Test Report Number: SHAH01527169

Applicant: MATERION ADVANCED MATERIALS TECHNOLOGIES AND SERVICES SUZHOU LTD.
NO 28, SU TONG RD, SUZHOU INDUSTRIAL PARK, 215021, CHINA.
Attn: BETTY XU

Date: 16 Dec, 2022

Sample Description:
One (1) piece of submitted sample said to be :
Item Name : Ti.

****

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

****

Conclusion:

Tested Sample	Standard	Result
Submitted Sample	Restriction of the use of certain hazardous substance in electrical and electronic equipment (RoHS Directive 2011/65/EU and (EU) 2015/863)	Pass

****

Prepared And Checked By:
For Intertek Testing Services Wuxi Ltd.

Peter Chen
General Manager

INTERTEK TESTING SERVICES WUXI LTD. 无锡天祥质量技术服务有限公司 检验检测专用章

Intertek Testing Services Wuxi Ltd.
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Test Report Number: SHAH01527169

Tests Conducted
1. RoHS Chemical Test

(A) Test Result Summary:

Testing Item	**Result**
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) ($\mu g/cm^2$)	N
Polybrominated Biphenyls (PBBs) Content (mg/kg)	
Monobromobiphenyl (MonoBB)	ND
Dibromobiphenyl (DiBB)	ND
Tribromobiphenyl (TriBB)	ND
Tetrabromobiphenyl (TetraBB)	ND
Pentabromobiphenyl (PentaBB)	ND
Hexabromobiphenyl (HexaBB)	ND
Heptabromobiphenyl (HeptaBB)	ND
Octabromobiphenyl (OctaBB)	ND
Nonabromobiphenyl (NonaBB)	ND
Decabromobiphenyl (DecaBB)	ND
Polybrominated Diphenyl Ethers (PBDEs) Content (mg/kg)	
Monobromodiphenyl Ether (MonoBDE)	ND
Dibromodiphenyl Ether (DiBDE)	ND
Tribromodiphenyl Ether (TriBDE)	ND
Tetrabromodiphenyl Ether (TetraBDE)	ND
Pentabromodiphenyl Ether (PentaBDE)	ND
Hexabromodiphenyl Ether (HexaBDE)	ND
Heptabromodiphenyl Ether (HeptaBDE)	ND
Octabromodiphenyl Ether (OctaBDE)	ND
Nonabromodiphenyl Ether (NonaBDE)	ND
Decabromodiphenyl Ether (DecaBDE)	ND
Phthalates Content (mg/kg)	
Bis(2-ethylhexyl)phthalate (DEHP)	ND
Butyl benzyl phthalate (BBP)	ND
Dibutyl phthalate (DBP)	ND
Diisobutyl phthalate (DIBP)	ND

mg/kg = milligram per kilogram
ND = Not Detected

N=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 μ 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).

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Tests Conducted

(B) RoHS Requirement:

Restricted Substances	Limits
Cadmium (Cd)	0.01% (100 mg/kg)
Lead (Pb)	0.1% (1000 mg/kg)
Mercury (Hg)	0.1% (1000 mg/kg)
Chromium (VI) (Cr^{6+})	0.1% (1000 mg/kg)
Polybrominated Biphenyls (PBBs)	0.1% (1000 mg/kg)
Polybrominated Diphenyl Ethers (PBDEs)	0.1% (1000 mg/kg)
Phthalates (DEHP, BBP, DBP, DIBP)	0.1% (1000 mg/kg)

The above limits were quoted from 2011/65/EU and (EU) 2015/863 for homogeneous material.

