检出(< RL)，ND针对SVHC物质。
(3) *测试结果是由选定的元素的结果并基于最坏的情况计算得出；
** 测试结果是由选定的标记物的结果并基于最坏的情况计算得出。
硼化合物的结果由ICP-OES测试的水提取硼元素结果换算得出。
RL = 0.005% 是针对元素 (例如钴、砷 、铅 、铬 (VI) 、铝、锆、硼、锶、锌、锑、钛、钡、镉)，除了钼的RL= 0.0005%，硼的RL= 0.0025%(仅对四氟硼酸铅)。
(4) § 只有当物质包含米氏酮(CAS No.: 90-94-8) 或米氏碱(CAS No.: 101-61-1) 的浓度≥ 0.1%(w / w) 的情况下，该物质才被提议定为SVHC
(5) / = 潜在的SVHC
除非另有说明，此报告结果仅对测试的样品负责。本报告未经本公司书面许可，不可部分复制。
检测报告仅用于客户科研、教学、内部质量控制、产品研发等目的，仅供内部参考。

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(SVHC)

附录

所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
I	1	4,4'-二氨基二苯甲烷(MDA)	101-77-9	0.050
I	2	2,4,6-三硝基-5-叔丁基间二甲苯(二甲苯麝香)	81-15-2	0.050
I	3	C10-13 氯代烃(短链氯化石蜡)	85535-84-8	0.050
I	4	蒽	120-12-7	0.050
I	5	邻苯二甲酸丁苄酯(BBP)	85-68-7	0.050
I	6	邻苯二甲酸二(2-乙基己基)酯(DEHP)	117-81-7	0.050
I	7	氧化双三丁基锡(TBTO)	56-35-9	0.050
I	8	二氯化钴*	7646-79-9	0.005
I	9	五氧化二砷*	1303-28-2	0.005
I	10	三氧化二砷*	1327-53-3	0.005
I	11	邻苯二甲酸二丁酯(DBP)	84-74-2	0.050
I	12	六溴环十二烷(HBCDD) 及其非对映异构体(α-HBCDD, β-HBCDD, γ-HBCDD)	-	0.050
I	13	砷酸氢铅*	7784-40-9	0.005
I	14	重铬酸钠*	7789-12-0, 10588-01-9	0.005
I	15	三乙基砷酸酯*	15606-95-8	0.005
II	16	2,4-二硝基甲苯	121-14-2	0.050
II	17	丙烯酰胺	79-06-1	0.050
II	18	蒽油**	90640-80-5	0.050
II	19	蒽油，蒽糊**	90640-81-6	0.050
II	20	蒽油，蒽糊，蒽馏分**	91995-15-2	0.050

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批次	序号	物质名称	CAS No.	RL (%)
II	21	蒽油，蒽糊，轻油**	91995-17-4	0.050
II	22	蒽油，含蒽量少**	90640-82-7	0.050
II	23	邻苯二甲酸二异丁酯	84-69-5	0.050
II	24	钼铬红(C.I.颜料红104)*	12656-85-8	0.005
II	25	铬酸铅*	7758-97-6	0.005
II	26	铅铬黄(C.I.颜料黄34)*	1344-37-2	0.005
II	27	沥青，煤焦油，高温**	65996-93-2	0.050
II	28	磷酸三(2-氯乙基)酯	115-96-8	0.050
III	29	重铬酸铵*	7789-09-5	0.005
III	30	硼酸*	-	0.005
III	31	无水四硼酸钠*	1303-96-4, 1330-43-4, 12179-04-3	0.005
III	32	铬酸钾*	7789-00-6	0.005
III	33	重铬酸钾*	7778-50-9	0.005
III	34	铬酸钠*	7775-11-3	0.005
III	35	水合硼酸钠*	12267-73-1	0.005
III	36	三氯乙烯	79-01-6	0.050
IV	37	乙二醇乙醚	110-80-5	0.050
IV	38	乙二醇单甲醚	109-86-4	0.050
IV	39	铬酸, 铬酸及重铬酸低聚物, 重铬酸*	-	0.005

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所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
IV	40	三氧化铬*	1333-82-0	0.005
IV	41	碳酸钴*	513-79-1	0.005
IV	42	乙酸钴*	71-48-7	0.005
IV	43	硝酸钴*	10141-05-6	0.005
IV	44	硫酸钴*	10124-43-3	0.005
V	45	1,2,3-三氯丙烷	96-18-4	0.050
V	46	1,2-苯二酸-二(C6-8支链)烷基酯(富C7)	71888-89-6	0.050
V	47	1,2-苯二酸-二(C7-11支链与直链)烷基(醇)酯	68515-42-4	0.050
V	48	1-甲基-2-吡咯烷酮	872-50-4	0.050
V	49	乙二醇乙醚醋酸酯	111-15-9	0.050
V	50	联氨	7803-57-8, 302-01-2	0.050
V	51	铬酸锶*	7789-06-2	0.005
VI	52	1,2-二氯乙烷	107-06-2	0.050
VI	53	4,4'-二氨基-3,3'-二氯二苯甲烷	101-14-4	0.050
VI	54	2-甲氧基苯胺	90-04-0	0.050
VI	55	对特辛基苯酚	140-66-9	0.050
VI	56	硅酸铝耐火陶瓷纤维*	-	0.005
VI	57	砷酸*	7778-39-4	0.005
VI	58	二乙二醇二甲醚	111-96-6	0.050
VI	59	邻苯二甲酸二甲氧基乙酯	117-82-8	0.050

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VI	60	砷酸钙*	7778-44-1	0.005
VI	61	铬酸铬*	24613-89-6	0.005
VI	62	甲醛与苯胺的低聚物	25214-70-4	0.050
VI	63	叠氮化铅*	13424-46-9	0.005
VI	64	苦味酸铅*	6477-64-1	0.005
VI	65	史蒂芬酸铅*	15245-44-0	0.005
VI	66	N,N-二甲基乙酰胺	127-19-5	0.050
VI	67	氢氧化铬酸锌*	49663-84-5	0.005
VI	68	酚酞	77-09-8	0.050
VI	69	氢氧化铬酸锌钾*	11103-86-9	0.005
VI	70	砷酸铅*	3687-31-8	0.005
VI	71	氧化锆硅酸铝耐火陶瓷纤维*	-	0.005
VII	72	C.I.碱性蓝26§	2580-56-5	0.050
VII	73	C.I.碱性紫3§	548-62-9	0.050
VII	74	三乙二醇二甲醚(TEGDME)	112-49-2	0.050
VII	75	乙二醇二甲醚(EGDME)	110-71-4	0.050
VII	76	4,4'-二(二甲氨基)二苯甲酮(米氏酮)	90-94-8	0.050
VII	77	4,4'-二(二甲氨基)-4''-甲氨基三苯甲醇§	561-41-1	0.050
VII	78	三氧化二硼*	1303-86-2	0.005
VII	79	甲酰胺	75-12-7	0.050
VII	80	甲基磺酸铅*	17570-76-2	0.005

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批次	序号	物质名称	CAS No.	RL (%)
VII	81	N,N,N',N'-四甲基-4,4'-二氨基二苯甲烷(米氏碱)	101-61-1	0.050
VII	82	1,3,5-三(环氧乙基甲基)-1,3,5-三嗪-2,4,6-(1H, 3H,5H)-三酮(TGIC)	2451-62-9	0.050
VII	83	C.I.溶剂蓝4§	6786-83-0	0.050
VII	84	1,3,5-三-[(2S和2R)-2,3-环氧丙基]-1,3,5-三嗪-2,4,6-(1H, 3H, 5H)-三酮(β-TGIC)	59653-74-6	0.050
VIII	85	二盐基邻苯二甲酸铅*	69011-06-9	0.005
VIII	86	1,2-苯二酸-二(支链与直链)戊基酯	84777-06-0	0.050
VIII	87	乙二醇二乙醚	629-14-1	0.050
VIII	88	1-溴丙烷	106-94-5	0.050
VIII	89	3-乙基-2-甲基-2-(3-甲基丁基)-1,3-恶唑烷	143860-04-2	0.050
VIII	90	对特辛基苯酚乙氧基醚	-	0.050
VIII	91	4,4'-二氨基-3,3'-二甲基二苯甲烷	838-88-0	0.050
VIII	92	4,4'-二氨基二苯醚及其盐	101-80-4	0.050
VIII	93	4-氨基偶氮苯	60-09-3	0.050
VIII	94	2,4-二氨基甲苯	95-80-7	0.050
VIII	95	4-壬基(支链与直链)苯酚	-	0.050
VIII	96	2-甲氧基-5-甲基苯胺	120-71-8	0.050
VIII	97	碱式乙酸铅*	51404-69-4	0.005
VIII	98	4-氨基联苯	92-67-1	0.050
VIII	99	十溴二苯醚(DecaBDE)	1163-19-5	0.050
VIII	100	环己烷-1,2-二羧酸酐,顺式-环己烷-1,2-二羧酸酐,反式-环己烷-1,2-二羧酸酐	-	0.050

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VIII	101	偶氮二甲酰胺	123-77-3	0.050
VIII	102	二丁基二氯化锡(DBTC)	683-18-1	0.050
VIII	103	硫酸二乙酯	64-67-5	0.050
VIII	104	邻苯二甲酸二异戊酯	605-50-5	0.050
VIII	105	硫酸二甲酯	77-78-1	0.050
VIII	106	地乐酚	88-85-7	0.050
VIII	107	双(十八酸基)二氧代三铅*	12578-12-0	0.005
VIII	108	C16-18-脂肪酸铅*	91031-62-8	0.005
VIII	109	呋喃	110-00-9	0.050
VIII	110	全氟十一烷酸	2058-94-8	0.050
VIII	111	全氟十四烷酸	376-06-7	0.050
VIII	112	甲基六氢邻苯二甲酸酐,4-甲基六氢邻苯二甲酸酐,1-甲基六氢邻苯二甲酸酐,3-甲基六氢邻苯二甲酸酐	-	0.050
VIII	113	四氟硼酸铅*	13814-96-5	0.005
VIII	114	氨基氰铅盐*	20837-86-9	0.005
VIII	115	硝酸铅*	10099-74-8	0.005
VIII	116	一氧化铅*	1317-36-8	0.005
VIII	117	碱式硫酸铅*	12036-76-9	0.005
VIII	118	四氧化三铅*	1314-41-6	0.005
VIII	119	钛酸铅*	12060-00-3	0.005
VIII	120	钛酸铅锆*	12626-81-2	0.005

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VIII	121	甲氧基乙酸	625-45-6	0.050
VIII	122	1,2-环氧丙烷	75-56-9	0.050
VIII	123	N,N-二甲基甲酰胺	68-12-2	0.050
VIII	124	N-甲基乙酰胺	79-16-3	0.050
VIII	125	邻苯二甲酸正戊基异戊基酯	776297-69-9	0.050
VIII	126	邻-氨基偶氮甲苯	97-56-3	0.050
VIII	127	2-氨基甲苯	95-53-4	0.050
VIII	128	全氟十三烷酸	72629-94-8	0.050
VIII	129	硫酸四氧化五铅*	12065-90-6	0.005
VIII	130	铅锑黄*	8012-00-8	0.005
VIII	131	掺杂铅的硅酸钡*	68784-75-8	0.005
VIII	132	硅酸铅*	11120-22-2	0.005
VIII	133	二碱式亚硫酸铅*	62229-08-7	0.005
VIII	134	四乙基铅*	78-00-2	0.005
VIII	135	硫酸三氧化四铅*	12202-17-4	0.005
VIII	136	全氟十二烷酸	307-55-1	0.050
VIII	137	碱式碳酸铅*	1319-46-6	0.005
VIII	138	二碱式亚磷酸铅*	12141-20-7	0.005
IX	139	4-壬基(支链与直链)苯酚乙氧基醚	-	0.050
IX	140	全氟辛酸铵(APFO)**	3825-26-1	0.050
IX	141	氧化镉*	1306-19-0	0.005

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批次	序号	物质名称	CAS No.	RL (%)
IX	142	镉	7440-43-9	0.005
IX	143	邻苯二甲酸二正戊酯(DPP)	131-18-0	0.050
IX	144	全氟辛酸(PFOA)	335-67-1	0.050
X	145	硫化镉*	1306-23-6	0.005
X	146	邻苯二甲酸二正己酯	84-75-3	0.050
X	147	C.I.直接红28	573-58-0	0.050
X	148	C.I.直接黑38	1937-37-7	0.050
X	149	2-巯基咪唑啉	96-45-7	0.050
X	150	乙酸铅*	301-04-2	0.005
X	151	磷酸三二甲苯酯	25155-23-1	0.050
XI	152	邻苯二甲酸二(支链与直链)己基酯	68515-50-4	0.050
XI	153	氯化镉*	10108-64-2	0.005
XI	154	水合过硼酸钠*	-	0.005
XI	155	过硼酸钠*	7632-04-4	0.005
XII	156	2-(2H-苯并三唑-2-基)-4,6-二叔戊基苯酚(UV-328)	25973-55-1	0.050
XII	157	2-苯并三唑-2-基-4,6-二叔丁基苯酚(UV-320)	3846-71-7	0.050
XII	158	二正辛基-双(2-乙基己基巯基乙酸酯)锡 (DOTE)	15571-58-1	0.050
XII	159	氟化镉 *	7790-79-6	0.005
XII	160	硫酸镉 *	10124-36-4,31119-53-6	0.005
XII	161	二正辛基-双(2-乙基己基巯基乙酸酯)锡(DOTE)和单辛基-三(2-乙基己基巯基乙酸酯)锡(MOTE)的反应物	-	0.050

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批次	序号	物质名称	CAS No.	RL (%)
XIII	162	1,2-苯二甲酸, 二(C6-10)烷基酯 / 1,2-苯二甲酸, 混合二己二辛二癸酯, 其中邻苯二甲酸二己酯含量≥0.3%	-	0.050
XIII	163	5-二级丁基-2-(2,4-二甲基环己-3-烯-1-基)-5-甲基-1,3-二恶烷[1]，5-二级丁基-2-(4,6-二甲基环己-3-烯-1-基)-5-甲基-1,3-二恶烷[2] [任何[1]和[2]或者其任意组合的单独异构体或其任何组合]	-	0.050
XIV	164	1,3-丙磺酸内酯	1120-71-4	0.050
XIV	165	2,4-二叔丁基-6-(5-氯苯并三唑-2-基)苯酚(UV-327)	3864-99-1	0.050
XIV	166	2-(2H-苯并三唑-2-基)-4-叔丁基-6-仲丁基苯酚 (UV-350)	36437-37-3	0.050
XIV	167	硝基苯	98-95-3	0.050
XIV	168	全氟壬酸及其钠盐和铵盐	-	0.050
XV	169	苯并(a)芘	50-32-8	0.050
XVI	170	4,4'-异亚丙基联苯酚 (双酚A)	80-05-7	0.050
XVI	171	4-庚基(支链与直链)苯酚	-	0.050
XVI	172	全氟癸酸 (PFDA) 及其钠盐和铵盐	-	0.050
XVI	173	对叔戊基苯酚	80-46-6	0.050
XVII	174	全氟己烷-1-磺酸及其盐	-	0.050
XVIII	175	双(六氯环戊二烯)环辛烷(包含任何顺式与反式同分异构体或其组合)	-	0.050
XVIII	176	苯并蒽(BaA)	56-55-3	0.050
XVIII	177	硝酸镉*	10325-94-7	0.005
XVIII	178	碳酸镉*	513-78-0	0.005
XVIII	179	氢氧化镉*	21041-95-2	0.005
XVIII	180	屈(CHR)	218-01-9	0.050

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所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
XVIII	181	1,3,4-噻二唑-2,5-二硫酮、甲醛与支链和直链4-庚基苯酚的反应产物(RP-HP)[含有支链和直链4-庚基苯酚重量比≥0.1%]	-	0.050
XIX	182	1,2,4-苯三酸酐(偏苯三酸酐)(TMA)	552-30-7	0.050
XIX	183	苯并(g,h,i)苝(二萘嵌苯) (BPE)	191-24-2	0.050
XIX	184	十甲基环五硅氧烷(D5)	541-02-6	0.050
XIX	185	邻苯二甲酸二环己酯(DCHP)	84-61-7	0.050
XIX	186	氧化硼钠*	12008-41-2	0.005
XIX	187	十二甲基环六硅氧烷(D6)	540-97-6	0.050
XIX	188	乙二胺(EDA)	107-15-3	0.050
XIX	189	铅	7439-92-1	0.005
XIX	190	八甲基环四硅氧烷(D4)	556-67-2	0.050
XIX	191	氢化三联苯	61788-32-7	0.050
XX	192	1,7,7-三甲基-3-(苯基亚甲基)双环[2.2.1]庚-2-酮 (3-亚苄基樟脑)	15087-24-8	0.050
XX	193	4,4'-(1,3-二甲基丁基)二苯酚(1,3-DMBBP)	6807-17-6	0.050
XX	194	苯并 (k)荧蒽(BkF)	207-08-9	0.050
XX	195	荧蒽(FLT)	206-44-0	0.050
XX	196	菲(PHE)	85-01-8	0.050
XX	197	芘(PYR)	129-00-0	0.050
XXI	198	2,3,3,3-四氟-2-(七氟丙氧基)丙酸及其盐和酰基卤化物(包括单体和组合)(HFPO-DA)	-	0.050
XXI	199	2-甲氧基乙基乙酸酯	110-49-6	0.050
XXI	200	4-叔丁基苯酚(PTBP)	98-54-4	0.050

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(SVHC)

附录

所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
XXI	201	三(4-壬基苯基，支链和直链)亚磷酸酯(TNPP)(含≥0.1%的支链和直链4-壬基苯酚)	-	0.050
XXII	202	2-苄基-2-二甲基氨基-4'-吗啉基苯基丁酮	119313-12-1	0.050
XXII	203	2-甲基-1-(4-甲硫基苯基)-2-吗啉基-1-丙酮	71868-10-5	0.050
XXII	204	邻苯二甲酸二异己酯	71850-09-4	0.050
XXII	205	全氟丁烷磺酸及其盐	-	0.050
XXIII	206	1-乙烯基咪唑	1072-63-5	0.050
XXIII	207	2-甲基咪唑	693-98-1	0.050
XXIII	208	对羟基苯甲酸丁酯	94-26-8	0.050
XXIII	209	双(乙酰丙酮基)二丁基锡**	22673-19-4	0.050
XXIV	210	四乙二醇二甲醚	143-24-8	0.050
XXIV	211	二月桂酸二辛基锡及任何其他二辛基锡双(脂肪酰氧基)衍生物**	-	0.050
XXV	212	1,4-二氧六环	123-91-1	0.050
XXV	213	二溴新戊二醇(BMP); 三溴新戊醇(TBNPA); 2,3-二溴-1-丙醇(2,3-DBPA)	-	0.050
XXV	214	铃兰醛及其立体异构体	-	0.050
XXV	215	双酚B	77-40-7	0.050
XXV	216	戊二醛	111-30-8	0.050
XXV	217	中链氯化石蜡(MCCP)	-	0.050
XXV	218	原硼酸钠盐*	13840-56-7	0.005
XXV	219	对十二烷基苯酚及其异构体(PDDP)	-	0.050

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(SVHC)

附录

所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
/	220	间苯二酚	108-46-3	0.050
/	221	(±)-1,7,7-三甲基-3-[(4-甲基苯基)亚甲基]二环[2.2.1]庚-2-酮，包括各个异构体和/或其组合(4-MBC)	-	0.050
/	222	2,2'-亚甲基双-(4-甲基-6-叔丁基苯酚) (DBMC)	119-47-1	0.050
/	223	S-(三环[5.2.1.0'2,6]癸-3-烯-8(或9)-基) O-(异丙基或异丁基或2-乙基己基) O-(异丙基或异丁基或2-乙基己基)二硫代磷酸酯	255881-94-8	0.050
/	224	乙烯基-三(2-甲氧基乙氧基)硅烷	1067-53-4	0.050

样品照片:

SHAMLP2200387418



SHA22-003874.009

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*** 报告完 ***

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Test Report (SVHC)

Lihuayi Weiyuan Chemical Co.,Ltd.
No.208,Lishi Road,Lijin County,Dongying City,Shandong Province

The following sample(s) was/were submitted and identified on behalf of the clients as : Polycarbonate

SGS Job No. :	SHIN2201000745PC - SH
Product Specification :	WY-117BR
Date of Sample Received :	07 Jan 2022
Testing Period :	07 Jan 2022 - 13 Jan 2022
Test Requested :	As requested by client, SVHC screening is performed according to: (i) Two hundred and nineteen (219) substances in the Candidate List of Substances of Very High Concern (SVHC) for authorization published by European Chemicals Agency (ECHA) on and before Jul 8, 2021 regarding Regulation (EC) No 1907/2006 concerning the REACH. (ii) One (1) potential Substances of Very High Concern (SVHC) in the notification of WTO on Jun 1, 2021. (iii) Four (4) substances in the Public Consultation List of potential Substances of Very High Concern (SVHC) published by European Chemicals Agency (ECHA) on and before Sep 3, 2021 regarding Regulation (EC) No 1907/2006 concerning the REACH.
Test Results :	Please refer to next page(s).

