TO : 鈺緯科技開發股份有限公司　　承認書編號: 241210002

系列 Ser No.: 452 Series

承　認　書

APPROVAL SHEET

DATE：2024/12/10

承　　認
APPROVED

Part NO.: 0452003.MRSN

Customer Part No.: 3ZFS301251Y (Z0540)

產地: Philippines

Brand: Littelfuse

Halogen Free

設計驗證
工程課
2024-12-17
發行
鈺緯科技開發股份有限公司

Surface Mount Ceramic Fuses 3A 125V

承認後請簽回一份

PLEASE RETURN US ONE COPY OF YOUR SIGHED SPECIFICATION AFTER YOU APPROVED IT.

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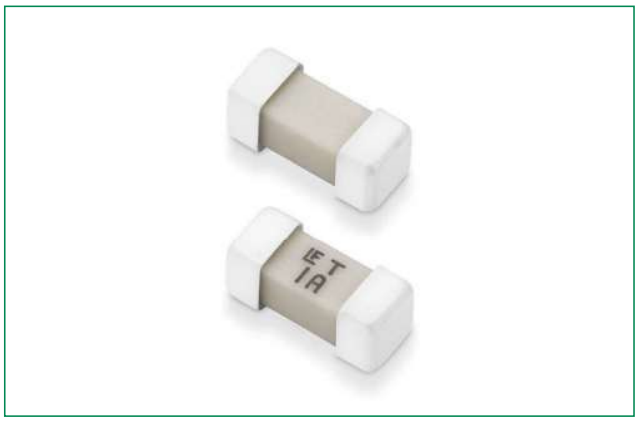
APPROVED BY	CHECKED BY	DESIGNED BY

捷強股份有限公司

GIANTRUM CO., LTD.
TEL : 886-2-77030951 (TWN)
852-27567879 (H.K.)
FAX : 886-2-7703-0955 (TWN)
852-27567140 (H.K.)

452/454 Series

NANO²® > Slo-Blo® Fuse



Web Resources

Download ECAD models, order samples, and find technical recources at www.littelfuse.com/452

Download ECAD models, order samples, and find technical recources at www.littelfuse.com/454

Agency Approvals

Agency	Agency File Number	Ampere Range
	E10480	0.375A - 12A
	29862	0.375A - 12A
	NBK030205-E10480B	1A - 5A
	J50515033	0.375A - 5A, 6.3A, 10A
	N/A	0.375A - 5A, 6.3A, 10A
	N/A	0.375A - 5A, 6.3A, 10A

Description

The NANO²® Slo-Blo® fuse has enhanced inrush withstand characteristics over the NANO²® Fast-Acting fuse. The unique time delay feature of this fuse design helps solve the problem of nuisance "opening" by accommodating inrush currents that normally cause a fast-acting fuse to open.

Features & Benefits

- Small size
- Wide range of current rating available (0.375A to 12A)
- Wide operating temperature range
- RoHS compliant and Halogen Free
- UL Recognized to UL/CSA/ NMX UL 248-1 and UL/CSA/ NMX UL 248-14
- Conforms to DENAN's Appendix 3
- Conforms to EN 60127-1 and EN 60127-7
- CE Mark indicates suitability for the European Market
- UKCA Mark indicates suitability for the UK Market

Applications

- Notebook PC
- LCD/PDP TV
- LCD monitor
- LCD/PDP panel
- LCD backlight inverter
- Portable DVD player
- Power supply
- Networking
- PC server
- Cooling fan system
- Storage system
- Telecom system
- Wireless basestation
- White goods
- Game console
- Office Automation equipment
- Battery charging circuit protection
- Industrial equipment

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
100%	4 hours, Minimum
200%	1 sec., Min.; 60 sec., Max.
300%	0.2 sec., Min.; 3 sec., Max
800%	0.002 sec., Min.; 0.1 sec., Max.

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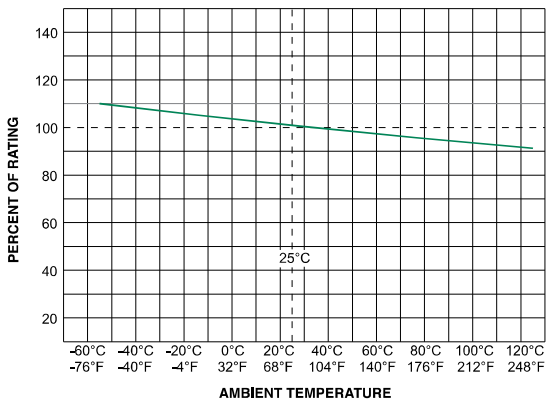
452/454 Series
NANO²® > Slo-Blo® Fuse

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2sec)	Agency Approvals					
						c UL us				CE	UK CA
0.375	.375	125	50A @ 125 VAC/VDC 300A @ 32 VDC PSE: 100A @ 100 VAC	1.2000	0.101	x	x	-	x	x	x
0.500	.500	125		0.7000	0.240	x	x	-	x	x	x
0.750	.750	125		0.3600	0.904	x	x	-	x	x	x
001.	001.	125		0.2250	1.98	x	x	x	x	x	x
1.50	01.5	125		0.0930	3.65	x	x	x	x	x	x
2.00	002.	125		0.0625	8.20	x	x	x	x	x	x
2.50	02.5	125		0.0450	15.0	x	x	x	x	x	x
3.00	003.	125		0.0340	20.16	x	x	x	x	x	x
3.50	03.5	125		0.0224	26.53	x	x	x	x	x	x
4.00	004.	125		0.0186	34.40	x	x	x	x	x	x
5.00	005.	125		0.0136	53.72	x	x	x	x	x	x
6.30	06.3	75	50A @ 72 VAC 50A @ 60 VDC 100A @ 75 VDC	0.0123	64.0	x	x	-	x	x	x
7.00	007.	75		0.0105	123.83	x	x	-	-	x	x
8.00	008.	75		0.0088	137.34	x	x	-	-	x	x
10.0	010.	75		0.0080	195.0	x	x	-	x	x	x
12.0	012.	75		0.0061	260.46	x	x	-	-	x	x

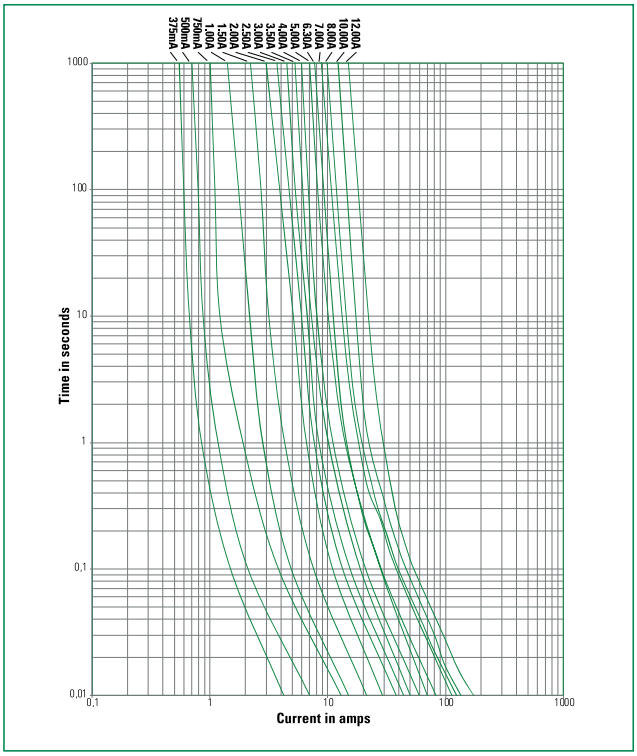
Notes: - I^2t calculated at 8ms.
- Resistance is measured at 10% of rated current, 25ºC

Temperature Re-rating Curve



Note:
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



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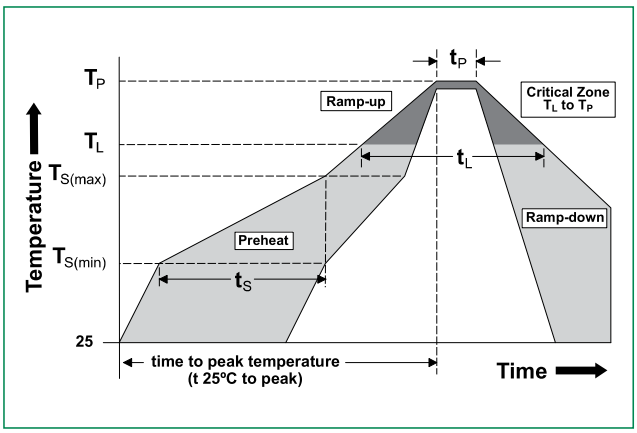
452/454 Series
NANO²® > Slo-Blo® Fuse

Soldering Parameters

Reflow Condition		Pb – Free assembly
Pre Heat	**- Temperature Min ($T_{s(min)}$)**	150°C
	- Temperature Max ($T_{s(max)}$)	200°C
	- Time (Min to Max) (t_s)	60 – 180 secs
Average ramp up rate (Liquidus Temp (T_L) to peak		5°C/second max.
$T_{S(max)}$ to T_L - Ramp-up Rate		5°C/second max.
Reflow	**- Temperature (T_L) (Liquidus)**	217°C
	- Temperature (t_L)	60 – 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °C
Time within 5°C of actual peak Temperature (t_p)		20 – 40 seconds
Ramp-down Rate		5°C/second max.
Time 25°C to peak Temperature (T_P)		8 minutes max.
Do not exceed		260°C

Wave Soldering Parameters	260°C Peak Temperature, 3 seconds max.



Product Characteristics

Materials	**Body:** Ceramic **Terminations**: Gold-plated Caps / Sn-dipped Silver Plated Caps (452 Series) Silver-plated Caps (454 Series)
Product Marking	Brand, Ampere Rating
Operating Temperature	-55°C to 125°C
Moisture Sensitivity Level	Level 1, J-STD-020
Solderability	MIL-STD-202, Method 208
Insulation Resistance (after Opening)	MIL-STD-202, Method 302, Test Condition A (10,000 ohms minimum)

Thermal Shock	MIL-STD-202, Method 107, Test Condition B, 5 cycles, -65°C / +125°C, 15 minutes @ each extreme
Mechanical Shock	MIL-STD-202, Method 213, Test I: Deenergized. 100G's pk amplitude, sawtooth wave 6ms duration, 3 cycles XYZ+xyz = 18 shocks
Vibration	MIL-STD-202, Method 201: 0.03" amplitude, 10-55 Hz in 1 min. 2hrs each XYZ=6hrs
Moisture Resistance	MIL-STD-202, Method 106, 10 cycles
Salt Spray	MIL-STD-202, Method 101, Test Condition B (48hrs)
Resistance to Soldering Heat	MIL-STD-202, Method 210, Test condition B (10 sec at 260°C)

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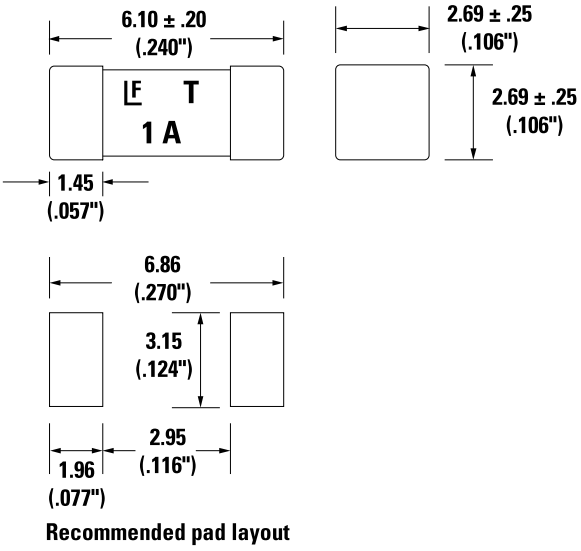
452/454 Series
NANO²® > Slo-Blo® Fuse

Dimensions



Recommended pad layout

Part Numbering System

0452 001. M R L

Series

Amp Code
Refer to Amp Code column in the Electrical Specifications table.
The dot is positioned at the end of the number sequence with whole ratings and within for fractional ratings.
Example: 0.375 Amp product is 0452.375MRL
(1 amp product shown)

Quantity code
M = 1000 pcs
N = 5000 pcs

Packaging code
R = Tape and Reel

L - RoHS Compliant & Halogen Free (Gold Plated Caps)

SN-RoHS Compliant & Halogen Free (Sn-dipped Caps)

Notes:
452 series may be ordered as "RoHS and HF (Gold Plated Caps)" ("L" suffix).
454 series is available only as "RoHS and HF" version and does not require "L" suffix.
Please do not include "L" suffix within 454 series ordering instructions.

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
12mm Tape and Reel	EIA-481 IEC 60286-3	5000	NR
12mm Tape and Reel	EIA-481 IEC 60286-3	1000	MR

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Test Report

No.: SZXEC24002403301 **Date:** Jul 31, 2024

Client Name: LITTELFUSE PHILIPPINES INC.

Client Address: LIMA TECHNOLOGY CENTER, SPECIAL ECONOMIC ZONE, MALVAR-LIPA, BATANGAS, PHILIPPINES

Sample Name: Tin-Plated Copper Wire - Cu,Sn--%

Material No.: 082xxx-001, DRCUxxx, 497xxx-001,…

The above sample(s) and information were provided by the client.

SGS Job No.: SZP24-033443

Sample Receiving Date: Jul 26, 2024

Testing Period: Jul 26, 2024 ~ Jul 31, 2024

Test Requested: Select 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).

Test Requirement	Conclusion
Phthalates	See Results

Signed for and on behalf of
SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

Andy Ni
Approved Signatory

scan to see the report
482BDB88

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Test Result(s):

Test Part Description：

SN ID	Sample No.	SGS Sample ID	Description
SN1	A1	SZX24-0024033-0001.C001	Silvery grey metal wire

Remarks:

(1) 1 mg/kg = 1 ppm = 0.0001%
(2) MDL = Method Detection Limit
(3) ND = Not Detected (< MDL)
(4) "-" = Not Regulated

Phthalates

Test Method: With reference to IEC 62321-8:2017, analysis was performed by GC-MS.

Test Item(s)	CAS No.	Unit(s)	MDL	A1
Dibutyl Phthalate (DBP)	84-74-2	mg/kg	50	ND
Bis-(2-ethylhexyl) Phthalate (DEHP)	117-81-7	mg/kg	50	ND
Benzyl Butyl Phthalate (BBP)	85-68-7	mg/kg	50	ND
Diisobutyl Phthalate (DIBP)	84-69-5	mg/kg	50	ND

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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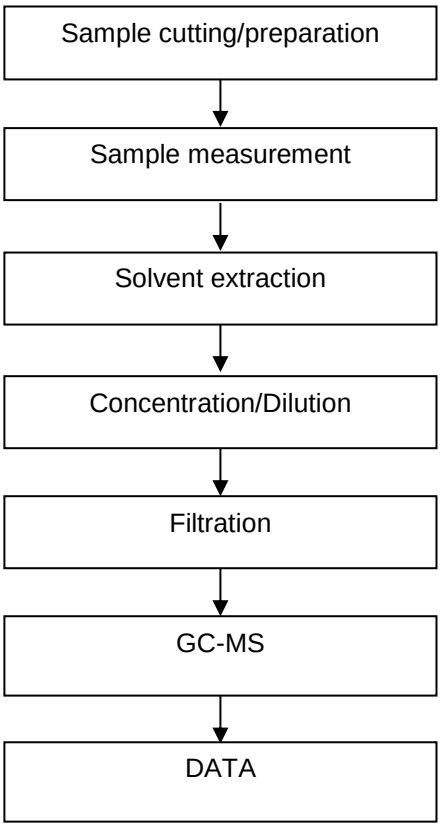
ATTACHMENTS

Phthalates Testing Flow Chart



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Test Report **Number: 240100028SHA-006**

Applicant: ELSCHUKOM GMBH
GEWERBESTRASSE 87, D-98669 VEILSDORF
GERMANY

Date: Jan. 18, 2024

Sample Description:

One (1) submitted sample said to be:

Part Description	:	Wire
Part Number	:	(38) 101 - - 271. - - - - – Tin plated copper wire – Cu,Sn--%
Country of Origin	:	GERMANY

****

Tests conducted:

As requested by the applicant, for details refer to attached page(s).

****

To be continued

Authorized by:
For Intertek testing services Ltd., Shanghai

Wenjia Gu
Senior Manager

Intertek Testing Services Ltd., Shanghai 上海天祥质量技术服务有限公司 检测报告专用章

Test Report **Number: 240100028SHA-006**

Tests Conducted

(I) Test result of RoHS Directive：

Testing item	**Result**
	(1)
Cadmium (Cd) content (mg/kg)	ND
Lead (Pb) content (mg/kg)	ND
Mercury (Hg) content (mg/kg)	ND
Chromium (VI)(Cr^{6+}) Result (By Boiling Water Extraction on Metal) ($\mu g/cm^2$)	Negative

Testing item	**Result**
	(2)
Cadmium (Cd) content (mg/kg)/(plating)	ND
Lead (Pb) content (mg/kg) /(plating)	ND
Mercury (Hg) content (mg/kg)/ (plating)	ND
Chromium (VI)(Cr^{6+}) Result (By Boiling Water Extraction on Metal) ($\mu g/cm^2$)/(plating)	Negative

Remark：mg/kg = milligram per kilogram
ND = Not Detected

Negative = A negative test result indicated the absorbance value of testing sample solution for Cr(VI) testing is less than the absorbance value of the 0.10$\mu g/cm^2$ equivalent comparison standard solution, the Cr(VI) concentration is below the limit of quantification, then the sample is considered to be negative for Cr(VI).

Tested Components：
(1) Substrate
(2) Plating

Responsibility of Chemist：April Sun

(II) RoHS Requirement：

Restricted Substances	Limits
Cadmium (Cd) Content	0.01% (100ppm)
Lead (Pb) Content	0.1% (1000ppm)
Mercury (Hg) Content	0.1% (1000ppm)
Chromium VI (Cr^{6+}) Content	0.1% (1000ppm)
Polybrominated Biphenyls (PBBs)	0.1% (1000ppm)
Polybrominated Diphenyl Ethers (PBDEs)	0.1% (1000ppm)

The above limits were quoted from RoHS Directive 2011/65/EU for homogeneous material.

****

To be continued

Tests Conducted

(III) Test Method：

Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) content	With reference to IEC 62321-5 Edition 1.0: 2013, by acid digestion until the tested sample was totally dissolved, and determined by ICP-OES.	2 mg/kg
Lead (Pb) content	With reference to IEC 62321-5 Edition 1.0: 2013, by acid digestion until the tested sample was totally dissolved, and determined by ICP-OES.	2 mg/kg
Mercury (Hg) content	With reference to IEC 62321-4 Edition 1.1：2017, by acid digestion until the tested sample was totally dissolved, and determined by ICP-OES.	2 mg/kg
Chromium (VI) (Cr^{6+}) content (for metal)	With reference to IEC 62321-7-1 Edition 1.0:2015, by boiling water extraction and determined by UV-VIS Spectrophotometer.	Positive(>0.13 μg/m^2)/ Negative(<0.10 μg/m^2) Inconclusive(0.10--0.13 μg/m^2)

Remark：Reporting limit = Quantitation Limit of Analyze in Sample

Date sample received: Jan. 03, 2024
Testing period: Jan. 03, 2024 To Jan. 05, 2024

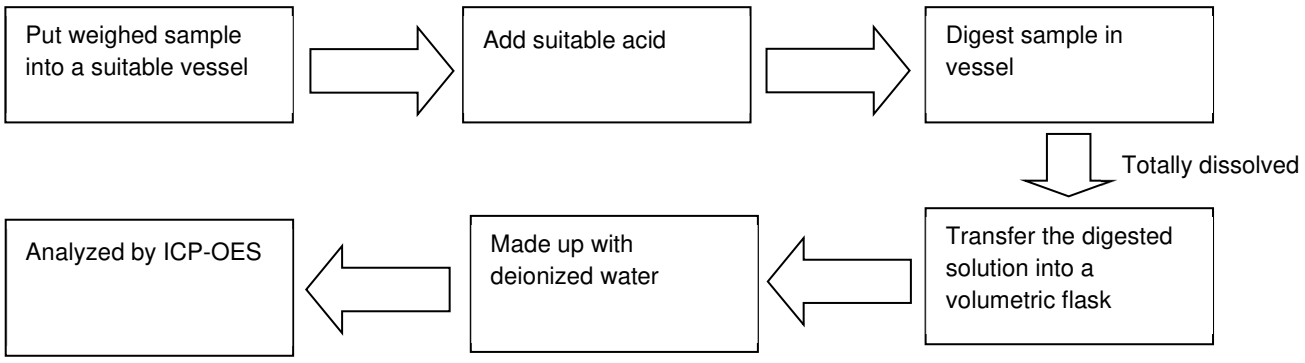
****

To be continued

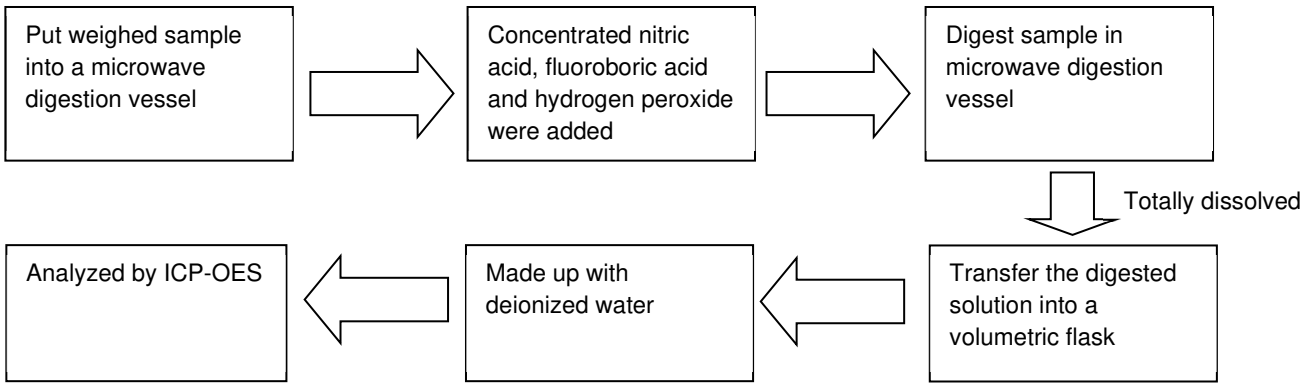
Tests Conducted

(D) Measurement Flowchart：

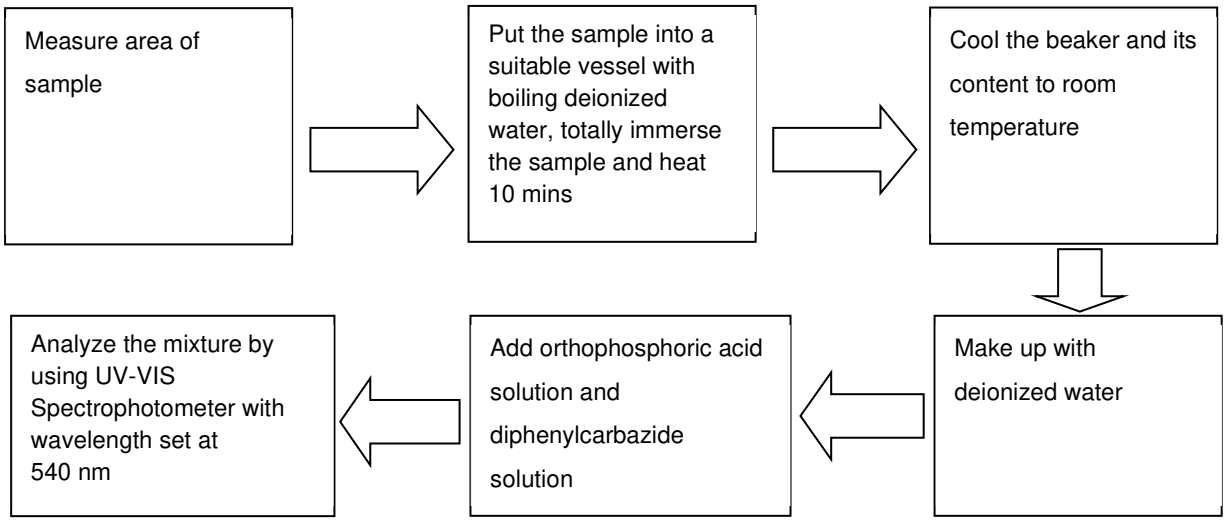
1. Test for Cd/Pb Contents



2. Test for Hg Content



3. Test for Chromium (VI) (Cr^{6+}) Content (Boiling Water Extraction)



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To be continued

Tests Conducted

Photo





****

To be continued

Test Report **Number: 240100028SHA-006**

Tests Conducted

Photo





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End of report

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測試報告
Test Report

號碼(No.): ETR23C02821　　日期(Date): 22-Dec-2023　　

名佳利金屬工業股份有限公司 (MINCHALI METAL INDUSTRY CO., LTD.)
桃園市中壢區北園路11號 (NO.11, BEIYUAN RD., CHUNG-LI DIST., TAOYUAN CITY, TAIWAN, R.O.C.)

