

**Test Report**

Number: SHAH01768066

Applicant: MATERION CORPORATION  
MAYFIELD HEIGHT, OH MATERION  
CORPORATION 6070 PARKLAND BLVD  
MAYFIELD HEIGHTS, OH 44124

Date: 12 Dec, 2024

**Sample Description:**

One (1) piece of submitted sample said to be :

Item Name : Cu.

Test Item : Pb,Cd,Hg,CrVI,PBBs,PBDEs,Phthalates,HBCDD,TBBPA,F,Cl,Br,I,PFOS,PFOA,  
Be,Sb.

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**Tests Conducted:**

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

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**Conclusion:**

<u>Tested Samples</u>	<u>Standard</u>	<u>Result</u>
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

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



Bill Zhang  
General Manager



**Test Report**

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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 <sup>6+</sup> ) Result (By Boiling Water Extraction on Metal) (μg/cm <sup>2</sup> )	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 μg/cm<sup>2</sup> 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 <sup>6+</sup> )	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 <sup>6+</sup> ) 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 <sup>2</sup> ) / Negative(<0.10 µg/cm <sup>2</sup> ) / Inconclusive(0.10µg/cm <sup>2</sup> --0.13 µg/cm <sup>2</sup> )
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	50 mg/kg

Date Sample Received: 03 Dec, 2024

Testing Period: 03 Dec, 2024 To 12 Dec, 2024

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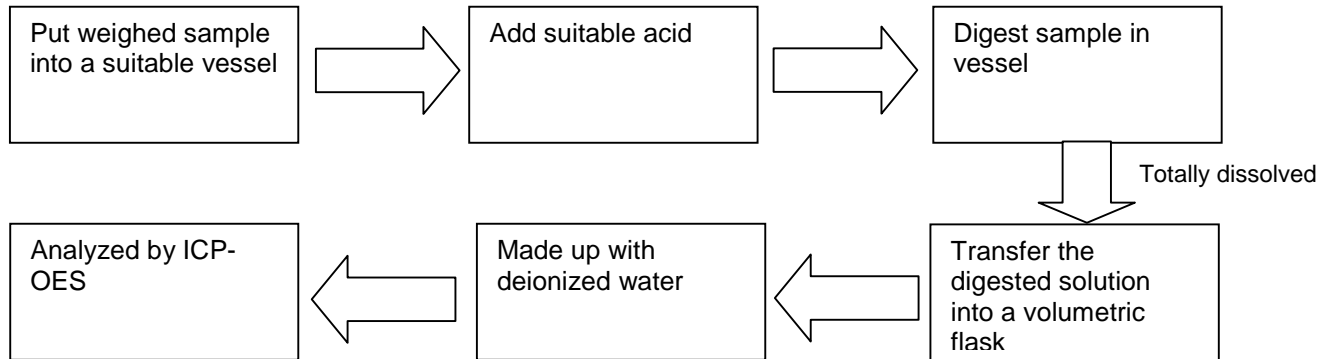


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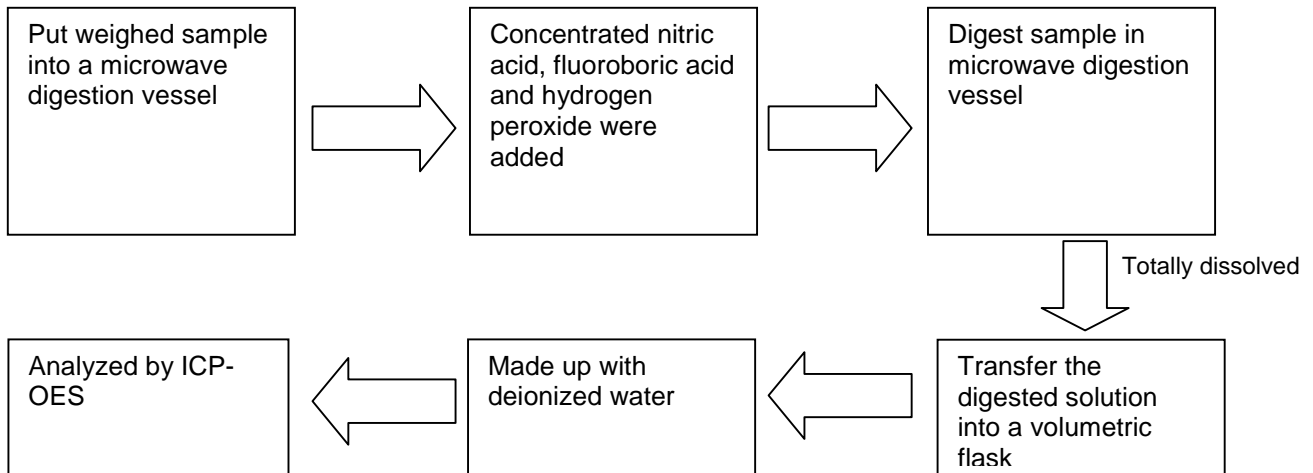
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Tests Conducted  
(D) Measurement Flowchart:

1. Test for Cd/Pb Contents



2. Test for Hg Content



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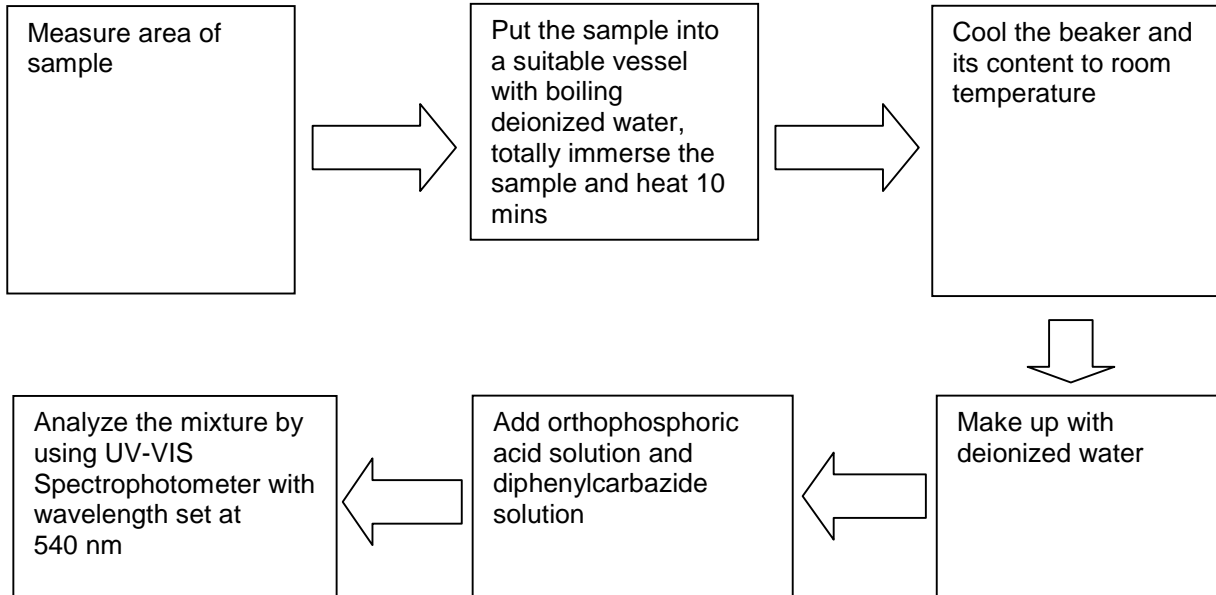