Summary :

According to the specified scope and evaluation screening, the test results of SVHC are ≤ 0.1% (w/w) in the submitted sample.	PASS

Signed for and on behalf of
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

scan to see the report
SHAMLP2200387417

Lilac Wei
Approved Signatory

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(SVHC)

Remark :

1. The chemical analysis of specified SVHC is performed by means of currently available analytical techniques against the following SVHC related documents published by ECHA: http://echa.europa.eu/web/guest/candidate-list-table
   These lists are under evaluation by ECHA and may subject to change in the future.
2. REACH obligation:
   2.1 Concerning article(s):
   Communication:
   Article 33 of Regulation (EC) No 1907/2006 requires supplier of an article containing a substance meeting the criteria in Article 57 and identified in accordance with Article 59(1) in a concentration above 0.1% weight by weight (w/w) shall provide the recipient of the article with sufficient information, available to the supplier, to allow safe use of the article including, as a minimum, the name of that substance in the Candidate List.

   Notification:
   In accordance with Regulation (EC) No 1907/2006, any EU producer or importer of articles shall notify ECHA, in accordance with paragraph 4 of Article 7, if a substance meets the criteria in Article 57 and is identified in accordance with Article 59(1) of the Regulation, if (a) the substance in the Candidate List is present in those articles in quantities totaling over one tonne per producer or importer per year; and (b) the substance in the Candidate List is present in those articles above a concentration of 0.1% weight by weight (w/w).

   SGS adopts the ruling of the Court of Justice of the European Union on the definition of an article under REACH unless indicated otherwise. Detail explanation is available at the following link:
   http://www.sgs.com/-/media/global/documents/technical-documents/technical-bulletins/sgs-crs-position-statement-on-svhc-in-articles-a4-en-16-06.pdf?la=en

   2.2 Concerning material(s):
   Test results in this report are based on the tested sample. This report refers to testing result of tested sample submitted as homogenous material(s). In case such material is being used to compose an article, the results indicated in this report may not represent SVHC concentration in such article. If this report refers to testing result of composite material group by equal weight proportion, the material in each composite test group may come from more than one article.

   If the sample is a substance or mixture, and it directly exports to EU, client has the obligation to comply with the supply chain communication obligation under Article 31 of Regulation (EC) No. 1907/2006 and the conditions of Authorization of substance of very high concern included in the Annex XIV of the Regulation (EC) No. 1907/2006.

   2.3 Concerning substance and preparation:
   If a SVHC is found over 0.1% (w/w) and/or the specific concentration limit which is set in Regulation (EC) No 1272/2008 and its amendments, client is suggested to prepare a Safety

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Data Sheet (SDS) against the SVHC to comply with the supply chain communication obligation under Regulation (EC) No 1907/2006, in which:
- a substance that is classified as hazardous under the CLP Regulation (EC) No 1272/2008.
- a mixture that is classified as hazardous under the CLP Regulation (EC) No 1272/2008, when it contains a substance with concentration equal to, or greater than the classification limit as set in Regulation (EC) No. 1272/2008; or
- a mixture is not classified as hazardous under the CLP Regulation (EC) No 1272/2008, but contains either:
(a) a substance posing human health or environmental hazards in an individual concentration of ≥ 1 % by weight for mixtures that are solid or liquids (i.e., non-gaseous mixtures) or ≥ 0.2 % by volume for gaseous mixtures; or
(b) a substance that is PBT, or vPvB in an individual concentration of ≥ 0.1 % by weight for mixtures that are solid or liquids (i.e., non-gaseous mixtures); or
(c) a substance on the SVHC candidate list (for reasons other than those listed above), in an individual concentration of ≥ 0.1 % by weight for non-gaseous mixtures; or
(d) a substance for which there are Europe-wide workplace exposure limits.

3. If a SVHC is found over the reporting limit, client is suggested to identify the composite component which contains the SVHC and the exact concentration of the SVHC by requesting further quantitative analysis from the laboratory.

Test Sample :

Sample Description :

Specimen No.	SGS Sample ID	Description
SN1	SHA22-003874.009	Transparent plastic particles

Test Method :

SGS In-House method-SHTC-CHEM-SOP-97-T, SHTC-CHEM-SOP-302-T, Analyzed by ICP-OES, UV-VIS, GC-MS, HPLC-DAD/MS and Colorimetric Method.

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(SVHC)

Test Result: (Substances in the Candidate List of SVHC)

Batch	Substance Name	CAS No.	009 Concentration (%)	RL (%)
-	All tested SVHC in candidate list	-	ND	-

Test Result: (Potential SVHC)

Batch	Substance Name	CAS No.	009 Concentration (%)	RL (%)
-	All tested Potential SVHC	-	ND	-

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Notes :

(1)The table above only shows detected SVHC, and SVHC that below RL are not reported. Please refer to Appendix for the full list of tested SVHC.

(2) RL = Reporting Limit (Test data will be shown if it ≥ RL. RL is not regulatory limit.)
ND = Not detected (lower than RL), ND is denoted on the SVHC substance.

(3) * The test result is based on the calculation of selected element(s) and to the worst-case scenario.
** The test result is based on the calculation of selected marker(s) and to the worst-case scenario.
Calculated concentration of boric compounds are based on water extractive boron detected by ICP-OES.
RL = 0.005% is evaluated for element (i.e. cobalt, arsenic, lead, chromium (VI), aluminum, zirconium, boron, strontium, zinc, antimony, titanium, barium, cadmium respectively), except molybdenum RL=0.0005%, boron RL=0.0025% (only for Lead bis(tetrafluoroborate)).

(4) § The substance is proposed for the identification as SVHC only where it contains Michler's ketone (CAS Number: 90-94-8) or Michler's base (CAS Number: 101-61-1) ≥0.1% (w/w).

(5) / = Potential SVHC

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
I	1	4,4' -Diaminodiphenylmethane(MDA)	101-77-9	0.050
I	2	5-tert-butyl-2,4,6-trinitro-m-xylene (musk xylene)	81-15-2	0.050
I	3	Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins)	85535-84-8	0.050
I	4	Anthracene	120-12-7	0.050
I	5	Benzyl butyl phthalate (BBP)	85-68-7	0.050
I	6	Bis (2-ethylhexyl)phthalate (DEHP)	117-81-7	0.050
I	7	Bis(tributyltin)oxide (TBTO)	56-35-9	0.050
I	8	Cobalt dichloride*	7646-79-9	0.005
I	9	Diarsenic pentaoxide*	1303-28-2	0.005
I	10	Diarsenic trioxide*	1327-53-3	0.005
I	11	Dibutyl phthalate (DBP)	84-74-2	0.050
I	12	Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α-HBCDD, β-HBCDD, γ-HBCDD)	-	0.050
I	13	Lead hydrogen arsenate*	7784-40-9	0.005
I	14	Sodium dichromate*	7789-12-0, 10588-01-9	0.005
I	15	Triethyl arsenate*	15606-95-8	0.005
II	16	2,4-Dinitrotoluene	121-14-2	0.050
II	17	Acrylamide	79-06-1	0.050
II	18	Anthracene oil**	90640-80-5	0.050
II	19	Anthracene oil, anthracene paste**	90640-81-6	0.050
II	20	Anthracene oil, anthracene paste, anthracene fraction**	91995-15-2	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
II	21	Anthracene oil, anthracene paste, distn. lights**	91995-17-4	0.050
II	22	Anthracene oil, anthracene-low**	90640-82-7	0.050
II	23	Diisobutyl phthalate	84-69-5	0.050
II	24	Lead chromate molybdate sulphate red (C.I. Pigment Red 104)*	12656-85-8	0.005
II	25	Lead chromate*	7758-97-6	0.005
II	26	Lead sulfochromate yellow (C.I. Pigment Yellow 34)*	1344-37-2	0.005
II	27	Pitch, coal tar, high temp.**	65996-93-2	0.050
II	28	Tris(2-chloroethyl)phosphate	115-96-8	0.050
III	29	Ammonium dichromate*	7789-09-5	0.005
III	30	Boric acid*	-	0.005
III	31	Disodium tetraborate, anhydrous*	1303-96-4, 1330-43-4, 12179-04-3	0.005
III	32	Potassium chromate*	7789-00-6	0.005
III	33	Potassium dichromate*	7778-50-9	0.005
III	34	Sodium chromate*	7775-11-3	0.005
III	35	Tetraboron disodium heptaoxide, hydrate*	12267-73-1	0.005
III	36	Trichloroethylene	79-01-6	0.050
IV	37	2-Ethoxyethanol	110-80-5	0.050
IV	38	2-Methoxyethanol	109-86-4	0.050
IV	39	Chromic acid, Oligomers of chromic acid and dichromic acid, Dichromic acid*	-	0.005

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
IV	40	Chromium trioxide*	1333-82-0	0.005
IV	41	Cobalt(II) carbonate*	513-79-1	0.005
IV	42	Cobalt(II) diacetate*	71-48-7	0.005
IV	43	Cobalt(II) dinitrate*	10141-05-6	0.005
IV	44	Cobalt(II) sulphate*	10124-43-3	0.005
V	45	1,2,3-trichloropropane	96-18-4	0.050
V	46	1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich	71888-89-6	0.050
V	47	1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters	68515-42-4	0.050
V	48	1-methyl-2-pyrrolidone	872-50-4	0.050
V	49	2-ethoxyethyl acetate	111-15-9	0.050
V	50	Hydrazine	7803-57-8, 302-01-2	0.050
V	51	Strontium chromate*	7789-06-2	0.005
VI	52	1,2-Dichloroethane	107-06-2	0.050
VI	53	2,2'-dichloro-4,4'-methylenedianiline	101-14-4	0.050
VI	54	2-Methoxyaniline; o-Anisidine	90-04-0	0.050
VI	55	4-(1,1,3,3-tetramethylbutyl)phenol	140-66-9	0.050
VI	56	Aluminosilicate Refractory Ceramic Fibres*	-	0.005
VI	57	Arsenic acid*	7778-39-4	0.005
VI	58	Bis(2-methoxyethyl) ether	111-96-6	0.050
VI	59	Bis(2-methoxyethyl) phthalate	117-82-8	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VI	60	Calcium arsenate*	7778-44-1	0.005
VI	61	Dichromium tris(chromate) *	24613-89-6	0.005
VI	62	Formaldehyde, oligomeric reaction products with aniline	25214-70-4	0.050
VI	63	Lead diazide, Lead azide*	13424-46-9	0.005
VI	64	Lead dipicrate*	6477-64-1	0.005
VI	65	Lead styphnate*	15245-44-0	0.005
VI	66	N,N-dimethylacetamide	127-19-5	0.050
VI	67	Pentazinc chromate octahydroxide*	49663-84-5	0.005
VI	68	Phenolphthalein	77-09-8	0.050
VI	69	Potassium hydroxyoctaoxodizincatedichromate*	11103-86-9	0.005
VI	70	Trilead diarsenate*	3687-31-8	0.005
VI	71	Zirconia Aluminosilicate Refractory Ceramic Fibres*	-	0.005
VII	72	[4-[[4-anilino-1-naphthyl][4-(dimethylamino)phenyl]methylene]cyclohexa-2,5-dien-1-ylidene] dimethylammonium chloride (C.I. Basic Blue 26)§	2580-56-5	0.050
VII	73	[4-[4,4'-bis(dimethylamino) benzhydrylidene]cyclohexa-2,5-dien-1-ylidene]dimethylammonium chloride (C.I. Basic Violet 3)§	548-62-9	0.050
VII	74	1,2-bis(2-methoxyethoxy)ethane (TEGDME; triglyme)	112-49-2	0.050
VII	75	1,2-dimethoxyethane; ethylene glycol dimethyl ether (EGDME)	110-71-4	0.050
VII	76	4,4'-bis(dimethylamino) benzophenone (Michler's Ketone)	90-94-8	0.050
VII	77	4,4'-bis(dimethylamino)-4''-(methylamino)trityl alcohol§	561-41-1	0.050
VII	78	Diboron trioxide*	1303-86-2	0.005

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VII	79	Formamide	75-12-7	0.050
VII	80	Lead(II) bis(methanesulfonate)*	17570-76-2	0.005
VII	81	N,N,N',N'-tetramethyl-4,4'-methylenedianiline (Michler's base)	101-61-1	0.050
VII	82	TGIC (1,3,5-tris (oxiranylmethyl) -1,3,5-triazine-2,4,6(1H,3H,5H)-trione)	2451-62-9	0.050
VII	83	α,α-Bis[4-(dimethylamino)phenyl]-4 (phenylamino)naphthalene-1-methanol (C.I. Solvent Blue 4) §	6786-83-0	0.050
VII	84	β-TGIC (1,3,5-tris[(2S and 2R)-2,3-epoxypropyl]-1,3,5-triazine-2,4,6-(1H,3H,5H)-trione)	59653-74-6	0.050
VIII	85	[Phthalato(2-)]dioxotrilead*	69011-06-9	0.005
VIII	86	1,2-Benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0	0.050
VIII	87	1,2-Diethoxyethane	629-14-1	0.050
VIII	88	1-Bromopropane	106-94-5	0.050
VIII	89	3-Ethyl-2-methyl-2-(3-methylbutyl)-1,3-oxazolidine	143860-04-2	0.050
VIII	90	4-(1,1,3,3-tetramethylbutyl)phenol, ethoxylated	-	0.050
VIII	91	4,4'-Methylenedi-o-toluidine	838-88-0	0.050
VIII	92	4,4'-Oxydianiline and its salts	101-80-4	0.050
VIII	93	4-Aminoazobenzene	60-09-3	0.050
VIII	94	4-Methyl-m-phenylenediamine	95-80-7	0.050
VIII	95	4-Nonylphenol, branched and linear	-	0.050
VIII	96	6-Methoxy-m-toluidine	120-71-8	0.050
VIII	97	Acetic acid, lead salt, basic*	51404-69-4	0.005

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Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VIII	98	Biphenyl-4-ylamine	92-67-1	0.050
VIII	99	Bis(pentabromophenyl) ether (DecaBDE)	1163-19-5	0.050
VIII	100	Cyclohexane-1,2-dicarboxylic anhydride, cis-cyclohexane-1,2-dicarboxylic anhydride, trans-cyclohexane-1,2-dicarboxylic anhydride	-	0.050
VIII	101	Diazene-1,2-dicarboxamide (C,C'-azodi(formamide))	123-77-3	0.050
VIII	102	Dibutyltin dichloride (DBTC)	683-18-1	0.050
VIII	103	Diethyl sulphate	64-67-5	0.050
VIII	104	Diisopentylphthalate	605-50-5	0.050
VIII	105	Dimethyl sulphate	77-78-1	0.050
VIII	106	Dinoseb	88-85-7	0.050
VIII	107	Dioxobis(stearato)trilead*	12578-12-0	0.005
VIII	108	Fatty acids, C16-18, lead salts*	91031-62-8	0.005
VIII	109	Furan	110-00-9	0.050
VIII	110	Henicosafluoroundecanoic acid	2058-94-8	0.050
VIII	111	Heptacosafluorotetradecanoic acid	376-06-7	0.050
VIII	112	Hexahydromethylphathalic anhydride, Hexahydro-4-methylphathalic anhydride, Hexahydro-1-methylphathalic anhydride, Hexahydro-3-methylphathalic anhydride	-	0.050
VIII	113	Lead bis(tetrafluoroborate)*	13814-96-5	0.005
VIII	114	Lead cyanamidate*	20837-86-9	0.005
VIII	115	Lead dinitrate*	10099-74-8	0.005
VIII	116	Lead monoxide*	1317-36-8	0.005