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 the applicant as)：

送樣廠商(Sample Submitted By)	:	名佳利金屬工業股份有限公司 (MINCHALI METAL INDUSTRY CO., LTD.)
樣品名稱(Sample Name)	:	BRASS(黃銅)
樣品型號(Style/Item No.)	:	C2600 (70/30)

==========

收件日(Sample Receiving Date)	:	15-Dec-2023
測試期間(Testing Period)	:	15-Dec-2023 to 22-Dec-2023

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 / Department Manager
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory - Taipei

PIN CODE: D4659B30

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測試部位敘述 (Test Part Description)

No.1 : 黃銅色金屬片 (BRASS METAL 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))	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))	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	8.48	1000
汞 (Hg) (Mercury (Hg))	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 (Hexavalent Chromium) Cr(VI) (#2)	參考IEC 62321-7-1: 2015，以紫外光-可見光分光光度計分析。(With reference to IEC 62321-7-1: 2015, analysis was performed by UV-VIS.)	μg/cm²	0.1	n.d.	-
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

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Test Report

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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
鄰苯二甲酸丁苯甲酯 (BBP) (Butyl benzyl phthalate (BBP))	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))		mg/kg	50	n.d.	1000
鄰苯二甲酸二(2-乙基己基)酯 (DEHP) (Di-(2-ethylhexyl) phthalate (DEHP))		mg/kg	50	n.d.	1000
鄰苯二甲酸二異丁酯 (DIBP) (Diisobutyl phthalate (DIBP))		mg/kg	50	n.d.	1000
氟 (F) (Fluorine (F)) (CAS No.: 14762-94-8)	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	n.d.	-
氯 (Cl) (Chlorine (Cl)) (CAS No.: 22537-15-1)		mg/kg	50	n.d.	-
溴 (Br) (Bromine (Br)) (CAS No.: 10097-32-2)		mg/kg	50	n.d.	-
碘 (I) (Iodine (I)) (CAS No.: 14362-44-8)		mg/kg	50	n.d.	-
四溴雙酚-A (TBBP-A) (Tetrabromobisphenol A (TBBP-A)) (CAS No.: 79-94-7)	參考RSTS-E&E-121，以液相層析儀/質譜儀分析。(With reference to RSTS-E&E-121, analysis was performed by LC/MS.)	mg/kg	10	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)
中鏈氯化石蠟(C14-C17) (MCCP) (Medium Chain Chlorinated Paraffins(C14-C17) (MCCP)) (CAS No.: 85535-85-9)	參考ISO 18219-2: 2021，以氣相層析儀/質譜儀分析。(With reference to ISO 18219-2: 2021, analysis was performed by GC/MS.)	mg/kg	50	n.d.	-
鈹 (Be) (Beryllium (Be)) (CAS No.: 7440-41-7)	參考US EPA 3050B: 1996，以感應耦合電漿發射光譜儀分析。(With reference to US EPA 3050B: 1996, analysis was performed by ICP-OES.)	mg/kg	2	n.d.	-
銻 (Sb) (Antimony (Sb)) (CAS No.: 7440-36-0)	參考US EPA 3050B: 1996，以感應耦合電漿發射光譜儀分析。(With reference to US EPA 3050B: 1996, analysis was performed by ICP-OES.)	mg/kg	2	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.	-

備註(Note)：

1. mg/kg = ppm；0.1wt% = 0.1% = 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. (#2) =
   a. 當六價鉻結果大於0.13 μg/cm²，表示樣品表層含有六價鉻。(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. 當六價鉻結果為n.d. (濃度小於0.10 μg/cm²)，表示表層不含六價鉻。(The sample is negative for Cr(VI) if Cr(VI) is n.d. (concentration less than 0.10 μg/cm²). The coating is considered a non-Cr(VI) based coating)
   c. 當六價鉻結果介於 0.10 及 0.13 μg/cm² 時，無法確定塗層是否含有六價鉻。(The result between 0.10 μg/cm² and 0.13 μg/cm² is considered to be inconclusive - unavoidable coating variations may influence the determination.)
6. 除非另有說明，參照ILAC-G8:09/2019，採用簡單二元(w=0)允收規則進行符合性判定；根據此規則，符合性結果之判定係以測試結果與限值做比較。(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. According to this rule, the judgement of conformity is based on the comparing test results with limits.)

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PFAS Remark：

現有PFAS定量技術是分析PFAS物質的特定結構，但同碳數族群之PFAS酸及鹽類物質，其可被辨識的特定結構相同，因此無法區別所分析的特定結構是來自酸或者鹽類，故測試結果為同碳數族群之PFAS之酸及鹽類物質的濃度總合。下表PFAS物質濃度皆已包含在測試結果中，相關資訊請參見下表：(下表列舉PFAS物質僅為範例，並不包含所有同碳數族群之PFAS鹽類。)
(The quantitative technology of PFAS is to analyze the specific structure of PFAS substances. However, PFAS acid and its salts with the same carbon number group have the same specific structure that can be identified. The tested results of the analyzed specific structure cannot be distinguished to identify the contribution from PFAS acid or its salts. Therefore, the tested results display the sum of concentrations of PFAS acids and its salts with the same carbon number group. The concentration of PFAS substances in the below table have been included in the tested results, please refer to the table for relevant information: (The listed PFAS substances are examples only, it do not include all PFAS salts with the same carbon number group.))

群組名稱 (Group Name)	物質名稱 (Substance Name)	CAS No.
PFOS, 及其鹽&衍生物 (PFOS, its salts & derivatives)	全氟辛烷磺酸 (PFOS)	1763-23-1
	全氟辛基磺酸鉀 (PFOS-K) Potassium perfluorooctanesulfonate (PFOS-K)	2795-39-3
	全氟辛基磺酸鋰 (PFOS-Li) Perfluorooctanesulfonic acid, lithium salt (PFOS-Li)	29457-72-5
	全氟辛基磺酸銨 (PFOS-NH_4) Perfluorooctanesulfonic acid, ammonium salt (PFOS-NH_4)	29081-56-9
	全氟辛基磺酸二乙醇銨 (PFOS-$NH(OH)_2$) Perfluorooctane sulfonate diethanolamine salt (PFOS-$NH(OH)_2$)	70225-14-8
	全氟辛基磺酸四乙基銨 (PFOS-$N(C_2H_5)_4$) Perfluorooctanesulfonic acid,tetraethylammonium salt (PFOS-$N(C_2H_5)_4$)	56773-42-3
	全氟辛基磺酸二癸二甲基銨 (PFOS-DDA) N-decyl-N,N-dimethyldecan-1-aminium 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctane-1-sulfonate (PFOS-DDA)	251099-16-8
	全氟辛基磺醯氟 (POSF) Perfluorooctane sulfonyl fluoride (POSF)	307-35-7
	全氟辛基磺酸鎂 (PFOS-Mg) Perfluorooctanesulfonic acid, magnesium salt (PFOS-Mg)	91036-71-4
	全氟辛基磺酸鈉 (PFOS-Na) Perfluorooctanesulfonic acid, sodium salt (PFOS-Na)	4021-47-0
	全氟辛烷磺酸哌啶 Piperidine 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctanesulfonate	71463-74-6

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群組名稱 (Group Name)	物質名稱 (Substance Name)	CAS No.
PFOA, 及其鹽&衍生物 (PFOA, its salts & derivatives)	全氟辛酸 (PFOA)	335-67-1
	全氟辛酸鈉 (PFOA-Na) Sodium perfluorooctanoate (PFOA-Na)	335-95-5
	全氟辛酸鉀 (PFOA-K) Potassium perfluorooctanoate (PFOA-K)	2395-00-8
	全氟辛酸銀 (PFOA-Ag) Silver perfluorooctanote (PFOA-Ag)	335-93-3
	全氟辛氟 (PFOA-F) Perfluorooctanoyl fluoride (PFOA-F)	335-66-0
	全氟辛酸銨 (APFO) Ammonium pentadecafluorooctanoate (APFO)	3825-26-1
	全氟辛酸鋰 (PFOA-Li) Lithium perfluorooctanoate (PFOA-Li)	17125-58-5

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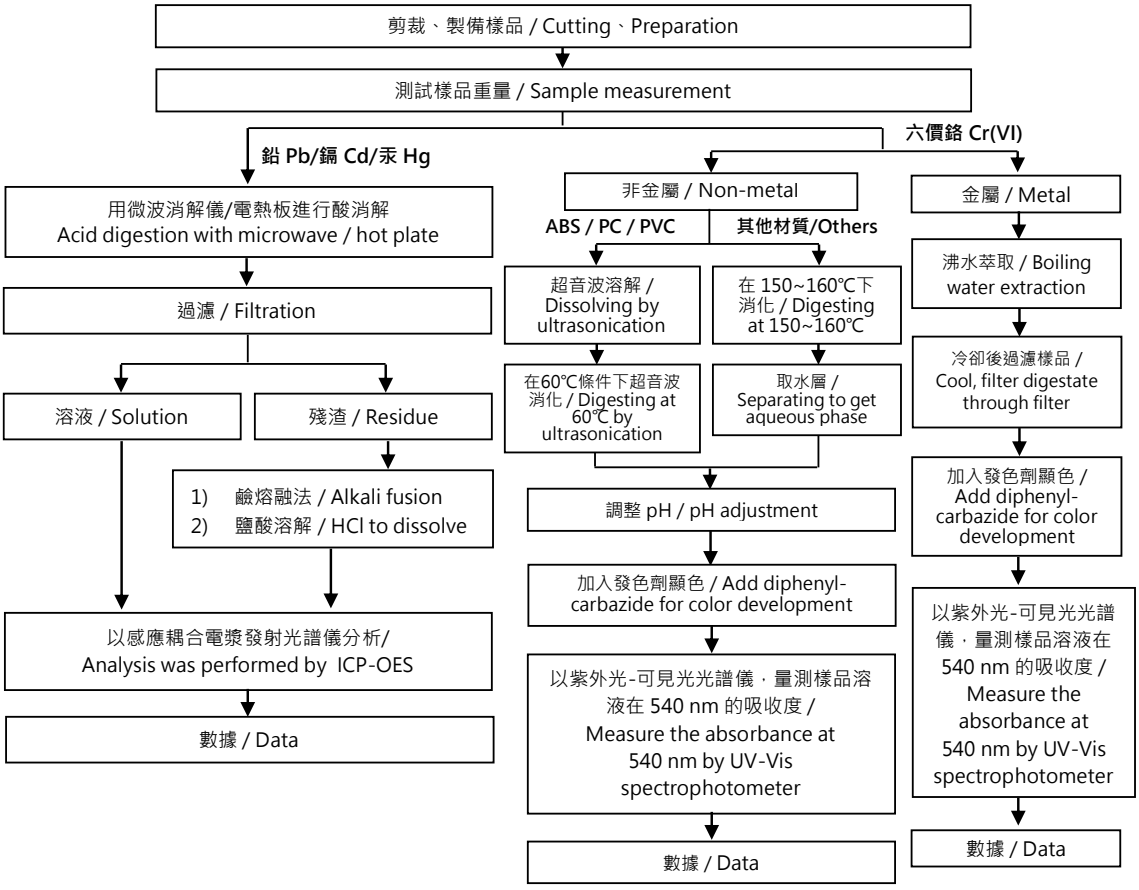
重金屬流程圖 / Analytical flow chart of heavy metal

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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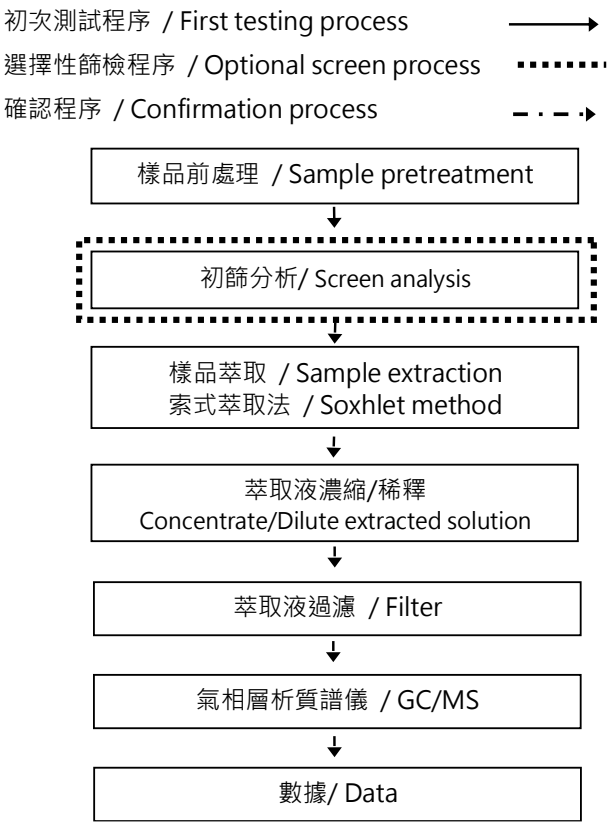
多溴聯苯/多溴聯苯醚分析流程圖 / Analytical flow chart - PBBs/PBDEs



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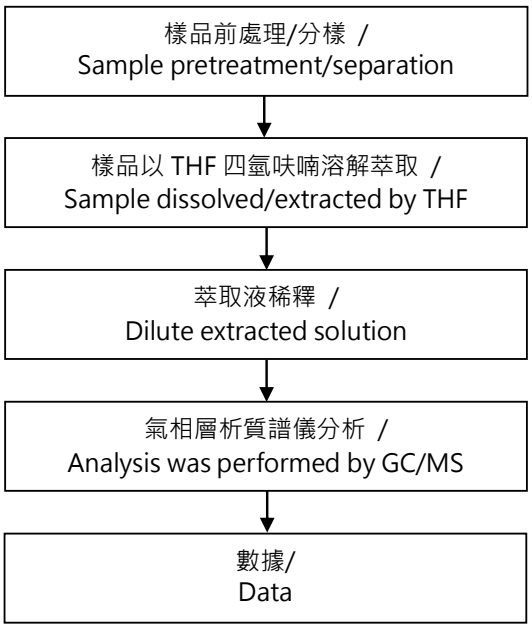
名佳利金屬工業股份有限公司 (MINCHALI METAL INDUSTRY CO., LTD.)
桃園市中壢區北園路11號 (NO.11, BEIYUAN RD., CHUNG-LI DIST., TAOYUAN CITY, TAIWAN, R.O.C.)

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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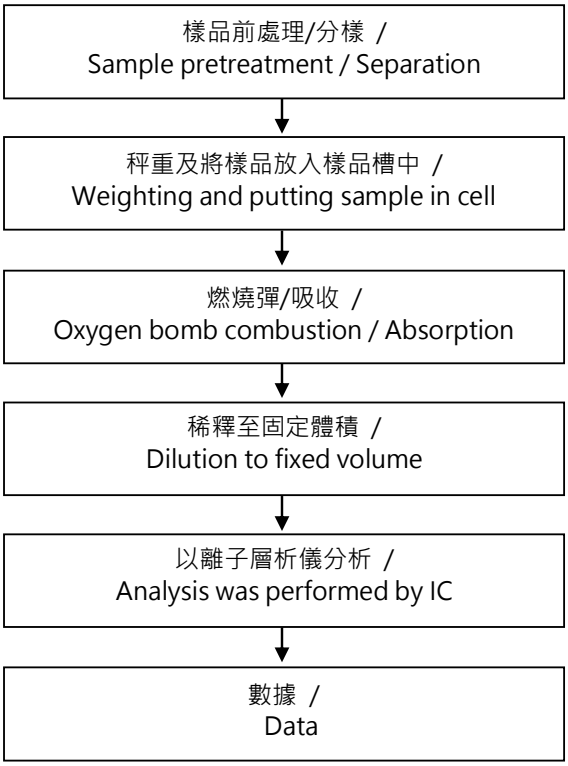
鹵素分析流程圖 / Analytical flow chart - Halogen



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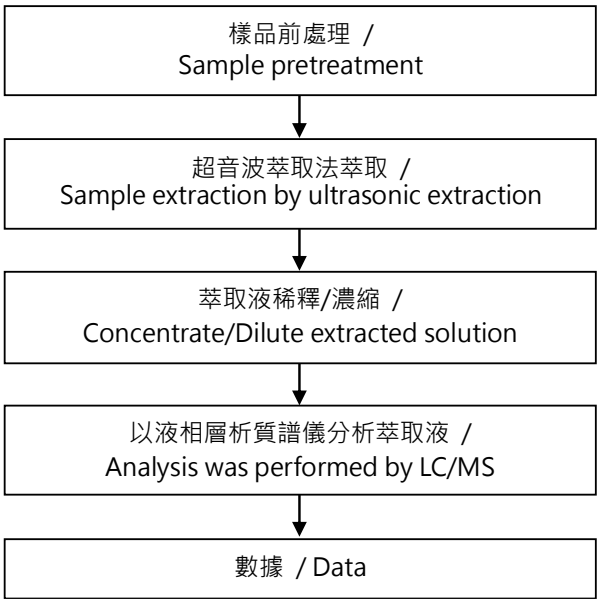
四溴雙酚-A 分析流程圖 / Analytical flow chart - TBBP-A



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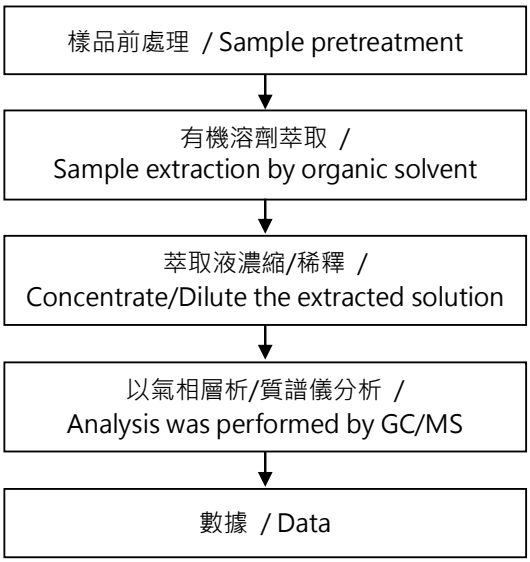
分析流程圖 / Analytical flow chart

【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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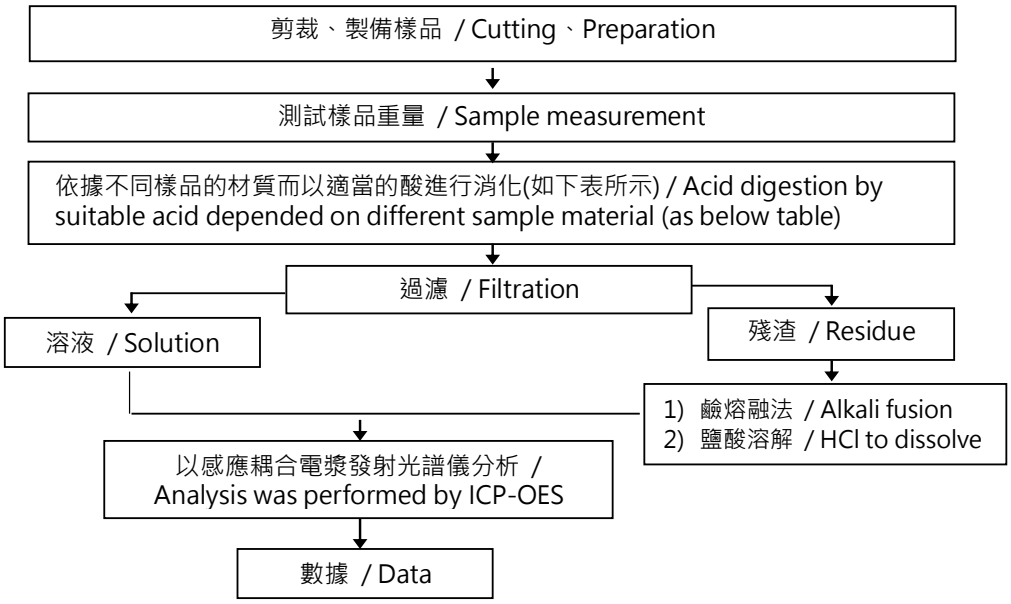
元素以 ICP-OES 分析的消化流程圖

(Flow chart of digestion for the elements analysis performed by ICP-OES)

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.



鋼,銅,鋁,焊錫 / Steel, copper, aluminum, solder	王水,硝酸,鹽酸,氫氟酸,雙氧水 / Aqua regia, HNO_3, HCl, HF, H_2O_2
玻璃 / Glass	硝酸,氫氟酸 / HNO_3,HF
金,鉑,鈀,陶瓷 / Gold, platinum, palladium, ceramic	王水 / Aqua regia
銀 / Silver	硝酸 / HNO_3
塑膠 / Plastic	硫酸,雙氧水,硝酸,鹽酸 / H_2SO_4, H_2O_2, HNO_3, HCl
其他 / Others	加入適當的試劑至完全溶解 / Added appropriate reagent to total digestion

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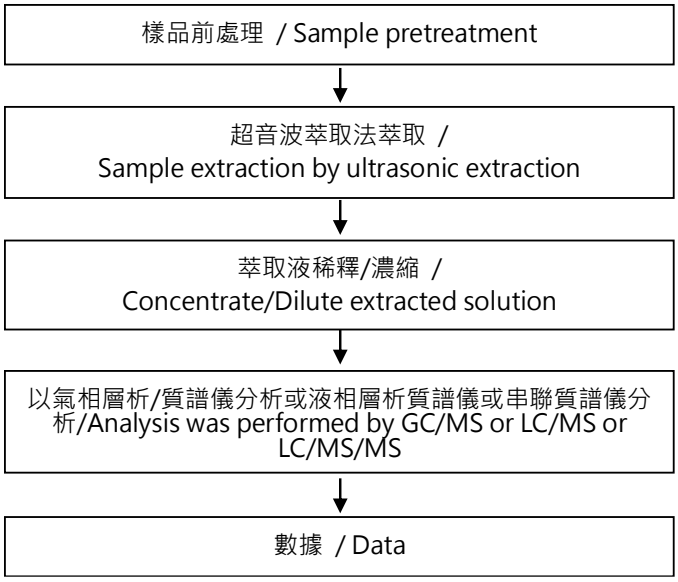
全氟化合物(包含全氟辛酸/全氟辛烷磺酸/其相關化合物等等)分析流程圖 / Analytical flow chart – PFAS (including PFOA/PFOS/its related compound, etc.)



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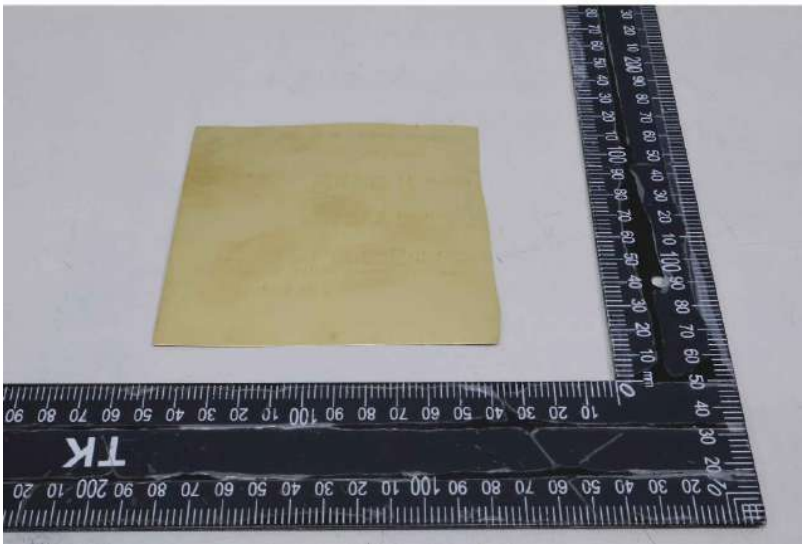
測試報告
Test Report

名佳利金屬工業股份有限公司 (MINCHALI METAL INDUSTRY CO., LTD.)
桃園市中壢區北園路11號 (NO.11, BEIYUAN RD., CHUNG-LI DIST., TAOYUAN CITY, TAIWAN, R.O.C.)

*** 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.)

ETR23C02821



** 報告結尾 (End of Report) **

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測試報告
Test Report

號碼(No.): ETR24100480　　日期(Date): 10-Jan-2024　　

昕慶股份有限公司 (SIN CHIN CO., LTD.)
桃園市中壢區東園路41號 (NO.41, DONGYUAN RD, ZHONGLI DIST., TAOYUAN CITY 320, TAIWAN (R.O.C.))

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 the applicant as)：

送樣廠商(Sample Submitted By)　：　昕慶股份有限公司 (SIN CHIN CO., LTD.)
樣品名稱(Sample Name)　：　CAP COPPER PLATED LAYER (CAP 鍍銅層)

==========

收件日(Sample Receiving Date)　：　02-Jan-2024
測試期間(Testing Period)　：　02-Jan-2024 to 10-Jan-2024

測試需求(Test Requested)　：
(1) 依據客戶指定，參考RoHS指令2011/65/EU Annex II測試鎘、鉛、汞、六價鉻、多溴聯苯、多溴聯苯醚。 (As specified by client, with reference to RoHS Directive 2011/65/EU Annex II to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs 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、多溴聯苯醚的測試結果符合RoHS 2011/65/EU Annex II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 comply with the limits as set by RoHS Directive 2011/65/EU Annex II.)

Troy Chang / Department Manager
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory - Taipei

PIN CODE: E77D8569

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桃園市中壢區東園路41號 (NO.41, DONGYUAN RD, ZHONGLI DIST., TAOYUAN CITY 320, TAIWAN (R.O.C.))

