









NSC-TISI-TIS 17025 Testing 0452 SGS (Thailand) Limited

**Test Report No.** 5455243 Date: 5-Jan-2023 **Page 1 of 15** 

Client: Furukawa Precision (Thailand) Co.,Ltd. 1/57 Moo 5 Rojana Industrial Park

T. Karnham, A. Uthai Ayutthaya 13210 Thailand

The following sample(s) was/were submitted and identified by client as:

Sample Name : C5191

Sample Description : Metal without plating

The following sample(s) was/were identified by SGS as:

SGS Sample No. : 5707959

Sample Condition : Sample is contained in a plastic bag.

Quantity Submitted : 1 bag

Sample Receiving Date : 28-Dec-2022

Testing Period : 28-Dec-2022 to 05-Jan-2023

Test Requested : In accordance with the RoHS Directive 2011/65/EU (Annex II) [amended by Directive

(EU) 2015/863] Selected test (s) as requested by client.

Test Method : (1) IEC 62321-5 edition 1.0 : 2013 for Lead content, Analyzed by ICP-OES.

(2) IEC 62321-5 edition 1.0 : 2013 for Cadmium content, Analyzed by ICP-OES.

(3) IEC 62321-4 ,edition 1.1 : 2017 for Mercury Content, Analyzed by ICP-OES.
(4) IEC 62321-7-1 edition 1.0 : 2015 for Hexavalent Chromium Content, Analyzed by

UV/Vis Spectrometry.

(5) IEC 62321-6 edition 1.0: 2015 for PBBs/PBDEs content, Analyzed by GC/MS.

(6) IEC 62321-8 edition 1.0 : 2017 for Phthalates content, Analyzed was performed

by GC/MS.

(7) LBCH-08482 based on BS EN 14582 : 2016

(8) With reference to IEC 62321 with - ICP-OES

(9) With reference to IEC 62321 with - ICP-OES

Test Results : Please refer to next page.

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# CONCLUSION

Based on the performed tests on submitted sample(s), the results of Cadmium (Cd), Lead (Pb), Mercury (Hg), Hexavalent chromium (Cr-VI), Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) and Phthalates such as Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP) comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU where the decision rules based on simple acceptance which the probability of false accept may be as high as 50% in case the results is exactly on the tolerance limit.

Signed for and on behalf of SGS (Thailand) Ltd.

**Anchalee Wunnaphuek** Acting - RSTS Lab Manager

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**Test Report No. TEST RESULTS** 

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Test results by chemical method (Unit: mg/kg)

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Test Item (s):	Method (Refer to)	Result (1)	MDL	RoHS Limit
Lead (Pb)	(1)	7	2	1000
Cadmium (Cd)	(2)	n.d.	2	100
Mercury (Hg)	(3)	n.d.	2	1000
Hexavalent Chromium (CrVI) by boiling water extraction # (Unit : (ug/cm2))	(4)	n.d.	0.10	-

**Test Part Description** Result (1) metal

#### Note:

(a) mg/kg = ppm; 0.1wt% = 1000 ppm

- (b) ug/cm2 = microgram/centremeter square
- (c) n.d. = Not Detected
- (d) MDL = Method Detection Limit
- (e) # = a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 ug/cm2. The sample coating is considered to contain CrVI
- b. The sample is negative for CrVI if CrVI is n.d. (concentration less than 0.10 ug/cm2). The coating is considered a non-CrVI based coating
- c. The result between 0.10 ug/cm2 and 0.13 ug/cm2 is considered to be inconclusive unavoidable coating variations may influence the determination
- (f) "-" = Not regulated
- (g) For corrosion protection coatings on metals: Information on storage conditions and production date of the tested sample is unavailable and thus results of Cr(VI) represent status of the sample at the time of testing represent status of the sample at the time of testing.

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Test results by chemical method (Unit: mg/kg)

Test Item (s):	Method (Refer to)	Result (1)	MDL	RoHS Limit
Sum of PBBs	(5)*	n.d.	-	1000
Monobromobiphenyl		n.d.	5	-
Dibromobiphenyl		n.d.	5	-
Tribromobiphenyl		n.d.	5	-
Tetrabromobiphenyl		n.d.	5	-
Pentabromobiphenyl		n.d.	5	-
Hexabromobiphenyl		n.d.	5	-
Heptabromobiphenyl		n.d.	5	-
Octabromobiphenyl		n.d.	5	-
Nonabromobiphenyl		n.d.	5	-
Decabromobiphenyl		n.d.	5	-

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Test results by chemical method (Unit: mg/kg)

Test Item (s):	Method (Refer to)	Result (1)	MDL	RoHS Limit
Sum of PBDEs	(5)*	n.d.	-	1000
Monobromodiphenyl ether		n.d.	5	-
Dibromodiphenyl ether		n.d.	5	-
Tribromodiphenyl ether		n.d.	5	-
Tetrabromodiphenyl ether		n.d.	5	-
Pentabromodiphenyl ether		n.d.	5	-
Hexabromodiphenyl ether		n.d.	5	-
Heptabromodiphenyl ether		n.d.	5	-
Octabromodiphenyl ether		n.d.	5	-
Nonabromodiphenyl ether		n.d.	5	-
Decabromodiphenyl ether		n.d.	5	-

**Test Part Description** Result (1) metal

Note:

(a) mg/kg = ppm; 0.1 wt% = 1000 ppm

(b) n.d. = Not Detected

(c) MDL = Method Detection Limit

(d) "-" = Not regulated

(e) Test done on client submitted sample

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# Phthalates Content for RoHS Directive 2011/65/EU Annex II [amended by Directive (EU) 2015/863], Analysis was performed by GC/MS.