**Test Report**

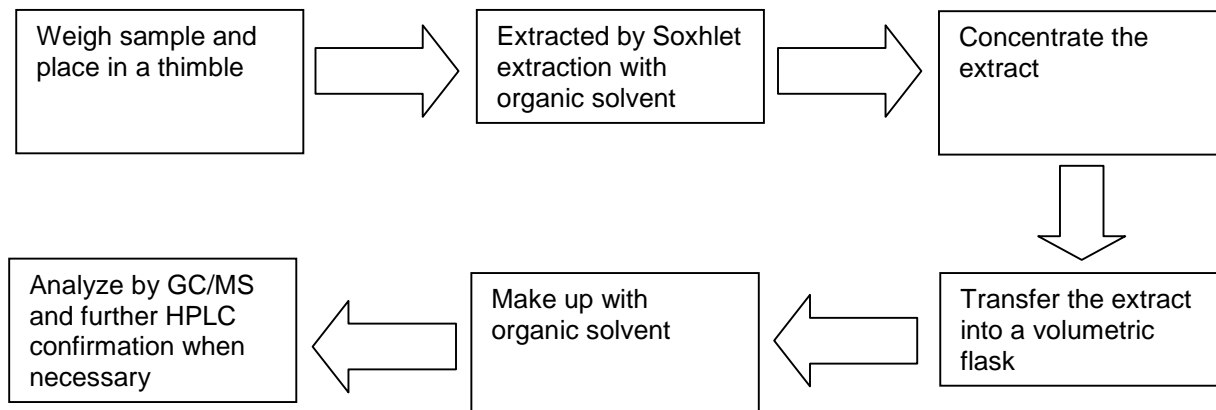
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Tests Conducted

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



4. Test for PBBs/PBDEs Contents



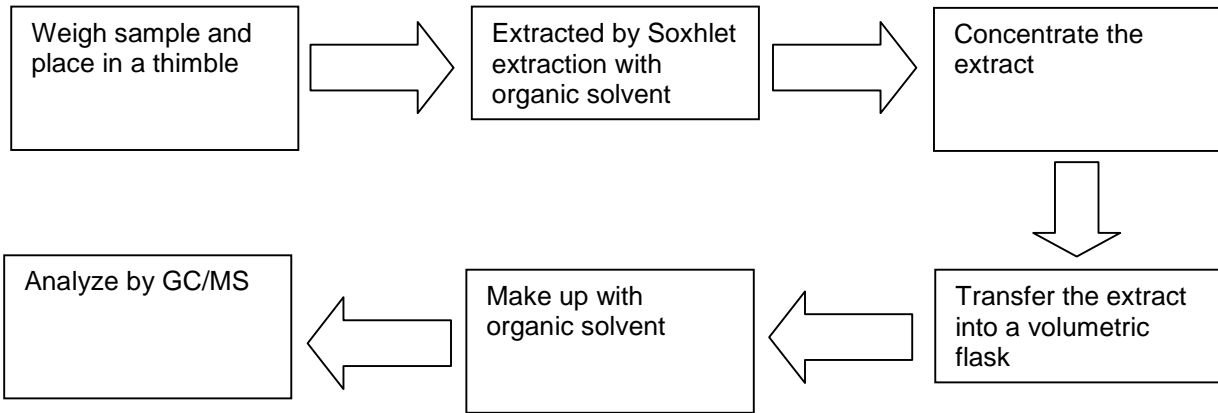
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Tests Conducted  
5. Test for Phthalate Contents



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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 BS EN 14582:2016 by combustion in a calorimetric bomb and determined by ion chromatography	50 ppm