測試部位敘述 (Test Part Description)

No.1 : 銅色金屬鍍層 (PLATING LAYER OF COPPER COLORED METAL)
No.2 : 銅色金屬 (含鍍層) (COPPER COLORED METAL (INCLUDING THE PLATING LAYER))

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	No.2	
鎘 (Cd) (Cadmium (Cd))	酸洗脫鍍層，參考IEC 62321-5: 2013，以感應耦合電漿發射光譜儀分析。(IEC 62321-5: 2013 application of modified digestion by surface etching, analysis was performed by ICP-OES.)	mg/kg	2	n.d.	---	100
鉛 (Pb) (Lead (Pb))		mg/kg	2	6.81	---	1000
汞 (Hg) (Mercury (Hg))	酸洗脫鍍層，參考IEC 62321-4: 2013+AMD1: 2017，以感應耦合電漿發射光譜儀分析。(IEC 62321-4: 2013+AMD1: 2017 application of modified digestion by surface etching, analysis was performed by ICP-OES.)	mg/kg	2	n.d.	---	1000
六價鉻 (Hexavalent Chromium) Cr(VI) (#2)	參考IEC 62321-7-1: 2015，以紫外光-可見光分光光度計分析。(With reference to IEC 62321-7-1: 2015, analysis was performed by UV-VIS.)	μg/cm²	0.1	n.d.	---	-
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

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測試報告
Test Report

號碼(No.): ETR24100480 日期(Date): 10-Jan-2024

昕慶股份有限公司 (SIN CHIN CO., LTD.)
桃園市中壢區東園路41號 (NO.41, DONGYUAN RD, ZHONGLI DIST., TAOYUAN CITY 320, TAIWAN (R.O.C.))

測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result)		限值 (Limit)
				No.1	No.2	
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
全氟辛烷磺酸及其鹽類 (PFOS and its salts) (CAS No.: 1763-23-1 and its salts)	參考US EPA 3550C: 2007，以液相層析串聯質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by LC/MS/MS.)	μg/m²	0.5	n.d.	---	-
全氟辛酸及其鹽類 (PFOA and its salts) (CAS No.: 335-67-1 and its salts)	參考US EPA 3550C: 2007，以液相層析串聯質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by LC/MS/MS.)	μg/m²	0.5	n.d.	---	-
氟 (F) (Fluorine (F)) (CAS No.: 14762-94-8)	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	---	n.d.	-
氯 (Cl) (Chlorine (Cl)) (CAS No.: 22537-15-1)	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	---	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	---	n.d.	-
碘 (I) (Iodine (I)) (CAS No.: 14362-44-8)	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	---	n.d.	-

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備註(Note)：

1. mg/kg = ppm；0.1wt% = 0.1% = 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. "---" = Not Conducted (未測試項目)
6. (#2) =
   a. 當六價鉻結果大於0.13 μg/cm²，表示樣品表層含有六價鉻。(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. 當六價鉻結果為n.d. (濃度小於0.10 μg/cm²)，表示表層不含六價鉻。(The sample is negative for Cr(VI) if Cr(VI) is n.d. (concentration less than 0.10 μg/cm²). The coating is considered a non-Cr(VI) based coating)
   c. 當六價鉻結果介於 0.10 及 0.13 μg/cm² 時，無法確定塗層是否含有六價鉻。(The result between 0.10 μg/cm² and 0.13 μg/cm² is considered to be inconclusive - unavoidable coating variations may influence the determination.)
7. 除非另有說明，參照ILAC-G8:09/2019，採用簡單二元(w=0)允收規則進行符合性判定；根據此規則，符合性結果之判定係以測試結果與限值做比較。(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. According to this rule, the judgement of conformity is based on the comparing test results with limits.)

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昕慶股份有限公司 (SIN CHIN CO., LTD.)
桃園市中壢區東園路41號 (NO.41, DONGYUAN RD, ZHONGLI DIST., TAOYUAN CITY 320, TAIWAN (R.O.C.))

PFAS Remark：

現有PFAS定量技術是分析PFAS物質的特定結構，但同碳數族群之PFAS酸及鹽類物質，其可被辨識的特定結構相同，因此無法區別所分析的特定結構是來自酸或者鹽類，故測試結果為同碳數族群之PFAS之酸及鹽類物質的濃度總合。下表PFAS物質濃度皆已包含在測試結果中，相關資訊請參見下表：(下表列舉PFAS物質僅為範例，並不包含所有同碳數族群之PFAS鹽類。)
(The quantitative technology of PFAS is to analyze the specific structure of PFAS substances. However, PFAS acid and its salts with the same carbon number group have the same specific structure that can be identified. The tested results of the analyzed specific structure cannot be distinguished to identify the contribution from PFAS acid or its salts. Therefore, the tested results display the sum of concentrations of PFAS acids and its salts with the same carbon number group. The concentration of PFAS substances in the below table have been included in the tested results, please refer to the table for relevant information: (The listed PFAS substances are examples only, it do not include all PFAS salts with the same carbon number group.))

群組名稱 (Group Name)	物質名稱 (Substance Name)	CAS No.
PFOS, 及其鹽&衍生物 (PFOS, its salts & derivatives)	全氟辛烷磺酸 (Perfluorooctane sulfonates) (PFOS)	1763-23-1
	全氟辛基磺酸鉀 (PFOS-K) Potassium perfluorooctanesulfonate (PFOS-K)	2795-39-3
	全氟辛基磺酸鋰 (PFOS-Li) Perfluorooctanesulfonic acid, lithium salt (PFOS-Li)	29457-72-5
	全氟辛基磺酸銨 (PFOS-NH_4) Perfluorooctanesulfonic acid, ammonium salt (PFOS-NH_4)	29081-56-9
	全氟辛基磺酸二乙醇銨 (PFOS-$NH(OH)_2$) Perfluorooctane sulfonate diethanolamine salt (PFOS-$NH(OH)_2$)	70225-14-8
	全氟辛基磺酸四乙基銨 (PFOS-$N(C_2H_5)_4$) Perfluorooctanesulfonic acid,tetraethylammonium salt (PFOS-$N(C_2H_5)_4$)	56773-42-3
	全氟辛基磺酸二癸二甲基銨 (PFOS-DDA) N-decyl-N,N-dimethyldecan-1-aminium 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctane-1-sulfonate (PFOS-DDA)	251099-16-8

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測試報告
Test Report

昕慶股份有限公司 (SIN CHIN CO., LTD.)
桃園市中壢區東園路41號 (NO.41, DONGYUAN RD, ZHONGLI DIST., TAOYUAN CITY 320, TAIWAN (R.O.C.))

群組名稱 (Group Name)	物質名稱 (Substance Name)	CAS No.
PFOS, 及其鹽&衍生物 (PFOS, its salts & derivatives)	全氟辛基磺醯氟 (POSF) Perfluorooctane sulfonyl fluoride (POSF)	307-35-7
	全氟辛基磺酸鎂 (PFOS-Mg) Perfluorooctanesulfonic acid, magnesium salt (PFOS-Mg)	91036-71-4
	全氟辛基磺酸鈉 (PFOS-Na) Perfluorooctanesulfonic acid, sodium salt (PFOS-Na)	4021-47-0
	全氟辛烷磺酸哌啶 Piperidine 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctanesulfonate	71463-74-6
PFOA, 及其鹽&衍生物 (PFOA, its salts & derivatives)	全氟辛酸 (Perfluorooctanoic acid) (PFOA)	335-67-1
	全氟辛酸鈉 (PFOA-Na) Sodium perfluorooctanoate (PFOA-Na)	335-95-5
	全氟辛酸鉀 (PFOA-K) Potassium perfluorooctanoate (PFOA-K)	2395-00-8
	全氟辛酸銀 (PFOA-Ag) Silver perfluorooctanote (PFOA-Ag)	335-93-3
	全氟辛氟 (PFOA-F) Perfluorooctanoyl fluoride (PFOA-F)	335-66-0
	全氟辛酸銨 (APFO) Ammonium pentadecafluorooctanoate (APFO)	3825-26-1
	全氟辛酸鋰 (PFOA-Li) Lithium perfluorooctanoate (PFOA-Li)	17125-58-5

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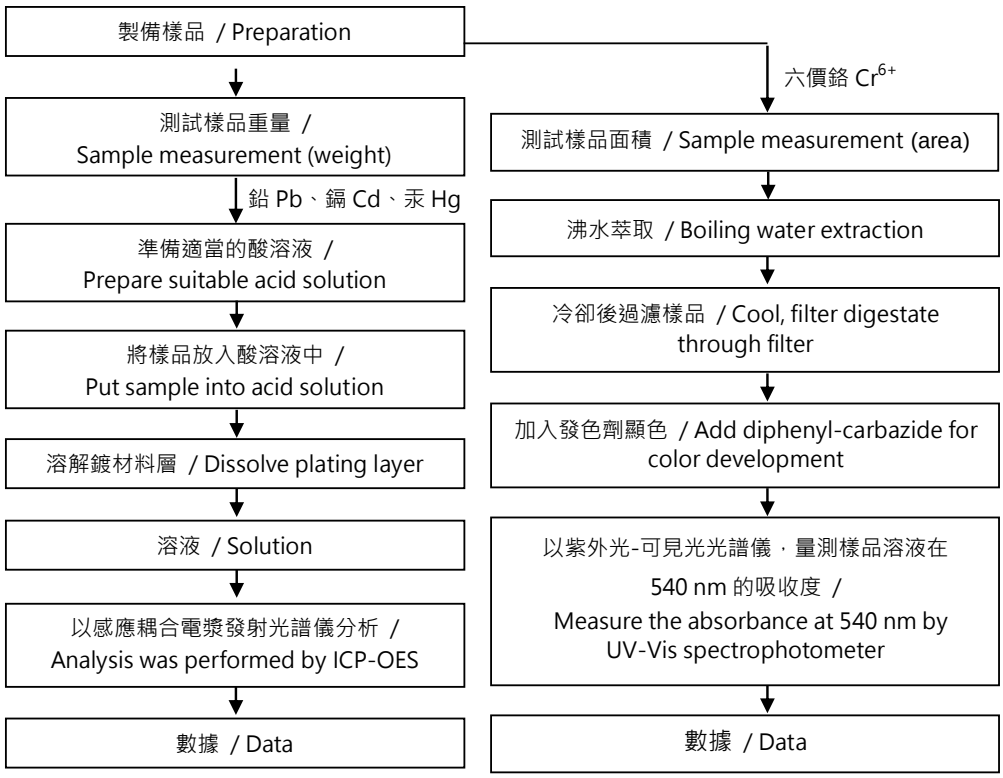
鍍層重金屬測試流程圖 / Flow chart of stripping method for metal analysis

根據以下的流程圖之條件，樣品之外部鍍層已完全溶解。(六價鉻測試方法除外) / The plating layer of samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr^{6+} test method excluded)



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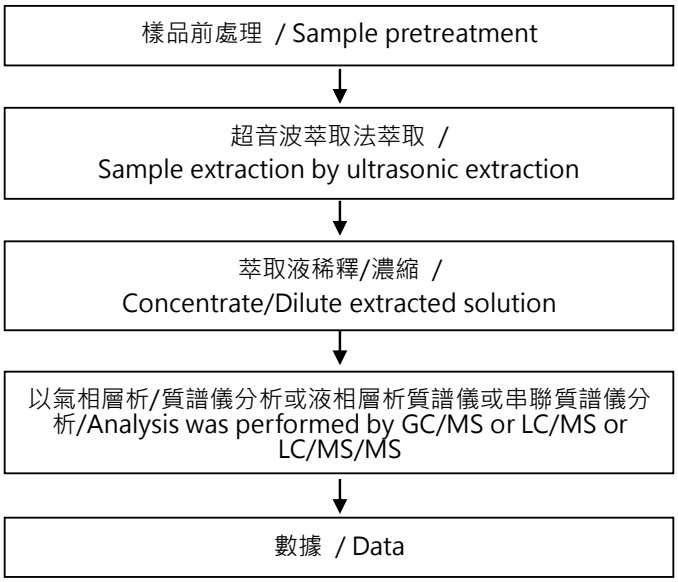
全氟化合物(包含全氟辛酸/全氟辛烷磺酸/其相關化合物等等)分析流程圖 / Analytical flow chart – PFAS (including PFOA/PFOS/its related compound, etc.)



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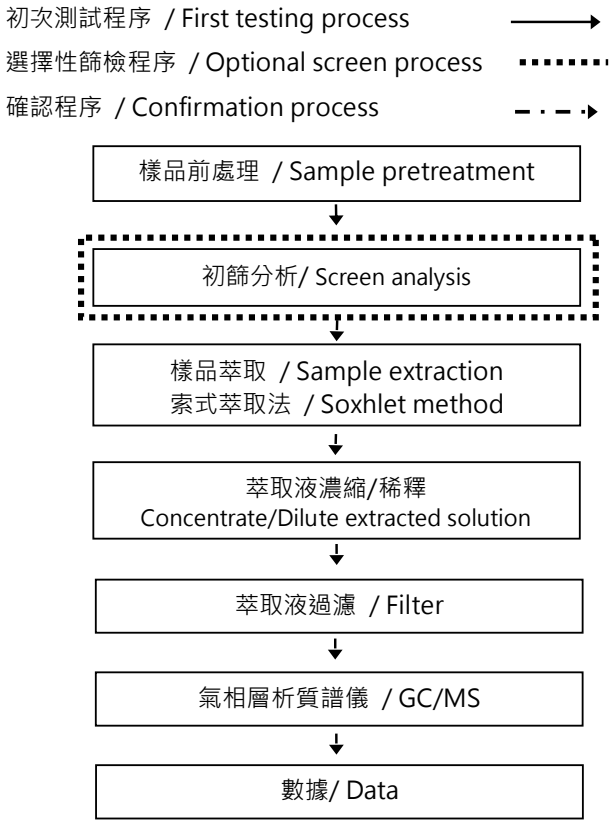
多溴聯苯/多溴聯苯醚分析流程圖 / Analytical flow chart - PBBs/PBDEs



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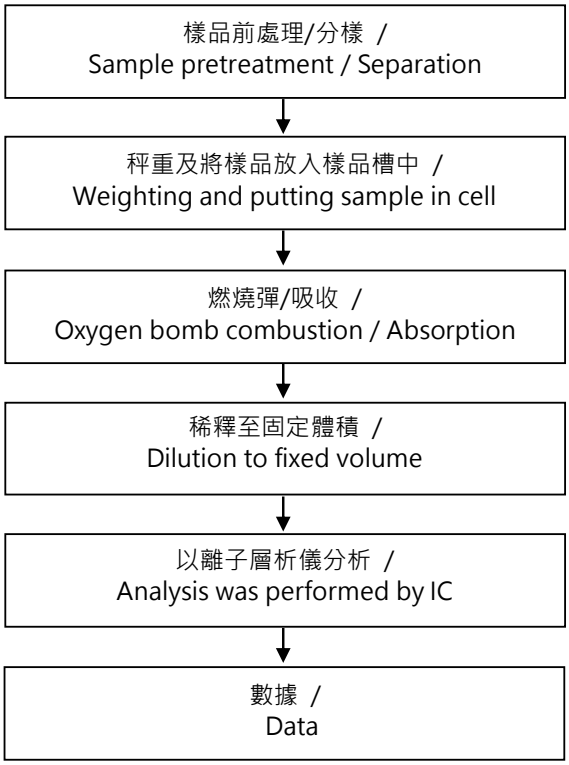
鹵素分析流程圖 / Analytical flow chart - Halogen



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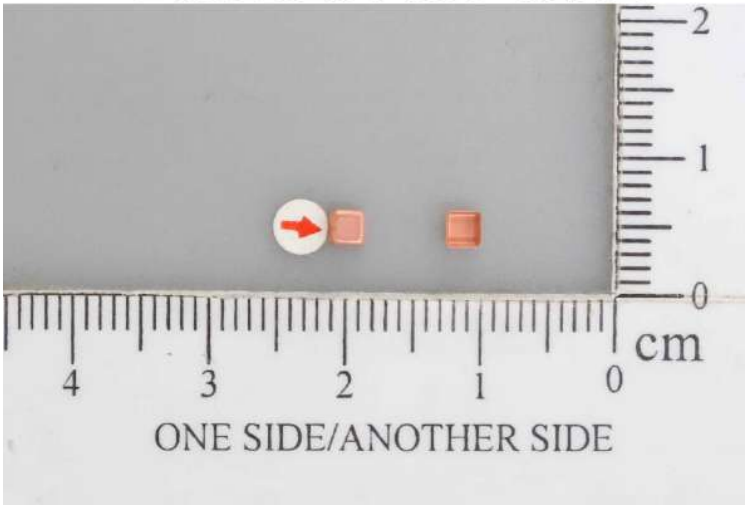
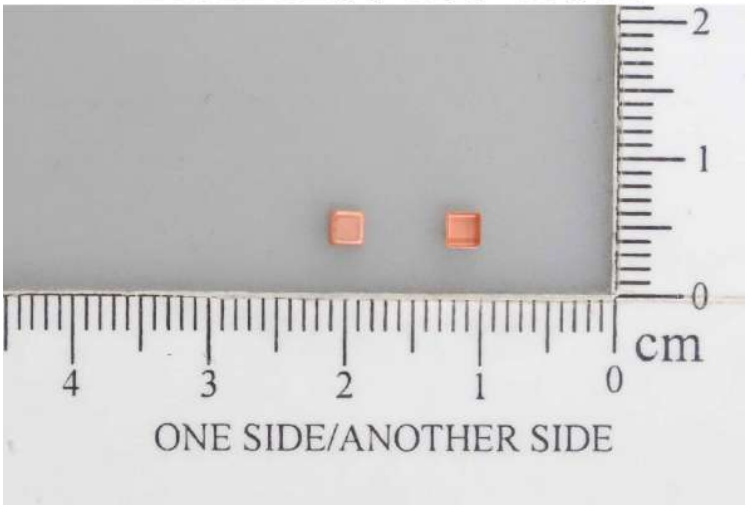
*** 照片中如有箭頭標示，則表示為實際檢測之樣品/部位. ***
(The tested sample / part is marked by an arrow if it's shown on the photo.)

ETR24100480 NO.1



ETR24100480 NO.2



** 報告結尾 (End of Report) **

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測試報告
Test Report

號碼(No.): ETR24100479　　日期(Date): 10-Jan-2024　　

昕慶股份有限公司 (SIN CHIN CO., LTD.)
桃園市中壢區東園路41號 (NO.41, DONGYUAN RD, ZHONGLI DIST., TAOYUAN CITY 320, TAIWAN (R.O.C.))

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 the applicant as)：

送樣廠商(Sample Submitted By)　：　昕慶股份有限公司 (SIN CHIN CO., LTD.)
樣品名稱(Sample Name)　：　CAP SILVER PLATED LAYER (CAP 鍍銀層)

==========

收件日(Sample Receiving Date)　：　02-Jan-2024
測試期間(Testing Period)　：　02-Jan-2024 to 10-Jan-2024

測試需求(Test Requested)　：
(1) 依據客戶指定，參考RoHS指令2011/65/EU Annex II測試鎘、鉛、汞、六價鉻、多溴聯苯、多溴聯苯醚。 (As specified by client, with reference to RoHS Directive 2011/65/EU Annex II to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs 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、多溴聯苯醚的測試結果符合RoHS 2011/65/EU Annex II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 comply with the limits as set by RoHS Directive 2011/65/EU Annex II.)

Troy Chang / Department Manager
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory - Taipei

CHECK REPORT
PIN CODE: 2EDBB2B9

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測試報告
Test Report

昕慶股份有限公司 (SIN CHIN CO., LTD.)
桃園市中壢區東園路41號 (NO.41, DONGYUAN RD, ZHONGLI DIST., TAOYUAN CITY 320, TAIWAN (R.O.C.))

測試部位敘述 (Test Part Description)

No.1 : 銀色金屬鍍層 (PLATING LAYER OF SILVER COLORED METAL)
No.2 : 銀色金屬 (含鍍層) (SILVER COLORED METAL (INCLUDING THE PLATING LAYER))

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	No.2	
鎘 (Cd) (Cadmium (Cd))	酸洗脫鍍層，參考IEC 62321-5: 2013，以感應耦合電漿發射光譜儀分析。(IEC 62321-5: 2013 application of modified digestion by surface etching, analysis was performed by ICP-OES.)	mg/kg	2	n.d.	---	100
鉛 (Pb) (Lead (Pb))		mg/kg	2	6.73	---	1000
汞 (Hg) (Mercury (Hg))	酸洗脫鍍層，參考IEC 62321-4: 2013+AMD1: 2017，以感應耦合電漿發射光譜儀分析。(IEC 62321-4: 2013+AMD1: 2017 application of modified digestion by surface etching, analysis was performed by ICP-OES.)	mg/kg	2	n.d.	---	1000
六價鉻 (Hexavalent Chromium) Cr(VI) (#2)	參考IEC 62321-7-1: 2015，以紫外光-可見光分光光度計分析。(With reference to IEC 62321-7-1: 2015, analysis was performed by UV-VIS.)	μg/cm²	0.1	n.d.	---	-
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

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測試報告
Test Report

號碼(No.): ETR24100479 日期(Date): 10-Jan-2024

昕慶股份有限公司 (SIN CHIN CO., LTD.)
桃園市中壢區東園路41號 (NO.41, DONGYUAN RD, ZHONGLI DIST., TAOYUAN CITY 320, TAIWAN (R.O.C.))

測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result)		限值 (Limit)
				No.1	No.2	
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
全氟辛烷磺酸及其鹽類 (PFOS and its salts) (CAS No.: 1763-23-1 and its salts)	參考US EPA 3550C: 2007，以液相層析串聯質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by LC/MS/MS.)	μg/m²	0.5	n.d.	---	-
全氟辛酸及其鹽類 (PFOA and its salts) (CAS No.: 335-67-1 and its salts)	參考US EPA 3550C: 2007，以液相層析串聯質譜儀分析。(With reference to US EPA 3550C: 2007, analysis was performed by LC/MS/MS.)	μg/m²	0.5	n.d.	---	-
氟 (F) (Fluorine (F)) (CAS No.: 14762-94-8)	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	---	n.d.	-
氯 (Cl) (Chlorine (Cl)) (CAS No.: 22537-15-1)	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	---	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	---	n.d.	-
碘 (I) (Iodine (I)) (CAS No.: 14362-44-8)	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	---	n.d.	-

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備註(Note)：

1. mg/kg = ppm；0.1wt% = 0.1% = 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. "---" = Not Conducted (未測試項目)
6. (#2) =
   a. 當六價鉻結果大於0.13 μg/cm²，表示樣品表層含有六價鉻。(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. 當六價鉻結果為n.d. (濃度小於0.10 μg/cm²)，表示表層不含六價鉻。(The sample is negative for Cr(VI) if Cr(VI) is n.d. (concentration less than 0.10 μg/cm²). The coating is considered a non-Cr(VI) based coating)
   c. 當六價鉻結果介於 0.10 及 0.13 μg/cm² 時，無法確定塗層是否含有六價鉻。(The result between 0.10 μg/cm² and 0.13 μg/cm² is considered to be inconclusive - unavoidable coating variations may influence the determination.)
7. 除非另有說明，參照ILAC-G8:09/2019，採用簡單二元(w=0)允收規則進行符合性判定；根據此規則，符合性結果之判定係以測試結果與限值做比較。(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. According to this rule, the judgement of conformity is based on the comparing test results with limits.)

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PFAS Remark：

現有PFAS定量技術是分析PFAS物質的特定結構，但同碳數族群之PFAS酸及鹽類物質，其可被辨識的特定結構相同，因此無法區別所分析的特定結構是來自酸或者鹽類，故測試結果為同碳數族群之PFAS之酸及鹽類物質的濃度總合。下表PFAS物質濃度皆已包含在測試結果中，相關資訊請參見下表：(下表列舉PFAS物質僅為範例，並不包含所有同碳數族群之PFAS鹽類。)
(The quantitative technology of PFAS is to analyze the specific structure of PFAS substances. However, PFAS acid and its salts with the same carbon number group have the same specific structure that can be identified. The tested results of the analyzed specific structure cannot be distinguished to identify the contribution from PFAS acid or its salts. Therefore, the tested results display the sum of concentrations of PFAS acids and its salts with the same carbon number group. The concentration of PFAS substances in the below table have been included in the tested results, please refer to the table for relevant information: (The listed PFAS substances are examples only, it do not include all PFAS salts with the same carbon number group.))