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Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VIII	117	Lead oxide sulfate*	12036-76-9	0.005
VIII	118	Lead tetroxide (orange lead)*	1314-41-6	0.005
VIII	119	Lead titanium trioxide*	12060-00-3	0.005
VIII	120	Lead titanium zirconium oxide*	12626-81-2	0.005
VIII	121	Methoxyacetic acid	625-45-6	0.050
VIII	122	Methyloxirane (Propylene oxide)	75-56-9	0.050
VIII	123	N,N-dimethylformamide	68-12-2	0.050
VIII	124	N-Methylacetamide	79-16-3	0.050
VIII	125	N-Pentyl-isopentylphthalate	776297-69-9	0.050
VIII	126	o-Aminoazotoluene	97-56-3	0.050
VIII	127	o-Toluidine	95-53-4	0.050
VIII	128	Pentacosafluorotridecanoic acid	72629-94-8	0.050
VIII	129	Pentalead tetraoxide sulphate*	12065-90-6	0.005
VIII	130	Pyrochlore, antimony lead yellow*	8012-00-8	0.005
VIII	131	Silicic acid, barium salt, lead-doped*	68784-75-8	0.005
VIII	132	Silicic acid, lead salt*	11120-22-2	0.005
VIII	133	Sulfurous acid, lead salt, dibasic*	62229-08-7	0.005
VIII	134	Tetraethyllead*	78-00-2	0.005
VIII	135	Tetralead trioxide sulphate*	12202-17-4	0.005
VIII	136	Tricosafluorododecanoic acid	307-55-1	0.050

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Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VIII	137	Trilead bis(carbonate)dihydroxide (basic lead carbonate)*	1319-46-6	0.005
VIII	138	Trilead dioxide phosphonate*	12141-20-7	0.005
IX	139	4-Nonylphenol, branched and linear, ethoxylated	-	0.050
IX	140	Ammonium pentadecafluorooctanoate (APFO)**	3825-26-1	0.050
IX	141	Cadmium oxide*	1306-19-0	0.005
IX	142	Cadmium	7440-43-9	0.005
IX	143	Dipentyl phthalate (DPP)	131-18-0	0.050
IX	144	Pentadecafluorooctanoic acid (PFOA)	335-67-1	0.050
X	145	Cadmium sulphide*	1306-23-6	0.005
X	146	Dihexyl phthalate	84-75-3	0.050
X	147	Disodium 3,3'-[[1,1'-biphenyl] -4,4'-diylbis (azo)] bis(4-aminonaphthalene- 1-sulphonate) (C.I. Direct Red 28)	573-58-0	0.050
X	148	Disodium 4-amino-3-[[4'-[(2,4-diaminophenyl) azo] [1,1'-biphenyl]-4-yl] azo] -5-hydroxy-6-(phenylazo) naphthalene-2,7-disulphonate (C.I. Direct Black 38)	1937-37-7	0.050
X	149	Imidazolidine-2-thione; (2-imidazoline-2-thiol)	96-45-7	0.050
X	150	Lead di(acetate)*	301-04-2	0.005
X	151	Trixylyl phosphate	25155-23-1	0.050
XI	152	1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4	0.050

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Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XI	153	Cadmium chloride*	10108-64-2	0.005
XI	154	Sodium perborate; perboric acid, sodium salt*	-	0.005
XI	155	Sodium peroxometaborate*	7632-04-4	0.005
XII	156	2- (2H-benzotriazol-2-yl) -4,6-ditertpentylphenol (UV-328)	25973-55-1	0.050
XII	157	2-benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320)	3846-71-7	0.050
XII	158	2-ethylhexyl 10-ethyl-4,4-dioctyl- 7-oxo-8-oxa-3,5-dithia- 4-stannatetradecanoate (DOTE)	15571-58-1	0.050
XII	159	Cadmium fluoride*	7790-79-6	0.005
XII	160	Cadmium sulphate*	10124-36-4,31119-53-6	0.005
XII	161	Reaction mass of 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate & 2-ethylhexyl 10-ethyl-4-[[2-[(2-ethylhexyl)oxy]-2-oxoethyl]thio]-4-octyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (reaction mass of DOTE & MOTE)	-	0.050
XIII	162	1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters; 1,2-benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters with ≥ 0.3% of dihexyl phthalate	-	0.050
XIII	163	5-sec-butyl-2-(2,4-dimethylcyclohex-3-en-1-yl)-5-methyl-1,3-dioxane [1], 5-sec-butyl-2-(4,6-dimethylcyclohex-3-en-1-yl)-5-methyl-1,3-dioxane [2] [covering any of the individual isomers of [1] and [2] or any combination thereof]	-	0.050
XIV	164	1,3-propanesultone	1120-71-4	0.050
XIV	165	2,4-di-tert-butyl-6-(5-chlorobenzotriazol-2-yl) phenol (UV-327)	3864-99-1	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XIV	166	2-(2H-benzotriazol-2-yl)-4-(tert-butyl)-6-(sec-butyl)phenol (UV-350)	36437-37-3	0.050
XIV	167	Nitrobenzene	98-95-3	0.050
XIV	168	Perfluorononan-1-oic-acid and its sodium and ammonium salts	-	0.050
XV	169	Benzo[def]chrysene (Benzo[a]pyrene)	50-32-8	0.050
XVI	170	4,4'-isopropylidenediphenol (bisphenol A)	80-05-7	0.050
XVI	171	4-Heptylphenol, branched and linear	-	0.050
XVI	172	Nonadecafluorodecanoic acid (PFDA) and its sodium and ammonium salts	-	0.050
XVI	173	p-(1,1-dimethylpropyl)phenol	80-46-6	0.050
XVII	174	Perfluorohexane-1-sulphonic acid and its salts	-	0.050
XVIII	175	1,6,7,8,9,14,15,16,17,17,18,18-Dodecachloropentacyclo[12.2.1.16,9.02,13.05,10]octadeca-7,15-diene ("Dechlorane Plus"™) [covering any of its individual anti- and syn-isomers or any combination thereof]	-	0.050
XVIII	176	Benz[a]anthracene	56-55-3	0.050
XVIII	177	Cadmium nitrate*	10325-94-7	0.005
XVIII	178	Cadmium carbonate*	513-78-0	0.005
XVIII	179	Cadmium hydroxide*	21041-95-2	0.005
XVIII	180	Chrysene	218-01-9	0.050
XVIII	181	Reaction products of 1,3,4-thiadiazolidine-2,5-dithione, formaldehyde and 4-heptylphenol, branched and linear (RP-HP) [with ≥0.1% w/w 4-heptylphenol, branched and linear]	-	0.050
XIX	182	Benzene-1,2,4-tricarboxylic acid 1,2-anhydride (trimellitic anhydride)	552-30-7	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XIX	183	Benzo[ghi]perylene	191-24-2	0.050
XIX	184	Decamethylcyclopentasiloxane (D5)	541-02-6	0.050
XIX	185	Dicyclohexyl phthalate (DCHP)	84-61-7	0.050
XIX	186	Disodium octaborate*	12008-41-2	0.005
XIX	187	Dodecamethylcyclohexasiloxane (D6)	540-97-6	0.050
XIX	188	Ethylenediamine (EDA)	107-15-3	0.050
XIX	189	Lead	7439-92-1	0.005
XIX	190	Octamethylcyclotetrasiloxane (D4)	556-67-2	0.050
XIX	191	Terphenyl, hydrogenated	61788-32-7	0.050
XX	192	1,7,7-trimethyl-3-(phenylmethylene)bicyclo [2.2.1]heptan-2-one (3-benzylidene camphor)	15087-24-8	0.050
XX	193	2,2-bis(4'-hydroxyphenyl)-4-methylpentane	6807-17-6	0.050
XX	194	Benzo[k]fluoranthene	207-08-9	0.050
XX	195	Fluoranthene	206-44-0	0.050
XX	196	Phenanthrene	85-01-8	0.050
XX	197	Pyrene	129-00-0	0.050
XXI	198	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propionic acid, its salts and its acyl halides (covering any of their individual isomers and combinations thereof)	-	0.050
XXI	199	2-methoxyethyl acetate	110-49-6	0.050
XXI	200	4-tert-butylphenol (PTBP)	98-54-4	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XXI	201	Tris(4-nonylphenyl, branched and linear) phosphite (TNPP) with ≥ 0.1% w/w of 4-nonylphenol, branched and linear (4-NP)	-	0.050
XXII	202	2-benzyl-2-dimethylamino-4'-morpholinobutyrophenone	119313-12-1	0.050
XXII	203	2-methyl-1-(4-methylthiophenyl)-2-morpholinopropan-1-one	71868-10-5	0.050
XXII	204	Diisohexyl phthalate	71850-09-4	0.050
XXII	205	Perfluorobutane sulfonic acid (PFBS) and its salts	-	0.050
XXIII	206	1-vinylimidazole	1072-63-5	0.050
XXIII	207	2-methylimidazole	693-98-1	0.050
XXIII	208	Butyl 4-hydroxybenzoate	94-26-8	0.050
XXIII	209	Dibutylbis(pentane-2,4-dionato-O,O') tin**	22673-19-4	0.050
XXIV	210	bis(2-(2-methoxyethoxy)ethyl) ether	143-24-8	0.050
XXIV	211	Dioctyltin dilaurate, stannane, dioctyl-, bis(coco acyloxy) derivs., and any other stannane, dioctyl-, bis(fatty acyloxy) derivs. wherein C12 is the predominant carbon number of the fatty acyloxy moiety**	-	0.050
XXV	212	1,4-dioxane	123-91-1	0.050
XXV	213	2,2-bis(bromomethyl)propane1,3-diol (BMP); 2,2-dimethylpropan-1-ol, tribromo derivative/3-bromo-2,2-bis(bromomethyl)-1-propanol (TBNPA); 2,3-dibromo-1-propanol (2,3-DBPA)	-	0.050
XXV	214	2-(4-tert-butylbenzyl)propionaldehyde and its individual stereoisomers	-	0.050
XXV	215	4,4'-(1-methylpropylidene)bisphenol (bisphenol B)	77-40-7	0.050
XXV	216	Glutaral	111-30-8	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XXV	217	Medium-chain chlorinated paraffins (MCCP) [UVCB substances consisting of more than or equal to 80% linear chloroalkanes with carbon chain lengths within the range from C14 to C17]	-	0.050
XXV	218	Orthoboric acid, sodium salt*	13840-56-7	0.005
XXV	219	Phenol, alkylation products (mainly in para position) with C12-rich branched alkyl chains from oligomerisation, covering any individual isomers and/ or combinations thereof (PDDP)	-	0.050
/	220	Resorcinol	108-46-3	0.050
/	221	(±)-1,7,7-trimethyl-3-[(4-methylphenyl)methylene]bicyclo[2.2.1]heptan-2-one covering any of the individual isomers and/or combinations thereof (4-MBC)	-	0.050
/	222	6,6'-di-tert-butyl-2,2'-methylenedi-p-cresol (DBMC)	119-47-1	0.050
/	223	S-(tricyclo[5.2.1.0'2,6]deca-3-en-8(or 9)-yl) O-(isopropyl or isobutyl or 2-ethylhexyl) O-(isopropyl or isobutyl or 2-ethylhexyl) phosphorodithioate	255881-94-8	0.050
/	224	Tris(2-methoxyethoxy)vinylsilane	1067-53-4	0.050

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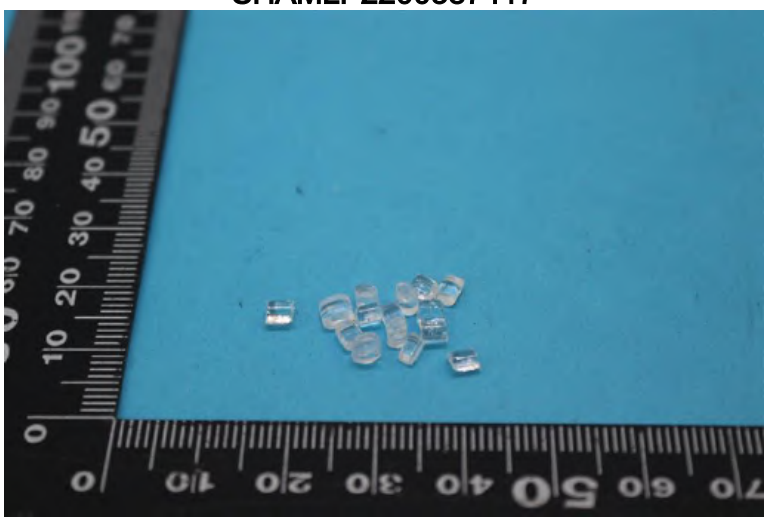
Sample photo:

SHAMLP2200387417



SHA22-003874.009

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Test Report

Lihuayi Weiyuan Chemical Co.,Ltd.

No.208,Lishi Road,Lijin County,Dongying City,Shandong Province

The following sample(s) was/were submitted and identified on behalf of the clients as : Polycarbonate

SGS Job No. :	SHIN2201000745PC - SH
Product Specification :	WY-117BR
Date of Sample Received :	07 Jan 2022
Testing Period :	07 Jan 2022 - 12 Jan 2022
Test Requested :	Selected test(s) as requested by client.
Test Method :	Please refer to next page(s).
Test Results :	Please refer to next page(s).
Conclusion :	Based on the performed tests on submitted sample(s), the results of Cadmium, Lead, Mercury, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) and Phthalates such as Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP) comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Signed for and on behalf of
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

scan to see the report

SHAMLP2200343917

Lilac Wei
Approved Signatory

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Test Results :

Test Part Description :

Specimen No.	SGS Sample ID	Description
SN1	SHA22-003439.009	Transparent plastic particles

Remarks :

(1) 1 mg/kg = 0.0001%

(2) MDL = Method Detection Limit

(3) ND = Not Detected (< MDL)

(4) "-" = Not Regulated

RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

Test Method : With reference to IEC 62321-4:2013+AMD1:2017, IEC62321-5:2013, IEC62321-7-2:2017, IEC 62321-6:2015 and IEC62321-8:2017, analyzed by ICP-OES, UV-Vis and GC-MS.

Test Item(s)	Limit	Unit	MDL	*009*
Cadmium (Cd)	100	mg/kg	2	ND
Lead (Pb)	1000	mg/kg	2	ND
Mercury (Hg)	1000	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))	1000	mg/kg	8	ND
Sum of PBBs	1000	mg/kg	-	ND
Monobromobiphenyl	-	mg/kg	5	ND
Dibromobiphenyl	-	mg/kg	5	ND
Tribromobiphenyl	-	mg/kg	5	ND
Tetrabromobiphenyl	-	mg/kg	5	ND
Pentabromobiphenyl	-	mg/kg	5	ND
Hexabromobiphenyl	-	mg/kg	5	ND
Heptabromobiphenyl	-	mg/kg	5	ND
Octabromobiphenyl	-	mg/kg	5	ND
Nonabromobiphenyl	-	mg/kg	5	ND
Decabromobiphenyl	-	mg/kg	5	ND
Sum of PBDEs	1000	mg/kg	-	ND
Monobromodiphenyl ether	-	mg/kg	5	ND
Dibromodiphenyl ether	-	mg/kg	5	ND
Tribromodiphenyl ether	-	mg/kg	5	ND
Tetrabromodiphenyl ether	-	mg/kg	5	ND

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Test Item(s)	Limit	Unit	MDL	*009*
Pentabromodiphenyl ether	-	mg/kg	5	ND
Hexabromodiphenyl ether	-	mg/kg	5	ND
Heptabromodiphenyl ether	-	mg/kg	5	ND
Octabromodiphenyl ether	-	mg/kg	5	ND
Nonabromodiphenyl ether	-	mg/kg	5	ND
Decabromodiphenyl ether	-	mg/kg	5	ND
Di-butyl Phthalate (DBP)	1000	mg/kg	50	ND
Benzyl Butyl Phthalate (BBP)	1000	mg/kg	50	ND
Di-2-Ethyl Hexyl Phthalate (DEHP)	1000	mg/kg	50	ND
Diisobutyl Phthalates (DIBP)	1000	mg/kg	50	ND

Notes :

(1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.
IEC 62321 series is equivalent to EN 62321 series
https://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101::::FSP_ORG_ID,FSP_LANG_ID:1258637,25

(2) The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments,including industrial monitoring and control instruments, from 22 July 2021.

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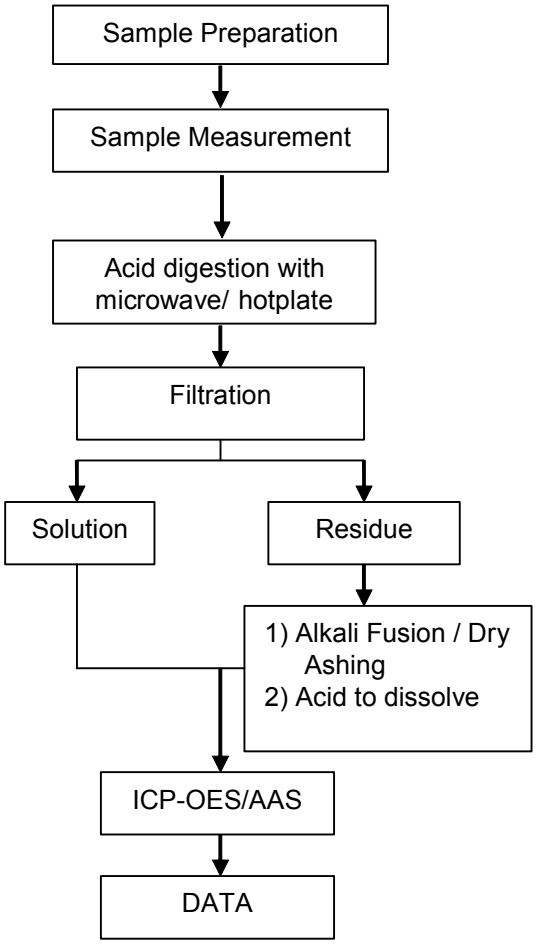
Elements (IEC62321) Testing Flow Chart

1) These samples were dissolved totally by pre-conditioning method according to below flow chart.