(C) 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	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/cm^2) / Negative(<0.10 μg/cm^2) / Inconclusive(0.10μg/cm^2 --0.13 μg/cm^2)
Polybrominated Biphenyls (PBBs)& Polybrominated Diphenyl Ethers (PBDEs) Content	With reference to IEC 62321-6 Edition 1.0:2015, by solvent extraction and determined by GC/MS and further HPLC confirmation when necessary	5 mg/kg
Phthalates (DEHP, BBP, DBP, DIBP) Content	With reference to IEC 62321-8 Edition 1.0:2017, by solvent extraction and determined by GC/MS	50mg/kg

Date Sample Received: 08 Dec, 2022

Testing Period: 08 Dec, 2022 To 16 Dec, 2022

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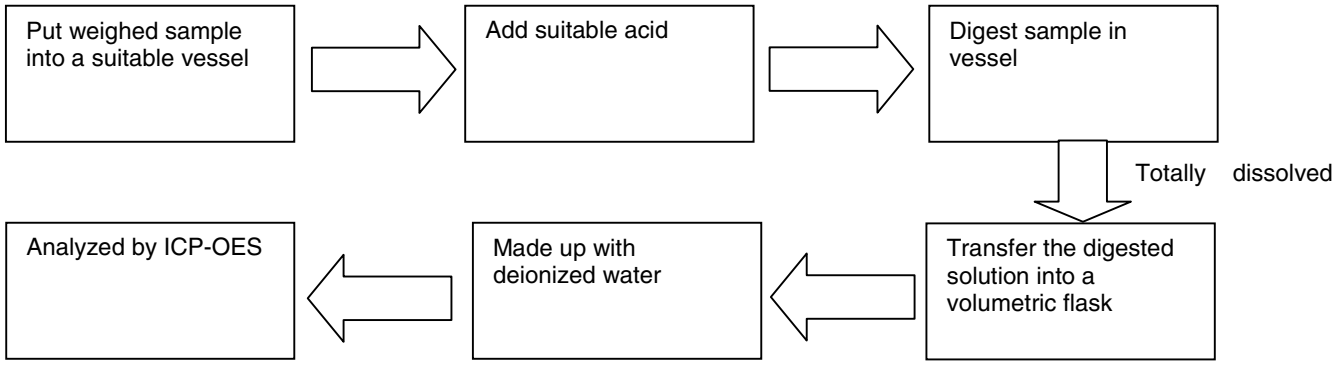
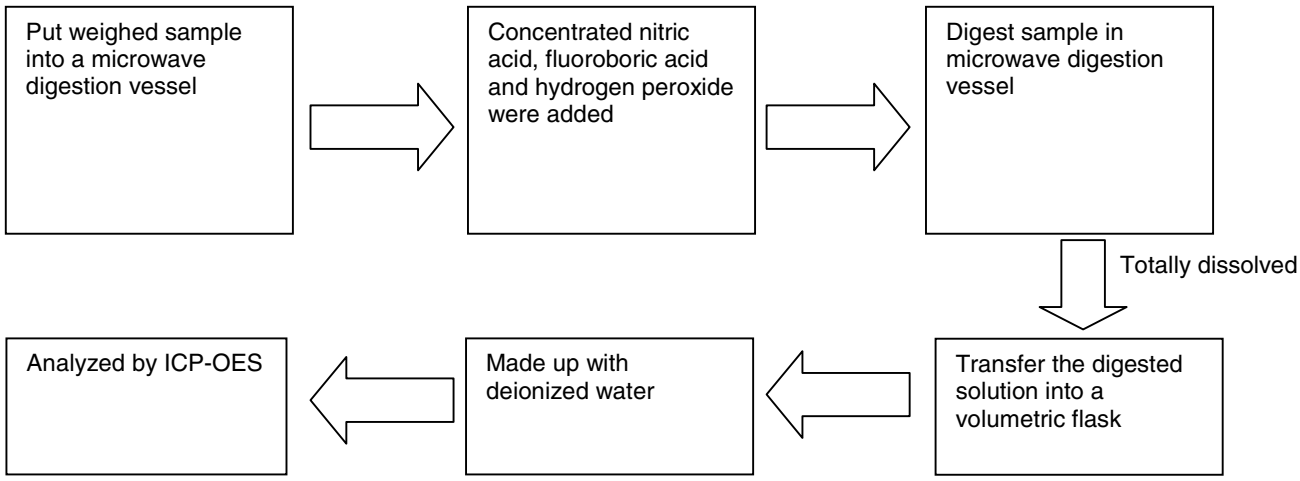
Tests Conducted
(D) Measurement Flowchart:

1. Test for Cd/Pb Contents



2. Test for Hg Content



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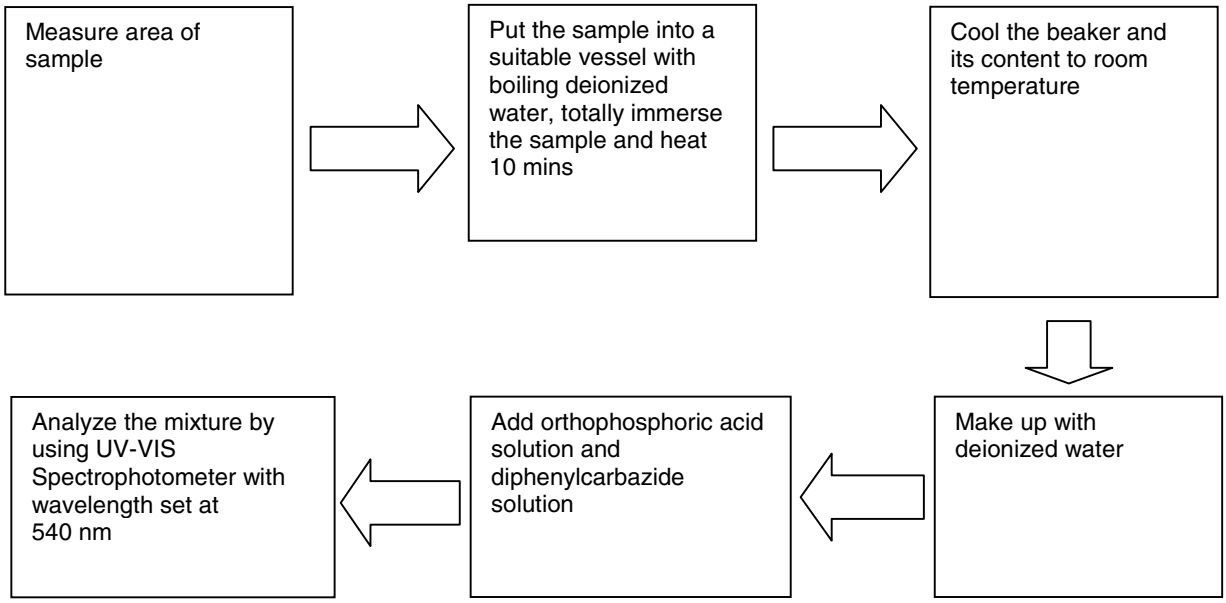
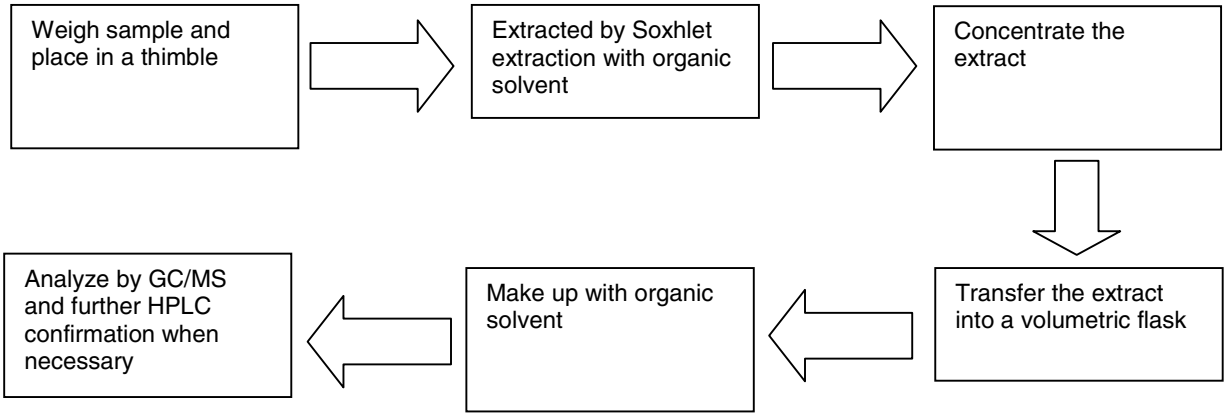
Tests Conducted