群組名稱 (Group Name)	物質名稱 (Substance Name)	CAS No.
PFOS, 及其鹽&衍生物 (PFOS, its salts & derivatives)	全氟辛烷磺酸 (Perfluorooctane sulfonates) (PFOS)	1763-23-1
	全氟辛基磺酸鉀 (PFOS-K) Potassium perfluorooctanesulfonate (PFOS-K)	2795-39-3
	全氟辛基磺酸鋰 (PFOS-Li) Perfluorooctanesulfonic acid, lithium salt (PFOS-Li)	29457-72-5
	全氟辛基磺酸銨 (PFOS-NH_4) Perfluorooctanesulfonic acid, ammonium salt (PFOS-NH_4)	29081-56-9
	全氟辛基磺酸二乙醇銨 (PFOS-$NH(OH)_2$) Perfluorooctane sulfonate diethanolamine salt (PFOS-$NH(OH)_2$)	70225-14-8
	全氟辛基磺酸四乙基銨 (PFOS-$N(C_2H_5)_4$) Perfluorooctanesulfonic acid,tetraethylammonium salt (PFOS-$N(C_2H_5)_4$)	56773-42-3
	全氟辛基磺酸二癸二甲基銨 (PFOS-DDA) N-decyl-N,N-dimethyldecan-1-aminium 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctane-1-sulfonate (PFOS-DDA)	251099-16-8

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群組名稱 (Group Name)	物質名稱 (Substance Name)	CAS No.
PFOS, 及其鹽&衍生物 (PFOS, its salts & derivatives)	全氟辛基磺醯氟 (POSF) Perfluorooctane sulfonyl fluoride (POSF)	307-35-7
	全氟辛基磺酸鎂 (PFOS-Mg) Perfluorooctanesulfonic acid, magnesium salt (PFOS-Mg)	91036-71-4
	全氟辛基磺酸鈉 (PFOS-Na) Perfluorooctanesulfonic acid, sodium salt (PFOS-Na)	4021-47-0
	全氟辛烷磺酸哌啶 Piperidine 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctanesulfonate	71463-74-6
PFOA, 及其鹽&衍生物 (PFOA, its salts & derivatives)	全氟辛酸 (Perfluorooctanoic acid) (PFOA)	335-67-1
	全氟辛酸鈉 (PFOA-Na) Sodium perfluorooctanoate (PFOA-Na)	335-95-5
	全氟辛酸鉀 (PFOA-K) Potassium perfluorooctanoate (PFOA-K)	2395-00-8
	全氟辛酸銀 (PFOA-Ag) Silver perfluorooctanote (PFOA-Ag)	335-93-3
	全氟辛氟 (PFOA-F) Perfluorooctanoyl fluoride (PFOA-F)	335-66-0
	全氟辛酸銨 (APFO) Ammonium pentadecafluorooctanoate (APFO)	3825-26-1
	全氟辛酸鋰 (PFOA-Li) Lithium perfluorooctanoate (PFOA-Li)	17125-58-5

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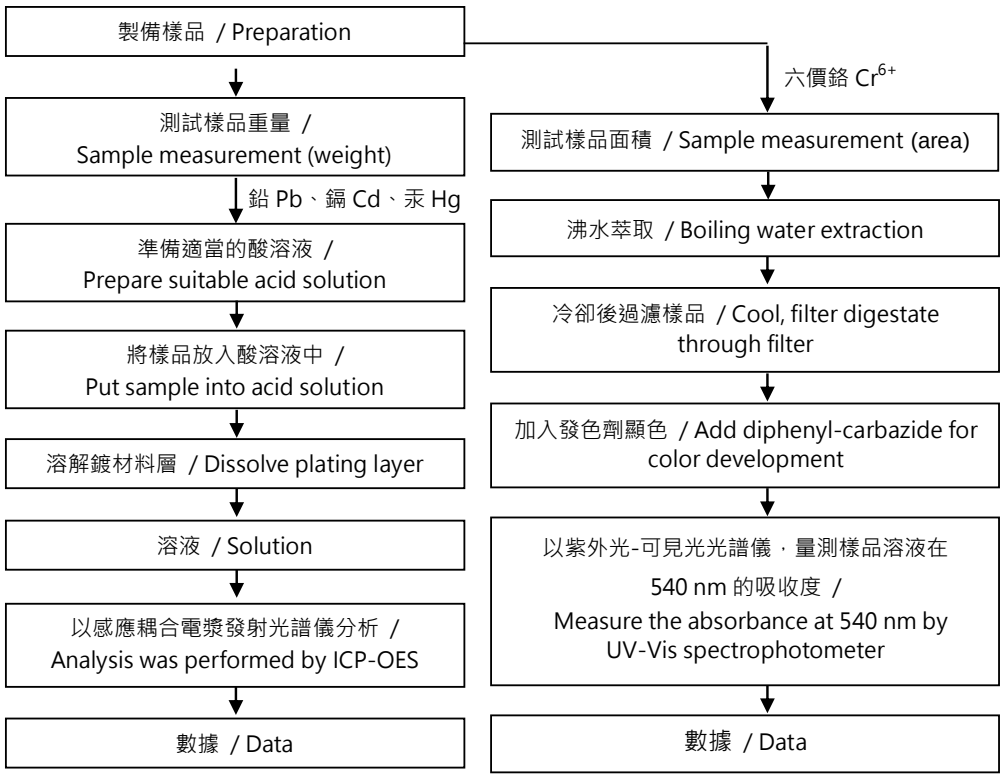
鍍層重金屬測試流程圖 / Flow chart of stripping method for metal analysis

根據以下的流程圖之條件，樣品之外部鍍層已完全溶解。(六價鉻測試方法除外) / The plating layer of samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr^{6+} test method excluded)



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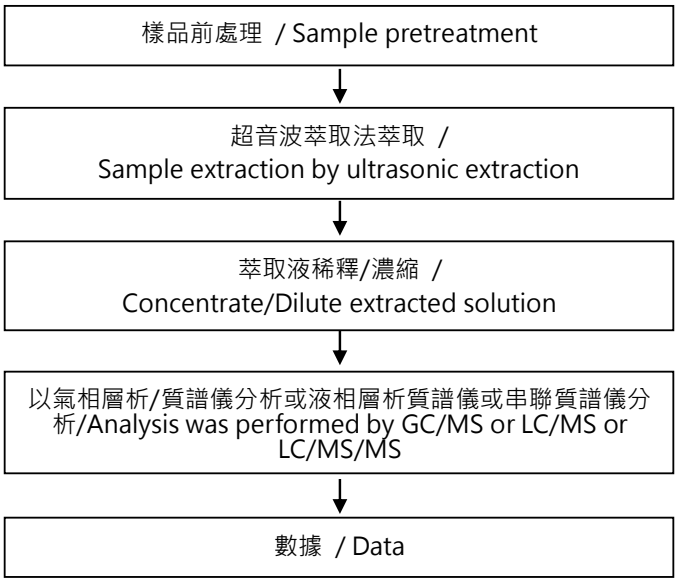
全氟化合物(包含全氟辛酸/全氟辛烷磺酸/其相關化合物等等)分析流程圖 / Analytical flow chart – PFAS (including PFOA/PFOS/its related compound, etc.)



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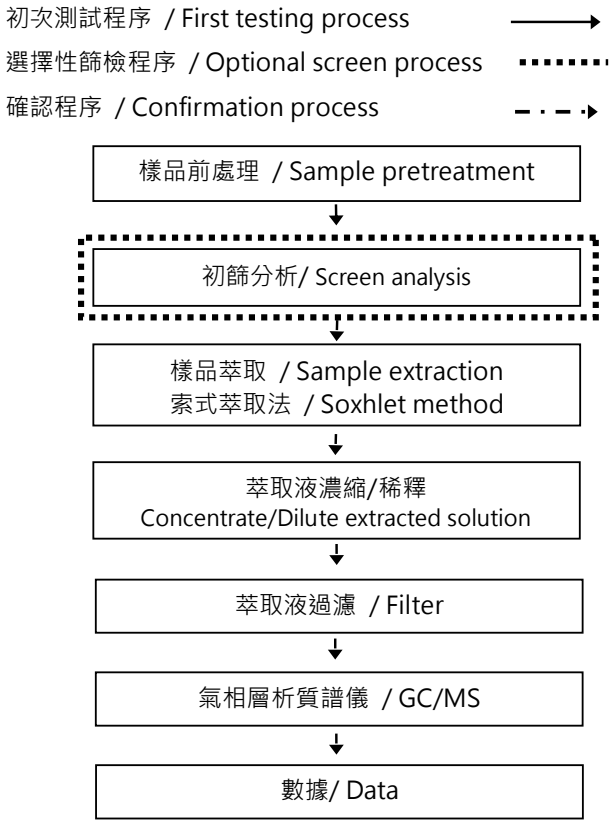
多溴聯苯/多溴聯苯醚分析流程圖 / Analytical flow chart - PBBs/PBDEs



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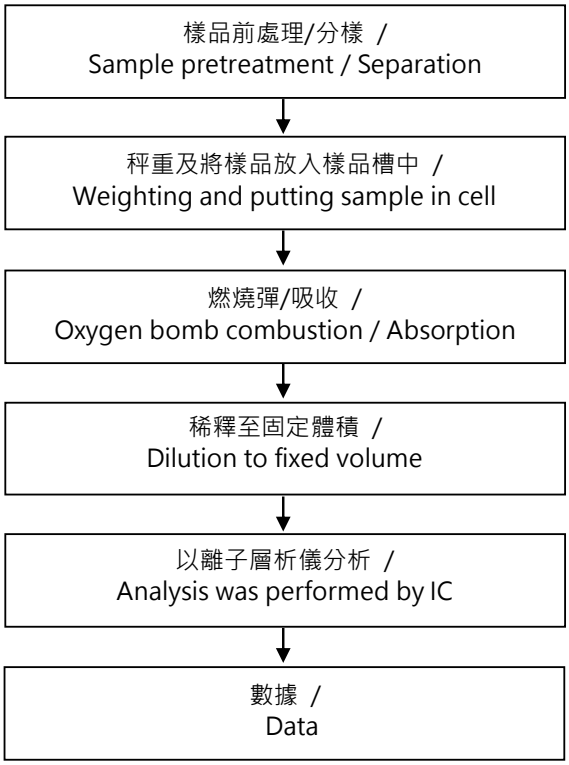
鹵素分析流程圖 / Analytical flow chart - Halogen



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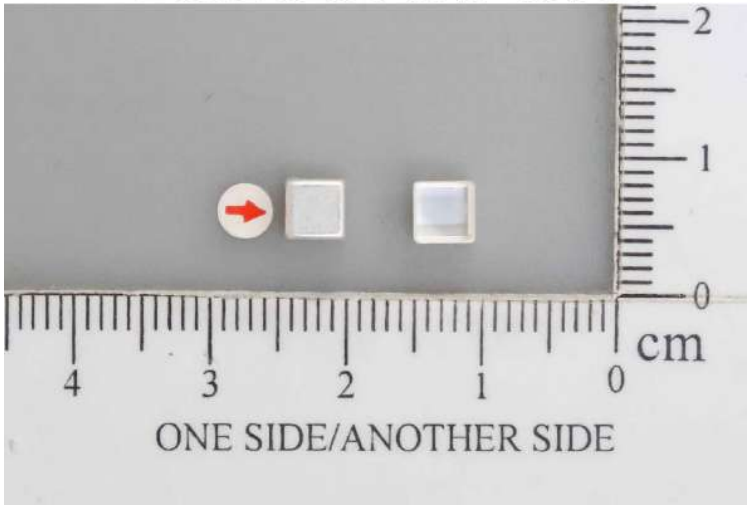
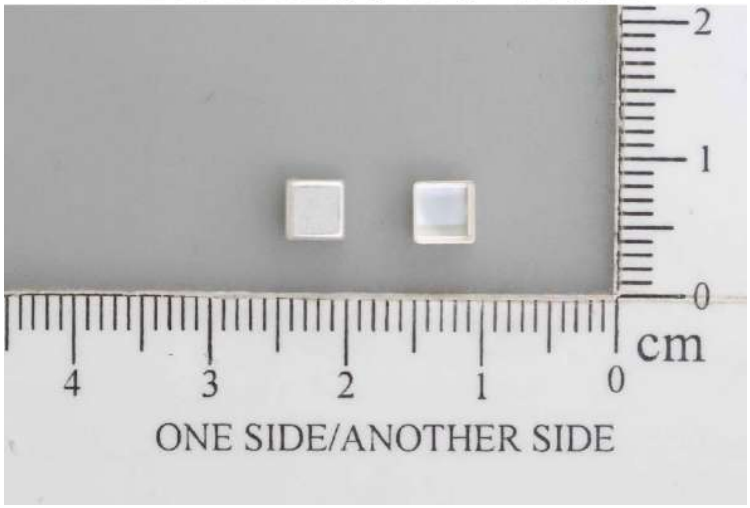
*** 照片中如有箭頭標示，則表示為實際檢測之樣品/部位. ***
(The tested sample / part is marked by an arrow if it's shown on the photo.)

ETR24100479 NO.1



ETR24100479 NO.2



** 報告結尾 (End of Report) **

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Test Report

No.: CANEC24001397203 **Date:** Feb 01, 2024

Client Name: LITTELFUSE PHILS.INC.

Client Address: LIMA TECHNOLOGY CENTER,MALVAR,BATANGAS,PHILIPPINES

Sample Name: Square Body

Material No.: 909-434

The above sample(s) and information were provided by the client.

SGS Job No.: SZP24-002413

Sample Receiving Date: Jan 18, 2024

Testing Period: Jan 18, 2024 ~ Jan 31, 2024

Test Requested: Select 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).

Test Requirement	Conclusion
EU RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU - Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE), Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)	Pass
Perfluorooctane Sulfonates (PFOS) and its derivatives and Perfluorooctanoic Acid (PFOA) and its salts	See Results
Halogen	See Results
Element(s)	See Results
PCBs	See Results

Signed for and on behalf of
SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch

Kelly Qu
Approved Signatory

scan to see the report
EE3FF456

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Attention: To check the authenticity of testing /inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

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中国·广东·广州高新技术产业开发区科学城科珠路198号 邮编: 510663
t (86-20) 82155555 www.sgsgroup.com.cn
t (86-20) 82155555 sgs.china@sgs.com

Test Result(s):

Test Part Description：

SN ID	Sample No.	SGS Sample ID	Description
SN1	A4	CAN24-0013972-0001.C004	Beige part

Remarks:

(1) 1 mg/kg = 1 ppm = 0.0001%
(2) MDL = Method Detection Limit
(3) ND = Not Detected (< MDL)
(4) "-" = Not Regulated

EU RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU - Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE), Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)

Test Method: With reference to IEC 62321-4:2013+AMD1:2017, IEC 62321-5:2013, IEC 62321-7-2:2017, IEC 62321-6:2015 and IEC 62321-8:2017, analysis was performed by ICP-OES/AAS, UV-Vis and GC-MS.

Test Item(s)	Limit	Unit(s)	MDL	A4
Lead (Pb)	1000	mg/kg	2	5
Mercury (Hg)	1000	mg/kg	2	ND
Cadmium (Cd)	100	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))	1000	mg/kg	8	ND
Polybrominated biphenyls (PBB)	1000	mg/kg	-	ND
Monobrominated biphenyl (MonoBB)	-	mg/kg	5	ND
Dibrominated biphenyl (DiBB)	-	mg/kg	5	ND
Tribrominated biphenyl (TriBB)	-	mg/kg	5	ND
Tetrabrominated biphenyl (TetraBB)	-	mg/kg	5	ND
Pentabrominated biphenyl (PentaBB)	-	mg/kg	5	ND
Hexabrominated biphenyl (HexaBB)	-	mg/kg	5	ND
Heptabrominated biphenyl (HeptaBB)	-	mg/kg	5	ND
Octabrominated biphenyl (OctaBB)	-	mg/kg	5	ND
Nonabrominated biphenyl (NonaBB)	-	mg/kg	5	ND
Decabrominated biphenyl (DecaBB)	-	mg/kg	5	ND
Polybrominated diphenyl ethers (PBDE)	1000	mg/kg	-	ND
Monobrominated diphenyl ether (MonoBDE)	-	mg/kg	5	ND
Dibrominated diphenyl ether (DiBDE)	-	mg/kg	5	ND
Tribrominated diphenyl ether (TriBDE)	-	mg/kg	5	ND
Tetrabrominated diphenyl ether (TetraBDE)	-	mg/kg	5	ND
Pentabrominated diphenyl ether (PentaBDE)	-	mg/kg	5	ND
Hexabrominated diphenyl ether (HexaBDE)	-	mg/kg	5	ND
Heptabrominated diphenyl ether (HeptaBDE)	-	mg/kg	5	ND

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Test Item(s)	Limit	Unit(s)	MDL	A4
Octabrominated diphenyl ether (OctaBDE)	-	mg/kg	5	ND
Nonabrominated diphenyl ether (NonaBDE)	-	mg/kg	5	ND
Decabrominated diphenyl ether (DecaBDE)	-	mg/kg	5	ND
Bis(2-ethylhexyl) phthalate (DEHP)	1000	mg/kg	50	ND
Butyl benzyl phthalate (BBP)	1000	mg/kg	50	ND
Dibutyl phthalate (DBP)	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.
(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.

Perfluorooctane Sulfonates (PFOS) and its derivatives and Perfluorooctanoic Acid (PFOA) and its salts

Test Method: Modified CEN/TS 15968:2010, analysis was performed by HPLC-MS or LC-MS/MS.

Test Item(s)	CAS No.	Unit(s)	MDL	A4
PFOS and its derivatives	-	mg/kg	-	ND
Perfluorooctane Sulfonates (PFOS) and its salts*	1763-23-1	mg/kg	0.010	ND
N-ethylperfluoro-1-octanesulfonamide (N-EtFOSA)	4151-50-2	mg/kg	0.010	ND
N-methylperfluoro-1-octanesulfonamide (N-MeFOSA)	31506-32-8	mg/kg	0.010	ND
2-(N-ethylperfluoro-1-octanesulfonamido) -ethanol (N-EtFOSE)	1691-99-2	mg/kg	0.010	ND
2-(N-methylperfluoro-1-octanesulfonamido) -ethanol (N-MeFOSE)	24448-09-7	mg/kg	0.010	ND
Perfluorooctane Sulfonamide (PFOSA)	754-91-6	mg/kg	0.010	ND
Perfluorooctanoic Acid (PFOA) and its salts*	335-67-1	mg/kg	0.010	ND

Notes:
(1) Perfluorooctanoic acid (PFOA) and its salts* including PFOA (CAS No. 335-67-1), APFO (CAS No. 3825-26-1), PFOA-Na (CAS No. 335-95-5), PFOA-K (CAS No. 2395-00-8), PFOA-Ag (CAS No. 335-93-3) and PFOA-F (CAS No. 335-66-0). The result of PFOA is used to represent PFOA and its salts.
(2) Perfluorooctane sulfonates (PFOS) and its salts* including PFOS (CAS No. 1763-23-1), POSF(CAS No. 307-35-7), PFOS-K (CAS No. 2795-39-3), PFOS-NH_4 (CAS No. 29081-56-9), PFOS-$N(C_{10}H_{21})_2(CH_3)_2$ (CAS No. 251099-16-8), PFOS-$NH_2(C_2H_4OH)_2$ (CAS No. 70225-14-8), PFOS-Li (CAS No. 29457-72-5), PFOS-$N(C_2H_5)_4$ (CAS No. 56773-42-3) and PFOS-Na (CAS No. 4021-47-0). The result of PFOS is used to represent PFOS and its salts.

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SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch Technical Services Technical Laboratory

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(3) Method(s) is/are not accredited by CNAS.

Halogen

Test Method: With reference to EN 14582:2016, analysis was performed by IC.

Test Item(s)	Unit(s)	MDL	A4
Fluorine(F)	mg/kg	20	ND
Chlorine(Cl)	mg/kg	50	ND
Bromine(Br)	mg/kg	50	ND
Iodine(I)	mg/kg	50	ND

Element(s)

Test Method: With reference to US EPA 3052:1996, analysis was performed by ICP-OES/AAS.

Test Item(s)	Unit(s)	MDL	A4
Arsenic(As)	mg/kg	10	ND
Beryllium(Be)	mg/kg	5	ND
Antimony(Sb)	mg/kg	10	ND

Notes:
(1) Method(s) is/are not accredited by CNAS.

PCBs

Test Method: SGS In-house method (GZTC CHEM-TOP-032-01, with reference to EPA 8082A:2007), analysis was performed by GC-ECD/GC-MS.

Test Item(s)	CAS No.	Unit(s)	MDL	A4
PCBs	-	mg/kg	-	ND
2,4,4'-Trichlorobiphenyl(PCB28)	7012-37-5	mg/kg	0.5	ND
2,2',5,5'-Tetrachlorobiphenyl(PCB52)	35693-99-3	mg/kg	0.5	ND
2,2',4,5,5'-Pentachlorobiphenyl(PCB101)	37680-73-2	mg/kg	0.5	ND
2,3',4,4',5-Pentachlorobiphenyl(PCB118)	31508-00-6	mg/kg	0.5	ND
2,2',3,4,4',5'-Hexachlorobiphenyl(PCB138)	35065-28-2	mg/kg	0.5	ND
2,2',4,4',5,5'-Hexachlorobiphenyl(PCB153)	35065-27-1	mg/kg	0.5	ND
2,2',3,4,4',5,5'-Heptachlorobiphenyl(PCB180)	35065-29-3	mg/kg	0.5	ND
Sum of 6 PCBs(PCB28、PCB52、PCB101、PCB138、PCB153、PCB180)	-	mg/kg	-	ND
Sum of PCBs	-	mg/kg	-	ND

Notes:
(1) Method(s) is/are not accredited by CNAS.

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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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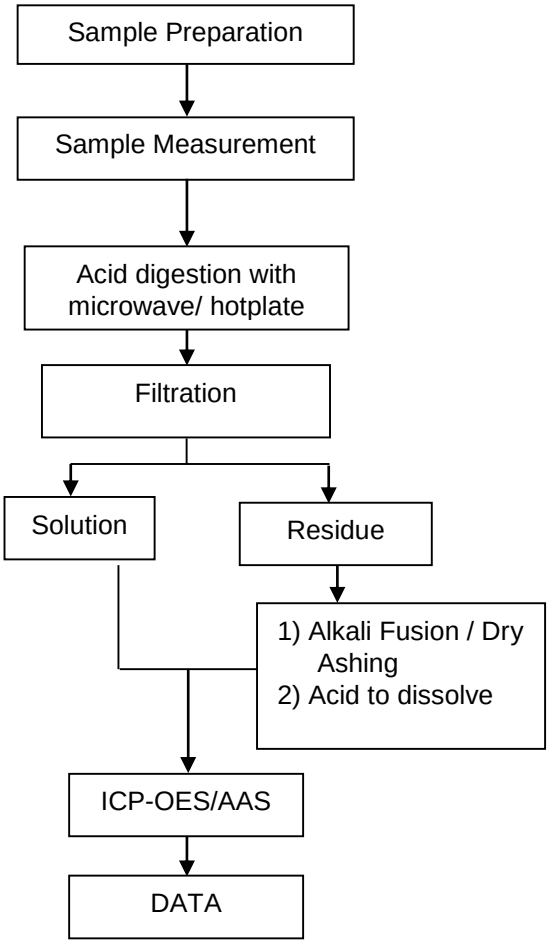
Elements Testing Flow Chart

These samples were dissolved totally by pre-conditioning method according to below flow chart.