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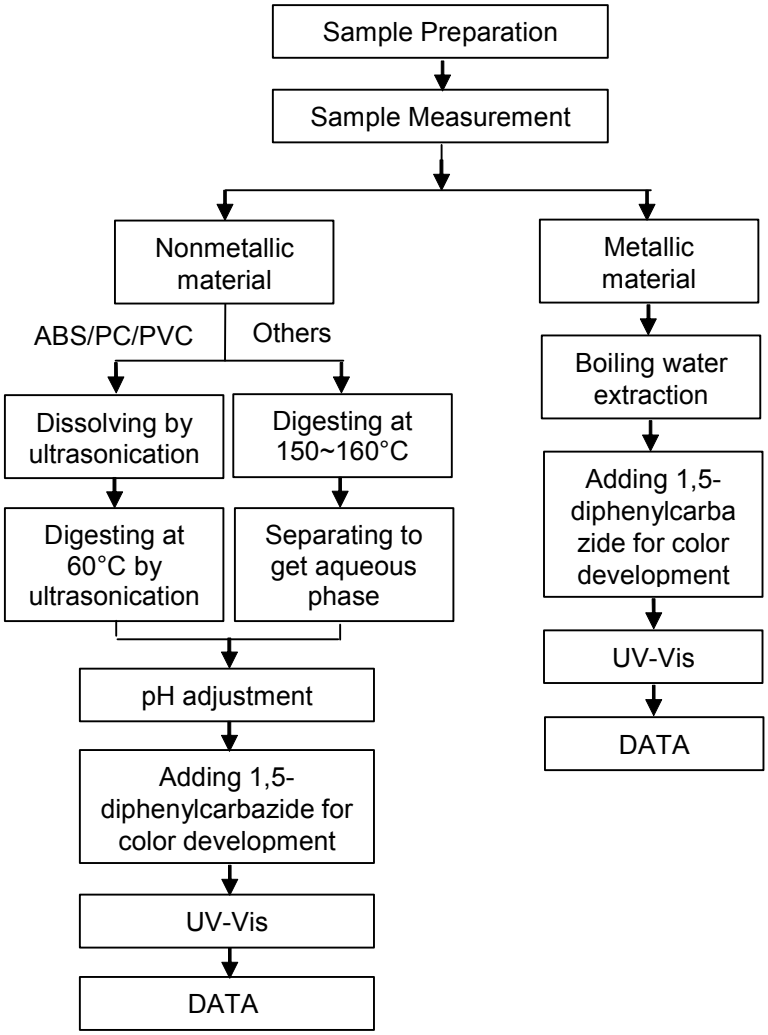
Hexavalent Chromium (Cr(VI)) Testing Flow Chart



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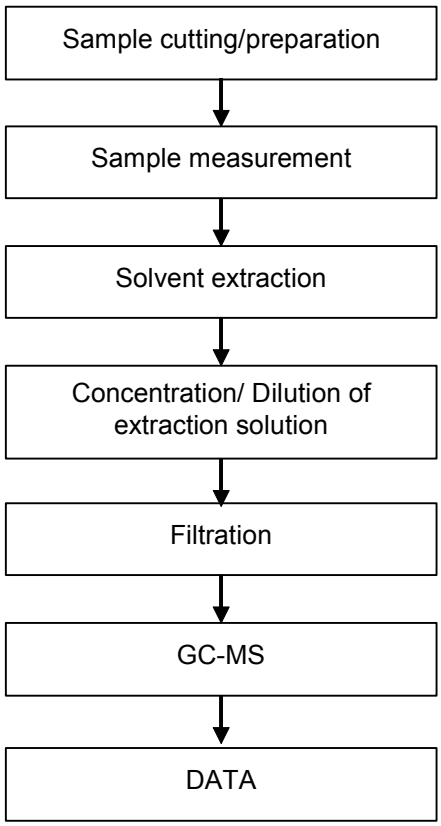
PBBs/PBDEs Testing Flow Chart



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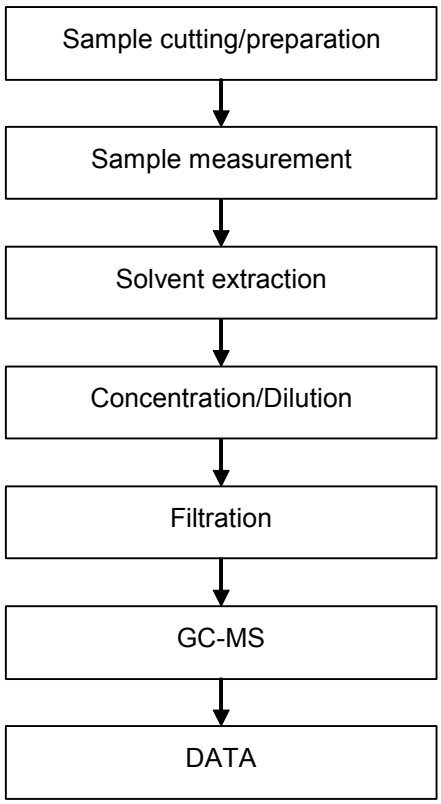
Phthalates Testing Flow Chart



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Sample photo:



SHA22-003439.009

SGS authenticate the photo on original report only

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测试报告

No. SHAMLP2200343918　　日期: 2022年01月12日　第1页,共8页

利华益维远化学股份有限公司
山东省东营市利津县利十路208号

以下测试之样品是由申请者所提供及确认：聚碳酸酯

SGS工作编号：	SHIN2201000745PC - SH
产品规格：	WY-117BR
样品接收日期：	2022年01月07日
测试周期：	2022年01月07日 - 2022年01月12日
测试要求：	根据客户要求测试
测试方法：	请参见下一页
测试结果：	请参见下一页
结论：	基于所送样品进行的测试，镉、铅、汞、六价铬、多溴联苯(PBBs)、多溴二苯醚(PBDEs)、邻苯二甲酸酯(如邻苯二甲酸二丁酯 (DBP)、邻苯二甲酸丁苄酯(BBP)、邻苯二甲酸二(2-乙基已基)酯(DEHP)和邻苯二甲酸二异丁酯(DIBP))的测试结果符合欧盟RoHS指令2011/65/EU附录II的修正指令(EU) 2015/863的限值要求。

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SHAMLP2200343918

Lilac Wei魏文凤
批准签署人

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测试结果 :

测试样品描述 :

样品编号	SGS样品ID	描述
SN1	SHA22-003439.009	透明塑料颗粒

备注 :

(1) 1 mg/kg = 0.0001%

(2) MDL = 方法检测限

(3) ND = 未检出 (< MDL)

(4) "-" = 未规定

RoHS指令2011/65/EU附录II的修正指令(EU) 2015/863

测试方法 : 参考IEC 62321-4:2013+AMD1:2017， IEC 62321-5:2013，IEC 62321-7-2:2017，IEC 62321-6:2015和IEC 62321-8:2017，采用ICP-OES，UV-Vis和GC-MS进行分析。

测试项目	限值	单位	MDL	*009*
镉(Cd)	100	mg/kg	2	ND
铅(Pb)	1000	mg/kg	2	ND
汞(Hg)	1000	mg/kg	2	ND
六价铬 (Cr(VI))	1000	mg/kg	8	ND
多溴联苯之和(PBBs)	1000	mg/kg	-	ND
一溴联苯	-	mg/kg	5	ND
二溴联苯	-	mg/kg	5	ND
三溴联苯	-	mg/kg	5	ND
四溴联苯	-	mg/kg	5	ND
五溴联苯	-	mg/kg	5	ND
六溴联苯	-	mg/kg	5	ND
七溴联苯	-	mg/kg	5	ND
八溴联苯	-	mg/kg	5	ND
九溴联苯	-	mg/kg	5	ND
十溴联苯	-	mg/kg	5	ND
多溴二苯醚之和(PBDEs)	1000	mg/kg	-	ND
一溴二苯醚	-	mg/kg	5	ND
二溴二苯醚	-	mg/kg	5	ND
三溴二苯醚	-	mg/kg	5	ND
四溴二苯醚	-	mg/kg	5	ND

检验检测专用章 Inspection & Testing Services

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测试项目	限值	单位	MDL	*009*
五溴二苯醚	-	mg/kg	5	ND
六溴二苯醚	-	mg/kg	5	ND
七溴二苯醚	-	mg/kg	5	ND
八溴二苯醚	-	mg/kg	5	ND
九溴二苯醚	-	mg/kg	5	ND
十溴二苯醚	-	mg/kg	5	ND
邻苯二甲酸二丁酯 (DBP)	1000	mg/kg	50	ND
邻苯二甲酸丁苄酯(BBP)	1000	mg/kg	50	ND
邻苯二甲酸二(2-乙基己基)酯(DEHP)	1000	mg/kg	50	ND
邻苯二甲酸二异丁酯(DIBP)	1000	mg/kg	50	ND

备注：

(1) 最大允许极限值引用自RoHS指令(EU) 2015/863 。
IEC 62321系列等同于 EN 62321系列
https://www.cenelec.eu/dyn/www/f?p=104:30:17422328703511101::::FSP_ORG_ID,FSP_LANG_ID:1258637,25

(2) 2021年7月22号开始，DEHP, BBP, DBP 和 DIBP的限制适用于医疗器械，包括体外医疗器械，监控仪表，包括工业监测和控制仪器。

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检测报告仅用于客户科研、教学、内部质量控制、产品研发等目的，仅供内部参考。

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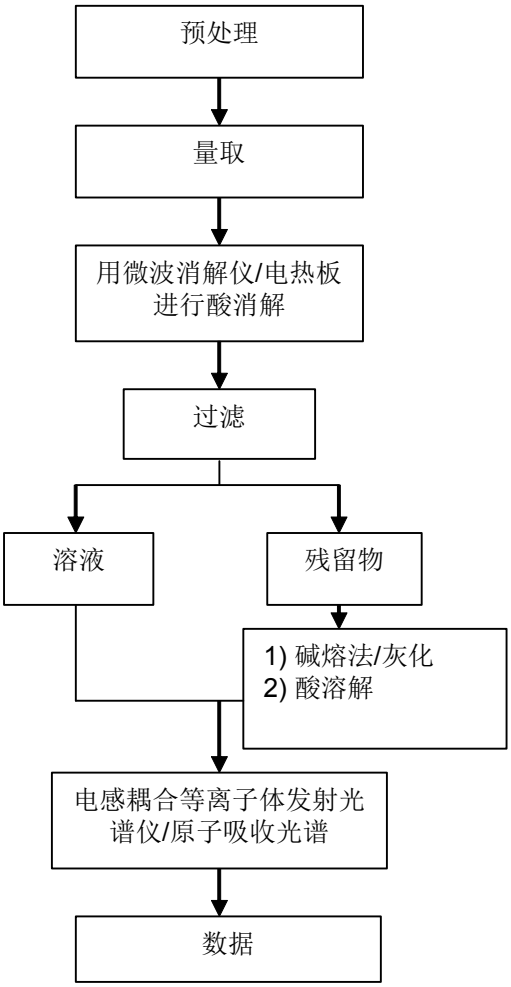
元素(IEC62321) 测试流程图

1)样品按照下述流程被完全消解



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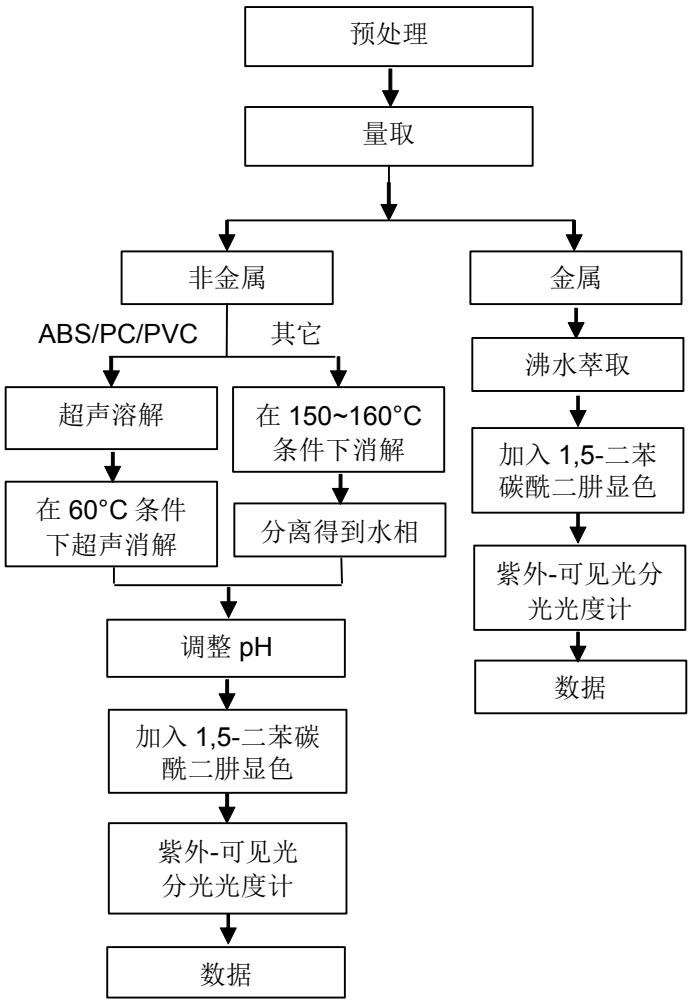
六价铬测试流程图



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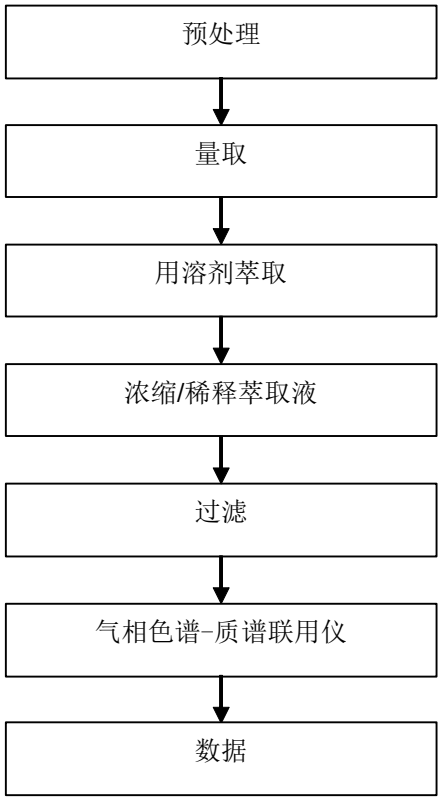

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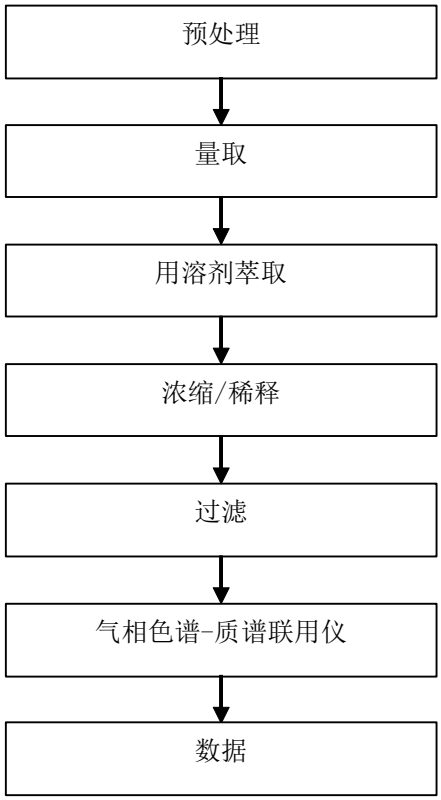

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Guangde ZT Technoiogy Co., Ltd.

No.7 PCB industrial park economic development zone,Guangde Anhui province,China

The following sample(s) was/were submitted and identified on behalf of the clients as : Lead Free PCB

SGS Job No. :	SP21-018627 - SH
Date of Sample Received :	16 Jun 2021
Testing Period :	16 Jun 2021 - 21 Jun 2021
Test Requested :	Selected test(s) as requested by client.
Test Method :	Please refer to next page(s).
Test Results :	Please refer to next page(s).
Conclusion :	Based on the performed tests on submitted sample(s), the results of Cadmium, Lead, Mercury, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) and Phthalates such as Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP) comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Signed for and on behalf of
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

scan to see the report

SHAEC2112290501

Mindy Yu
Approved Signatory

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Test Results :

Test Part Description :

Specimen No.	SGS Sample ID	Description
SN1	SHA21-122905.001	Green PCB

Remarks :

(1) 1 mg/kg = 0.0001%

(2) MDL = Method Detection Limit

(3) ND = Not Detected (< MDL)

(4) "-" = Not Regulated

RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

Test Method : With reference to IEC 62321-4:2013+AMD1:2017, IEC62321-5:2013, IEC62321-7-2:2017, IEC 62321-6:2015 and IEC62321-8:2017, analyzed by ICP-OES, UV-Vis and GC-MS.

Test Item(s)	Limit	Unit	MDL	*001*
Cadmium (Cd)	100	mg/kg	2	ND
Lead (Pb)	1000	mg/kg	2	10
Mercury (Hg)	1000	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))	1000	mg/kg	8	ND
Sum of PBBs	1000	mg/kg	-	ND
Monobromobiphenyl	-	mg/kg	5	ND
Dibromobiphenyl	-	mg/kg	5	ND
Tribromobiphenyl	-	mg/kg	5	ND
Tetrabromobiphenyl	-	mg/kg	5	ND
Pentabromobiphenyl	-	mg/kg	5	ND
Hexabromobiphenyl	-	mg/kg	5	ND
Heptabromobiphenyl	-	mg/kg	5	ND
Octabromobiphenyl	-	mg/kg	5	ND
Nonabromobiphenyl	-	mg/kg	5	ND
Decabromobiphenyl	-	mg/kg	5	ND
Sum of PBDEs	1000	mg/kg	-	ND
Monobromodiphenyl ether	-	mg/kg	5	ND
Dibromodiphenyl ether	-	mg/kg	5	ND
Tribromodiphenyl ether	-	mg/kg	5	ND
Tetrabromodiphenyl ether	-	mg/kg	5	ND

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Test Item(s)	Limit	Unit	MDL	*001*
Pentabromodiphenyl ether	-	mg/kg	5	ND
Hexabromodiphenyl ether	-	mg/kg	5	ND
Heptabromodiphenyl ether	-	mg/kg	5	ND
Octabromodiphenyl ether	-	mg/kg	5	ND
Nonabromodiphenyl ether	-	mg/kg	5	ND
Decabromodiphenyl ether	-	mg/kg	5	ND
Di-butyl Phthalate (DBP)	1000	mg/kg	50	ND
Benzyl Butyl Phthalate (BBP)	1000	mg/kg	50	ND
Di-2-Ethyl Hexyl Phthalate (DEHP)	1000	mg/kg	50	ND
Diisobutyl Phthalates (DIBP)	1000	mg/kg	50	ND

Notes :

(1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.
IEC 62321 series is equivalent to EN 62321 series
https://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101::::FSP_ORG_ID,FSP_LANG_ID:1258637,25

(2) The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments,including industrial monitoring and control instruments, from 22 July 2021.

Phthalates

Test Method : With reference to IEC 62321-8:2017, determination of phthalates by GC-MS.