Date Sample Received: 03 Dec, 2024

Testing Period: 03 Dec, 2024 To 12 Dec, 2024

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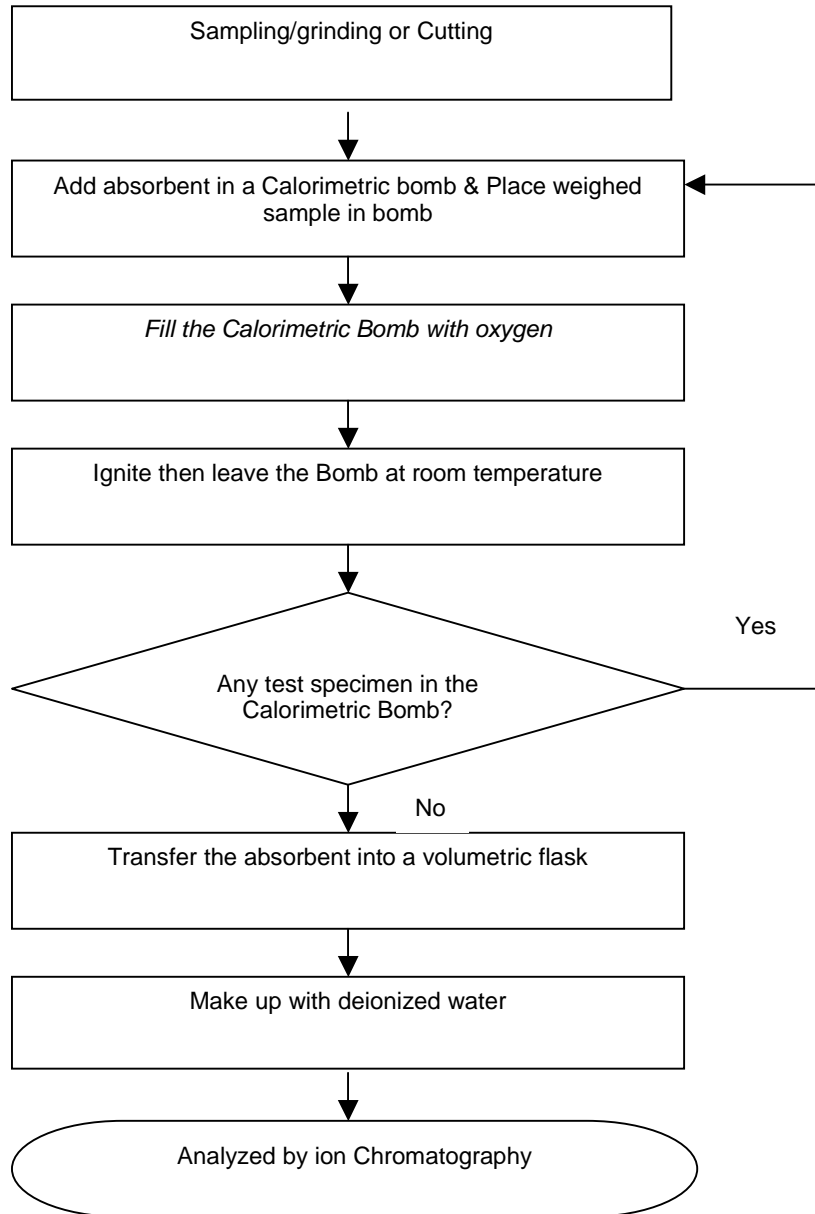
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Tests Conducted  
(III) Measurement flowchart:

Test for Halogen content

Reference method: BS EN 14582: 2016



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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.

<u>Test Item</u>	<u>Result in ppm</u>
Perfluorooctanesulfonic Acid (PFOS)	ND
Perfluorooctane Acid (PFOA)	ND

Remark: ND = Not Detected (Less than detection limit)  
Detection Limit = 1 ppm  
ppm = parts per million = mg/kg

Date Sample Received: 03 Dec, 2024  
Testing Period: 03 Dec, 2024 To 12 Dec, 2024

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.

<u>Test Item</u>	<u>Result in ppm</u>
Perfluorooctanesulfonic Acid (PFOS)	ND
Perfluorooctane Acid (PFOA)	ND

Remark: ND = Not Detected (Less than detection limit)  
Detection Limit = 0.025 ppm  
ppm = parts per million = mg/kg

Date Sample Received: 03 Dec, 2024  
Testing Period: 03 Dec, 2024 To 12 Dec, 2024

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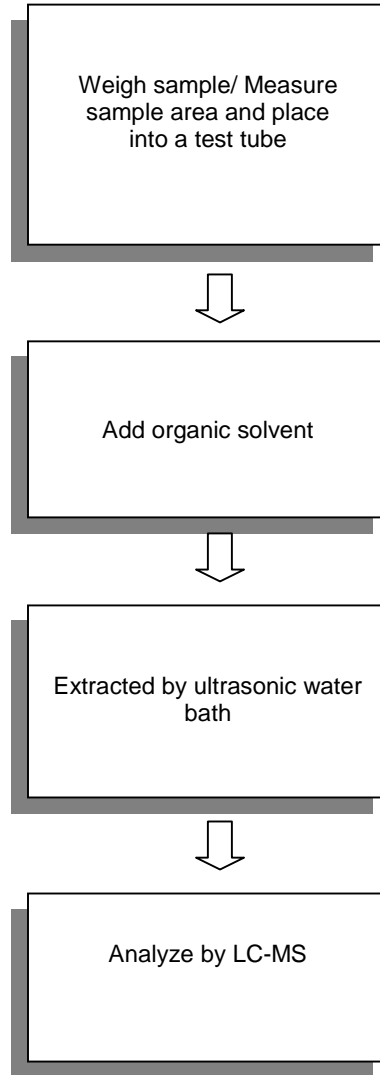