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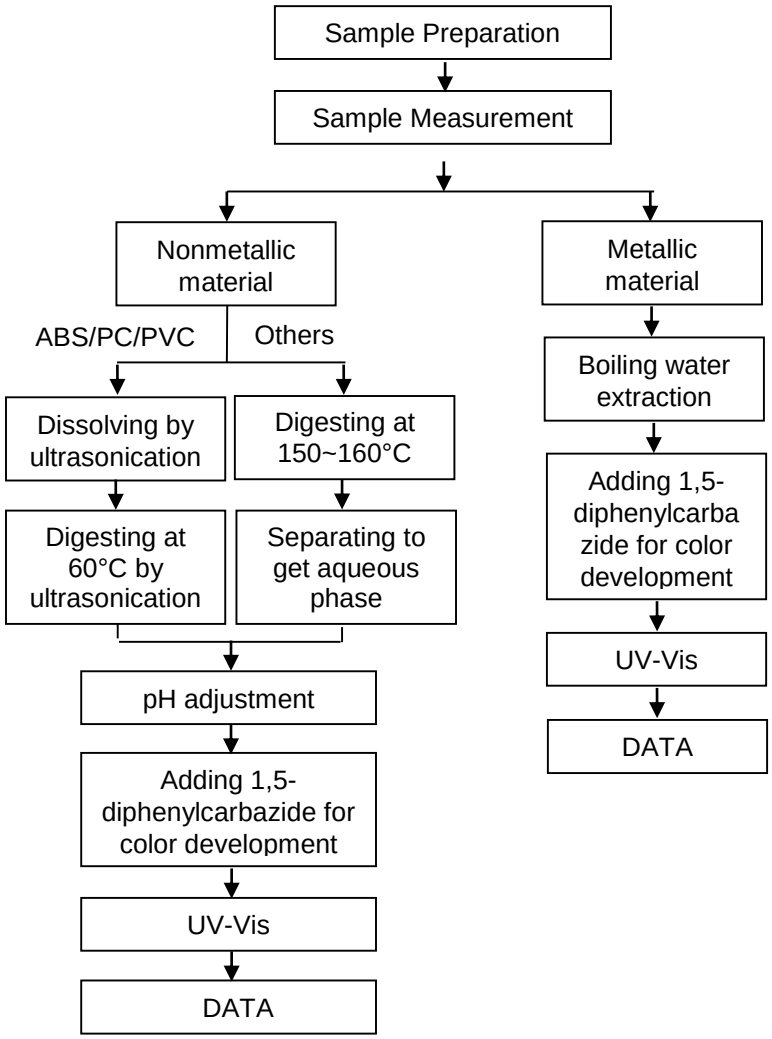
Hexavalent Chromium (Cr(VI)) Testing Flow Chart



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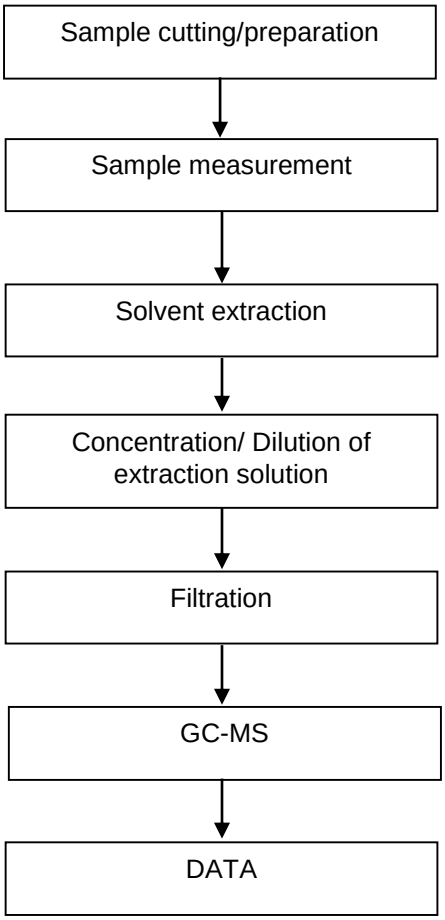
PBB/PBDE Testing Flow Chart



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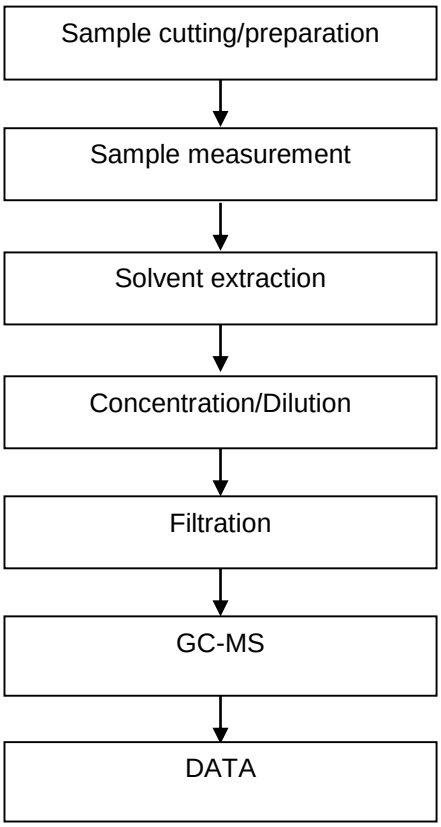
Phthalates Testing Flow Chart



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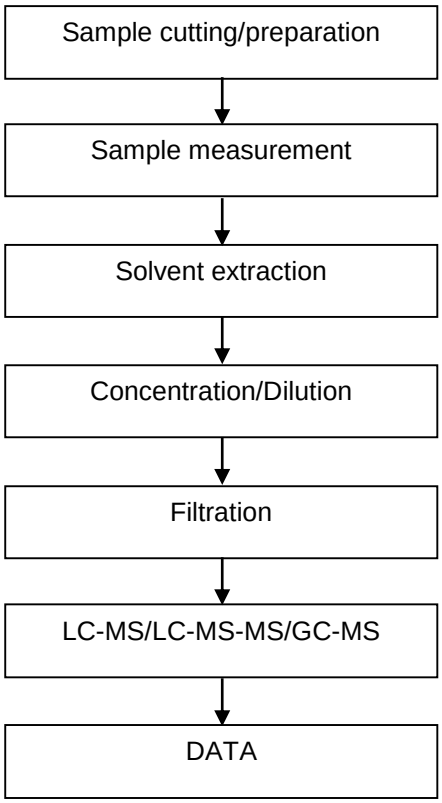
PFASs/ PFOS/PFOA Testing Flow Chart



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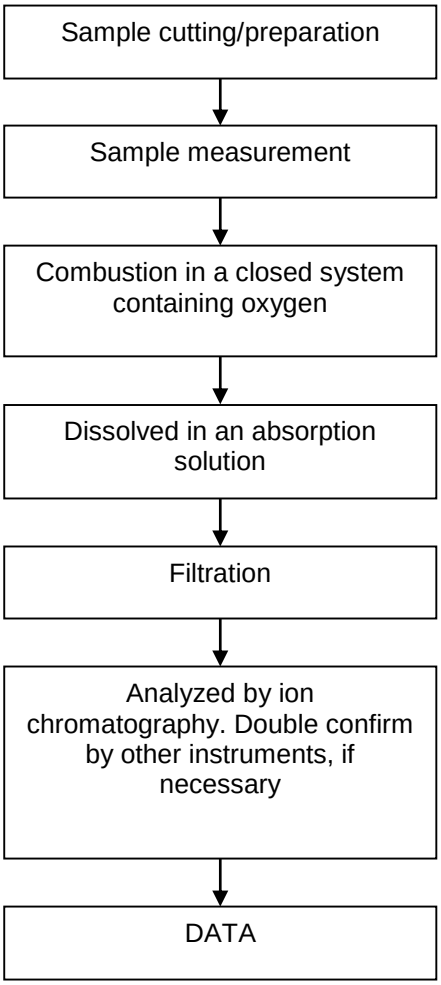
Halogen Testing Flow Chart



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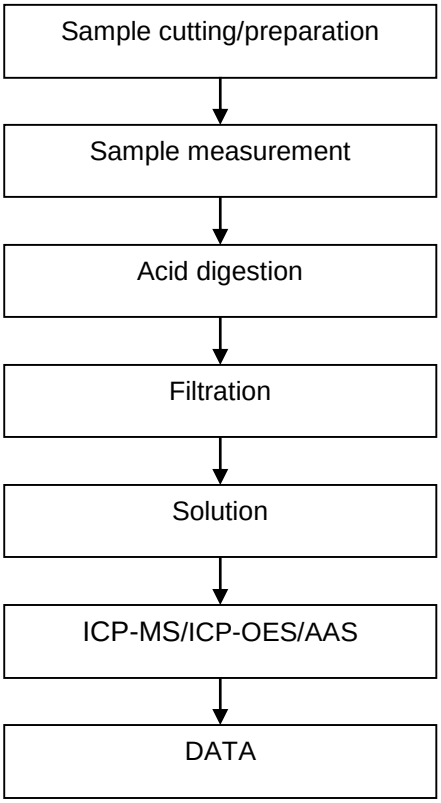
Elements Testing Flow Chart



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Sample Photo:



CAN24-0013972-0001.C004

SGS authenticate the photo on original report only

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Test Report

Number : TWNC01240458

Issue Date : Feb 01, 2024

Applicant: Littelfuse Philippines Inc
LIMA Technology Center, SEZ,
Lipa City-Malvar, Batangas,
Philippines.

Sample Description:

One (1) Group of Submitted Samples Said To Be :

Part Description	: Black Ink (cured)
Part Number	: 425809
Date Sample Received	: Jan 19, 2024
Date Test Started	: Jan 19, 2024

Test Conducted :

As requested by the applicant, for details please refer to attached pages.

Authorized By:
On behalf of Intertek Testing Services Taiwan Limited

Matt Wang
General Manager

Signed by:

Thomas Chou
Manager

Intertek Testing Services Taiwan Ltd.
全國公證檢驗股份有限公司

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Taipei, 114690, Taiwan, R.O.C.
114690 台北市內湖區瑞光路 423 號 8 樓

Tel: (+886-2) 6602-2888 · 2797-8885
Fax: (+886-2) 6602-2420
www.intertek-twn.com

Test Conducted :

Test Result Summary:

Test Item	Unit	Test Method	Result Submitted samples	RL
Heavy Metal				
Cadmium (Cd) Content	ppm	With reference to IEC 62321-5: 2013, by microwave or acid digestion and determined by ICP-OES.	ND	2
Lead (Pb) Content	ppm	With reference to IEC 62321-5: 2013, by microwave or acid digestion and determined by ICP-OES.	ND	2
Mercury (Hg) Content	ppm	With reference to IEC 62321-4: 2013+AMD1: 2017, by microwave or acid digestion and determined by ICP-OES.	ND	2
Arsenic (As) Content	ppm	With reference to USEPA 3052, by microwave digestion and determined by ICP-OES.	ND	2
Beryllium (Be) Content	ppm	With reference to USEPA 3052, by microwave digestion and determined by ICP-OES.	ND	2
Antimony (Sb) Content	ppm	With reference to USEPA 3052, by microwave digestion and determined by ICP-OES.	ND	2
Chromium VI (Cr(VI)) Content	ppm	With reference to IEC 62321-7-2: 2017, organic solvent was used to dissolve or swell sample matrix, followed by alkaline digestion and determined by UV-Vis Spectrophotometer.	ND	8
Polybrominated Biphenyls (PBBs)				
Monobrominated Biphenyls (MonoBB)	ppm	With reference to IEC 62321-6: 2015, by solvent extraction and determined by GC-MS and further HPLC-DAD confirmation when necessary.	ND	5
Dibrominated Biphenyls (DiBB)	ppm		ND	5
Tribrominated Biphenyls (TriBB)	ppm		ND	5
Tetrabrominated Biphenyls (TetraBB)	ppm		ND	5
Pentabrominated Biphenyls (PentaBB)	ppm		ND	5
Hexabrominated Biphenyls (HexaBB)	ppm		ND	5
Heptabrominated Biphenyls (HeptaBB)	ppm		ND	5
Octabrominated Biphenyls (OctaBB)	ppm		ND	5
Nonabrominated Biphenyls (NonaBB)	ppm		ND	5
Decabrominated Biphenyl (DecaBB)	ppm		ND	5

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Number : TWNC01240458

Test Conducted :

Test Item	Unit	Test Method	Result Submitted samples	RL
Polybrominated Diphenyl Ethers (PBDEs)				
Monobrominated Diphenyl Ethers (MonoBDE)	ppm	With reference to IEC 62321-6: 2015, by solvent extraction and determined by GC-MS and further HPLC-DAD confirmation when necessary.	ND	5
Dibrominated Diphenyl Ethers (DiBDE)	ppm		ND	5
Tribrominated Diphenyl Ethers (TriBDE)	ppm		ND	5
Tetrabrominated Diphenyl Ethers (TetraBDE)	ppm		ND	5
Pentabrominated Diphenyl Ethers (PentaBDE)	ppm		ND	5
Hexabrominated Diphenyl Ethers (HexaBDE)	ppm		ND	5
Heptabrominated Diphenyl Ethers (HeptaBDE)	ppm		ND	5
Octabrominated Diphenyl Ethers (OctaBDE)	ppm		ND	5
Nonabrominated Diphenyl Ethers (NonaBDE)	ppm		ND	5
Decabrominated Diphenyl Ether (DecaBDE)	ppm		ND	5
Halogen Content				
Fluorine (F)	ppm	With reference to EN 14582:2016 by combustion bomb with oxygen and determined by Ion Chromatography.	ND	50
Chlorine (Cl)	ppm		ND	50
Bromine (Br)	ppm		ND	50
Iodine (I)	ppm		ND	50
Phthalates				
Di(2-ethylhexyl) Phthalate (DEHP)	ppm	With reference to IEC 62321-8:2017, by solvent extraction and determined by GC-MS.	ND	10
Dibutyl Phthalate (DBP)	ppm		ND	10
Benzyl Butyl Phthalate (BBP)	ppm		ND	10
Diisobutyl Phthalate (DIBP)	ppm		ND	10

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Test Conducted :

Test Item	Unit	Test Method	Result Submitted samples	RL
Others				
Polychlorinated Biphenyls (PCBs)	ppm	With reference to USEPA 3540C, by solvent extraction and determined by GC-ECD or GC-ECNI-MS.	ND	1
Perfluorooctane Sulfonates Including PFOS, PFOSA, N-Me-FOSA, N-Et-FOSA, N-Me-FOSE, N-Et-FOSE	ppm	With reference to CEN/TS 15968:2010, by solvent extraction and determined by LC-MS-MS.	ND	0.01
Perfluorooctanoic Acid (PFOA)	ppm	With reference to CEN/TS 15968:2010, by solvent extraction and determined by LC-MS-MS.	ND	0.01

Remarks: ppm = Parts per million based on wet weight of tested sample = mg/kg
ND = Not detected
RL = Reporting limit, quantitation limit of analyte in sample

Responsibility of Chemist: Cloud Hsu/ Vita Fu

Date Sample Received : Jan 19, 2024
Test Period : Jan 19, 2024 to Feb 01, 2024

RoHS Limit

Restricted Substances	Limits
Cadmium (Cd) content	0.01% (100ppm)
Lead (Pb) content	0.1% (1000ppm)
Mercury (Hg) content	0.1% (1000ppm)
Chromium VI (Cr(VI)) content	0.1% (1000ppm)
Polybrominated Biphenyls (PBBs)	0.1% (1000ppm)
Polybrominated Diphenyl Ethers (PBDEs)	0.1% (1000ppm)
Di(2-ethylhexyl) Phthalate (DEHP)	0.1% (1000ppm)
Dibutyl Phthalate (DBP)	0.1% (1000ppm)
Benzyl Butyl Phthalate (BBP)	0.1% (1000ppm)
Diisobutyl Phthalate (DIBP)	0.1% (1000ppm)

The limits were quoted from Annex II of 2011/65/EU and Amendment (EU) 2015/863 for homogeneous material.

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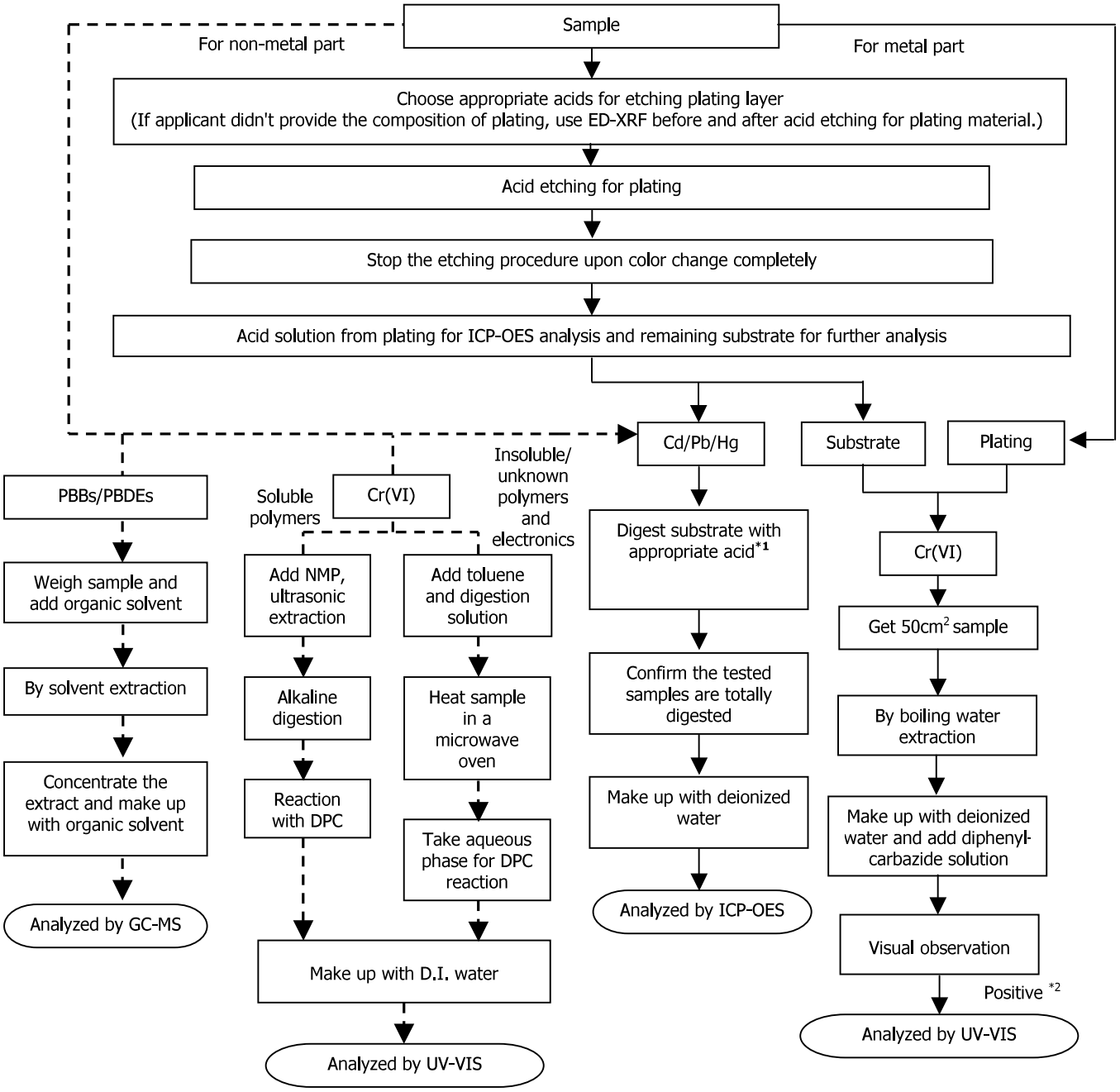
Test Conducted :

Measurement Flowchart:

Test for Cd/Pb/Hg/Chromium (VI)/PBBs/PBDEs Content
Reference Standard : Cd/Pb: IEC 62321-5:2013; Hg: IEC 62321-4:2013+AMD1:2017;
Chromium (VI): IEC 62321-7-1:2015 (boiling water extraction);
Chromium (VI): IEC 62321-7-2:2017 (solvent and alkaline extraction);
PBBs/PBDEs: IEC 62321-6:2015



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Number : TWNC01240458

Test Conducted :

Remarks:

*1: List of Appropriate Acid :

Material	Acid Added for Digestion
Polymers	HNO_3,HCl,HF,H_2O_2,H_3BO_3
Metals	HNO_3,HCl,HF
Electronics	HNO_3,HCl,H_2O_2,HBF_4

*2: If sample solution is significantly more intense than 0.13 μg/cm^2 equivalent comparison standard, Chromium VI would be determined as detected, the result of visual observation is positive.

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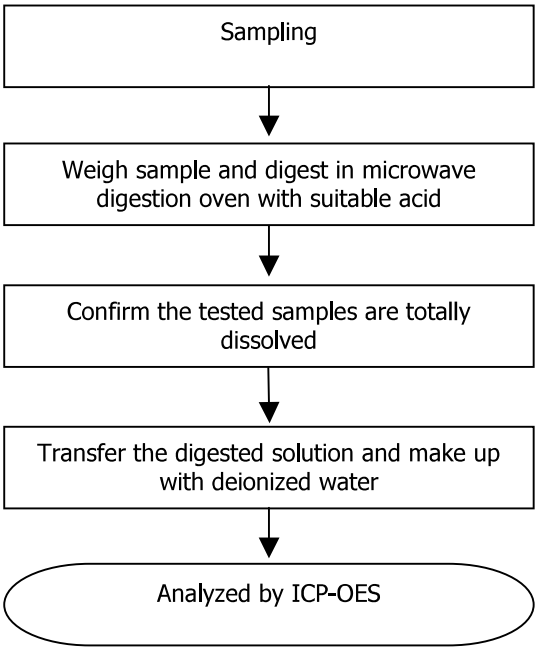
Test Conducted :

Measurement Flowchart:

Test for Heavy Metal (As,Be,Sb) Content
Reference Method：USEPA 3052



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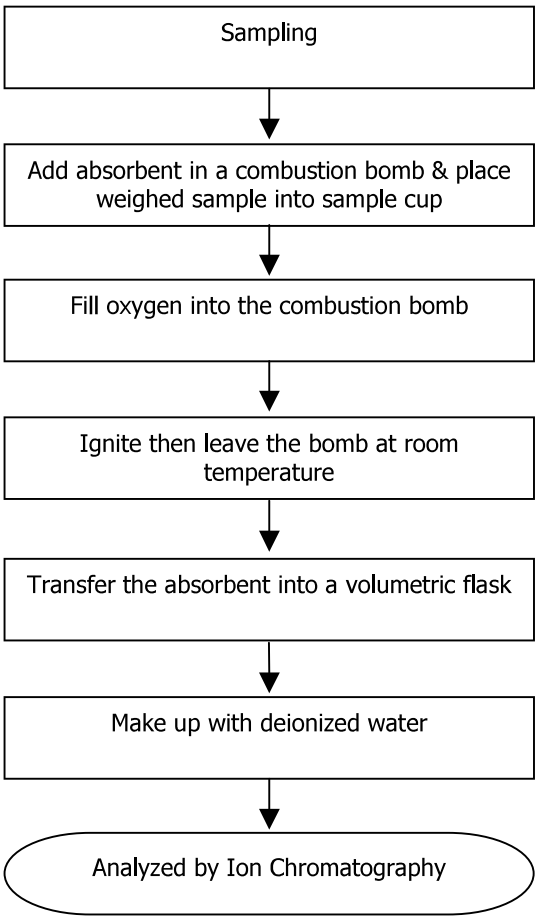
Test Conducted :

Measurement Flowchart:

Test for Halogen Content
Reference Method：EN 14582:2016



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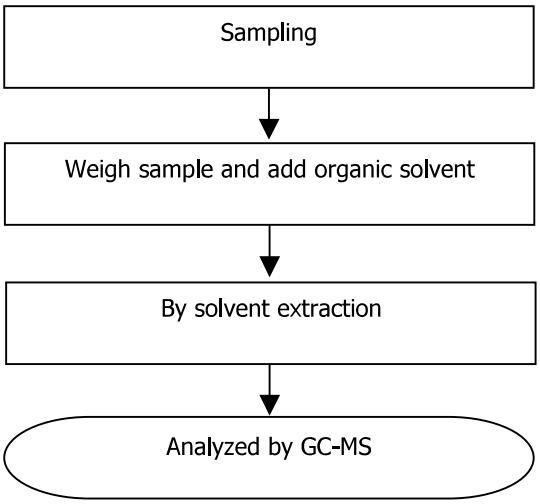
Test Conducted :

Measurement Flowchart:

Test for Phthalates Content
Reference Method: IEC 62321-8:2017



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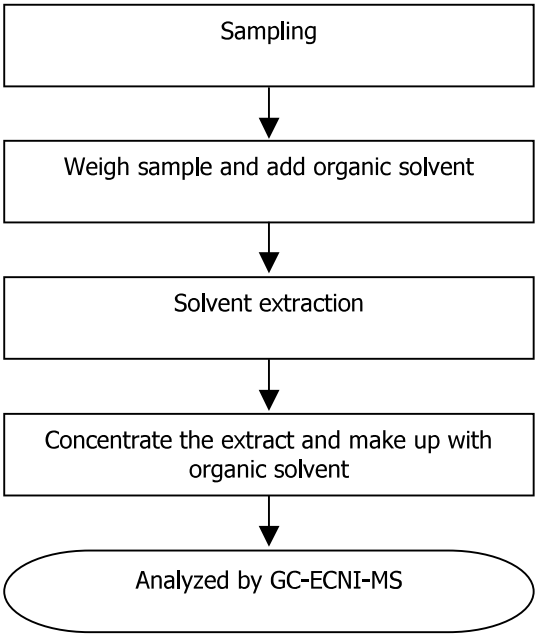
Test Conducted :

Measurement Flowchart:

Test for Polychlorinated Biphenyls (PCBs) Content
Reference Method : USEPA 3540C



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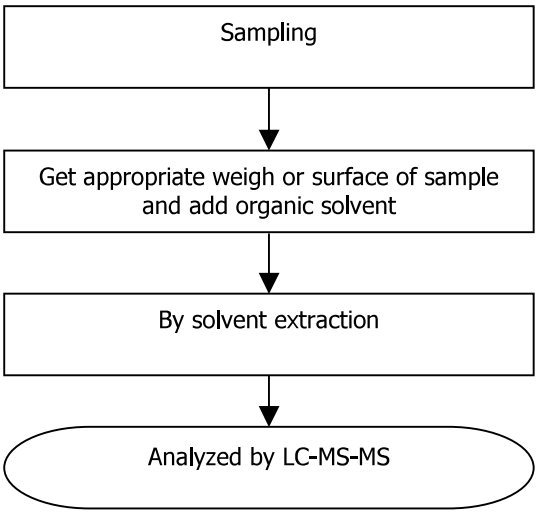
Test Conducted :

Measurement Flowchart:

Test for Perfluorooctane Sulfonates (PFOS) / Perfluorooctanoic Acid (PFOA) Content
Reference Method : CEN/TS 15968:2010



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Number : TWNC01240458

Sample photo:







End of Report

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Reporting Statements of Conformity: *Please note that the test results contain statement of conformity with the decision rules which are based on the specifications of customers, regulations and standards, and does not consider measurement uncertainty.*

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Test Report

No.: CANEC24001397202 **Date:** Feb 01, 2024

Client Name: LITTELFUSE PHILS.INC.

Client Address: LIMA TECHNOLOGY CENTER,MALVAR,BATANGAS,PHILIPPINES

Sample Name: Pb92.5Sn5Ag2.5 Solder Wire

Material No.: 692323

The above sample(s) and information were provided by the client.

SGS Job No.: SZP24-002413

Sample Receiving Date: Jan 18, 2024

Testing Period: Jan 18, 2024 ~ Jan 31, 2024

Test Requested: Select 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).