Test Item(s)	CAS NO.	Unit	MDL	001
Diisononyl Adipate(DINA)	33703-08-1	mg/kg	50	ND
Diisononyl Phthalate (DINP)	28553-12-0 /68515-48-0	mg/kg	50	ND
Di-n-octyl Phthalate (DNOP)	117-84-0	mg/kg	50	ND
Diisodecyl Phthalate (DIDP)	26761-40-0 /68515-49-1	mg/kg	50	ND
Total (DBP + BBP + DEHP+DIBP)	-	%	-	ND

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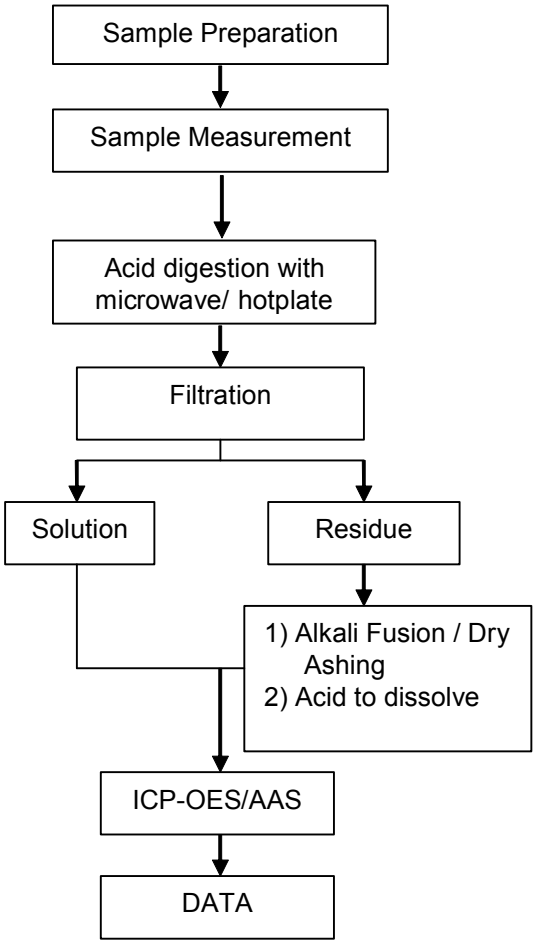
Elements (IEC62321) Testing Flow Chart

1) These samples were dissolved totally by pre-conditioning method according to below flow chart.



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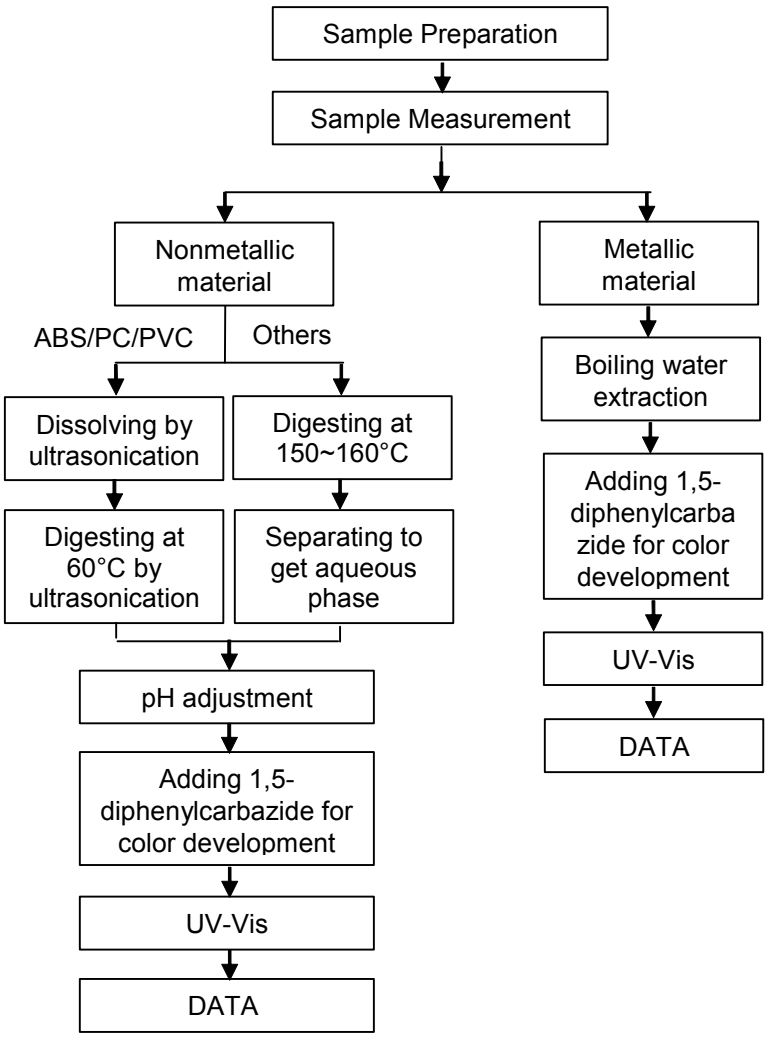
Hexavalent Chromium (Cr(VI)) Testing Flow Chart



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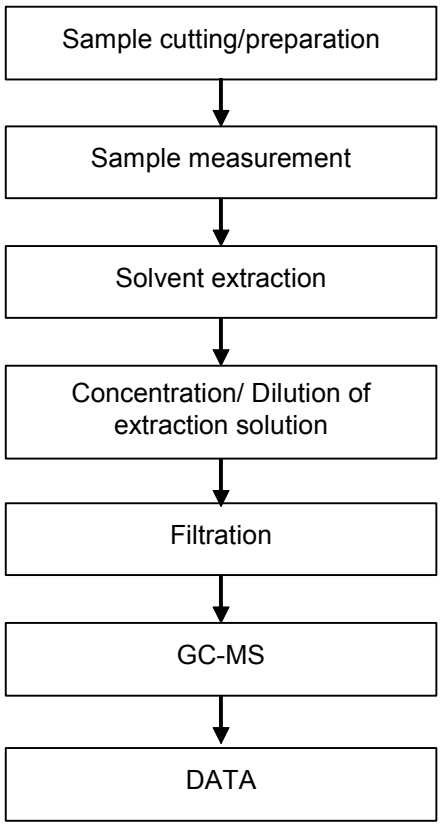
PBBs/PBDEs Testing Flow Chart



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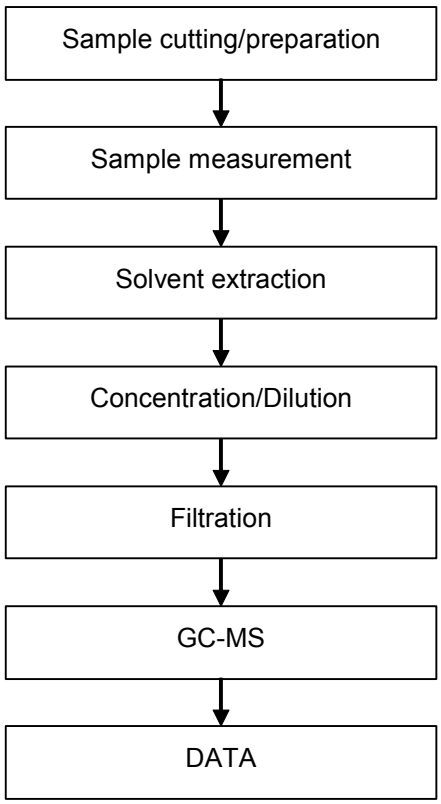
Phthalates Testing Flow Chart



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Sample photo:



SHA21-122905.001

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测试报告

No. SHAEC2112290502 日期: 2021年06月21日

广德众泰科技有限公司

中国安徽省广德经济开发区PCB产业园7号楼

以下测试之样品是由申请者所提供及确认 : PCB无铅板

SGS工作编号 :	SP21-018627 - SH
样品接收日期 :	2021年06月16日
测试周期 :	2021年06月16日 - 2021年06月21日
测试要求 :	根据客户要求测试
测试方法 :	请参见下一页
测试结果 :	请参见下一页
结论 :	基于所送样品进行的测试，镉、铅、汞、六价铬、多溴联苯(PBBs)、多溴二苯醚(PBDEs)、邻苯二甲酸酯(如邻苯二甲酸二丁酯 (DBP)、邻苯二甲酸丁苄酯(BBP)、邻苯二甲酸二(2-乙基已基)酯(DEHP)和邻苯二甲酸二异丁酯(DIBP))的测试结果符合欧盟RoHS指令2011/65/EU附录II的修正指令(EU) 2015/863的限值要求。

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SHAEC2112290502

Mindy Yu俞迪
批准签署人

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测试结果 :

测试样品描述 :

样品编号	SGS样品ID	描述
SN1	SHA21-122905.001	绿色PCB板

备注 :

(1) 1 mg/kg = 0.0001%

(2) MDL = 方法检测限

(3) ND = 未检出 (< MDL)

(4) "-" = 未规定

RoHS指令2011/65/EU附录II的修正指令(EU) 2015/863

测试方法 : 参考IEC 62321-4:2013+AMD1:2017， IEC 62321-5:2013，IEC 62321-7-2:2017，IEC 62321-6:2015和IEC 62321-8:2017，采用ICP-OES，UV-Vis和GC-MS进行分析。

测试项目	限值	单位	MDL	*001*
镉(Cd)	100	mg/kg	2	ND
铅(Pb)	1000	mg/kg	2	10
汞(Hg)	1000	mg/kg	2	ND
六价铬 (Cr(VI))	1000	mg/kg	8	ND
多溴联苯之和(PBBs)	1000	mg/kg	-	ND
一溴联苯	-	mg/kg	5	ND
二溴联苯	-	mg/kg	5	ND
三溴联苯	-	mg/kg	5	ND
四溴联苯	-	mg/kg	5	ND
五溴联苯	-	mg/kg	5	ND
六溴联苯	-	mg/kg	5	ND
七溴联苯	-	mg/kg	5	ND
八溴联苯	-	mg/kg	5	ND
九溴联苯	-	mg/kg	5	ND
十溴联苯	-	mg/kg	5	ND
多溴二苯醚之和(PBDEs)	1000	mg/kg	-	ND
一溴二苯醚	-	mg/kg	5	ND
二溴二苯醚	-	mg/kg	5	ND
三溴二苯醚	-	mg/kg	5	ND
四溴二苯醚	-	mg/kg	5	ND

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测试项目	限值	单位	MDL	*001*
五溴二苯醚	-	mg/kg	5	ND
六溴二苯醚	-	mg/kg	5	ND
七溴二苯醚	-	mg/kg	5	ND
八溴二苯醚	-	mg/kg	5	ND
九溴二苯醚	-	mg/kg	5	ND
十溴二苯醚	-	mg/kg	5	ND
邻苯二甲酸二丁酯 (DBP)	1000	mg/kg	50	ND
邻苯二甲酸丁苄酯(BBP)	1000	mg/kg	50	ND
邻苯二甲酸二(2-乙基己基)酯(DEHP)	1000	mg/kg	50	ND
邻苯二甲酸二异丁酯(DIBP)	1000	mg/kg	50	ND

备注：

(1) 最大允许极限值引用自RoHS指令(EU) 2015/863 。
IEC 62321系列等同于 EN 62321系列
https://www.cenelec.eu/dyn/www/f?p=104:30:17422328703511101::::FSP_ORG_ID,FSP_LANG_ID:1258637,25

(2) 2021年7月22号开始，DEHP, BBP, DBP 和 DIBP的限制适用于医疗器械，包括体外医疗器械，监控仪表，包括工业监测和控制仪器。

邻苯二甲酸酯

测试方法： 参考IEC 62321-8：2017，用GC-MS测定邻苯二甲酸酯的含量。

测试项目	CAS NO.	单位	MDL	001
己二酸二异壬酯 (DINA)	33703-08-1	mg/kg	50	ND
邻苯二甲酸二异壬酯 (DINP)	28553-12-0 /68515-48-0	mg/kg	50	ND
邻苯二甲酸二辛酯 (DNOP)	117-84-0	mg/kg	50	ND
邻苯二甲酸二异癸酯 (DIDP)	26761-40-0 /68515-49-1	mg/kg	50	ND
(DBP + BBP + DEHP+DIBP) 总含量	-	%	-	ND

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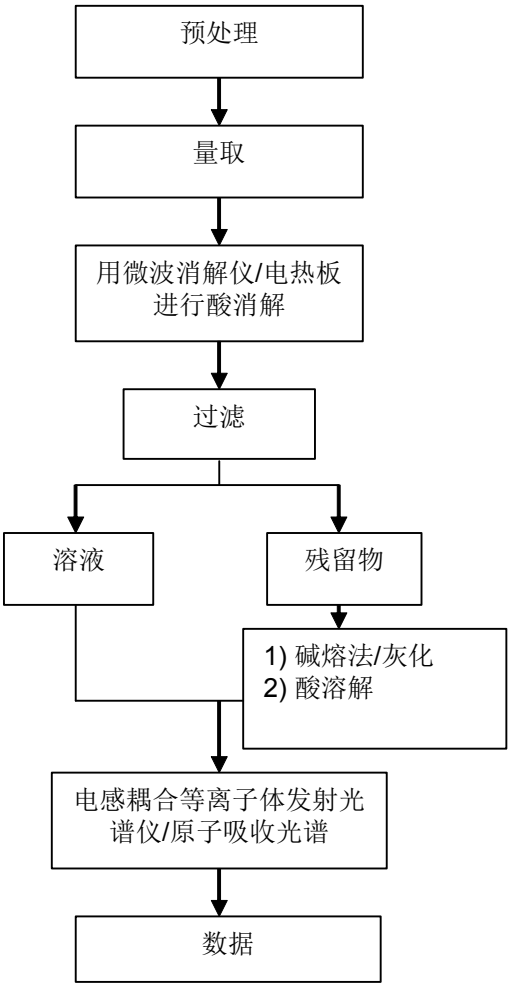
附件

元素(IEC62321) 测试流程图

1)样品按照下述流程被完全消解



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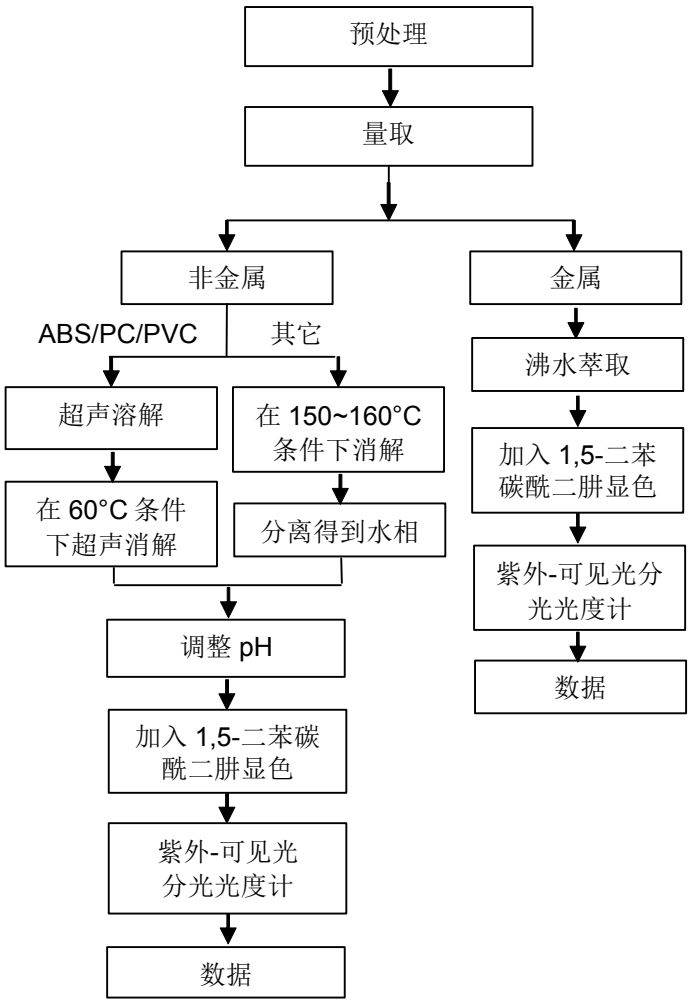
六价铬测试流程图



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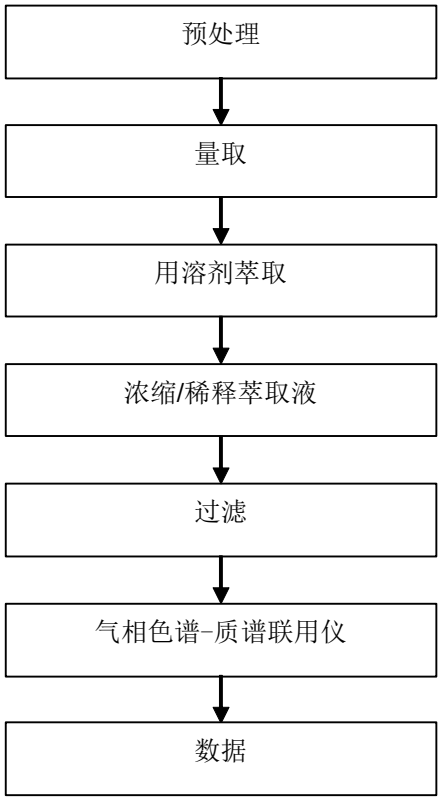
PBBs/PBDEs 测试流程图



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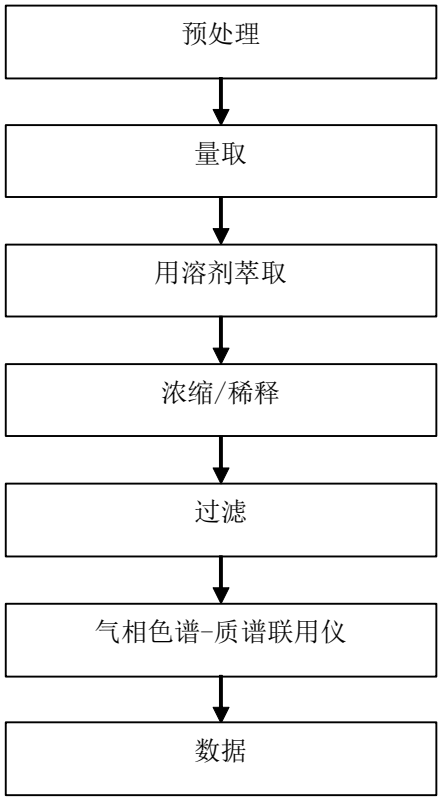
Phthalates 测试流程图



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Test Report (SVHC)

Guangde ZT Technoiogy Co., Ltd.
No.7 PCB industrial park economic development zone,Guangde Anhui province,China

The following sample(s) was/were submitted and identified on behalf of the clients as : Lead Free PCB

SGS Job No. :	SP21-036661 - SH
Date of Sample Received :	03 Dec 2021
Testing Period :	03 Dec 2021 - 10 Dec 2021
Test Requested :	As requested by client, SVHC screening is performed according to: (i) Two hundred and nineteen (219) substances in the Candidate List of Substances of Very High Concern (SVHC) for authorization published by European Chemicals Agency (ECHA) on and before Jul 8, 2021 regarding Regulation (EC) No 1907/2006 concerning the REACH. (ii) One (1) potential Substances of Very High Concern (SVHC) in the notification of WTO on Jun 1, 2021. (iii) Four (4) substances in the Public Consultation List of potential Substances of Very High Concern (SVHC) published by European Chemicals Agency (ECHA) on and before Sep 3, 2021 regarding Regulation (EC) No 1907/2006 concerning the REACH.
Test Results :	Please refer to next page(s).