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



4. Test for PBBs/PBDEs Contents



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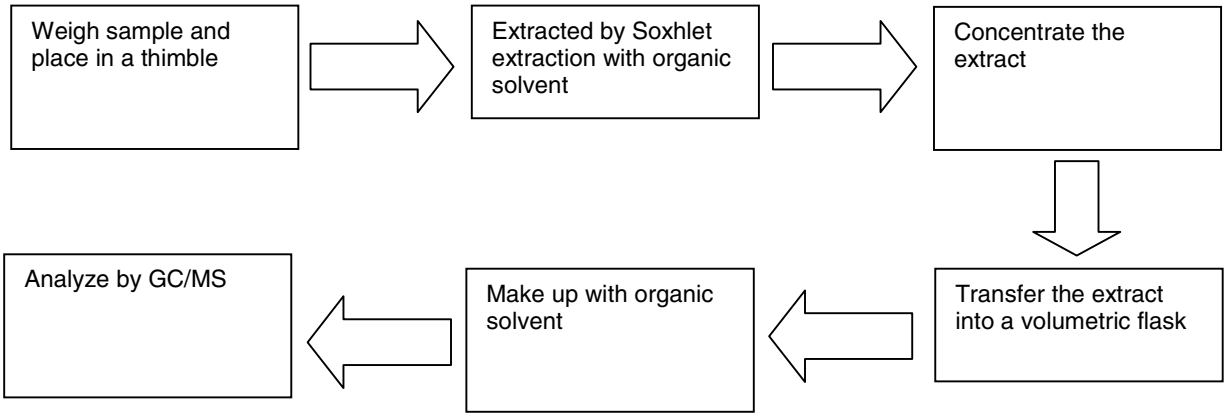
Tests Conducted

5. Test for Phthalate Contents



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Tests Conducted

2. Halogen Content

I. Testing Result

Testing Item	Result (ppm)
Fluorine (F) content	ND
Chlorine (Cl) content	ND
Bromine (Br) content	ND
Iodine (I) content	ND

Remark: ppm = Parts per million = mg/kg
ND = Not Detected

II. Testing Method

Testing Item	Testing Method	Reporting Limit
Halogen (F, Cl, Br, I) content	With reference to EN 14582:2016 by combustion in a calorimetric bomb and determined by ion chromatography	50 ppm