Test Requirement	Conclusion
EU RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU - Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE), Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)	Pass
Perfluorooctane Sulfonates (PFOS) and its derivatives and Perfluorooctanoic Acid (PFOA) and its salts	See Results
Halogen	See Results
Element(s)	See Results
PCBs	See Results

Signed for and on behalf of
SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch

Kelly Qu
Approved Signatory

scan to see the report
88DB2985

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Test Result(s):

Test Part Description：

SN ID	Sample No.	SGS Sample ID	Description
SN1	A3	CAN24-0013972-0001.C003	Silver-gray metal wire with powder

Remarks:

(1) 1 mg/kg = 1 ppm = 0.0001%
(2) MDL = Method Detection Limit
(3) ND = Not Detected (< MDL)
(4) "-" = Not Regulated

EU RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU - Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE), Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)

Test Method: With reference to IEC 62321-4:2013+AMD1:2017, IEC 62321-5:2013, IEC 62321-7-1:2015, IEC 62321-6:2015 and IEC62321-8:2017, analysis was performed by ICP-OES/AAS, UV-Vis and GC-MS.

Test Item(s)	Limit	Unit(s)	MDL	A3
Lead (Pb)	1000	mg/kg	2	941234▲
Mercury (Hg)	1000	mg/kg	2	ND
Cadmium (Cd)	100	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))▼	-	µg/cm²	0.10	ND
Polybrominated biphenyls (PBB)	1000	mg/kg	-	ND
Monobrominated biphenyl (MonoBB)	-	mg/kg	5	ND
Dibrominated biphenyl (DiBB)	-	mg/kg	5	ND
Tribrominated biphenyl (TriBB)	-	mg/kg	5	ND
Tetrabrominated biphenyl (TetraBB)	-	mg/kg	5	ND
Pentabrominated biphenyl (PentaBB)	-	mg/kg	5	ND
Hexabrominated biphenyl (HexaBB)	-	mg/kg	5	ND
Heptabrominated biphenyl (HeptaBB)	-	mg/kg	5	ND
Octabrominated biphenyl (OctaBB)	-	mg/kg	5	ND
Nonabrominated biphenyl (NonaBB)	-	mg/kg	5	ND
Decabrominated biphenyl (DecaBB)	-	mg/kg	5	ND
Polybrominated diphenyl ethers (PBDE)	1000	mg/kg	-	ND
Monobrominated diphenyl ether (MonoBDE)	-	mg/kg	5	ND
Dibrominated diphenyl ether (DiBDE)	-	mg/kg	5	ND
Tribrominated diphenyl ether (TriBDE)	-	mg/kg	5	ND
Tetrabrominated diphenyl ether (TetraBDE)	-	mg/kg	5	ND
Pentabrominated diphenyl ether (PentaBDE)	-	mg/kg	5	ND
Hexabrominated diphenyl ether (HexaBDE)	-	mg/kg	5	ND
Heptabrominated diphenyl ether (HeptaBDE)	-	mg/kg	5	ND

检验检测专用章 Inspection & Testing Services

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Test Item(s)	Limit	Unit(s)	MDL	A3
Octabrominated diphenyl ether (OctaBDE)	-	mg/kg	5	ND
Nonabrominated diphenyl ether (NonaBDE)	-	mg/kg	5	ND
Decabrominated diphenyl ether (DecaBDE)	-	mg/kg	5	ND
Bis(2-ethylhexyl) phthalate (DEHP)	1000	mg/kg	50	ND
Butyl benzyl phthalate (BBP)	1000	mg/kg	50	ND
Dibutyl phthalate (DBP)	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.

(3) ▼ = a. The sample is positive for Cr(VI) if the Cr(VI)concentration is greater than 0.13 μg/cm^2. 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/cm^2). The coating is considered a non-Cr(VI) based coating.

c. The result between 0.10 μg/cm^2 and 0.13 μg/cm^2 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.

(4) PBBs/PBDEs, DBP, BBP, DEHP, DIBP is/are not accredited by CNAS.

Perfluorooctane Sulfonates (PFOS) and its derivatives and Perfluorooctanoic Acid (PFOA) and its salts

Test Method: Modified CEN/TS 15968:2010, analysis was performed by HPLC-MS or LC-MS/MS.

Test Item(s)	CAS No.	Unit(s)	MDL	A3
PFOS and its derivatives	-	mg/kg	-	ND
Perfluorooctane Sulfonates (PFOS) and its salts*	1763-23-1	mg/kg	0.010	ND
N-ethylperfluoro-1-octanesulfonamide (N-EtFOSA)	4151-50-2	mg/kg	0.010	ND
N-methylperfluoro-1-octanesulfonamide (N-MeFOSA)	31506-32-8	mg/kg	0.010	ND
2-(N-ethylperfluoro-1-octanesulfonamido) -ethanol (N-EtFOSE)	1691-99-2	mg/kg	0.010	ND
2-(N-methylperfluoro-1-octanesulfonamido) -ethanol (N-MeFOSE)	24448-09-7	mg/kg	0.010	ND
Perfluorooctane Sulfonamide (PFOSA)	754-91-6	mg/kg	0.010	ND
Perfluorooctanoic Acid (PFOA) and its salts*	335-67-1	mg/kg	0.010	ND

Notes:

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(1) Perfluorooctanoic acid (PFOA) and its salts* including PFOA (CAS No. 335-67-1), APFO (CAS No. 3825-26-1), PFOA-Na (CAS No. 335-95-5), PFOA-K (CAS No. 2395-00-8), PFOA-Ag (CAS No. 335-93-3) and PFOA-F (CAS No. 335-66-0). The result of PFOA is used to represent PFOA and its salts.
(2) Perfluorooctane sulfonates (PFOS) and its salts* including PFOS (CAS No. 1763-23-1), POSF(CAS No. 307-35-7), PFOS-K (CAS No. 2795-39-3), PFOS-NH_4 (CAS No. 29081-56-9), PFOS-$N(C_{10}H_{21})_2(CH_3)_2$ (CAS No. 251099-16-8), PFOS-$NH_2(C_2H_4OH)_2$ (CAS No. 70225-14-8), PFOS-Li (CAS No. 29457-72-5), PFOS-$N(C_2H_5)_4$ (CAS No. 56773-42-3) and PFOS-Na (CAS No. 4021-47-0). The result of PFOS is used to represent PFOS and its salts.
(3) Method(s) is/are not accredited by CNAS.

Halogen

Test Method: With reference to EN 14582:2016, analysis was performed by IC.

Test Item(s)	Unit(s)	MDL	A3
Fluorine(F)	mg/kg	20	ND
Chlorine(Cl)	mg/kg	50	70
Bromine(Br)	mg/kg	50	ND
Iodine(I)	mg/kg	50	ND

Notes:
(1) Method(s) is/are not accredited by CNAS.

Element(s)

Test Method: With reference to US EPA 3050B:1996, analysis was performed by ICP-OES/AAS.

Test Item(s)	Unit(s)	MDL	A3
Arsenic(As)	mg/kg	10	ND
Beryllium(Be)	mg/kg	5	ND
Antimony(Sb)	mg/kg	50	ND

Notes:
(1) Method(s) is/are not accredited by CNAS.

PCBs

Test Method: SGS In-house method (GZTC CHEM-TOP-032-01, with reference to EPA 8082A:2007), analysis was performed by GC-ECD/GC-MS.

Test Item(s)	CAS No.	Unit(s)	MDL	A3
PCBs	-	mg/kg	-	ND
2,4,4'-Trichlorobiphenyl(PCB28)	7012-37-5	mg/kg	0.5	ND
2,2',5,5'-Tetrachlorobiphenyl(PCB52)	35693-99-3	mg/kg	0.5	ND
2,2',4,5,5'-Pentachlorobiphenyl(PCB101)	37680-73-2	mg/kg	0.5	ND
2,3',4,4',5-Pentachlorobiphenyl(PCB118)	31508-00-6	mg/kg	0.5	ND

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检验检测专用章 Inspection & Testing Services

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Test Item(s)	CAS No.	Unit(s)	MDL	A3
2,2',3,4,4',5'-Hexachlorobiphenyl(PCB138)	35065-28-2	mg/kg	0.5	ND
2,2',4,4',5,5'-Hexachlorobiphenyl(PCB153)	35065-27-1	mg/kg	0.5	ND
2,2',3,4,4',5,5'-Heptachlorobiphenyl(PCB180)	35065-29-3	mg/kg	0.5	ND
Sum of 6 PCBs(PCB28、PCB52、PCB101、PCB138、PCB153、PCB180)	-	mg/kg	-	ND
Sum of PCBs	-	mg/kg	-	ND

Notes:
(1) Method(s) is/are not accredited by CNAS.

Remark▲: According to the declaration from the client, Lead (Pb) in specimen is exempted by EU RoHS directive 2011/65/EU based on |ANNEX III 7(a)|: Lead in high melting temperature type solders (i.e. lead-based alloys containing 85 % by weight or more lead).
More information about exemption can be found via the following link: https://rohs.sgsonline.com.cn/PDFLinks/en/RSTS-TP-037%20RoHS%20Exemption%20%28EN%29.pdf
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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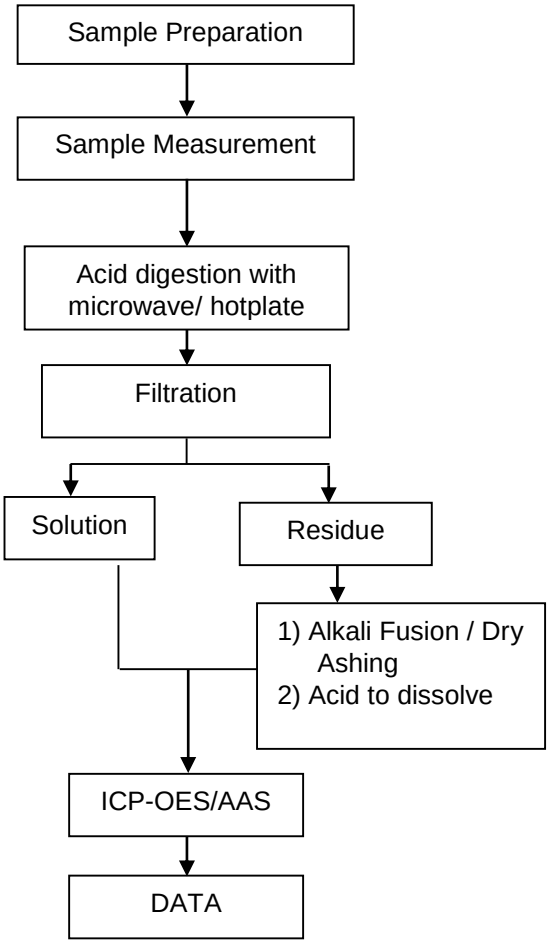
Elements Testing Flow Chart

These samples were dissolved totally by pre-conditioning method according to below flow chart.



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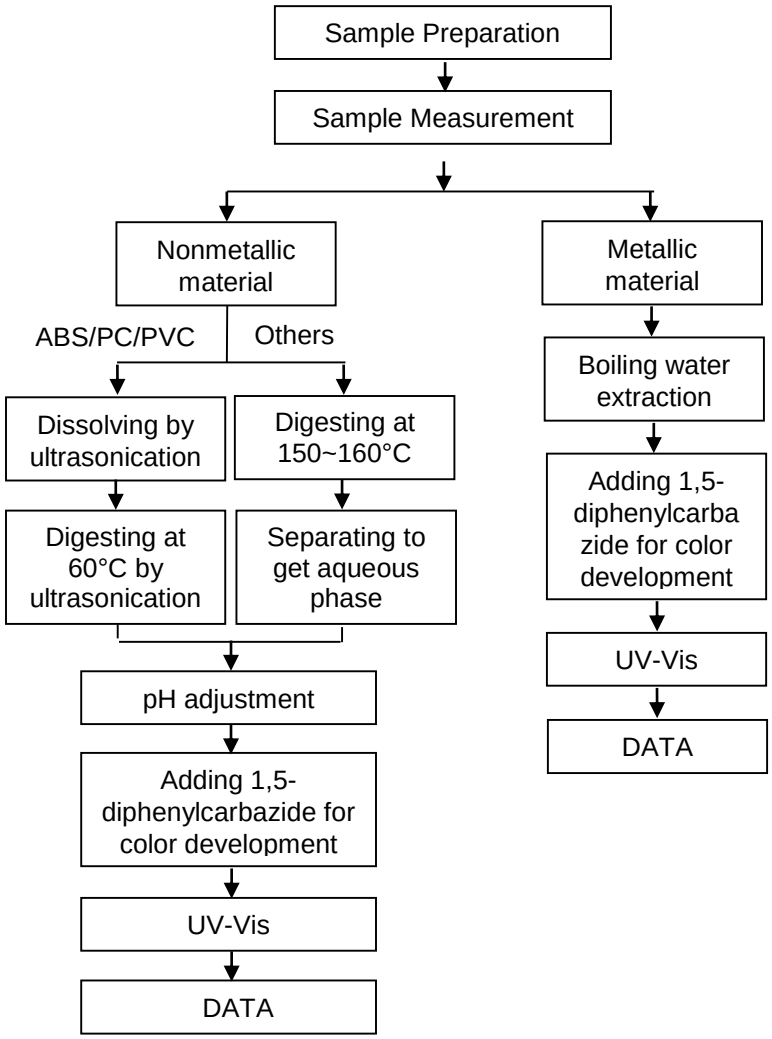
Hexavalent Chromium (Cr(VI)) Testing Flow Chart



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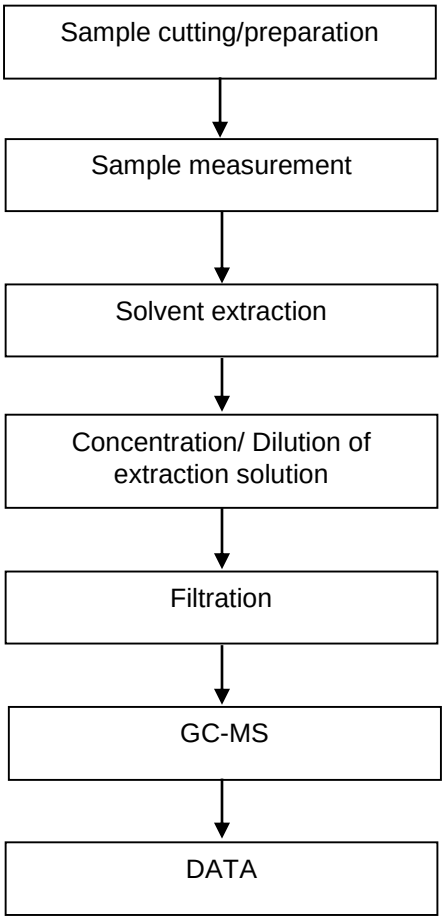
PBB/PBDE Testing Flow Chart



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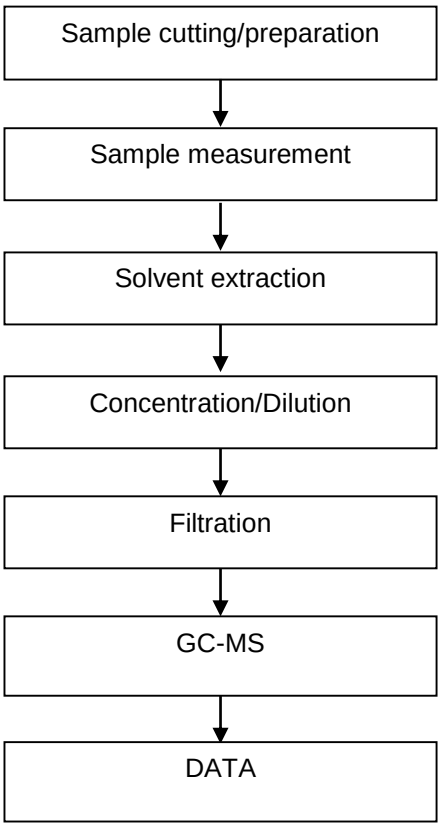
Phthalates Testing Flow Chart



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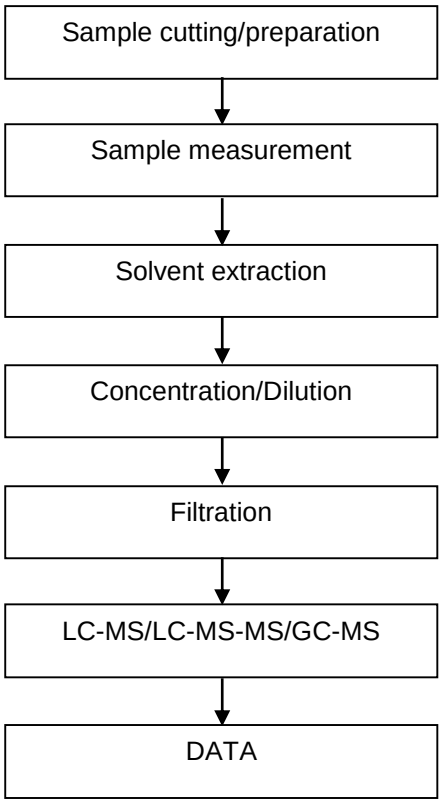
PFASs/ PFOS/PFOA Testing Flow Chart



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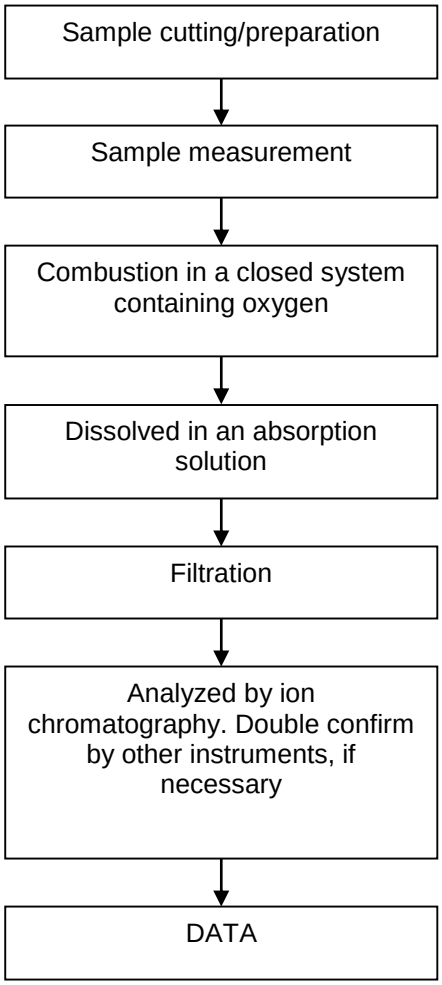
Halogen Testing Flow Chart



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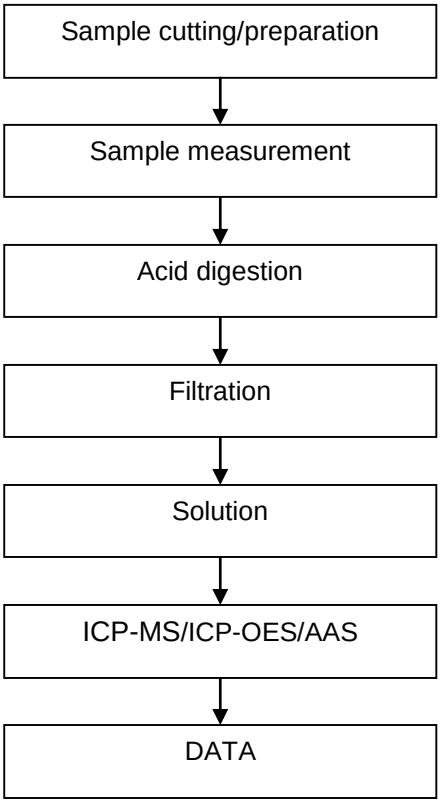
Elements Testing Flow Chart



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Sample Photo:



CAN24-0013972-0001.C003

SGS authenticate the photo on original report only

*** End of Report ***

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Test Report

No.: SZXEC24000175101 **Date:** Jan 24, 2024

Client Name: LITTELFUSE PHILS.INC.

Client Address: LIMA TECHNOLOGY CENTER,MALVAR,BATANGAS,PHILIPPINES

Sample Name: Ceramic Fiber Yarn

Material No.: 648106-001

The above sample(s) and information were provided by the client.

SGS Job No.: SZP24-002417

Sample Receiving Date: Jan 18, 2024

Testing Period: Jan 18, 2024 ~ Jan 24, 2024

Test Requested: Select 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).

Test Requirement	Conclusion
EU RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU - Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE), Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)	Pass
Halogen	See Results
Element(s)	See Results

Signed for and on behalf of
SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

Ford

Ford Shi
Approved Signatory

scan to see the report
F36DDB6F

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Test Result(s):

Test Part Description：

SN ID	Sample No.	SGS Sample ID	Description
SN1	A1	SZX24-0001751-0001.C001	White thread

Remarks:

(1) 1 mg/kg = 1 ppm = 0.0001%
(2) MDL = Method Detection Limit
(3) ND = Not Detected (< MDL)
(4) "-" = Not Regulated

EU RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU - Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE), Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)

Test Method: With reference to IEC 62321-4:2013+AMD1:2017, IEC 62321-5:2013, IEC 62321-7-2:2017, IEC 62321-6:2015 and IEC 62321-8:2017, analysis was performed by ICP-OES/AAS, UV-Vis and GC-MS.

Test Item(s)	Limit	Unit(s)	MDL	A1
Lead (Pb)	1000	mg/kg	2	ND
Mercury (Hg)	1000	mg/kg	2	ND
Cadmium (Cd)	100	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))	1000	mg/kg	8	ND
Polybrominated biphenyls (PBB)	1000	mg/kg	-	ND
Monobrominated biphenyl (MonoBB)	-	mg/kg	5	ND
Dibrominated biphenyl (DiBB)	-	mg/kg	5	ND
Tribrominated biphenyl (TriBB)	-	mg/kg	5	ND
Tetrabrominated biphenyl (TetraBB)	-	mg/kg	5	ND
Pentabrominated biphenyl (PentaBB)	-	mg/kg	5	ND
Hexabrominated biphenyl (HexaBB)	-	mg/kg	5	ND
Heptabrominated biphenyl (HeptaBB)	-	mg/kg	5	ND
Octabrominated biphenyl (OctaBB)	-	mg/kg	5	ND
Nonabrominated biphenyl (NonaBB)	-	mg/kg	5	ND
Decabrominated biphenyl (DecaBB)	-	mg/kg	5	ND
Polybrominated diphenyl ethers (PBDE)	1000	mg/kg	-	ND
Monobrominated diphenyl ether (MonoBDE)	-	mg/kg	5	ND
Dibrominated diphenyl ether (DiBDE)	-	mg/kg	5	ND
Tribrominated diphenyl ether (TriBDE)	-	mg/kg	5	ND
Tetrabrominated diphenyl ether (TetraBDE)	-	mg/kg	5	ND
Pentabrominated diphenyl ether (PentaBDE)	-	mg/kg	5	ND
Hexabrominated diphenyl ether (HexaBDE)	-	mg/kg	5	ND
Heptabrominated diphenyl ether (HeptaBDE)	-	mg/kg	5	ND

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Test Item(s)	Limit	Unit(s)	MDL	A1
Octabrominated diphenyl ether (OctaBDE)	-	mg/kg	5	ND
Nonabrominated diphenyl ether (NonaBDE)	-	mg/kg	5	ND
Decabrominated diphenyl ether (DecaBDE)	-	mg/kg	5	ND
Bis-(2-ethylhexyl) Phthalate(DEHP)	1000	mg/kg	50	ND
Benzyl Butyl Phthalate(BBP)	1000	mg/kg	50	ND
Dibutyl Phthalate(DBP)	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.
(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.

Halogen

Test Method: With reference to EN 14582:2016, analysis was performed by IC.

Test Item(s)	Unit(s)	MDL	A1
Fluorine(F)	mg/kg	20	ND
Chlorine(Cl)	mg/kg	50	ND
Bromine(Br)	mg/kg	50	ND
Iodine(I)	mg/kg	50	ND

Element(s)

Test Method: With reference to US EPA 3052:1996, analysis was performed by ICP-OES/AAS.

Test Item(s)	Unit(s)	MDL	A1
Beryllium(Be)	mg/kg	5	ND
Antimony(Sb)	mg/kg	10	ND

Remark: Element(s) are not accredited by CNAS.
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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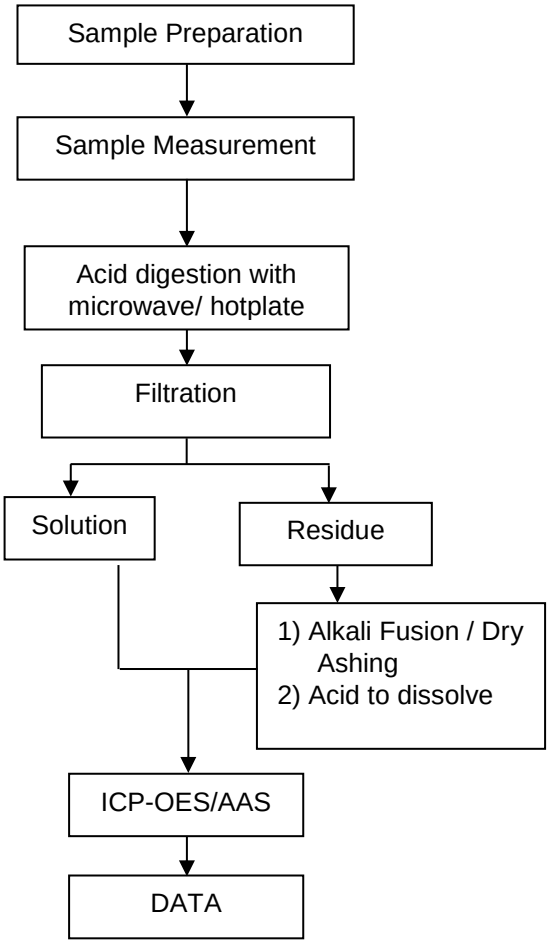
Elements Testing Flow Chart

These samples were dissolved totally by pre-conditioning method according to below flow chart.