Summary :

According to the specified scope and evaluation screening, the test results of SVHC are ≤ 0.1% (w/w) in the submitted sample.	PASS

Signed for and on behalf of
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

Annie Liu

Annie Liu
Approved Signatory

scan to see the report
AFF3DA35

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Remark :

1. The chemical analysis of specified SVHC is performed by means of currently available analytical techniques against the following SVHC related documents published by ECHA: http://echa.europa.eu/web/guest/candidate-list-table
   These lists are under evaluation by ECHA and may subject to change in the future.
2. REACH obligation:
   2.1 Concerning article(s):
   Communication:
   Article 33 of Regulation (EC) No 1907/2006 requires supplier of an article containing a substance meeting the criteria in Article 57 and identified in accordance with Article 59(1) in a concentration above 0.1% weight by weight (w/w) shall provide the recipient of the article with sufficient information, available to the supplier, to allow safe use of the article including, as a minimum, the name of that substance in the Candidate List.

   Notification:
   In accordance with Regulation (EC) No 1907/2006, any EU producer or importer of articles shall notify ECHA, in accordance with paragraph 4 of Article 7, if a substance meets the criteria in Article 57 and is identified in accordance with Article 59(1) of the Regulation, if (a) the substance in the Candidate List is present in those articles in quantities totaling over one tonne per producer or importer per year; and (b) the substance in the Candidate List is present in those articles above a concentration of 0.1% weight by weight (w/w).

   SGS adopts the ruling of the Court of Justice of the European Union on the definition of an article under REACH unless indicated otherwise. Detail explanation is available at the following link:
   http://www.sgs.com/-/media/global/documents/technical-documents/technical-bulletins/sgs-crs-position-statement-on-svhc-in-articles-a4-en-16-06.pdf?la=en

   2.2 Concerning material(s):
   Test results in this report are based on the tested sample. This report refers to testing result of tested sample submitted as homogenous material(s). In case such material is being used to compose an article, the results indicated in this report may not represent SVHC concentration in such article. If this report refers to testing result of composite material group by equal weight proportion, the material in each composite test group may come from more than one article.

   If the sample is a substance or mixture, and it directly exports to EU, client has the obligation to comply with the supply chain communication obligation under Article 31 of Regulation (EC) No. 1907/2006 and the conditions of Authorization of substance of very high concern included in the Annex XIV of the Regulation (EC) No. 1907/2006.

   2.3 Concerning substance and preparation:
   If a SVHC is found over 0.1% (w/w) and/or the specific concentration limit which is set in Regulation (EC) No 1272/2008 and its amendments, client is suggested to prepare a Safety

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Data Sheet (SDS) against the SVHC to comply with the supply chain communication obligation under Regulation (EC) No 1907/2006, in which:
- a substance that is classified as hazardous under the CLP Regulation (EC) No 1272/2008.
- a mixture that is classified as hazardous under the CLP Regulation (EC) No 1272/2008, when it contains a substance with concentration equal to, or greater than the classification limit as set in Regulation (EC) No. 1272/2008; or
- a mixture is not classified as hazardous under the CLP Regulation (EC) No 1272/2008, but contains either:
(a) a substance posing human health or environmental hazards in an individual concentration of ≥ 1 % by weight for mixtures that are solid or liquids (i.e., non-gaseous mixtures) or ≥ 0.2 % by volume for gaseous mixtures; or
(b) a substance that is PBT, or vPvB in an individual concentration of ≥ 0.1 % by weight for mixtures that are solid or liquids (i.e., non-gaseous mixtures); or
(c) a substance on the SVHC candidate list (for reasons other than those listed above), in an individual concentration of ≥ 0.1 % by weight for non-gaseous mixtures; or
(d) a substance for which there are Europe-wide workplace exposure limits.

3. If a SVHC is found over the reporting limit, client is suggested to identify the composite component which contains the SVHC and the exact concentration of the SVHC by requesting further quantitative analysis from the laboratory.

Test Sample :

Sample Description :

Specimen No.	SGS Sample ID	Description
SN1	SHA21-265276.001	Green PCB

Test Method :

SGS In-House method-SHTC-CHEM-SOP-97-T, SHTC-CHEM-SOP-302-T, Analyzed by ICP-OES, UV-VIS, GC-MS, HPLC-DAD/MS and Colorimetric Method.

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(SVHC)

Test Result: (Substances in the Candidate List of SVHC)

Batch	Substance Name	CAS No.	001 Concentration (%)	RL (%)
-	All tested SVHC in candidate list	-	ND	-

Test Result: (Potential SVHC)

Batch	Substance Name	CAS No.	001 Concentration (%)	RL (%)
-	All tested Potential SVHC	-	ND	-

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Notes :

(1)The table above only shows detected SVHC, and SVHC that below RL are not reported. Please refer to Appendix for the full list of tested SVHC.

(2) RL = Reporting Limit (Test data will be shown if it ≥ RL. RL is not regulatory limit.)
ND = Not detected (lower than RL), ND is denoted on the SVHC substance.

(3) * The test result is based on the calculation of selected element(s) and to the worst-case scenario.
** The test result is based on the calculation of selected marker(s) and to the worst-case scenario.
Calculated concentration of boric compounds are based on water extractive boron detected by ICP-OES.
RL = 0.005% is evaluated for element (i.e. cobalt, arsenic, lead, chromium (VI), aluminum, zirconium, boron, strontium, zinc, antimony, titanium, barium, cadmium respectively), except molybdenum RL=0.0005%, boron RL=0.0025% (only for Lead bis(tetrafluoroborate)).

(4) § The substance is proposed for the identification as SVHC only where it contains Michler's ketone (CAS Number: 90-94-8) or Michler's base (CAS Number: 101-61-1) ≥0.1% (w/w).

(5) / = Potential SVHC

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
I	1	4,4' -Diaminodiphenylmethane(MDA)	101-77-9	0.050
I	2	5-tert-butyl-2,4,6-trinitro-m-xylene (musk xylene)	81-15-2	0.050
I	3	Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins)	85535-84-8	0.050
I	4	Anthracene	120-12-7	0.050
I	5	Benzyl butyl phthalate (BBP)	85-68-7	0.050
I	6	Bis (2-ethylhexyl)phthalate (DEHP)	117-81-7	0.050
I	7	Bis(tributyltin)oxide (TBTO)	56-35-9	0.050
I	8	Cobalt dichloride*	7646-79-9	0.005
I	9	Diarsenic pentaoxide*	1303-28-2	0.005
I	10	Diarsenic trioxide*	1327-53-3	0.005
I	11	Dibutyl phthalate (DBP)	84-74-2	0.050
I	12	Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α-HBCDD, β-HBCDD, γ-HBCDD)	-	0.050
I	13	Lead hydrogen arsenate*	7784-40-9	0.005
I	14	Sodium dichromate*	7789-12-0, 10588-01-9	0.005
I	15	Triethyl arsenate*	15606-95-8	0.005
II	16	2,4-Dinitrotoluene	121-14-2	0.050
II	17	Acrylamide	79-06-1	0.050
II	18	Anthracene oil**	90640-80-5	0.050
II	19	Anthracene oil, anthracene paste**	90640-81-6	0.050
II	20	Anthracene oil, anthracene paste, anthracene fraction**	91995-15-2	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
II	21	Anthracene oil, anthracene paste, distn. lights**	91995-17-4	0.050
II	22	Anthracene oil, anthracene-low**	90640-82-7	0.050
II	23	Diisobutyl phthalate	84-69-5	0.050
II	24	Lead chromate molybdate sulphate red (C.I. Pigment Red 104)*	12656-85-8	0.005
II	25	Lead chromate*	7758-97-6	0.005
II	26	Lead sulfochromate yellow (C.I. Pigment Yellow 34)*	1344-37-2	0.005
II	27	Pitch, coal tar, high temp.**	65996-93-2	0.050
II	28	Tris(2-chloroethyl)phosphate	115-96-8	0.050
III	29	Ammonium dichromate*	7789-09-5	0.005
III	30	Boric acid*	-	0.005
III	31	Disodium tetraborate, anhydrous*	1303-96-4, 1330-43-4, 12179-04-3	0.005
III	32	Potassium chromate*	7789-00-6	0.005
III	33	Potassium dichromate*	7778-50-9	0.005
III	34	Sodium chromate*	7775-11-3	0.005
III	35	Tetraboron disodium heptaoxide, hydrate*	12267-73-1	0.005
III	36	Trichloroethylene	79-01-6	0.050
IV	37	2-Ethoxyethanol	110-80-5	0.050
IV	38	2-Methoxyethanol	109-86-4	0.050
IV	39	Chromic acid, Oligomers of chromic acid and dichromic acid, Dichromic acid*	-	0.005

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
IV	40	Chromium trioxide*	1333-82-0	0.005
IV	41	Cobalt(II) carbonate*	513-79-1	0.005
IV	42	Cobalt(II) diacetate*	71-48-7	0.005
IV	43	Cobalt(II) dinitrate*	10141-05-6	0.005
IV	44	Cobalt(II) sulphate*	10124-43-3	0.005
V	45	1,2,3-trichloropropane	96-18-4	0.050
V	46	1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich	71888-89-6	0.050
V	47	1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters	68515-42-4	0.050
V	48	1-methyl-2-pyrrolidone	872-50-4	0.050
V	49	2-ethoxyethyl acetate	111-15-9	0.050
V	50	Hydrazine	7803-57-8, 302-01-2	0.050
V	51	Strontium chromate*	7789-06-2	0.005
VI	52	1,2-Dichloroethane	107-06-2	0.050
VI	53	2,2'-dichloro-4,4'-methylenedianiline	101-14-4	0.050
VI	54	2-Methoxyaniline; o-Anisidine	90-04-0	0.050
VI	55	4-(1,1,3,3-tetramethylbutyl)phenol	140-66-9	0.050
VI	56	Aluminosilicate Refractory Ceramic Fibres*	-	0.005
VI	57	Arsenic acid*	7778-39-4	0.005
VI	58	Bis(2-methoxyethyl) ether	111-96-6	0.050
VI	59	Bis(2-methoxyethyl) phthalate	117-82-8	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VI	60	Calcium arsenate*	7778-44-1	0.005
VI	61	Dichromium tris(chromate) *	24613-89-6	0.005
VI	62	Formaldehyde, oligomeric reaction products with aniline	25214-70-4	0.050
VI	63	Lead diazide, Lead azide*	13424-46-9	0.005
VI	64	Lead dipicrate*	6477-64-1	0.005
VI	65	Lead styphnate*	15245-44-0	0.005
VI	66	N,N-dimethylacetamide	127-19-5	0.050
VI	67	Pentazinc chromate octahydroxide*	49663-84-5	0.005
VI	68	Phenolphthalein	77-09-8	0.050
VI	69	Potassium hydroxyoctaoxodizincatedichromate*	11103-86-9	0.005
VI	70	Trilead diarsenate*	3687-31-8	0.005
VI	71	Zirconia Aluminosilicate Refractory Ceramic Fibres*	-	0.005
VII	72	[4-[[4-anilino-1-naphthyl][4-(dimethylamino)phenyl]methylene]cyclohexa-2,5-dien-1-ylidene] dimethylammonium chloride (C.I. Basic Blue 26)§	2580-56-5	0.050
VII	73	[4-[4,4'-bis(dimethylamino) benzhydrylidene]cyclohexa-2,5-dien-1-ylidene]dimethylammonium chloride (C.I. Basic Violet 3)§	548-62-9	0.050
VII	74	1,2-bis(2-methoxyethoxy)ethane (TEGDME; triglyme)	112-49-2	0.050
VII	75	1,2-dimethoxyethane; ethylene glycol dimethyl ether (EGDME)	110-71-4	0.050
VII	76	4,4'-bis(dimethylamino) benzophenone (Michler's Ketone)	90-94-8	0.050
VII	77	4,4'-bis(dimethylamino)-4''-(methylamino)trityl alcohol§	561-41-1	0.050
VII	78	Diboron trioxide*	1303-86-2	0.005

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Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VII	79	Formamide	75-12-7	0.050
VII	80	Lead(II) bis(methanesulfonate)*	17570-76-2	0.005
VII	81	N,N,N',N'-tetramethyl-4,4'-methylenedianiline (Michler's base)	101-61-1	0.050
VII	82	TGIC (1,3,5-tris (oxiranylmethyl) -1,3,5-triazine-2,4,6(1H,3H,5H)-trione)	2451-62-9	0.050
VII	83	α,α-Bis[4-(dimethylamino)phenyl]-4 (phenylamino)naphthalene-1-methanol (C.I. Solvent Blue 4) §	6786-83-0	0.050
VII	84	β-TGIC (1,3,5-tris[(2S and 2R)-2,3-epoxypropyl]-1,3,5-triazine-2,4,6-(1H,3H,5H)-trione)	59653-74-6	0.050
VIII	85	[Phthalato(2-)]dioxotrilead*	69011-06-9	0.005
VIII	86	1,2-Benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0	0.050
VIII	87	1,2-Diethoxyethane	629-14-1	0.050
VIII	88	1-Bromopropane	106-94-5	0.050
VIII	89	3-Ethyl-2-methyl-2-(3-methylbutyl)-1,3-oxazolidine	143860-04-2	0.050
VIII	90	4-(1,1,3,3-tetramethylbutyl)phenol, ethoxylated	-	0.050
VIII	91	4,4'-Methylenedi-o-toluidine	838-88-0	0.050
VIII	92	4,4'-Oxydianiline and its salts	101-80-4	0.050
VIII	93	4-Aminoazobenzene	60-09-3	0.050
VIII	94	4-Methyl-m-phenylenediamine	95-80-7	0.050
VIII	95	4-Nonylphenol, branched and linear	-	0.050
VIII	96	6-Methoxy-m-toluidine	120-71-8	0.050
VIII	97	Acetic acid, lead salt, basic*	51404-69-4	0.005

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Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VIII	98	Biphenyl-4-ylamine	92-67-1	0.050
VIII	99	Bis(pentabromophenyl) ether (DecaBDE)	1163-19-5	0.050
VIII	100	Cyclohexane-1,2-dicarboxylic anhydride, cis-cyclohexane-1,2-dicarboxylic anhydride, trans-cyclohexane-1,2-dicarboxylic anhydride	-	0.050
VIII	101	Diazene-1,2-dicarboxamide (C,C'-azodi(formamide))	123-77-3	0.050
VIII	102	Dibutyltin dichloride (DBTC)	683-18-1	0.050
VIII	103	Diethyl sulphate	64-67-5	0.050
VIII	104	Diisopentylphthalate	605-50-5	0.050
VIII	105	Dimethyl sulphate	77-78-1	0.050
VIII	106	Dinoseb	88-85-7	0.050
VIII	107	Dioxobis(stearato)trilead*	12578-12-0	0.005
VIII	108	Fatty acids, C16-18, lead salts*	91031-62-8	0.005
VIII	109	Furan	110-00-9	0.050
VIII	110	Henicosafluoroundecanoic acid	2058-94-8	0.050
VIII	111	Heptacosafluorotetradecanoic acid	376-06-7	0.050
VIII	112	Hexahydromethylphathalic anhydride, Hexahydro-4-methylphathalic anhydride, Hexahydro-1-methylphathalic anhydride, Hexahydro-3-methylphathalic anhydride	-	0.050
VIII	113	Lead bis(tetrafluoroborate)*	13814-96-5	0.005
VIII	114	Lead cyanamidate*	20837-86-9	0.005
VIII	115	Lead dinitrate*	10099-74-8	0.005
VIII	116	Lead monoxide*	1317-36-8	0.005

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Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VIII	117	Lead oxide sulfate*	12036-76-9	0.005
VIII	118	Lead tetroxide (orange lead)*	1314-41-6	0.005
VIII	119	Lead titanium trioxide*	12060-00-3	0.005
VIII	120	Lead titanium zirconium oxide*	12626-81-2	0.005
VIII	121	Methoxyacetic acid	625-45-6	0.050
VIII	122	Methyloxirane (Propylene oxide)	75-56-9	0.050
VIII	123	N,N-dimethylformamide	68-12-2	0.050
VIII	124	N-Methylacetamide	79-16-3	0.050
VIII	125	N-Pentyl-isopentylphthalate	776297-69-9	0.050
VIII	126	o-Aminoazotoluene	97-56-3	0.050
VIII	127	o-Toluidine	95-53-4	0.050
VIII	128	Pentacosafluorotridecanoic acid	72629-94-8	0.050
VIII	129	Pentalead tetraoxide sulphate*	12065-90-6	0.005
VIII	130	Pyrochlore, antimony lead yellow*	8012-00-8	0.005
VIII	131	Silicic acid, barium salt, lead-doped*	68784-75-8	0.005
VIII	132	Silicic acid, lead salt*	11120-22-2	0.005
VIII	133	Sulfurous acid, lead salt, dibasic*	62229-08-7	0.005
VIII	134	Tetraethyllead*	78-00-2	0.005
VIII	135	Tetralead trioxide sulphate*	12202-17-4	0.005
VIII	136	Tricosafluorododecanoic acid	307-55-1	0.050

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Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
VIII	137	Trilead bis(carbonate)dihydroxide (basic lead carbonate)*	1319-46-6	0.005
VIII	138	Trilead dioxide phosphonate*	12141-20-7	0.005
IX	139	4-Nonylphenol, branched and linear, ethoxylated	-	0.050
IX	140	Ammonium pentadecafluorooctanoate (APFO)**	3825-26-1	0.050
IX	141	Cadmium oxide*	1306-19-0	0.005
IX	142	Cadmium	7440-43-9	0.005
IX	143	Dipentyl phthalate (DPP)	131-18-0	0.050
IX	144	Pentadecafluorooctanoic acid (PFOA)	335-67-1	0.050
X	145	Cadmium sulphide*	1306-23-6	0.005
X	146	Dihexyl phthalate	84-75-3	0.050
X	147	Disodium 3,3'-[[1,1'-biphenyl] -4,4'-diylbis (azo)] bis(4-aminonaphthalene- 1-sulphonate) (C.I. Direct Red 28)	573-58-0	0.050
X	148	Disodium 4-amino-3-[[4'-[(2,4-diaminophenyl) azo] [1,1'-biphenyl]-4-yl] azo] -5-hydroxy-6-(phenylazo) naphthalene-2,7-disulphonate (C.I. Direct Black 38)	1937-37-7	0.050
X	149	Imidazolidine-2-thione; (2-imidazoline-2-thiol)	96-45-7	0.050
X	150	Lead di(acetate)*	301-04-2	0.005
X	151	Trixylyl phosphate	25155-23-1	0.050
XI	152	1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4	0.050