Date Sample Received: 08 Dec, 2022
Testing Period: 08 Dec, 2022 To 16 Dec, 2022

****

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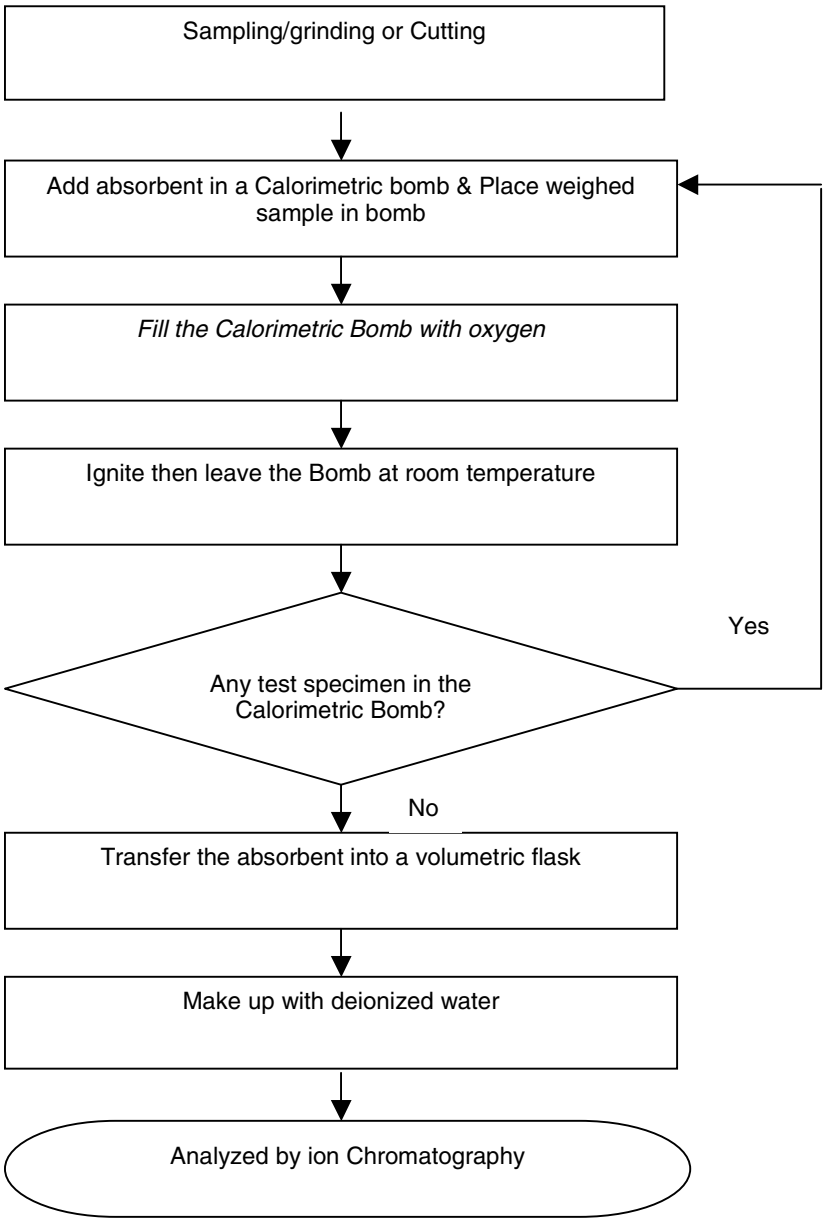
Tests Conducted
(III) Measurement flowchart：

Test for Halogen content

Reference method： EN 14582：2016



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Test Report Number： SHAH01527169

Tests Conducted

3. Perfluorooctane Sulfonates (PFOS) and Perfluorooctanoic Acid (PFOA)

With Reference To EPA 3550C, By solvent extraction and followed by Liquid Chromatography – Mass Spectrometry (LC-MS) analysis.

Test Item	Result in ppm
Perfluorooctanesulfonic Acid (PFOS)	ND
Perfluorooctane Acid (PFOA)	ND

Remark： ND = Not Detected (Less than detection limit)
Detection Limit = 1 ppm

Date Sample Received: 08 Dec, 2022
Testing Period: 08 Dec, 2022 To 16 Dec, 2022

4. Perfluorooctane Sulfonates (PFOS) and Perfluorooctanoic Acid (PFOA)

With Reference To CEN/TS 15968, By solvent extraction and followed by Liquid Chromatography – Mass Spectrometry (LC-MS) analysis.