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Tests Conducted  
Measurement flowchart:

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: 03 Dec, 2024  
Testing Period: 03 Dec, 2024 To 12 Dec, 2024

6. 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: 03 Dec, 2024  
Testing Period: 03 Dec, 2024 To 12 Dec, 2024

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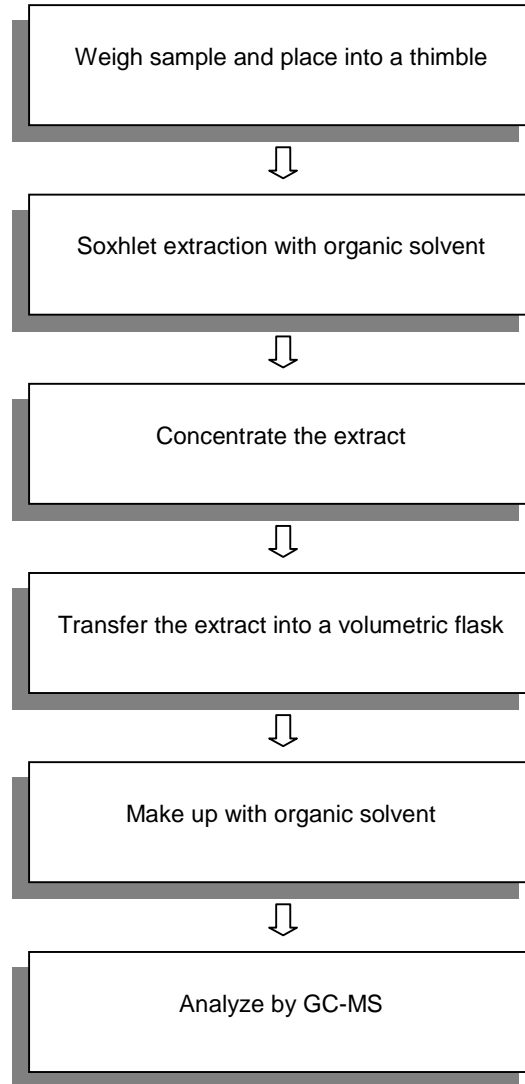
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Tests Conducted

**Measurement flowchart:**

Test for HBCDD (hexabromocyclododecane) content



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Tests Conducted

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

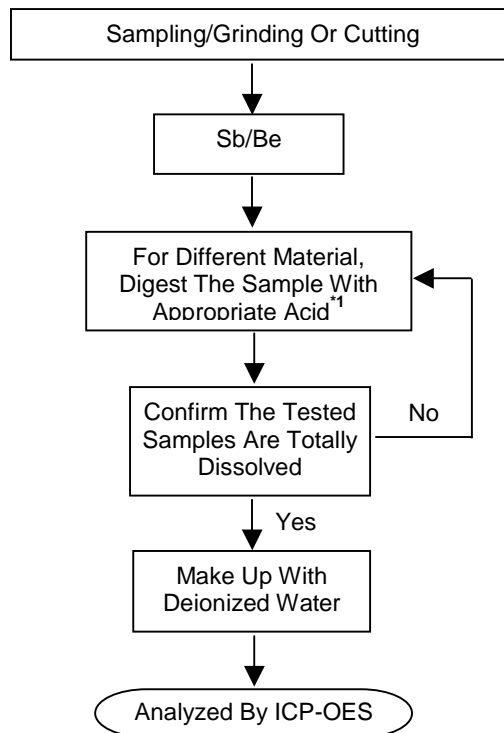
With Reference To US EPA 3052, Acid Digestion Method Was Used And total Antimony(Sb),Beryllium(Be) content were determined by Inductively Coupled Argon Plasma Spectrometry.