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Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XI	153	Cadmium chloride*	10108-64-2	0.005
XI	154	Sodium perborate; perboric acid, sodium salt*	-	0.005
XI	155	Sodium peroxometaborate*	7632-04-4	0.005
XII	156	2- (2H-benzotriazol-2-yl) -4,6-ditertpentylphenol (UV-328)	25973-55-1	0.050
XII	157	2-benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320)	3846-71-7	0.050
XII	158	2-ethylhexyl 10-ethyl-4,4-dioctyl- 7-oxo-8-oxa-3,5-dithia- 4-stannatetradecanoate (DOTE)	15571-58-1	0.050
XII	159	Cadmium fluoride*	7790-79-6	0.005
XII	160	Cadmium sulphate*	10124-36-4,31119-53-6	0.005
XII	161	Reaction mass of 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate & 2-ethylhexyl 10-ethyl-4-[[2-[(2-ethylhexyl)oxy]-2-oxoethyl]thio]-4-octyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (reaction mass of DOTE & MOTE)	-	0.050
XIII	162	1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters; 1,2-benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters with ≥ 0.3% of dihexyl phthalate	-	0.050
XIII	163	5-sec-butyl-2-(2,4-dimethylcyclohex-3-en-1-yl)-5-methyl-1,3-dioxane [1], 5-sec-butyl-2-(4,6-dimethylcyclohex-3-en-1-yl)-5-methyl-1,3-dioxane [2] [covering any of the individual isomers of [1] and [2] or any combination thereof]	-	0.050
XIV	164	1,3-propanesultone	1120-71-4	0.050
XIV	165	2,4-di-tert-butyl-6-(5-chlorobenzotriazol-2-yl) phenol (UV-327)	3864-99-1	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XIV	166	2-(2H-benzotriazol-2-yl)-4-(tert-butyl)-6-(sec-butyl)phenol (UV-350)	36437-37-3	0.050
XIV	167	Nitrobenzene	98-95-3	0.050
XIV	168	Perfluorononan-1-oic-acid and its sodium and ammonium salts	-	0.050
XV	169	Benzo[def]chrysene (Benzo[a]pyrene)	50-32-8	0.050
XVI	170	4,4'-isopropylidenediphenol (bisphenol A)	80-05-7	0.050
XVI	171	4-Heptylphenol, branched and linear	-	0.050
XVI	172	Nonadecafluorodecanoic acid (PFDA) and its sodium and ammonium salts	-	0.050
XVI	173	p-(1,1-dimethylpropyl)phenol	80-46-6	0.050
XVII	174	Perfluorohexane-1-sulphonic acid and its salts	-	0.050
XVIII	175	1,6,7,8,9,14,15,16,17,17,18,18-Dodecachloropentacyclo[12.2.1.16,9.02,13.05,10]octadeca-7,15-diene ("Dechlorane Plus"™) [covering any of its individual anti- and syn-isomers or any combination thereof]	-	0.050
XVIII	176	Benz[a]anthracene	56-55-3	0.050
XVIII	177	Cadmium nitrate*	10325-94-7	0.005
XVIII	178	Cadmium carbonate*	513-78-0	0.005
XVIII	179	Cadmium hydroxide*	21041-95-2	0.005
XVIII	180	Chrysene	218-01-9	0.050
XVIII	181	Reaction products of 1,3,4-thiadiazolidine-2,5-dithione, formaldehyde and 4-heptylphenol, branched and linear (RP-HP) [with ≥0.1% w/w 4-heptylphenol, branched and linear]	-	0.050
XIX	182	Benzene-1,2,4-tricarboxylic acid 1,2-anhydride (trimellitic anhydride)	552-30-7	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XIX	183	Benzo[ghi]perylene	191-24-2	0.050
XIX	184	Decamethylcyclopentasiloxane (D5)	541-02-6	0.050
XIX	185	Dicyclohexyl phthalate (DCHP)	84-61-7	0.050
XIX	186	Disodium octaborate*	12008-41-2	0.005
XIX	187	Dodecamethylcyclohexasiloxane (D6)	540-97-6	0.050
XIX	188	Ethylenediamine (EDA)	107-15-3	0.050
XIX	189	Lead	7439-92-1	0.005
XIX	190	Octamethylcyclotetrasiloxane (D4)	556-67-2	0.050
XIX	191	Terphenyl, hydrogenated	61788-32-7	0.050
XX	192	1,7,7-trimethyl-3-(phenylmethylene)bicyclo [2.2.1]heptan-2-one (3-benzylidene camphor)	15087-24-8	0.050
XX	193	2,2-bis(4'-hydroxyphenyl)-4-methylpentane	6807-17-6	0.050
XX	194	Benzo[k]fluoranthene	207-08-9	0.050
XX	195	Fluoranthene	206-44-0	0.050
XX	196	Phenanthrene	85-01-8	0.050
XX	197	Pyrene	129-00-0	0.050
XXI	198	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propionic acid, its salts and its acyl halides (covering any of their individual isomers and combinations thereof)	-	0.050
XXI	199	2-methoxyethyl acetate	110-49-6	0.050
XXI	200	4-tert-butylphenol (PTBP)	98-54-4	0.050

检验检测专用章 Inspection & Testing Services

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XXI	201	Tris(4-nonylphenyl, branched and linear) phosphite (TNPP) with ≥ 0.1% w/w of 4-nonylphenol, branched and linear (4-NP)	-	0.050
XXII	202	2-benzyl-2-dimethylamino-4'-morpholinobutyrophenone	119313-12-1	0.050
XXII	203	2-methyl-1-(4-methylthiophenyl)-2-morpholinopropan-1-one	71868-10-5	0.050
XXII	204	Diisohexyl phthalate	71850-09-4	0.050
XXII	205	Perfluorobutane sulfonic acid (PFBS) and its salts	-	0.050
XXIII	206	1-vinylimidazole	1072-63-5	0.050
XXIII	207	2-methylimidazole	693-98-1	0.050
XXIII	208	Butyl 4-hydroxybenzoate	94-26-8	0.050
XXIII	209	Dibutylbis(pentane-2,4-dionato-O,O') tin**	22673-19-4	0.050
XXIV	210	bis(2-(2-methoxyethoxy)ethyl) ether	143-24-8	0.050
XXIV	211	Dioctyltin dilaurate, stannane, dioctyl-, bis(coco acyloxy) derivs., and any other stannane, dioctyl-, bis(fatty acyloxy) derivs. wherein C12 is the predominant carbon number of the fatty acyloxy moiety**	-	0.050
XXV	212	1,4-dioxane	123-91-1	0.050
XXV	213	2,2-bis(bromomethyl)propane1,3-diol (BMP); 2,2-dimethylpropan-1-ol, tribromo derivative/3-bromo-2,2-bis(bromomethyl)-1-propanol (TBNPA); 2,3-dibromo-1-propanol (2,3-DBPA)	-	0.050
XXV	214	2-(4-tert-butylbenzyl)propionaldehyde and its individual stereoisomers	-	0.050
XXV	215	4,4'-(1-methylpropylidene)bisphenol (bisphenol B)	77-40-7	0.050
XXV	216	Glutaral	111-30-8	0.050

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Appendix

Full list of tested SVHC:

Batch	No.	Substance Name	CAS No.	RL (%)
XXV	217	Medium-chain chlorinated paraffins (MCCP) [UVCB substances consisting of more than or equal to 80% linear chloroalkanes with carbon chain lengths within the range from C14 to C17]	-	0.050
XXV	218	Orthoboric acid, sodium salt*	13840-56-7	0.005
XXV	219	Phenol, alkylation products (mainly in para position) with C12-rich branched alkyl chains from oligomerisation, covering any individual isomers and/ or combinations thereof (PDDP)	-	0.050
/	220	Resorcinol	108-46-3	0.050
/	221	(±)-1,7,7-trimethyl-3-[(4-methylphenyl)methylene]bicyclo[2.2.1]heptan-2-one covering any of the individual isomers and/or combinations thereof (4-MBC)	-	0.050
/	222	6,6'-di-tert-butyl-2,2'-methylenedi-p-cresol (DBMC)	119-47-1	0.050
/	223	S-(tricyclo[5.2.1.0'2,6]deca-3-en-8(or 9)-yl) O-(isopropyl or isobutyl or 2-ethylhexyl) O-(isopropyl or isobutyl or 2-ethylhexyl) phosphorodithioate	255881-94-8	0.050
/	224	Tris(2-methoxyethoxy)vinylsilane	1067-53-4	0.050

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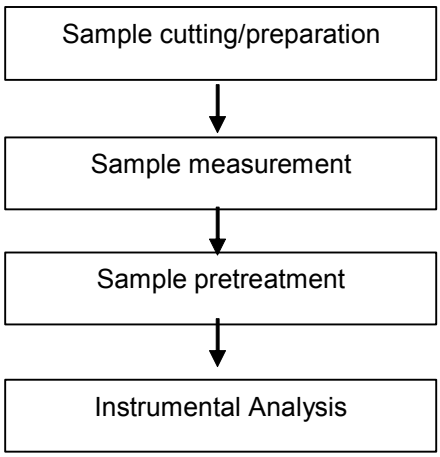
ATTACHMENTS

SVHC Testing Flow Chart



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测试报告 (SVHC)

No. SHAEC2126527602　　日期: 2021年12月10日　第1页,共19页

广德众泰科技有限公司
中国安徽省广德经济开发区PCB产业园7号楼

以下测试之样品是由申请者所提供及确认 : PCB无铅板

SGS工作编号 :	SP21-036661 - SH
样品接收日期 :	2021年12月03日
测试周期 :	2021年12月03日 - 2021年12月10日
测试要求 :	根据客户要求， (i) 基于欧洲化学品管理署截止2021年7月8日公布的供授权审议的高关注物质候选清单(根据欧盟第1907/2006号REACH法规)，对219种高关注物质(SVHC)进行筛分测试。 (ii) 基于WTO 2021年6月1日的通知，对1种潜在的高关注物质(SVHC)进行筛分测试。 (iii) 基于欧洲化学品管理署截止2021年9月3日公布的潜在的高关注物质咨询清单(根据欧盟第1907/2006号REACH法规)，对4种高关注物质(SVHC)进行筛分测试。
测试结果 :	请参见下一页

总结 :

根据具体的范围和筛分测试，所提交样品中SVHC测试结果≤ 0.1% (w/w)。	通过

通标标准技术服务（上海）有限公司
授权签名

scan to see the report

A35FB025

Annie Liu刘盈妹
批准签署人

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备注：

1. 本报告所涉及的关于特定高关注物质的化学分析是根据欧洲化学品管理署发布的下列文件，利用现有的分析技术完成的。
   http://echa.europa.eu/web/guest/candidate-list-table
   这些文件清单由欧洲化学品管理署评估, 将来可能会有变化。
2. REACH法规义务：
   2.1关于物品：
   告知：
   欧盟第1907/2006（EC）号法规第33条规定，含有满足第57条中的标准并根据第59条第一款被确定且质量分数大于0.1%的物质的物品的所有供应商应向物品接受者提供其可获取的充足信息，以使物品使用安全，这些信息至少包括含有的候选清单中物质的名称。

   通报：
   根据欧盟第1907/2006（EC）号法规，如果满足以下两个条件，如果物质符合第57条中的标准并根据第59条第一款被确定，物品的任何欧洲制造商或进口商应根据第7条第4款向欧盟化学品管理署进行通报：(a) 候选清单中的物质在物品中的总含量超过1吨/年/生产商或进口商；(b) 候选清单中的物质在物品中的总含量以质量分数计超过0.1% 的浓度。

   SGS采用欧盟法院对REACH物品定义的裁定，除非另有说明。详细的解释请见下列网址：
   http://www.sgs.com/-/media/global/documents/technical-documents/technical-bulletins/sgs-crs-position-statement-on-svhc-in-articles-a4-en-16-06.pdf?la=en

   2.2 关于材料：
   报告中的测试结果是基于测试样品。如样品是均一材质，当其构成成品时，此结果不能代表成品中的SVHC浓度。如样品为均一材质等比例合测，这些材质也可能来自不同的物品。

   如果样品是一种物质或混合物，并且直接出口到欧盟，客户有责任遵守欧盟第1907/2006号REACH法规第31 条供应链信息传递的义务和附件十四中的授权高关注物质授权的责任。

   2.3 关于物质和配制品：
   如果样品中高关注物质的浓度超过0.1% (w/w)和/或欧盟第1272/2008号CLP法规及其修订中设定的特殊浓度限值，建议客户根据欧盟第1907/2006号REACH法规对有关高关注物质准备安全数据表(SDS)以符合供应链通信的义务，如
   -根据欧盟第1272/2008号CLP法规被列为有害物质。
   -根据欧盟第1272/2008号CLP法规被列为有害混合物，而当中物质的浓度大于或等于欧盟第1272/2008号CLP法规列出的浓度限值;或
   -根据欧盟第1272/2008号CLP法规并未列为有害混合物，但包含：
   (a) 对人类健康或环境有害的物质，而在固体或液体混合物（即非气体混合物）中其浓度≥1%(w/w)或在气体混合物中占体积≥0.2%，或
   (b) PBT或vPvB物质，在固体或液体混合物（即非气体混合物）中个别浓度≥0.1%(w/w)，或
   (c) 授权审议的高关注物质候选清单上的物质（除上述以外的原因）在个别非气体混合物中的浓度≥0.1%(w/w)，或

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(d) 设有欧洲范围内工作场所接触限值的物质。

3. 如果样品中SVHC的测试结果超过报告限，建议客户进一步定量分析检测含有SVHC的组分并且得到SVHC物质的准确浓度。

测试样品：

测试样品描述：

样品编号	SGS样品ID	描述
SN1	SHA21-265276.001	绿色线路板

测试方法：

SGS内部方法-SHTC-CHEM-SOP-97-T, SHTC-CHEM-SOP-302-T ， 采用ICP-OES、UV-VIS、GC-MS、HPLC-DAD/MS和比色法分析。

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(SVHC)

测试结果: (SVHC候选清单中的高关注物质)

批次	物质名称	CAS No.	001 浓度 (%)	RL (%)
-	所有测试的候选清单中的SVHC	-	ND	-

测试结果：(潜在的SVHC)

批次	物质名称	CAS No.	001 浓度 (%)	RL (%)
-	所有测试的潜在的SVHC	-	ND	-

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注释：

(1) 上表仅显示检出的SVHC，低于RL的SVHC没有列出。所有测试的SVHC请参见附录。
(2) RL = 报告限(当测试结果 ≥ RL时显示数据。RL不同于法规限值。)
ND = 未检出(< RL)，ND针对SVHC物质。
(3) *测试结果是由选定的元素的结果并基于最坏的情况计算得出；
** 测试结果是由选定的标记物的结果并基于最坏的情况计算得出。
硼化合物的结果由ICP-OES测试的水提取硼元素结果换算得出。
RL = 0.005% 是针对元素 (例如钴、砷 、铅 、铬 (VI) 、铝、锆、硼、锶、锌、锑、钛、钡、镉)，除了钼的RL= 0.0005%，硼的RL= 0.0025%(仅对四氟硼酸铅)。
(4) § 只有当物质包含米氏酮(CAS No.: 90-94-8) 或米氏碱(CAS No.: 101-61-1) 的浓度≥ 0.1%(w / w) 的情况下，该物质才被提议定为SVHC
(5) / = 潜在的SVHC
除非另有说明，此报告结果仅对测试的样品负责。本报告未经本公司书面许可，不可部分复制。
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所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
I	1	4,4'-二氨基二苯甲烷(MDA)	101-77-9	0.050
I	2	2,4,6-三硝基-5-叔丁基间二甲苯(二甲苯麝香)	81-15-2	0.050
I	3	C10-13 氯代烃(短链氯化石蜡)	85535-84-8	0.050
I	4	蒽	120-12-7	0.050
I	5	邻苯二甲酸丁苄酯(BBP)	85-68-7	0.050
I	6	邻苯二甲酸二(2-乙基己基)酯(DEHP)	117-81-7	0.050
I	7	氧化双三丁基锡(TBTO)	56-35-9	0.050
I	8	二氯化钴*	7646-79-9	0.005
I	9	五氧化二砷*	1303-28-2	0.005
I	10	三氧化二砷*	1327-53-3	0.005
I	11	邻苯二甲酸二丁酯(DBP)	84-74-2	0.050
I	12	六溴环十二烷(HBCDD) 及其非对映异构体(α-HBCDD, β-HBCDD, γ-HBCDD)	-	0.050
I	13	砷酸氢铅*	7784-40-9	0.005
I	14	重铬酸钠*	7789-12-0, 10588-01-9	0.005
I	15	三乙基砷酸酯*	15606-95-8	0.005
II	16	2,4-二硝基甲苯	121-14-2	0.050
II	17	丙烯酰胺	79-06-1	0.050
II	18	蒽油**	90640-80-5	0.050
II	19	蒽油，蒽糊**	90640-81-6	0.050
II	20	蒽油，蒽糊，蒽馏分**	91995-15-2	0.050

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批次	序号	物质名称	CAS No.	RL (%)
II	21	蒽油，蒽糊，轻油**	91995-17-4	0.050
II	22	蒽油，含蒽量少**	90640-82-7	0.050
II	23	邻苯二甲酸二异丁酯	84-69-5	0.050
II	24	钼铬红(C.I.颜料红104)*	12656-85-8	0.005
II	25	铬酸铅*	7758-97-6	0.005
II	26	铅铬黄(C.I.颜料黄34)*	1344-37-2	0.005
II	27	沥青，煤焦油，高温**	65996-93-2	0.050
II	28	磷酸三(2-氯乙基)酯	115-96-8	0.050
III	29	重铬酸铵*	7789-09-5	0.005
III	30	硼酸*	-	0.005
III	31	无水四硼酸钠*	1303-96-4, 1330-43-4, 12179-04-3	0.005
III	32	铬酸钾*	7789-00-6	0.005
III	33	重铬酸钾*	7778-50-9	0.005
III	34	铬酸钠*	7775-11-3	0.005
III	35	水合硼酸钠*	12267-73-1	0.005
III	36	三氯乙烯	79-01-6	0.050
IV	37	乙二醇乙醚	110-80-5	0.050
IV	38	乙二醇单甲醚	109-86-4	0.050
IV	39	铬酸, 铬酸及重铬酸低聚物, 重铬酸*	-	0.005