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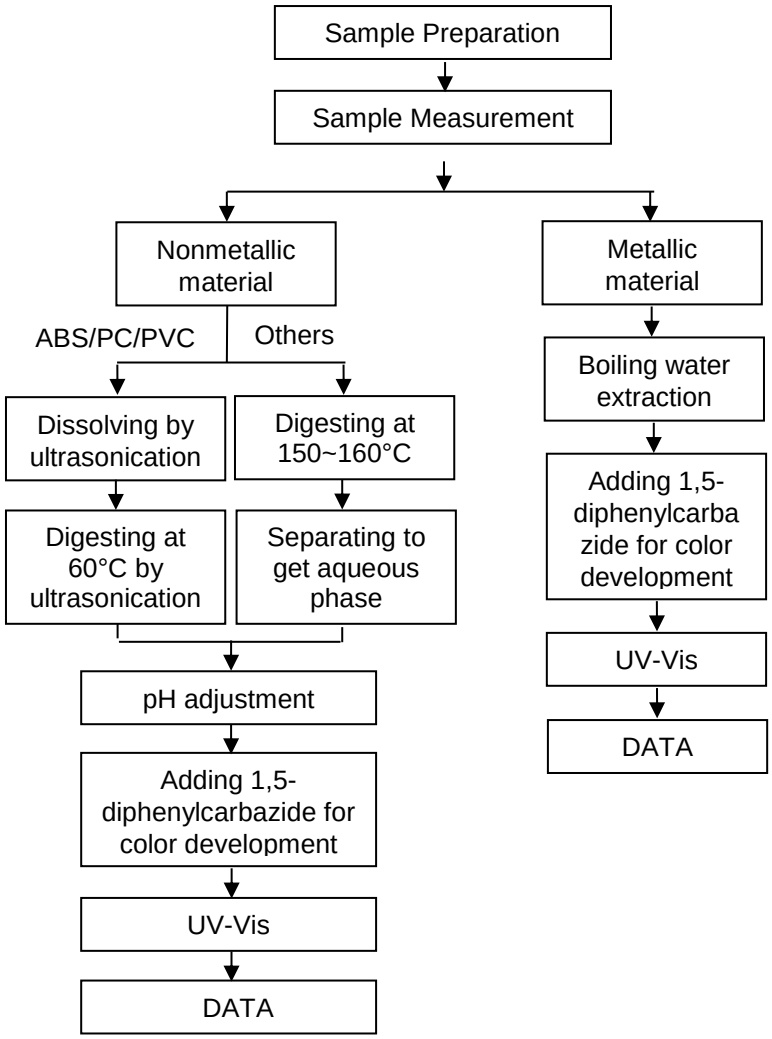
Hexavalent Chromium (Cr(VI)) Testing Flow Chart



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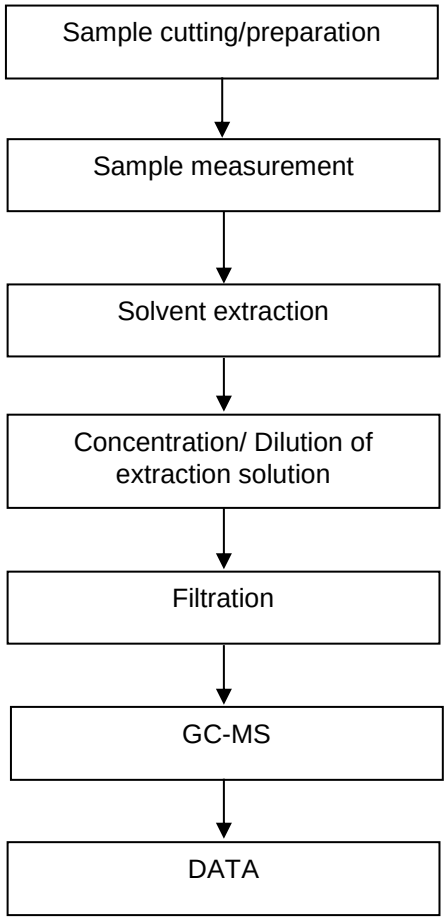
PBBs/PBDEs Testing Flow Chart



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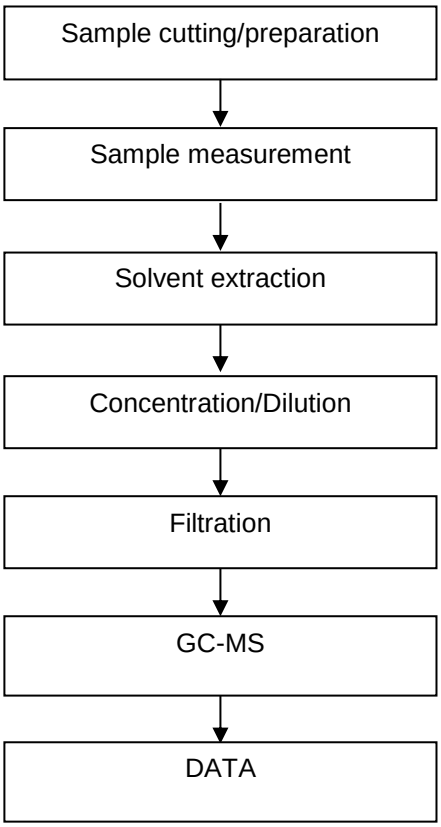
Phthalates Testing Flow Chart



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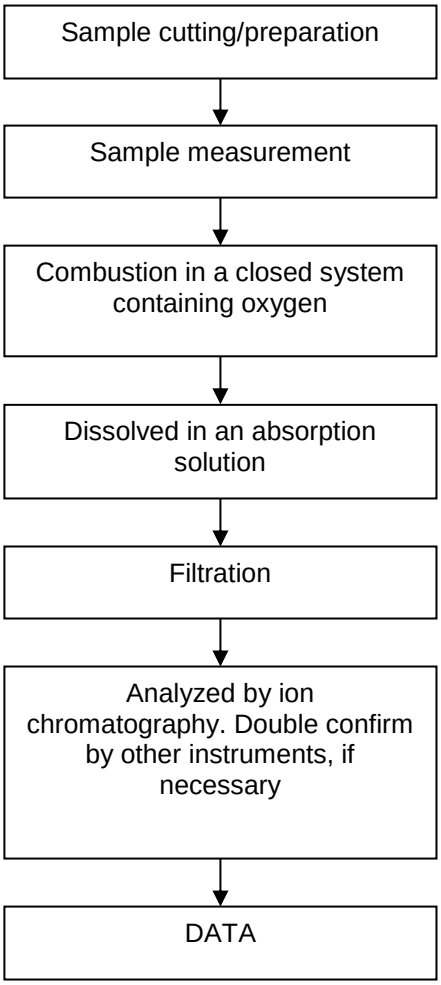
Halogen Testing Flow Chart



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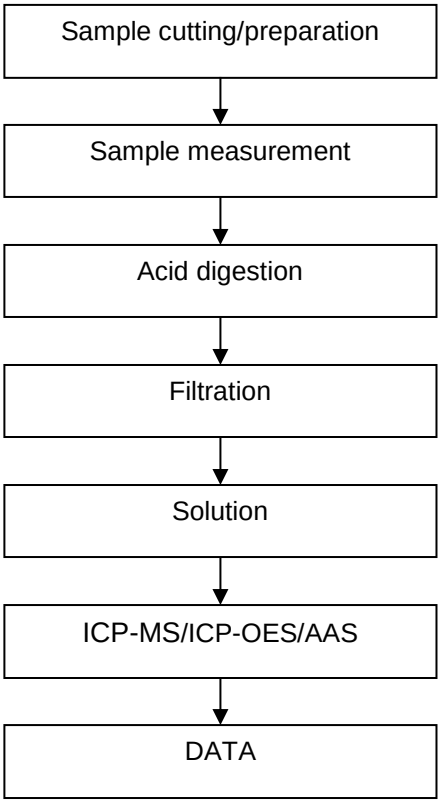
Elements Testing Flow Chart



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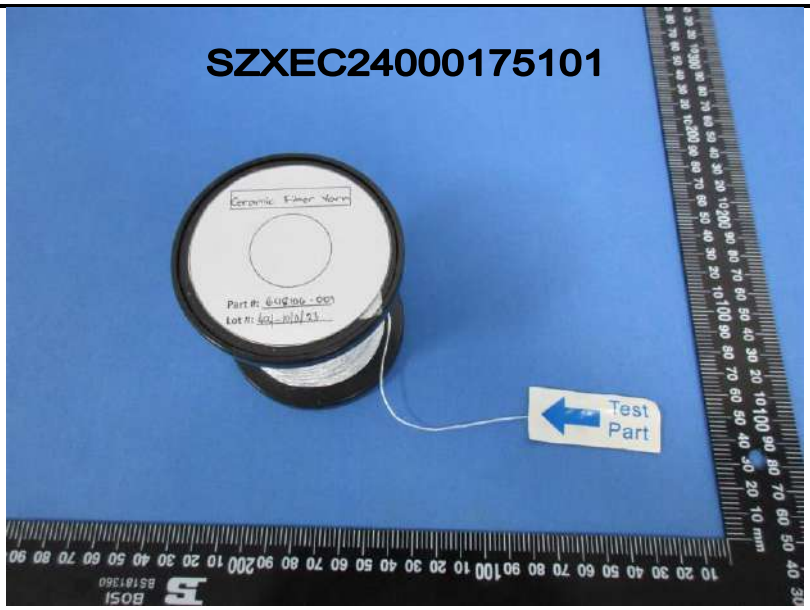

SZX24-0001751-0001.C001

SGS authenticate the photo on original report only

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Test Report

No.: SZXEC24000175116 **Date:** Jan 31, 2024

Client Name: LITTELFUSE PHILS.INC.

Client Address: LIMA TECHNOLOGY CENTER,MALVAR,BATANGAS,PHILIPPINES

Sample Name: Sn99.3Cu0.7 Tin Wire

Material No.: 082803

The above sample(s) and information were provided by the client.

SGS Job No.: SZP24-002417

Sample Receiving Date: Jan 18, 2024

Testing Period: Jan 18, 2024 ~ Jan 31, 2024

Test Requested: Select 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).

Test Requirement	Conclusion
EU RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU - Lead, Mercury, Cadmium, Hexavalent chromium, Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)	Pass
Element(s)	See Results

Signed for and on behalf of
SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

Ford Shi
Approved Signatory

scan to see the report

C148185A

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Test Result(s):

Test Part Description：

SN ID	Sample No.	SGS Sample ID	Description
SN1	A14	SZX24-0001751-0001.C014	Silvery metal wire

Remarks:

(1) 1 mg/kg = 1 ppm = 0.0001%
(2) MDL = Method Detection Limit
(3) ND = Not Detected (< MDL)
(4) "-" = Not Regulated

EU RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU - Lead, Mercury, Cadmium, Hexavalent chromium, Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)

Test Method: With reference to IEC 62321-4:2013+AMD1:2017, IEC 62321-5:2013, IEC 62321-7-1:2015 and IEC62321-8:2017, analysis was performed by ICP-OES/AAS, UV-Vis and GC-MS.

Test Item(s)	Limit	Unit(s)	MDL	A14
Lead (Pb)	1000	mg/kg	2	113
Mercury (Hg)	1000	mg/kg	2	ND
Cadmium (Cd)	100	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))▼	-	$\mu g/cm^2$	0.10	ND
Bis-(2-ethylhexyl) Phthalate(DEHP)	1000	mg/kg	50	ND
Benzyl Butyl Phthalate(BBP)	1000	mg/kg	50	ND
Dibutyl Phthalate(DBP)	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.
(3) ▼ =
a. The sample is positive for Cr(VI) if the Cr(VI)concentration is greater than 0.13 $\mu g/cm^2$. 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 $\mu g/cm^2$). The coating is considered a non-Cr(VI) based coating.
c. The result between 0.10 $\mu g/cm^2$ and 0.13 $\mu g/cm^2$ 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.

Element(s)

Test Method: With reference to US EPA 3050B:1996, analysis was performed by ICP-OES/AAS.

Test Item(s)	Unit(s)	MDL	A14
Beryllium(Be)	mg/kg	5	ND
Antimony(Sb)	mg/kg	10	38

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Remark: Phthalates such as Bis(2-ethylhexyl) phthalate (DEHP) , Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP), Diisobutylphthalate (DIBP), and Element(s) are not accredited by CNAS.
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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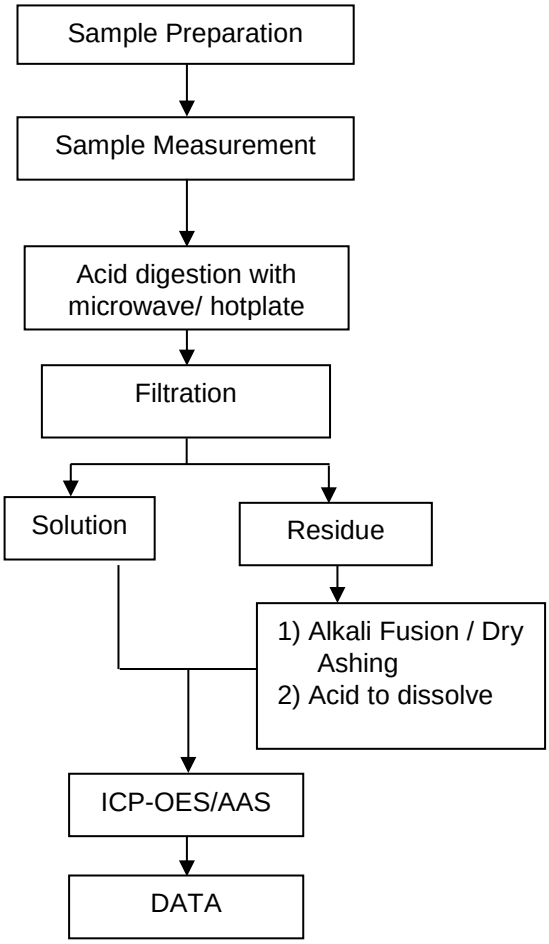
Elements Testing Flow Chart

These samples were dissolved totally by pre-conditioning method according to below flow chart.



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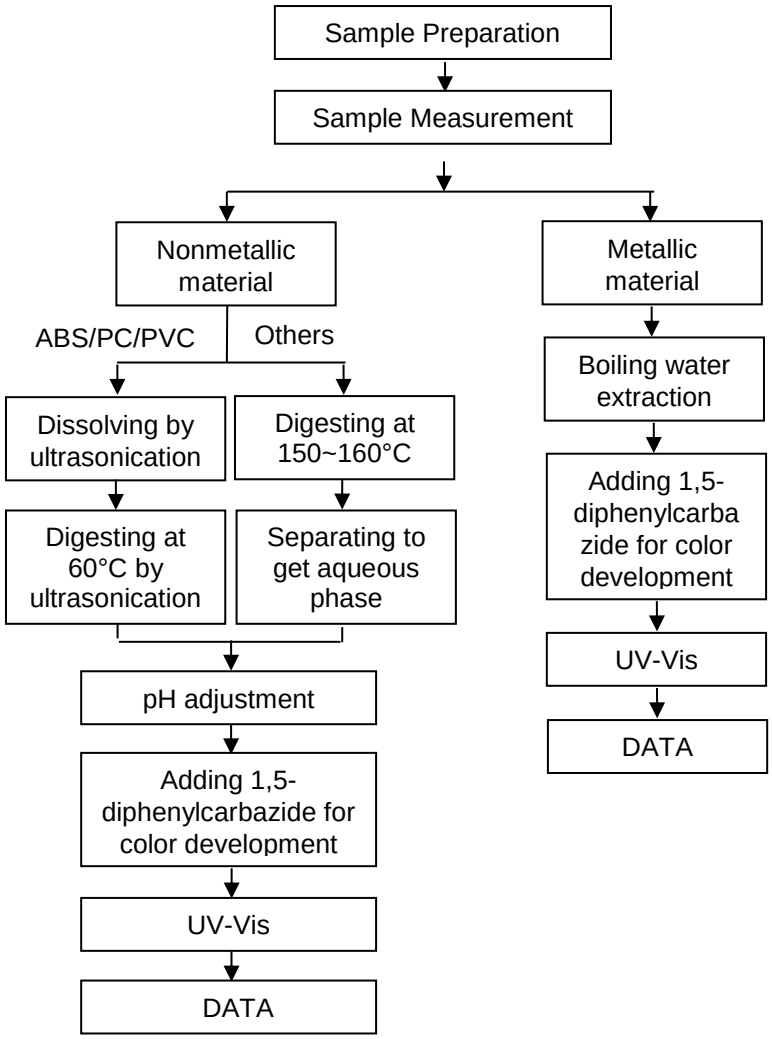
Hexavalent Chromium (Cr(VI)) Testing Flow Chart



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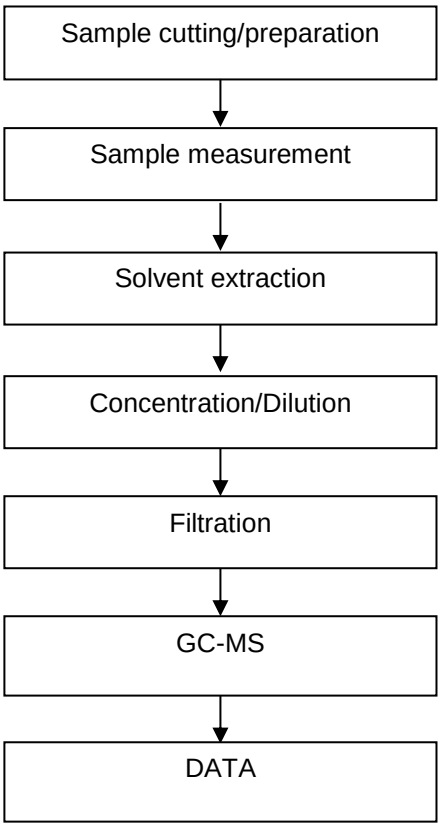
Phthalates Testing Flow Chart



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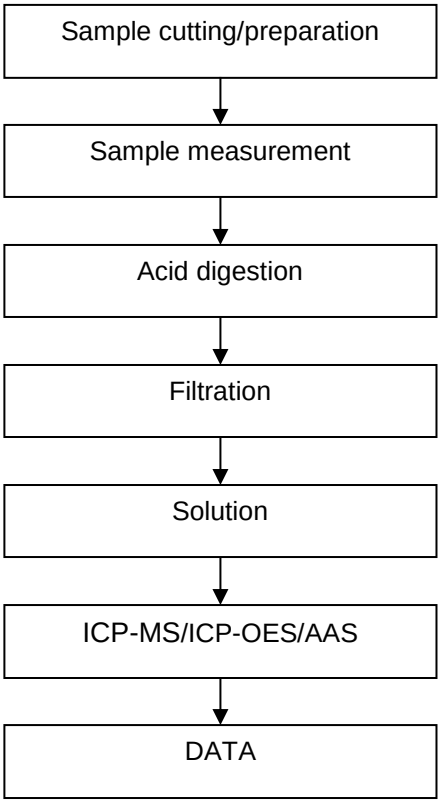
Elements Testing Flow Chart



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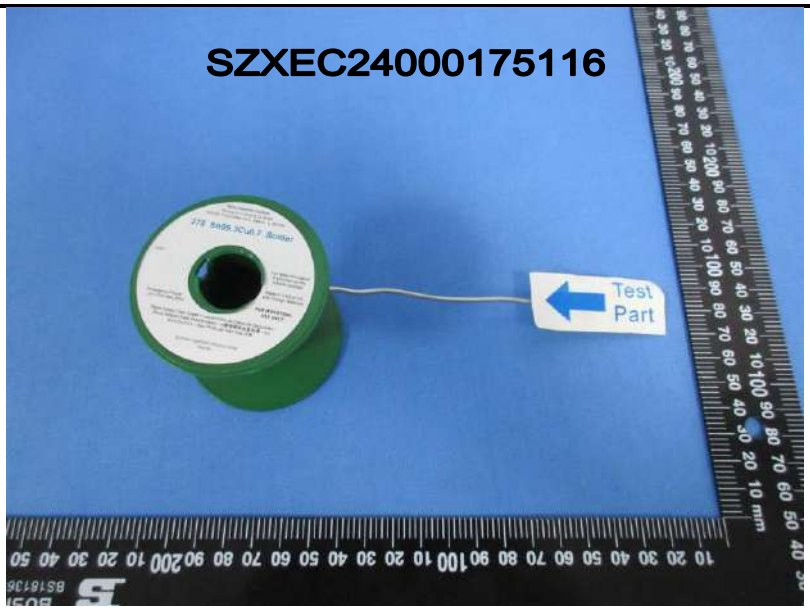
Sample Photo:



SZX24-0001751-0001.C014

SGS authenticate the photo on original report only

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Littelfuse
Expertise Applied | Answers Delivered

Document Number: 452/454_20230511_RevB

EU Declaration of Conformity

Manufacturer:	Littelfuse, Inc. 8755 W. Higgins Road Suite 500 Chicago, IL 60631, USA 773-628-1000
Product Description:	NANO$^{2®}$ Slo-blo Surface Mount Fuse
Catalog Number:	452/454 series

This declaration of conformity is issued under the sole responsibility of Littelfuse, Inc.

As of the date of this Declaration, Littelfuse, Inc. declares the referenced products are in conformance with the following European Directives:

2011/65/EU – Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS2), and all its Amendments.

This compliance is demonstrated in accordance with the following standards/technical specifications:

EN IEC 63000：2018, Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

2014/35/EU – Electrical Equipment Designed for Use Within Certain Voltage Limits (Low Voltage Directives).

This compliance is demonstrated in accordance with the following standards/technical specifications:

EN 60127-1: 2006+A1:2011+A2:2015, Miniature fuses - Part 1: Definitions for miniature fuses and general requirements for miniature fuse-links
EN 60127-7: 2016, Miniature fuses - Part 7: Miniature fuse-links for special applications
UL/CSA/NMX 248-1, 3rd Edition: Low-Voltage Fuses - Part 1: General Requirements, 3rd Edition
UL/CSA/NMX 248-14, 2nd Ediion: Standard for Low-Voltage Fuses - Part 14: Supplemental Fuses, 2nd Edition

These products must be installed, maintained and used in the applications for which they were made in accordance with “professional practices”, relevant installation standards and instructions from Littelfuse.

Signed for and on behalf of Littelfuse, Inc.: Date: 2023-05-11

Saad Lambaz
Global Standards Manager
Chicago, IL, USA

CERTIFICATION RECORD

The company named below has been authorized by CSA International to represent the products listed in this record as "CSA Certified" and to affix the CSA Mark to these products according to the terms and conditions of the CSA Service Agreement and applicable CSA program requirements (including additional Markings).