	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: 03 Dec, 2024  
Testing Period: 03 Dec, 2024 To 12 Dec, 2024

Measurement Flowchart:



Remarks:

\*1: List Of Appropriate Acid:

Material	Acid Added For Digestion
Polymers	HNO <sub>3</sub> ,HCL, HF, H <sub>2</sub> O <sub>2</sub> , H <sub>3</sub> BO <sub>3</sub>
Metals	HNO <sub>3</sub> ,HCL, HF
Electronics	HNO <sub>3</sub> ,HCL, H <sub>2</sub> O <sub>2</sub> , HBF <sub>4</sub>

\*2: If The Result Of Spot Test Is Positive, Chromium VI Would Be Determined As Detected.

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Tests Conducted

8. 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: 03 Dec, 2024  
Testing Period: 03 Dec, 2024 To 12 Dec, 2024

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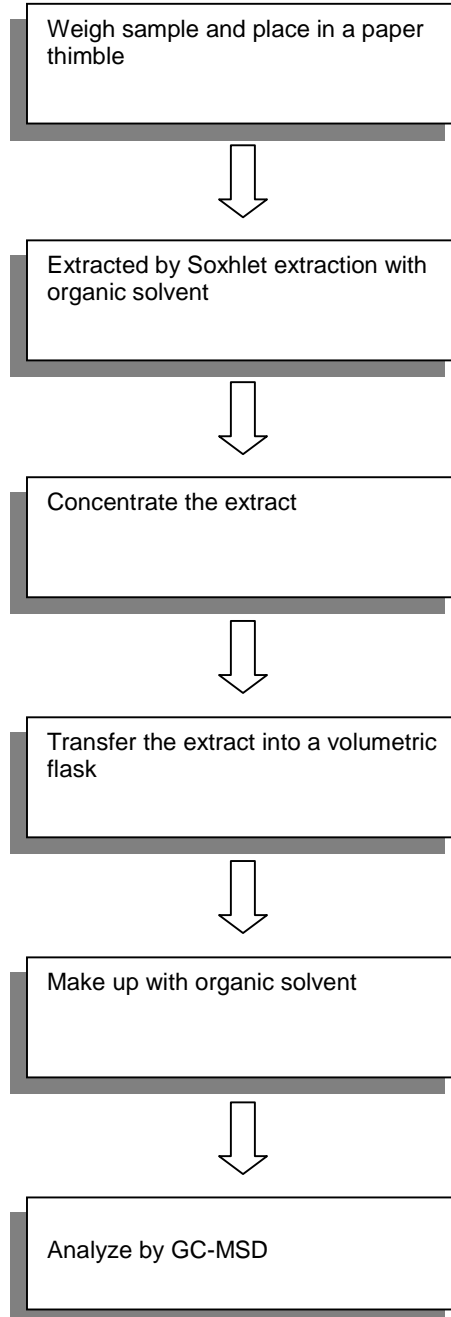


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Tests Conducted  
Measurement flowchart

Test for **TBBPA** content:



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Tests Conducted

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.*

*The sample(s) and sample information hereto are provided by the client who shall be solely responsible for the authenticity and integrity thereof. The results shown in this report relate only to the sample(s) received and tested. It is not intended to be a recommendation for any particular course of action. Intertek does not accept a duty of care or any other responsibility to any person other than the Client in respect of this report and only accepts liability to the Client insofar as is expressly contained in the terms and conditions governing Intertek's provision of services to you. Intertek makes no warranties or representations either express or implied with respect to this report save as provided for in those terms and conditions. We have aimed to conduct the review on a diligent and careful basis and we do not accept any liability to you for any loss arising out of or in connection with this report, in contract, tort, by statute or otherwise, except in the event of our gross negligence or wilful misconduct. This report shall not be reproduced unless with prior written approval from Intertek Testing Services Wuxi Ltd.*