Test Item	Result in ppm
Perfluorooctanesulfonic Acid (PFOS)	ND
Perfluorooctane Acid (PFOA)	ND

Remark： ND = Not Detected (Less than detection limit)
Detection Limit = 0.025 ppm

Date Sample Received: 08 Dec, 2022
Testing Period: 08 Dec, 2022 To 16 Dec, 2022

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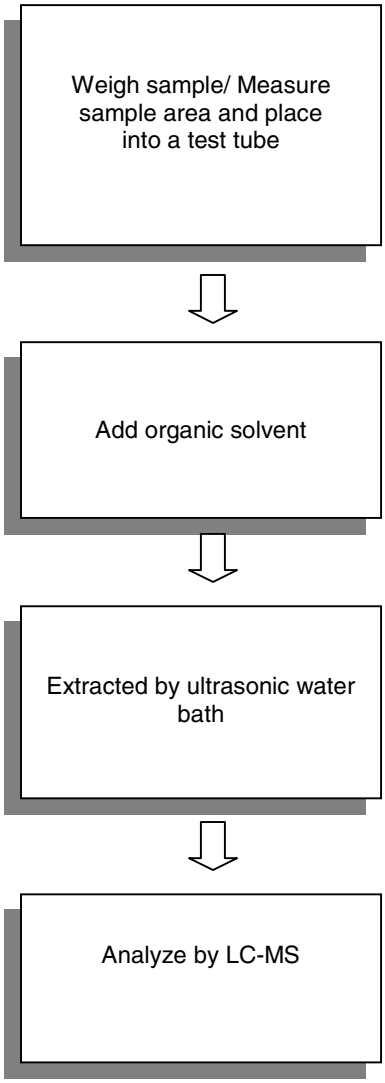
Tests Conducted
Measurement flowchart：

Test for Perfluorooctane Sulfonates(PFOS)and Perfluorooctanoic Acid (PFOA) content：



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Tests Conducted

5. Phthalate Content Test

With Reference To EN14372, By Gas Chromatography-Mass Spectrometry (GC-MS) Analysis.

Tested Compound	Result (In ppm)
Di-Iso-Decyl Phthalate (DIDP)	ND
Di-N-Hexyl Phthalate (DNHP)	ND
Bis(2-methoxyethyl)phthalate (DMEP)	ND
Bis(2-methoxyethyl)phthalate (BMEP)	ND
Di-isopentylphthalate (DIPP)	ND
D-pentyl iso-pentylphthalate (NPIPP)	ND
Dipentyl phthalate (DNPP)	ND

With Reference To IEC 62321-8:2017, By Gas Chromatography-Mass Spectrometry (GC-MS) Analysis.

Tested Compound	Result (In ppm)
Di-Iso-Nonyl Phthalate (DINP)	ND
Di-N-Octyl Phthalate (DNOP)	ND

Detection Limit = 50 ppm
ND = Not Detected
ppm = parts per million = mg/kg

Date Sample Received: 08 Dec, 2022
Testing Period: 08 Dec, 2022

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Tests Conducted

6. Total Antimony(Sb),Beryllium(Be) Content

With Reference To US EPA 3052, Acid Digestion Method Was Used And total Antimony(Sb),Beryllium(Be) content were determined by Inductively Coupled Argon Plasma Spectrometry.