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Analysis	Method (Refer to)	Result (1) (mg/kg)	MDL	RoHS Limit (mg/kg)
DBP (Di-butyl phthalate) (CAS No.: 84-74-2)	(6)*	n.d.	50	1000
BBP (Benzyl butyl phthalate) (CAS No.: 85-68-7)	(6)*	n.d.	50	1000
DEHP (Di-2-ethylhexyl phthalate) (CAS No.: 117-81-7)	(6)*	n.d.	50	1000
DIBP (Di-isobutyl phthalate) (CAS No.: 84-69-5)	(6)*	n.d.	50	1000

**Test Part Description** Result (1) metal

Note:

(a) mg/kg = ppm; 0.1 wt% = 1000 ppm

(b) n.d. = Not Detected

(c) MDL = Method Detection Limit

(d) Test done on client submitted sample

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**TEST RESULTS** 









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Analysis	Method (Refer to 7)**	Instrument	Unit	MDL	Result (1)
Halogen	-	-	-	-	-
Halogen-Fluorine (F) (CAS No.14762-94-8)	LBCH-08482 based on BS EN 14582 : 2016	Analyzed was performed by Ion Chromatography	mg/kg	50	n.d.
Halogen -Chlorine (CI) (CAS No.22537-15-1)	LBCH-08482 based on BS EN 14582 : 2016	Analyzed was performed by lon Chromatography	mg/kg	50	n.d.
Halogen -Bromine (Br) (CAS No.10097-32-2)	LBCH-08482 based on BS EN 14582 : 2016	Analyzed was performed by lon Chromatography	mg/kg	50	n.d.
Halogen-lodine (I) (CAS No.14362-44-8)	LBCH-08482 based on BS EN 14582 : 2016	Analyzed was performed by Ion Chromatography	mg/kg	50	n.d.

### Notes:

- (a) mg/kg = ppm
- (b) n.d. = not detected
- (c) MDL = Method detection limit
- (d) Test done on client submitted sample
- (e) Result (1) metal

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Analysis	Method (Refer to)	Instrument	Unit	MDL	Result (1)
Antimony (Sb)	(8)*	ICP- OES	mg/kg	5	n.d.
Beryllium (Be)	(9)*	ICP-OES	mg/kg	5	n.d.

Note:

(a) mg/kg = ppm; 0.1wt% = 1000 ppm

(b) n.d. = Not Detected

(c) MDL = Method Detection Limit

(d) Result (1) metal

(e) Test done on client submitted sample

#### Remarks:

(1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.

(2) IEC 62321 series is equivalent to EN 62321 series.

https://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101::::FSP\_ORG\_ID,FSP\_LANG\_ID:1258637,25
(3) The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, from 22 July 2021

Test(s) marked \* on this report are not included in the Accreditation Scope.

The test item(s) marked with \*\* are tested by SGS (Thailand) Ltd. - 10, 10/1-4 and 12 Soi Rama III S.59, Chong Nonsi, Yan Nawa, Bangkok with no accreditation.

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Flow chart of Pb,Cd,Hg Testing

(Test method : IEC 62321)

Mechanical Sample Preparation | Т Acid digestion with | Microwave/Hotplate Filtration Residue No ----- Yes - 1 Total digestion 1 - 1 1 Analysis was performed by ICP-OES Data

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Flow chart of Hexavalent Chromium Testing

(Test method : IEC 62321)

+
Metallic material
Boiling water Extraction
Adding Orthophosphoric acid    Solution and    1,5-diphenylcarbazide for    color development
Analysis was   performed by UV-Vis
Data
•

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Flow chart of PBBs, PBDEs Testing

(Test method : IEC 62321) Sample pretreatment/separation | Sample solvent extraction by Toluene Concentrate/Dilution of extracted solution Filtration Analysis was performed by GC/MS ----+ Data

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### Flow chart of Phthalates Testing

(Test method : IEC 62321)
Sample pretreatment/separation
Sample dissolved/extraction   by Hexane
Dilution   extracted solution
Analysis was   performed by GC/MS
Data

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> Analytical flow chart of halogen content Sample pretreatment/ Separation | Weighting and putting sample in cell | Oxygen Bomb / Absorption Dilution to fixed volume Analysis was performed by IC

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Flow chart of digestion for the element analysis performed by ICP-OES

Cutting/Preparation 1 Sample Measurement Acid digestion/Microwave digestion by suitable acid depended on different sample material (as below table) 1 ---Filtration-----Solution Residue 1) Alkali Fusion 2) HCl to dissolve 1 **ICP-OES** 

_		L
İ		Aqua regia, HNO3, HCl, HF, H2O2
ļ	Glass	HNO3/HF
I	Gold,platinum,palladium,ceramic	Aqua regia
1	Silver	HNO3
I	Plastic	H2SO4,H2O2,HNO3,HC1
	Others	Any acid to total digestion

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## **SAMPLE/ATTACHMENT PICTURE**



\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* End of Report \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

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