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批次	序号	物质名称	CAS No.	RL (%)
IV	40	三氧化铬*	1333-82-0	0.005
IV	41	碳酸钴*	513-79-1	0.005
IV	42	乙酸钴*	71-48-7	0.005
IV	43	硝酸钴*	10141-05-6	0.005
IV	44	硫酸钴*	10124-43-3	0.005
V	45	1,2,3-三氯丙烷	96-18-4	0.050
V	46	1,2-苯二酸-二(C6-8支链)烷基酯(富C7)	71888-89-6	0.050
V	47	1,2-苯二酸-二(C7-11支链与直链)烷基(醇)酯	68515-42-4	0.050
V	48	1-甲基-2-吡咯烷酮	872-50-4	0.050
V	49	乙二醇乙醚醋酸酯	111-15-9	0.050
V	50	联氨	7803-57-8, 302-01-2	0.050
V	51	铬酸锶*	7789-06-2	0.005
VI	52	1,2-二氯乙烷	107-06-2	0.050
VI	53	4,4'-二氨基-3,3'-二氯二苯甲烷	101-14-4	0.050
VI	54	2-甲氧基苯胺	90-04-0	0.050
VI	55	对特辛基苯酚	140-66-9	0.050
VI	56	硅酸铝耐火陶瓷纤维*	-	0.005
VI	57	砷酸*	7778-39-4	0.005
VI	58	二乙二醇二甲醚	111-96-6	0.050
VI	59	邻苯二甲酸二甲氧基乙酯	117-82-8	0.050

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批次	序号	物质名称	CAS No.	RL (%)
VI	60	砷酸钙*	7778-44-1	0.005
VI	61	铬酸铬*	24613-89-6	0.005
VI	62	甲醛与苯胺的低聚物	25214-70-4	0.050
VI	63	叠氮化铅*	13424-46-9	0.005
VI	64	苦味酸铅*	6477-64-1	0.005
VI	65	史蒂芬酸铅*	15245-44-0	0.005
VI	66	N,N-二甲基乙酰胺	127-19-5	0.050
VI	67	氢氧化铬酸锌*	49663-84-5	0.005
VI	68	酚酞	77-09-8	0.050
VI	69	氢氧化铬酸锌钾*	11103-86-9	0.005
VI	70	砷酸铅*	3687-31-8	0.005
VI	71	氧化锆硅酸铝耐火陶瓷纤维*	-	0.005
VII	72	C.I.碱性蓝26§	2580-56-5	0.050
VII	73	C.I.碱性紫3§	548-62-9	0.050
VII	74	三乙二醇二甲醚(TEGDME)	112-49-2	0.050
VII	75	乙二醇二甲醚(EGDME)	110-71-4	0.050
VII	76	4,4'-二(二甲氨基)二苯甲酮(米氏酮)	90-94-8	0.050
VII	77	4,4'-二(二甲氨基)-4''-甲氨基三苯甲醇§	561-41-1	0.050
VII	78	三氧化二硼*	1303-86-2	0.005
VII	79	甲酰胺	75-12-7	0.050
VII	80	甲基磺酸铅*	17570-76-2	0.005

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所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
VII	81	N,N,N',N'-四甲基-4,4'-二氨基二苯甲烷(米氏碱)	101-61-1	0.050
VII	82	1,3,5-三(环氧乙基甲基)-1,3,5-三嗪-2,4,6-(1H, 3H,5H)-三酮(TGIC)	2451-62-9	0.050
VII	83	C.I.溶剂蓝4§	6786-83-0	0.050
VII	84	1,3,5-三-[(2S和2R)-2,3-环氧丙基]-1,3,5-三嗪-2,4,6-(1H, 3H, 5H)-三酮(β-TGIC)	59653-74-6	0.050
VIII	85	二盐基邻苯二甲酸铅*	69011-06-9	0.005
VIII	86	1,2-苯二酸-二(支链与直链)戊基酯	84777-06-0	0.050
VIII	87	乙二醇二乙醚	629-14-1	0.050
VIII	88	1-溴丙烷	106-94-5	0.050
VIII	89	3-乙基-2-甲基-2-(3-甲基丁基)-1,3-恶唑烷	143860-04-2	0.050
VIII	90	对特辛基苯酚乙氧基醚	-	0.050
VIII	91	4,4'-二氨基-3,3'-二甲基二苯甲烷	838-88-0	0.050
VIII	92	4,4'-二氨基二苯醚及其盐	101-80-4	0.050
VIII	93	4-氨基偶氮苯	60-09-3	0.050
VIII	94	2,4-二氨基甲苯	95-80-7	0.050
VIII	95	4-壬基(支链与直链)苯酚	-	0.050
VIII	96	2-甲氧基-5-甲基苯胺	120-71-8	0.050
VIII	97	碱式乙酸铅*	51404-69-4	0.005
VIII	98	4-氨基联苯	92-67-1	0.050
VIII	99	十溴二苯醚(DecaBDE)	1163-19-5	0.050
VIII	100	环己烷-1,2-二羧酸酐,顺式-环己烷-1,2-二羧酸酐,反式-环己烷-1,2-二羧酸酐	-	0.050

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(SVHC)

附录

所有测试的SVHC:

批次	序号	物质名称	CAS No.	RL (%)
VIII	101	偶氮二甲酰胺	123-77-3	0.050
VIII	102	二丁基二氯化锡(DBTC)	683-18-1	0.050
VIII	103	硫酸二乙酯	64-67-5	0.050
VIII	104	邻苯二甲酸二异戊酯	605-50-5	0.050
VIII	105	硫酸二甲酯	77-78-1	0.050
VIII	106	地乐酚	88-85-7	0.050
VIII	107	双(十八酸基)二氧代三铅*	12578-12-0	0.005
VIII	108	C16-18-脂肪酸铅*	91031-62-8	0.005
VIII	109	呋喃	110-00-9	0.050
VIII	110	全氟十一烷酸	2058-94-8	0.050
VIII	111	全氟十四烷酸	376-06-7	0.050
VIII	112	甲基六氢邻苯二甲酸酐,4-甲基六氢邻苯二甲酸酐,1-甲基六氢邻苯二甲酸酐,3-甲基六氢邻苯二甲酸酐	-	0.050
VIII	113	四氟硼酸铅*	13814-96-5	0.005
VIII	114	氨基氰铅盐*	20837-86-9	0.005
VIII	115	硝酸铅*	10099-74-8	0.005
VIII	116	一氧化铅*	1317-36-8	0.005
VIII	117	碱式硫酸铅*	12036-76-9	0.005
VIII	118	四氧化三铅*	1314-41-6	0.005
VIII	119	钛酸铅*	12060-00-3	0.005
VIII	120	钛酸铅锆*	12626-81-2	0.005

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批次	序号	物质名称	CAS No.	RL (%)
VIII	121	甲氧基乙酸	625-45-6	0.050
VIII	122	1,2-环氧丙烷	75-56-9	0.050
VIII	123	N,N-二甲基甲酰胺	68-12-2	0.050
VIII	124	N-甲基乙酰胺	79-16-3	0.050
VIII	125	邻苯二甲酸正戊基异戊基酯	776297-69-9	0.050
VIII	126	邻-氨基偶氮甲苯	97-56-3	0.050
VIII	127	2-氨基甲苯	95-53-4	0.050
VIII	128	全氟十三烷酸	72629-94-8	0.050
VIII	129	硫酸四氧化五铅*	12065-90-6	0.005
VIII	130	铅锑黄*	8012-00-8	0.005
VIII	131	掺杂铅的硅酸钡*	68784-75-8	0.005
VIII	132	硅酸铅*	11120-22-2	0.005
VIII	133	二碱式亚硫酸铅*	62229-08-7	0.005
VIII	134	四乙基铅*	78-00-2	0.005
VIII	135	硫酸三氧化四铅*	12202-17-4	0.005
VIII	136	全氟十二烷酸	307-55-1	0.050
VIII	137	碱式碳酸铅*	1319-46-6	0.005
VIII	138	二碱式亚磷酸铅*	12141-20-7	0.005
IX	139	4-壬基(支链与直链)苯酚乙氧基醚	-	0.050
IX	140	全氟辛酸铵(APFO)**	3825-26-1	0.050
IX	141	氧化镉*	1306-19-0	0.005

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批次	序号	物质名称	CAS No.	RL (%)
IX	142	镉	7440-43-9	0.005
IX	143	邻苯二甲酸二正戊酯(DPP)	131-18-0	0.050
IX	144	全氟辛酸(PFOA)	335-67-1	0.050
X	145	硫化镉*	1306-23-6	0.005
X	146	邻苯二甲酸二正己酯	84-75-3	0.050
X	147	C.I.直接红28	573-58-0	0.050
X	148	C.I.直接黑38	1937-37-7	0.050
X	149	2-巯基咪唑啉	96-45-7	0.050
X	150	乙酸铅*	301-04-2	0.005
X	151	磷酸三二甲苯酯	25155-23-1	0.050
XI	152	邻苯二甲酸二(支链与直链)己基酯	68515-50-4	0.050
XI	153	氯化镉*	10108-64-2	0.005
XI	154	水合过硼酸钠*	-	0.005
XI	155	过硼酸钠*	7632-04-4	0.005
XII	156	2-(2H-苯并三唑-2-基)-4,6-二叔戊基苯酚(UV-328)	25973-55-1	0.050
XII	157	2-苯并三唑-2-基-4,6-二叔丁基苯酚(UV-320)	3846-71-7	0.050
XII	158	二正辛基-双(2-乙基己基巯基乙酸酯)锡 (DOTE)	15571-58-1	0.050
XII	159	氟化镉 *	7790-79-6	0.005
XII	160	硫酸镉 *	10124-36-4,31119-53-6	0.005
XII	161	二正辛基-双(2-乙基己基巯基乙酸酯)锡(DOTE)和单辛基-三(2-乙基己基巯基乙酸酯)锡(MOTE)的反应物	-	0.050

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批次	序号	物质名称	CAS No.	RL (%)
XIII	162	1,2-苯二甲酸, 二(C6-10)烷基酯 / 1,2-苯二甲酸, 混合二己二辛二癸酯, 其中邻苯二甲酸二己酯含量≥0.3%	-	0.050
XIII	163	5-二级丁基-2-(2,4-二甲基环己-3-烯-1-基)-5-甲基-1,3-二恶烷[1]，5-二级丁基-2-(4,6-二甲基环己-3-烯-1-基)-5-甲基-1,3-二恶烷[2] [任何[1]和[2]或者其任意组合的单独异构体或其任何组合]	-	0.050
XIV	164	1,3-丙磺酸内酯	1120-71-4	0.050
XIV	165	2,4-二叔丁基-6-(5-氯苯并三唑-2-基)苯酚(UV-327)	3864-99-1	0.050
XIV	166	2-(2H-苯并三唑-2-基)-4-叔丁基-6-仲丁基苯酚 (UV-350)	36437-37-3	0.050
XIV	167	硝基苯	98-95-3	0.050
XIV	168	全氟壬酸及其钠盐和铵盐	-	0.050
XV	169	苯并(a)芘	50-32-8	0.050
XVI	170	4,4'-异亚丙基联苯酚 (双酚A)	80-05-7	0.050
XVI	171	4-庚基(支链与直链)苯酚	-	0.050
XVI	172	全氟癸酸 (PFDA) 及其钠盐和铵盐	-	0.050
XVI	173	对叔戊基苯酚	80-46-6	0.050
XVII	174	全氟己烷-1-磺酸及其盐	-	0.050
XVIII	175	双(六氯环戊二烯)环辛烷(包含任何顺式与反式同分异构体或其组合)	-	0.050
XVIII	176	苯并蒽(BaA)	56-55-3	0.050
XVIII	177	硝酸镉*	10325-94-7	0.005
XVIII	178	碳酸镉*	513-78-0	0.005
XVIII	179	氢氧化镉*	21041-95-2	0.005
XVIII	180	屈(CHR)	218-01-9	0.050

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批次	序号	物质名称	CAS No.	RL (%)
XVIII	181	1,3,4-噻二唑-2,5-二硫酮、甲醛与支链和直链4-庚基苯酚的反应产物(RP-HP)[含有支链和直链4-庚基苯酚重量比≥0.1%]	-	0.050
XIX	182	1,2,4-苯三酸酐(偏苯三酸酐)(TMA)	552-30-7	0.050
XIX	183	苯并(g,h,i)苝(二萘嵌苯) (BPE)	191-24-2	0.050
XIX	184	十甲基环五硅氧烷(D5)	541-02-6	0.050
XIX	185	邻苯二甲酸二环己酯(DCHP)	84-61-7	0.050
XIX	186	氧化硼钠*	12008-41-2	0.005
XIX	187	十二甲基环六硅氧烷(D6)	540-97-6	0.050
XIX	188	乙二胺(EDA)	107-15-3	0.050
XIX	189	铅	7439-92-1	0.005
XIX	190	八甲基环四硅氧烷(D4)	556-67-2	0.050
XIX	191	氢化三联苯	61788-32-7	0.050
XX	192	1,7,7-三甲基-3-(苯基亚甲基)双环[2.2.1]庚-2-酮 (3-亚苄基樟脑)	15087-24-8	0.050
XX	193	4,4'-(1,3-二甲基丁基)二苯酚(1,3-DMBBP)	6807-17-6	0.050
XX	194	苯并 (k)荧蒽(BkF)	207-08-9	0.050
XX	195	荧蒽(FLT)	206-44-0	0.050
XX	196	菲(PHE)	85-01-8	0.050
XX	197	芘(PYR)	129-00-0	0.050
XXI	198	2,3,3,3-四氟-2-(七氟丙氧基)丙酸及其盐和酰基卤化物(包括单体和组合)(HFPO-DA)	-	0.050
XXI	199	2-甲氧基乙基乙酸酯	110-49-6	0.050
XXI	200	4-叔丁基苯酚(PTBP)	98-54-4	0.050

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批次	序号	物质名称	CAS No.	RL (%)
XXI	201	三(4-壬基苯基，支链和直链)亚磷酸酯(TNPP)(含≥0.1%的支链和直链4-壬基苯酚)	-	0.050
XXII	202	2-苄基-2-二甲基氨基-4'-吗啉基苯基丁酮	119313-12-1	0.050
XXII	203	2-甲基-1-(4-甲硫基苯基)-2-吗啉基-1-丙酮	71868-10-5	0.050
XXII	204	邻苯二甲酸二异己酯	71850-09-4	0.050
XXII	205	全氟丁烷磺酸及其盐	-	0.050
XXIII	206	1-乙烯基咪唑	1072-63-5	0.050
XXIII	207	2-甲基咪唑	693-98-1	0.050
XXIII	208	对羟基苯甲酸丁酯	94-26-8	0.050
XXIII	209	双(乙酰丙酮基)二丁基锡**	22673-19-4	0.050
XXIV	210	四乙二醇二甲醚	143-24-8	0.050
XXIV	211	二月桂酸二辛基锡及任何其他二辛基锡双(脂肪酰氧基)衍生物**	-	0.050
XXV	212	1,4-二氧六环	123-91-1	0.050
XXV	213	二溴新戊二醇(BMP); 三溴新戊醇(TBNPA); 2,3-二溴-1-丙醇(2,3-DBPA)	-	0.050
XXV	214	铃兰醛及其立体异构体	-	0.050
XXV	215	双酚B	77-40-7	0.050
XXV	216	戊二醛	111-30-8	0.050
XXV	217	中链氯化石蜡(MCCP)	-	0.050
XXV	218	原硼酸钠盐*	13840-56-7	0.005
XXV	219	对十二烷基苯酚及其异构体(PDDP)	-	0.050

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批次	序号	物质名称	CAS No.	RL (%)
/	220	间苯二酚	108-46-3	0.050
/	221	(±)-1,7,7-三甲基-3-[(4-甲基苯基)亚甲基]二环[2.2.1]庚-2-酮，包括各个异构体和/或其组合(4-MBC)	-	0.050
/	222	2,2'-亚甲基双-(4-甲基-6-叔丁基苯酚) (DBMC)	119-47-1	0.050
/	223	S-(三环[5.2.1.0'2,6]癸-3-烯-8(或9)-基) O-(异丙基或异丁基或2-乙基己基) O-(异丙基或异丁基或2-乙基己基)二硫代磷酸酯	255881-94-8	0.050
/	224	乙烯基-三(2-甲氧基乙氧基)硅烷	1067-53-4	0.050

检验检测专用章 Inspection & Testing Services

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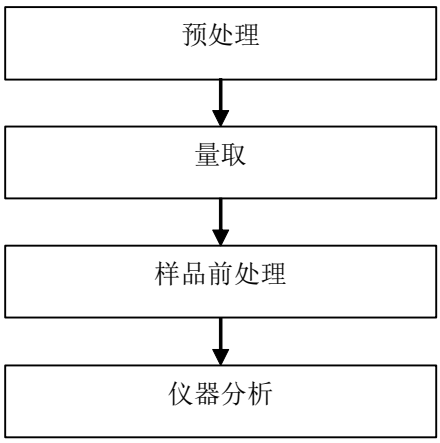
SVHC 测试流程图



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Revision date: 2021-04-22
Print date: 2021-09-29

RoHS DECLARATION
(Directive 2011/65/EU (Annex II amended by Commission Delegated Directive (EU) 2015/863)

According to the recipe for the manufacturing of **Akulon®, Arnite®, Arnitel®, EcoPaXX®, Novamid®, Nylatron™, Stanyl®, ForTii®** and **Xytron™** grades **(all colors)** the following substances are not intentionally used or added:

- The heavy metals cadmium, lead, chromium (VI) and mercury
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ethers (PBDE) including Decabromodiphenyl ether (decaBDE)
- Bis(2-ethylhexyl) phthalate (DEHP)
- Butyl benzyl phthalate (BBP)
- Dibutyl phthalate (DBP)
- Diisobutyl phthalate (DIBP).

Since the presence of the above-mentioned substances couldn't be expected under normal conditions, the absence has not been checked by tests.

Although the above-mentioned substances are not intentionally added, this does not exclude the presence of traces due to (among others) impurities in the components supplied by third parties and used in our production facilities.

However, it is our opinion that the chemical composition of the above mentioned products fully complies with the requirements for the above-mentioned substances according to Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU of the European Parliament and of the Council as regards the list of restricted substances.

This information holds for the material as it leaves its production facilities and does not include any additive, pigment, etc. subsequently added by the converter or processing steps undertaken by any other third party.

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On behalf of DSM Engineering Materials,

W. Saelmans
Senior Expert
Regulatory Affairs & Product Safety

R. Offermanns
Senior Expert
Regulatory Affairs & Product Safety

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