	Result (ppm)
Antimony(Sb)	ND
Beryllium(Be)	ND

Remark： ppm = parts per million = mg/kg
Detection Limit= 2 ppm
ND=Not Detected

Date Sample Received: 08 Dec, 2022
Testing Period: 08 Dec, 2022 To 16 Dec, 2022

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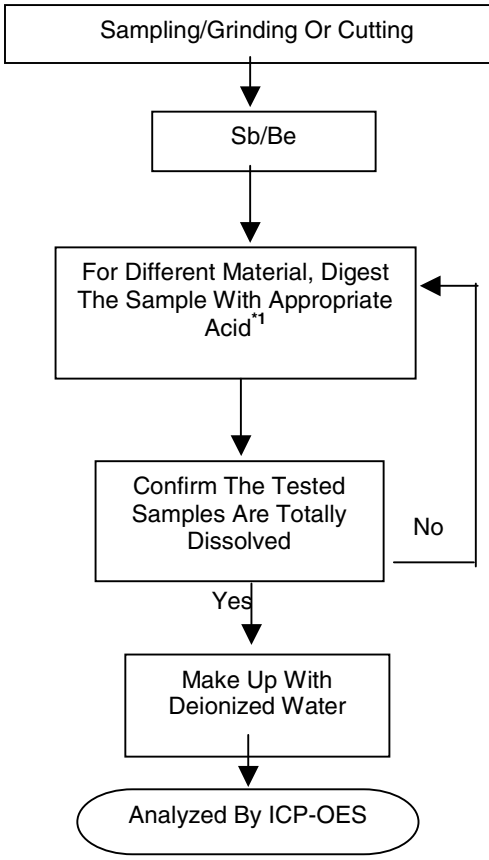
Tests Conducted
Measurement Flowchart:



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 The Result Of Spot Test Is Positive, Chromium VI Would Be Determined As Detected.

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Tests Conducted

7. HBCDD Content

(Ⅰ)Test result summary：

Testing Item	Result (ppm)
HBCDD (hexabromocyclododecane)	ND

Remarks：ppm = Parts per million = mg/kg
ND = Not Detected

(Ⅱ) Test Method：

Testing Item	Testing Method	Reporting Limit
HBCDD (hexabromocyclododecane)	With reference to US EPA 3540C, by solvent extraction and determined by GC-MS	10 ppm

Date Sample Received: 08 Dec, 2022
Testing Period: 08 Dec, 2022 To 16 Dec, 2022

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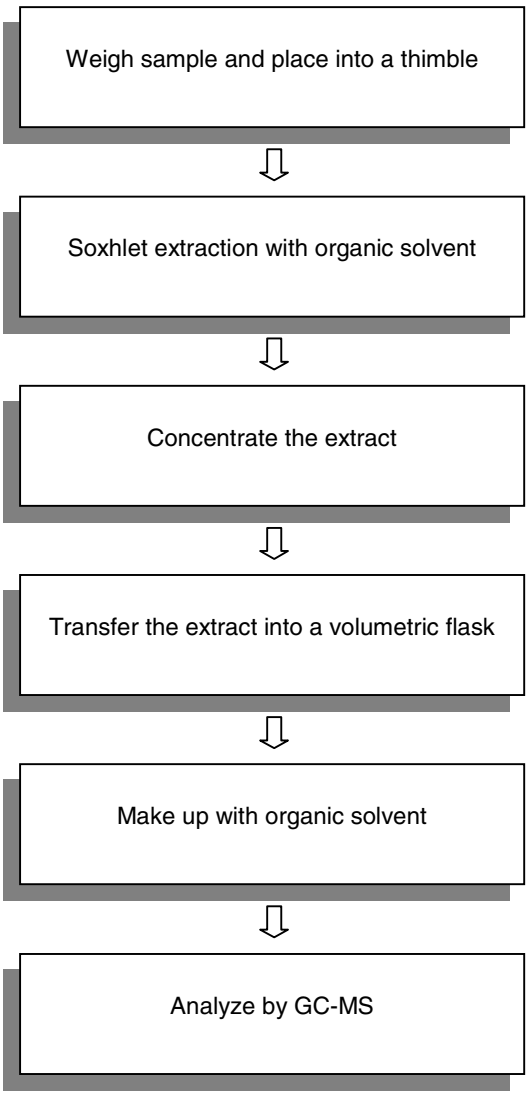
Tests Conducted

Measurement flowchart:

Test for HBCDD (hexabromocyclododecane) content



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Tests Conducted

8. TBBPA-bis and TBBPA

(Ⅰ) Test result summary:

Testing Item	Result (ppm)
TBBPA (Tetrabromobisphenol A)	ND

Remarks: ppm = Parts per million = mg/kg
ND = Not Detected

(Ⅱ) Test method:

Testing Item	Testing Method	Reporting Limit
TBBPA (Tetrabromobisphenol A)	With reference to USEPA 3540C, by solvent extraction and determined by HPLC	10 ppm

Date Sample Received: 08 Dec, 2022
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Tests Conducted

Measurement flowchart

Test for TBBPA content:

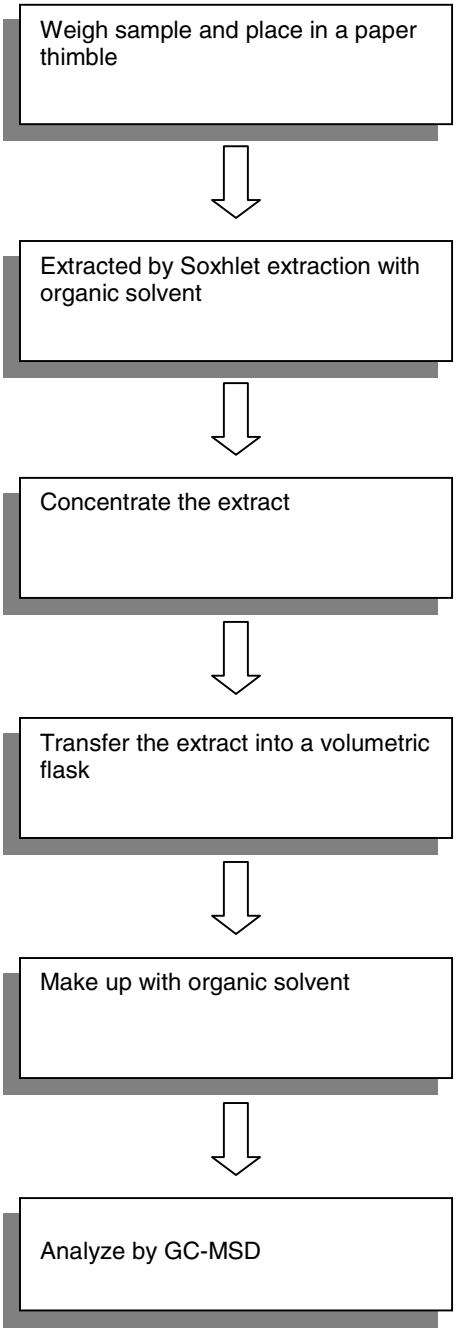

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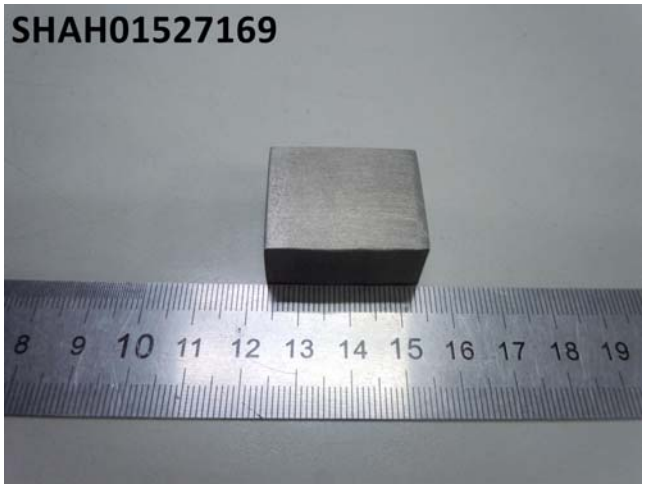
Photo



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End Of Report

The statements of conformity reported have considered the decision rule agreed, namely that Intertek have taken account of measurement uncertainty as calculated by Intertek, and applied according to ILAC-G8/09:2019 (Non-binary acceptance based on guard band w = U) except designation from the customer, regulation or test specification. This decision rule only applies to the numeric test results.

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