File No: 029862_0_000
Class No: 1422, 01, FUSES, Special Type,

SUBMITTOR

0004501292
Littelfuse, Inc.
8755 W. Higgins Rd Suite 500
Chicago, Illinois 60631
United States

FACTORIES

0004545541
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Piedras Negras, Coahuila 26090
Mexico

0004545860
Suzhou Littelfuse OVS Ltd.
6 Xin Hai St. China - Singapore Suzhou Industrial Park
Suzhou, Jiangsu 215000
China

0004548889
Littelfuse Phils., Inc.
Lima Technology Center, Special Economic Zone Malvar 4233, Lipa
Batangas, Batangas 4217
Philippines

January 26, 2021 (Replaces: April 11, 2019)

- "LITTELFUSE" non-renewable cartridge fuses, supplemental type, as follows:
- Size 1 by 1/4 in: Types 362 and 368 (Pigtail Series), 250V, 0.125-2A incl., 125V, 2.5-6A incl.
- Size 1-1/4 by 1/4 in or 0.275 by 1.275 in (Pigtail Series): Types 312 and 318 (Pigtail Series), 250V, .01 to 10A incl; short circuit rating - 10000A at 125V; 1A and less 35A at 250V; greater than 1A through 3.5A, 100A at 250V; greater than 3.5A through 10A, 200A at 250V;
- Size 1-1/4 by 1/4 in or 0.275 by 1.275 in (Pigtail Series): Types 312 and 318 (Pigtail Series), 250V, .01 to 10A incl; short circuit rating - 10000A at 125V; 1A and less 35A at 250V; greater than 1A through 3.5A, 100A at 250V; greater than 3.5A through 10A, 200A at 250V;
- Types 313, 313ID, and 315 (Pigtail Series), 250V, .01-10A, incl; short circuit rating - 10000A at 125V; 1A and less 35A at 250V; greater than 1A through 3.5A, 100A at 250V; greater than 3.5A through 10A, 200A at 250V; Type 315 (Pigtail Series), 12 to 15A, 125Vac, Short Circuit Rating IR125-150A.
- Types 314 and 324 (Pigtail Series), 250V, .125-15A, incl; short circuit rating - 10000A at 125V ac/dc; 1A and less 35A at 250V; greater than 1A through 3.5A, 100A at 250V; greater than 3.5A through 10A, 200A at 250V; greater than 10A through 15A, 750A at 250V;
- Types 326, 325 (Pigtail Series), 250V, .25-20A; short circuit rating - 10000A at 125V; 3.2A and less, 100A at 250V; greater than 3.2A through 20A, 400A at 250V25-30A, IR125-400A;
- Type 311, 32V, 4-30A incl.; Type 312, 32V, 10-30A incl.; Type 307, 32V, 20A;
- Type 310306, 125V, 7A; short circuit rating - 10000A at 125V; Type 373, 375 (pigtail) 4-10A, 250V, 11-15A, 125V; short circuit rating - 10000A at 125V; 4A through 10A, 200A at 250V.
- Cat No 314020, 324020 and WP91768, 20A, 300V ac max, IR125V ac/DC-10kA, IR250V ac-1KA, IR300V ac - 200A.
  "Miniature" glass envelope fuse, 4mm by 15mm, 250V ac, Cat Series 220 (pigtail), Cat Nos 220002, 220003, 220004, 220006, 220011, 220029 (no pigtail) rated 0.35A; 220010 rated 0.55A; 220027 rated 1A; 220033 rated 1.5A.
- Supplemental fuses, Cat No 220007, 220019, 3A, 350V ac, IR125-10kA, IR250-100A, IR300-100A, IR350-100A, IR 142VDC-160A.
- "Miniature" glass envelope fuse, 4mm by 15mm, Cat Series 229, 230 (pigtail) with suffix 0.25 through 03.5 rated 0.25A through 3.5A, 250V ac; short circuit rating - 10000A at 125V; 1A and less, 35A at 250V; greater than 1A

through 3.5A, 100A at 250V.
- Supplemental fuses, Cat Nos 220056 and 220057, 1.25A, 250V ac, IR125-10kA, IR250-100A.
- Supplemental fuses, Cat Series 229, 230 (pigtail) and 220015 (pigtail), 4A, 125V ac, IR125-10kA.
- "Pico" fuses: Catalogue Series 251, 252, 255, 256, 491, followed by Suffix 062 through 010, rated 125V ac or dc, 0.062A through 10A; short circuit rating - 300A at 125V dc, 50A at 125V ac.
- Pico fuses Cat No 250038, 7A, 125V ac/dc IR 125V dc, 300A, IR 125V ac, 50A.
- "Pico" fuses: Cat Nos 250039 and 250041, 10A, 125V ac/dc, IR 125V dc -300A, IR 125V ac-50A.
- "Pico" fuses: Catalogue Series 265, 266, 275, 276, followed by Suffix 062 through 010, rated 125V ac or dc, 0.062A through 10A; short circuit rating - 300A at 125V dc, 50A at 125V ac.
- "Pico" fuses: Cat Series 251, 252, 255, 256, 491, followed by suffix 012 through 0.15, rated 32V ac or dc, 12 through 15A, IR32-50A.
- "Pico" fuses: Cat Series 265, 266, 275, 276, followed by suffix 012 through 015, rated 32V ac or dc, 12 through 15A, IR32-50A.
- "Pico" fuses: Series 473 (axial position pigtail leads), 474 (radial position pigtail leads) followed by suffix 375 through 007, rated 125V ac or dc, 3/8 through 7A, IR 50A at 125V ac or dc.
- "Pico" fuses: Series 471 or 499 (axial position pigtail leads), 472 (radial position pigtail leads) rated 5A and less, 125V ac or dc, IR 50A at 125V ac or dc.
- "Micro" fuses: Catalogue Series 262, 268, 272, 278, 273, 279 followed by Suffix 002 through 005, rated 1/500A through 5A; short circuit rating - 10000A at 125V ac.
- Miniature, glass cartridge, 0.25 by 1.64 in, Cat Series LMF, 0.3-10A, 300V ac; Cat Series LGR, 0.5-15A, 300V ac.

Note: Suffix "L" may be added to Cat Series LGR fuse when fuse is provided in the submittor's LHR fuseholder assembly.

- Supplemental fuses, Series BLS and 537 followed by suffixes 0.2A through 5A, rated 600 Vac, IR 10kA and 6A through 10 A rated 250 Vac, IR 10kA.
- Size 1-1/2 by 13/32 in; Types KLK and 532, 600V, 0.1-30A incl; Types FLM and 533, 250V, .1-30A incl; Types BLN and 536, 250V, .5-30A incl; Types BLF and 535, 250V, .5-15A incl., 125V, 20-30A incl; Types FLQ and 538, 500V, 30A and less; Type KLKF, 600V ac and less, 15 and 20A; Type KLKD, 30A and less, 600V ac/dc and less.
- "Micro" fuses, Cat Series 202, 0.063-5A, 250V ac, IR250-50A; Cat Series 203, 0.25-5A, 250V ac, IR 250-50A.
- Supplemental fuses Series 224 (pigtail series) and 225, cartridge type 4.5mm by 15mm; 3.5A and less 250V; 3.6A to 10A, 125V; short circuit rating - 10000A at 125V, 1A and less 35A at 250V; 1.5A through 3.5A, 100A at 250V.
- Supplemental fuses Catalogue Series 235 and 236 (pigtail) cartridge type, 5mm by 20mm; 0.1-3A, 250V; 3.6-7A, 125V; short circuit rating - 10000A at 125V, 35A at 250V for 1A and less ratings, 100A at 250V for 1.1-3A ratings.
- Supplemental fuses, Catalogue Series 237, 1-10A, 125V ac and less, IR125-10kA non-renewable glass cartridge type, 5 by 20mm.
- Supplemental fuses, Catalogue Series 234, 10A and less, 250V ac and less.
- Supplemental fuses Catalogue Series 239 (pigtail) cartridge type, with or without one prefix followed by suffix numbers and with or without additional suffix characters, may be followed by P may be followed by SP or E, 5mm by 20mm, rated 0.08A–3.5A, 250 Vac, IR125-10kA; 0.08A–1A, 250 Vac, IR250-35A (1.0A or less); 1.25A–3.5A, 250 Vac, IR250-100A (Greater than 1, but less than or equal to 3.5); 4, 5 or 7 A, 125 Vac, IR125-10kA.
- "Nano" fuses, Cat Series 271, cartridge type; 0.5A and less, 125V ac and less, IR125-50A; 0.6A to 4A, 60V ac and less, IR60-50A; 4.1A to 15A, 32V ac and less, IR32-50A.
- "Nano" fuses, Series 429, 0.125-0.375A, 125V ac/dc, IR125V ac/dc-50A, 1/2-2A, 63V ac/dc, IR63V ac/dc-50A, 2-1/2-3A, 32V ac/dc, IR32V ac/dc-50A, 4-8A, 24V ac/dc, IR 24V ac/dc-35A intended for surface mount installation on pcb.
- "Nano" fuses, Series 431; 0.25-1.0A, 32V ac/dc, IR32V ac/dc-50A; 1.5-5A, 32V ac/dc, IR32V ac/dc-35A.
- "Nano" fuses, Series 451, 453 and 490, 0.062-15A, 125V ac/dc; non-renewable, intended for surface mount installation on printed circuit boards.
  A suffix “L” after the part number designates the use of gold plated caps.
  A suffix “SN” after the part number designates the use of Tin Dipped caps.
- "Nano" fuse, Cat No 450005, 3A, 125V ac/dc, IR 125V ac, -100A, IR 125V dc-300A.
- "Nano" fuses,, Series 452 and 454, 3/8-5A, 125V ac/dc, IR125V ac/dc-50A and 6-12A, 72Vac/60Vdc, IR 60dc -50A resistive, IR 72Vac -50A resistive, intended for surface mount installation on pcb.
  A suffix “L” after the part number designates the use of gold plated caps
  A suffix “SN” after the part number designates the use of Tin Dipped caps.
- "Nano" " fuses, Series 452xxxC where xxx is replaced with 0.375 through 005, rated 3/8-5A, 125V ac/dc, IR 125V ac/dc-50A resistive, intended for surface mount installation on pcb.
  A suffix “L” after the part number designates the use of gold plated caps.
  A suffix “SN” after the part number designates the use of Tin Dipped caps.
- "Nano" fuses, Series 451xxxC where xxx is replaced with 003 through 005, with or without one prefix and with or without up to three additional suffix letters: rated 3 – 5A, 125Vac/dc, IR125-50A ac at Unity pf, -50A dc Resistive and IR32-300A dc Resistive.
  A suffix “L” after the part number designates the use of gold plated caps.
  A suffix “SN” after the part number designates the use of Tin Dipped caps
- "Nano" fuse, Cat No 450002, 1/2A, 125V ac/dc, IR 125V ac/dc-50A.
- Micro fuses, Series 263 with suffixes 062 to 005, 0.062A-5A, 250V ac, IR250-50A.
- Pico SMD fuses, Cat Series 459 followed by suffix 125 through 005, rated 125V ac or dc, 0.125-5A.
- Pico SMD fuses, Series 460 followed by suffix 375 through 005, rated 125V ac or dc, 3/8-5A; IR 125V ac or dc, 50A.
- Series 257 and Series 287 blade type fuses, 3A to 30A, 32V dc or ac max.
- Series 586 or Cat No FLU 440 1A, 1000 V ac/dc; Series 585 or Cat No FLU011, 15A, 1000V ac/dc.
- Supplemental Fuses, Cat No 220013, 5A, 300V ac, IR 300-100A, Cat No 220044, 1A, 350V ac, IR 350-100A.
- Miniature Fuses, Series 325 and 326 followed by Suffixes 012, 015 and 020, rated 12-20A, 250V ac or by Suffixes 025 and 030 with or without one of two additional suffixes, rated 25-30A, 125V ac. Cat No WP91769, followed by List No 135 through 139, rated 25-30A, 125V ac, Cat No WP91769, followed by List No 35 through 39, rated 12-20A, 250V ac.
- Supplemental Fuses, 2205 Series, 0.25-2.5A, 250V ac, IR125-10kA, IR250-35A.
- Supplemental Fuses, 2206 Series, 0.75-3.0A; 250V ac, IR125V ac-10kA; IR300V ac-100A; IR 140V dc - 150A for 3A rating only.
- Supplemental Fuses, 1/4 by 1-1/4 inch ceramic cartridge, Cat Nos 314020, 324020 and WP91768, 20A, 300V ac max. IR125V ac/dc-10kA, IR250V ac-1kA, IR300V ac-200A.
  Supplemental Fuses, non-renewable, 5 by 20mm glass cartridge type Cat Series 233, 1.0-3.15A, 250V ac, IR 125-10kA, IR 250-100A, 4-6.3A, 125V ac, IR125-10kA; 8 - 10A, 125V ac, IR125-10kA.

- "Nano" fuses, Series 436, 0.75-1.6A, 250V ac, IR250V ac-100A; 125V ac, IR125V ac-10kA; 600V ac, IR600V ac-40A.
- Microfuses Series 493, 0.25-0.5A, 63V ac/dc, IR63V ac/dc-50A; rated 0.75-1.0A, 32V ac/dc, IR32V ac/dc-50A; rated 1.5-3.0A, 32V ac/dc, IR32V ac/dc-50A.
- Special purpose fuse, Series 401, 0.18-10A, 125V ac and 60V dc. Series 401, 0.88-5A, 160V dc-55A, IR125V ac-100A.
- Microfuses, Series 433, 466 rated 0.125-0.375A, 125V ac/dc, IR125V ac/dc-50A, rated 0.5-2A, 63V ac/dc, IR63V ac/dc-50A, rated 2-1/2-3A, 32V ac/dc, IR32V ac/dc-50, rated 4-7A, 24V ac/dc, IR 24V ac/dc-35A.
- Microfuses, Series 466, rated 6 to 10A, 24 Vac/dc, IR 24 Vac/dc-35A.; 4 and 5A, 32V ac/dc, JR32Vac/dc-50A.
- Supplemental Fuse, Series 468, 0.5 - 1.5A at 63V ac/dc , IR63V ac/dc, 50A; 2A at 63V ac/dc, IR63V ac/dc - 35A, 2.5A at 63Vac/dc, IR 63Vac – 35A, IR 63Vdc – 50A; 3A at 32V ac/dc, IR32V ac/dc - 50A.
- Microfuses, Series 448, 0.062-8A, 125V ac/dc, IR 125V ac/dc-50A, IR 32V dc-300A; 10A, 125V ac/dc, IR 125V ac-35A, IR 125V dc-50A, IR 32V dc-300A; 12-15A, 65V ac/dc, IR 65V ac/dc-50A, IR 24V dc-300A.

Notes:

1. Types 313, 315 and 326 have been tested for a limited short circuit at 250V.
2. Fuses for supplementary overcurrent protection are Certified for use only in equipment where the suitability of the combination is determined by CSA International.
3. Catalogue Series 202, 203, 220, 224, 225, 229, 230, 235, 236, 238, 239, 312, 313, 314, 315, 318, 324, 325, 326, 362, 368, 451, 452, 453, 454, 473,251, 252, 255, 256, may have suffix letters added to the catalogue number to indicate special pigtail and/or identity colour code marking and/or heat shrink tubing. Prefix letter may be added to Cat No to denote packaging issues.
4. Catalogue Series 251, 252, 255, 256 may have colour code current rating as well as marked current rating.
5. Catalogue Series 202, 203 have a 3 digit suffix to denote current rating.

6. Series BLS and 537 fuses are intended to provide supplementary overcurrent protection in equipment in order to provide individual protection for components or internal circuits.

7. These Fuses are not intended for branch circuit protection.

- Microfuses, Series 874, rated 10A max, 250V ac max, IR 50A at 250 Vac; Series 875, rated 10A max, 250V ac max, IR 50A at 250Vac. Series 875 also rated 12A at 125V ac and 32Vdc max, IR 50A at 125Vac and 32 Vdc.

Note: Catalogue numbers 875 and 874 with suffix “P” are identical to catalogue numbers 875 and 874 respectively except for the use of Lead free solder

/ld

Zertifikat
mit überwachter Konformität

Certificate
of surveyed conformity

TÜVRheinland®

Zertifikat Nr. ***Certificate No.***
J 50515033

Blatt ***Sheet***
0001

Ihr Zeichen *Client Reference*	**Unser Zeichen** *Our Reference*	**Ausstellungsdatum**	*Date of Issue*
H.Z.	01-SSC-CN21K51N 001	18.08.2021	*(day/mo/yr)*

Genehmigungsinhaber ***License Holder***
Littelfuse Inc.
8755 West Higgins Road,
O'Hare Plaza II Ste 500
Chicago IL 60631
USA

Fertigungsstätte ***Manufacturing Plant***
Littelfuse Phils., Inc.
Lima Technology Center
Special Economic Zone
Lipa City-Malvar
Batangas
Philippines

Prüfzeichen ***Test Mark***

TÜVRheinland® CERTIFIED
Safety
Regular Production Surveillance
www.tuv.com ID 1111243693

Geprüft nach ***Tested acc. to***
EN 60127-1:2006+A1+A2 EN 60127-7:2016
IEC 60127-1:2006+A1+A2 IEC 60127-7:2015

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

(Miniature Fuse-link)

Type Designation	: 452/454 series (Littelfuse)	9
Rated Voltage	: 125Vdc and 125Vac	
Rated Current	: 375mA; 500mA; 750mA; 1A; 1,5A 2A; 2,5A; 3A; 3,5A; 4A and 5A	
Rated Breaking Capacity	: 50A	
T/I Characteristics	: t2=3600s, t8=1s	

9

ANLAGE (Appendix): 1.0

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde.
Das Produkt entspricht den o.g. Anforderungen, die Herstellung wird überwacht.
This certificate is based on our Testing and Certification Regulation. The product fulfills above mentioned requirements, the production is subject to surveillance.

Zertifizierungsstelle

TÜV Rheinland LGA Products GmbH Zertifizierungsstelle

Kenny Shi

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
Tel.: +49 221 806-1371 e-mail: cert-validity@de.tuv.com
Fax: +49 221 806-3935 http://www.tuv.com/safety

10020 d 04.08 TÜV, TUEV and TUV are registered trademarks. Utilisation and application requires prior approval.

Zertifikat
mit überwachter Konformität

Certificate
of surveyed conformity

TÜVRheinland®

Zertifikat Nr. ***Certificate No.***
J 50515033

Blatt ***Sheet***
0002

Ihr Zeichen ***Client Reference***
H.Z.

Unser Zeichen ***Our Reference***
01-Cuiclaire-CN21K51N 002

Ausstellungsdatum ***Date of Issue*** *(day/mo/yr)*
08.06.2023

Genehmigungsinhaber ***License Holder***
Littelfuse Inc.
8755 West Higgins Road,
O'Hare Plaza II Ste 500
Chicago IL 60631
USA

Fertigungsstätte ***Manufacturing Plant***
Littelfuse Phils., Inc.
Lima Technology Center
Special Economic Zone
Lipa City-Malvar
Batangas
Philippines

Prüfzeichen ***Test Mark***

TÜVRheinland® CERTIFIED
Safety
Regular Production Surveillance
www.tuv.com ID 1111243683

Geprüft nach ***Tested acc. to***
EN 60127-1:2006+A1+A2 EN 60127-7:2016
IEC 60127-1:2006+A1+A2 IEC 60127-7:2015

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

(Miniature Fuse-link)

as page 0001
Additional ratings for
Type Designation : 452/454 series (Littelfuse)

Rated Voltage : AC 72V; DC 75V

Rated Current : 6,3A; 10.0A

Rated Breaking Capacity: 50A at 72VAC
100A at 75VDC

T/I Characteristics : t2=3600s, t8=1s

Remark: Appendix 1.0 dated on 2023-06-02 replaces Appendix 1.0 dated on 2021-08-18.

ANLAGE (Appendix): 1.0

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde.
Das Produkt entspricht den o.g. Anforderungen, die Herstellung wird überwacht.
This certificate is based on our Testing and Certification Regulation. The product fulfills above mentioned requirements, the production is subject to surveillance.

Zertifizierungsstelle

TÜV Rheinland LGA Products GmbH Zertifizierungsstelle

Kenny Shi

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
http://www.tuv.com/safety E-mail: markcheck@tuv.com
Fax: +49 221 806-3935

10/020 d 04.08 TÜV, TUEV and TUV are registered trademarks. Utilisation and application requires prior approval.

Littelfuse
Expertise Applied | Answers Delivered

Document Number:
UKDoC_452/454_20230511_RevB

UK Declaration of Conformity

Manufacturer:	Littelfuse, Inc. 8755 W. Higgins Road Suite 500 Chicago, IL 60631, USA 773-628-1000
Product Description:	NANO$^{2®}$ Slo-blo Surface Mount Fuse
Catalog Number:	452/454 Series

This UK declaration of conformity is issued under the sole responsibility of Littelfuse, Inc.

As of the date of this declaration, Littelfuse, Inc. declares the product is in conformity with the following statuary requirements:

The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 This compliance is demonstrated in accordance with the following standards/technical specifications: **EN IEC 63000:2018,** Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances
Electrical Equipment (Safety) Regulations 2016 This compliance is demonstrated in accordance with the following designated standards: **EN 60127-1**: **2006+A1:2011+A2:2015,** Miniature Fuses – Part 1: Definitions for miniature fuses and general requirements for miniature fuse-links. **EN 60127-7: 2016,** Miniature fuses - Part 7: Miniature fuse-links for special applications **UL/CSA/NMX 248-1:** Low-Voltage Fuses - Part 1: General Requirements, 3rd Edition **UL/CSA/NMX 248-14:** Standard for Low-Voltage Fuses - Part 14: Supplemental Fuses, 2nd Edition

These products must be installed, maintained and used in the applications for which they were made in accordance with “professional practices”, relevant installation standards and instructions from Littelfuse.

Signed for and on behalf of Littelfuse, Inc.: Date: 2022-05-11

Global Standards Manager
Chicago, IL, USA

DENAN STATEMENT OF CONFORMITY ASSESSMENT
電気用品安全法適合性同等検査合格書

頁/Page	Page 1 of 2
検査合格書番号/Statement No.	NBK030205-E10480B
交付年月日/Issue Date	2019-02-24
有効年月日/Expiration Date	2026-02-23
改版年月日/Revise Date	
試験報告書番号/Test Report No.	4788715235
客先/Representative	Littelfuse Inc. 8755 W. Higgins Road, Suite 500, Chicago, IL 60631 U.S.A
申請者/Applicant	Littelfuse Phils.Inc. Lima Technology Center, Special Economic Zone Lipa City – Malvar, Batangas, Philippines 4233
製造工場/Factory	申請者とおなじ Same as applicant
電気用品名/Product Name	その他の包装ヒューズ Other enclosed fuses
型式の区分/Type Classification	添付１参照/Refer to Attachment 1
適用試験規格/Standards used	Interpretation of DENAN Technical Requirements Ministerial Ordinance Appendix 3 電気用品の技術上の基準を定める省令の解釈別表第三
適合性検査の方法/Conformity Assessment Method	DENAN Technical Requirements & Enforcement Regulations Appendix 4 電気用品の技術基準及び電気用品安全法施行規則別表第四
PSEマーク/PSE Mark PS E UL-US	Representative sample(s) of the Specified Product(s) (as defined by the Japan's Ministry of Economy, Trade and Industry) and the factory have been found to comply with Technical Requirements stipulated in Paragraph 1 of Article 8 of the Electrical Appliance and Material Safety Law and the requirements stipulated by the Ministerial Ordinance in Paragraph 2 of Article 9 of the Law (limited to inspections relating to Item 2 of Paragraph 1 of Article 9 of the Law) by the Conformity Assessment Body as listed below: 特定電気用品（経済産業省の定めたもの）の供試品及び工場が電気用品安全法第８条第１項に規定する技術基準及び同法第９条第２項の経済産業省令で定める基準（法第９条第１項第２号に係る検査に係るものに限る）に適合していることを下記の検査機関が確認しました。 This DENAN Statement of Conformity Assessment does not indicate acceptability of the product(s) for Listing, Classification or Recognition by UL LLC or any other certifications or marks authorized by UL LLC or its affiliates. Products marked with a PSE Mark and the CAB ID must comply with the DENAN Law / Standards. この適合性同等検査合格書は製品のＵＬリスティング、クラシフィケーション、レコグニション、又はＵＬ及び関連会社が承認する他の如何なる認証やマークを認定するものではありません。PSE マーク及び検査機関の略称を表示する製品は電気用品安全法及び技術基準に適合しなければなりません。 This DENAN Statement of Conformity Assessment has been issued based on the evaluation of submitted tests samples of the Electrical Products, and does not indicates the fulfillment of the responsibility to confirm the conformity to the Technical Requirements stipulated in paragraph 1 of Article 8 of the Electrical Appliance and Material Safety Law for the Electrical Products in the same Type Classification by the Applicant. この適合性同等検査合格書は、提出された試験用の電気用品に関して評価を行った上で交付したものであり、同一の型式の区分にある電気用品について電気用品安全法第８条第１項に規定する技術基準適合確認の義務を履行したことを示すものではありません。 This DENAN Statement of Conformity Assessment is valid only for the attached scope of Type Classification or for combinations of the Type Classification. この適合性同等検査合格書は、別紙に記載されている型式の区分の範囲内及び区分の組み合わせについてのみ有効です。
検査機関/Conformity Assessment Body	UL LLC 333 Pfingsten Road, Northbrook, Illinois 60062 USA
発行者/Issued by	Kazuhiko Iwasaki DENAN Program Owner

DENAN STATEMENT OF CONFORMITY ASSESSMENT
電気用品安全法適合性同等検査合格書

検査合格書番号/Statement No. NBK030205-E10480B

交付年月日/Issue Date 2019-02-24

有効年月日/Expiration Date 2026-02-23

添付 1/ Attachment 1

型式の区分/ Type Classification

要素 Factor	区分 Classification
定格電圧 Rated voltage	125Ｖ以下のもの 125V or less
定格電流（定格電流表示のあるものの場 合に限る。） Rated current (limited to those with rated current markings)	５Ａ以下のもの 5A or less
適用電動機の定格容量（定格電流表示のないものの場合に限る。） Rated capacity of applicable motor (limited to those without rated current markings)	該当なし NA
可溶体の主材料 Fuse element materials	銅のもの Copper
可溶体の数 Number of fuse elements	１のもの One
再使用（管形ヒューズを除く。） Reusability (excluding cartridge fuses)	できないもの Not reusable
内部充てん物 Filler materials	ないもの Without filler materials
筒（内筒を除く。）の材料 Outer cartridge materials	磁器のもの又はガラスのもの Ceramic or glass
端子 Terminals	その他のもの Others
排気孔 Exhausting opening	ないもの Without exhausting opening
溶断の表示 Blowout fuse indicator	ないもの Without blowout fuse indicator
用途 Application	電子機器用のもの For use in electric appliances
定格遮断電流 Rated breaking capacity	100Ａ以下のもの 100A or less

This certificate is a renewal of NBK030205-E10480B ; issue date:2012-02-24, expiration date:2019-02-23.

UL iQ for Fuses

Fuses E10480

Guide Information

LITTELFUSE INC

8755 W Higgins Rd, Suite 500, Chicago IL 60631

452*$, 454*

Supplemental micro fuses: surface mount

Size mm(in)	Amps (A)	Volts (V)	Interrupting Rating (A)
6.1 x 2.69 x 2.69 (0.24 x 0.11 x 0.11)	0.375 - 5	125Vac	50
	0.375 - 5	125Vdc	50
	0.375 - 5	32Vdc	300
	6.3 - 12	72Vac	50
	6.3 - 12	60Vdc	50
	6.3 - 12	75Vdc	100
	6	72Vac	50
	6	60Vdc	50
	6	75Vdc	100

$ - May be followed by -L or -SN

* - With or without one prefix character and with or without additional suffix characters that signify options that do not affect the electrical characteristics.

Report Date: 1992-07-08

Last Revised: 2023-06-27

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