

**HAESUNGDS CO., LTD.**

(Seongju-dong) 726 Unnam-ro, Seongsan-gu  
Changwon-si, Gyeongnam  
Korea



The following sample(s) was/were submitted and identified by/on behalf of the client as:-

**SGS File No.** : AYGU23-09414  
**Product Name** : LEAD FRAME  
**Item No./Part No.** : EFTEC64T-uPPF RT  
**Received Date** : 2023. 12. 06  
**Test Period** : 2023. 12. 06 to 2023. 12. 11  
**Test Results** : For further details, please refer to following page(s)

**SGS Korea Co., Ltd.**  
**/ Busan Branch**



**Taehee Kang / Technical Manager**

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**Sample No.** : AYGU23-09414.001  
**Sample Description** : LEAD FRAME  
**Item No./Part No.** : EFTEC64T-uPPF RT  
**Materials** : Metal Alloy

**Heavy Metals**

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5 : 2013, by ICP-OES	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 62321-5 : 2013, by ICP-OES	5	N.D.
Mercury (Hg)	mg/kg	With reference to IEC 62321-4 : 2013+A1 : 2017, by ICP-OES	2	N.D.
Hexavalent Chromium (Cr VI) *	µg/cm <sup>2</sup>	With reference to IEC 62321-7-1 : 2015, by UV-Vis	0.1	N.D.

**Total Metals**

Test Items	Unit	Test Method	MDL	Results
Antimony (Sb)	mg/kg	With reference to EPA 3052 : 1996, EPA 6010D : 2018, by ICP-OES	10	N.D.
Beryllium (Be)	mg/kg	With reference to EPA 3052 : 1996, EPA 6010D : 2018, by ICP-OES	5	N.D.
Arsenic (As)	mg/kg	With reference to EPA 3052 : 1996, EPA 6010D : 2018, by ICP-OES	10	N.D.

**Flame Retardants-PBBs/PBDEs**

Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Dibromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Tribromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Pentabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Heptabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Octabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Nonabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Decabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.

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**Item No./Part No.** : EFTEC64T-uPPF RT  
**Materials** : Metal Alloy

**Flame Retardants-PBBs/PBDEs**

Test Items	Unit	Test Method	MDL	Results
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.

**Phthalates**

Test Items	Unit	Test Method	MDL	Results
Di-butyl phthalate (DBP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Benzyl butyl phthalate (BBP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-(2-ethylhexyl) phthalate (DEHP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-isobutyl phthalate (DIBP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
[di(C6-C8 alkyl)phthalate] branched (DIHP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
[di(C7-C11 alkyl)phthalate] linear and branched (DHNUP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Bis(2-methoxyethyl) phthalate (BMP, BMEP, DMEP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-isononyl phthalate (DINP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-isodecyl phthalate (DIDP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-n-octyl phthalate (DNOP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-n-hexyl phthalate (DNHP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-n-pentyl phthalate(DPP, DnPP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.

**Halogen Contents**

Test Items	Unit	Test Method	MDL	Results
Bromine(Br)	mg/kg	With reference to EN 14582 : 2016, by IC	30	N.D.
Chlorine(Cl)	mg/kg	With reference to EN 14582 : 2016, by IC	30	N.D.
Fluorine(F)	mg/kg	With reference to EN 14582 : 2016, by IC	30	N.D.
Iodine(I)	mg/kg	With reference to EN 14582 : 2016, by IC	50	N.D.

**Flame Retardants**

Test Items	Unit	Test Method	MDL	Results
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**Sample No.** : AYGU23-09414.001  
**Sample Description** : LEAD FRAME  
**Item No./Part No.** : EFTEC64T-uPPF RT  
**Materials** : Metal Alloy

**Flame Retardants**

Test Items	Unit	Test Method	MDL	Results
Hexabromocyclododecane (HBCDD, HBCD)	mg/kg	With reference to EPA 3540C : 1996, EPA 3550C : 2007 by GC-MS	5	N.D.

**Other(s)**

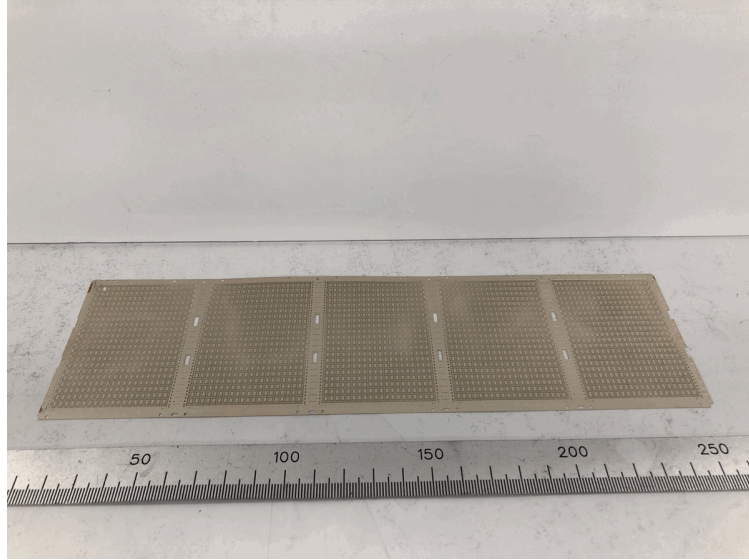
Test Items	Unit	Test Method	MDL	Results
Perfluorooctanoic acid (PFOA) and its salts *	µg/kg	With reference to CEN/TS 15968 : 2010, by LC-MS-MS	10	N.D.
Perfluorooctane sulfonate (PFOS) and its salts ^	µg/kg	With reference to CEN/TS 15968 : 2010, by LC-MS-MS	10	N.D.

^ PFOS refer to its salts / derivative including PFOS-K (CAS No.: 2795-39-3), PFOS-Li (CAS No.: 29457-72-5), PFOS-NH<sub>4</sub> (CAS No.: 29081-56-9), PFOS-NH(OH)<sub>2</sub> (CAS No.: 70225-14-8), PFOS-N(C<sub>2</sub>H<sub>5</sub>)<sub>4</sub> (CAS No.: 56773-42-3), PFOS-N(C<sub>10</sub>H<sub>21</sub>)<sub>2</sub>(CH<sub>3</sub>)<sub>2</sub> (CAS No. 251099-16-8) and POSF (CAS No.: 307-35-7).

\* PFOA refer to its salts including PFOA-Na (CAS No.: 335-95-5), PFOA-K (CAS No.: 2395-00-8), PFOA-Ag (CAS No.: 335-93-3), PFOA-F (CAS No.: 335-66-0) and APFO (CAS No.: 3825-26-1).

- NOTE:
- (1) N.D. = Not detected.(<MDL)
  - (2) mg/kg = ppm
  - (3) µg/kg = ppb
  - (4) MDL = Method Detection Limit
  - (5) - = No regulation
  - (6) Negative = Undetectable / Positive = Detectable
  - (7) \*\* = Qualitative analysis (No Unit)
  - (8) \* = a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 ug/cm<sup>2</sup>. 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/cm<sup>2</sup>). The coating is considered a non-CrVI based coating.  
 c. The result between 0.10 ug/cm<sup>2</sup> and 0.13 ug/cm<sup>2</sup> is considered to be inconclusive - unavoidable coating variations may influence the determination.

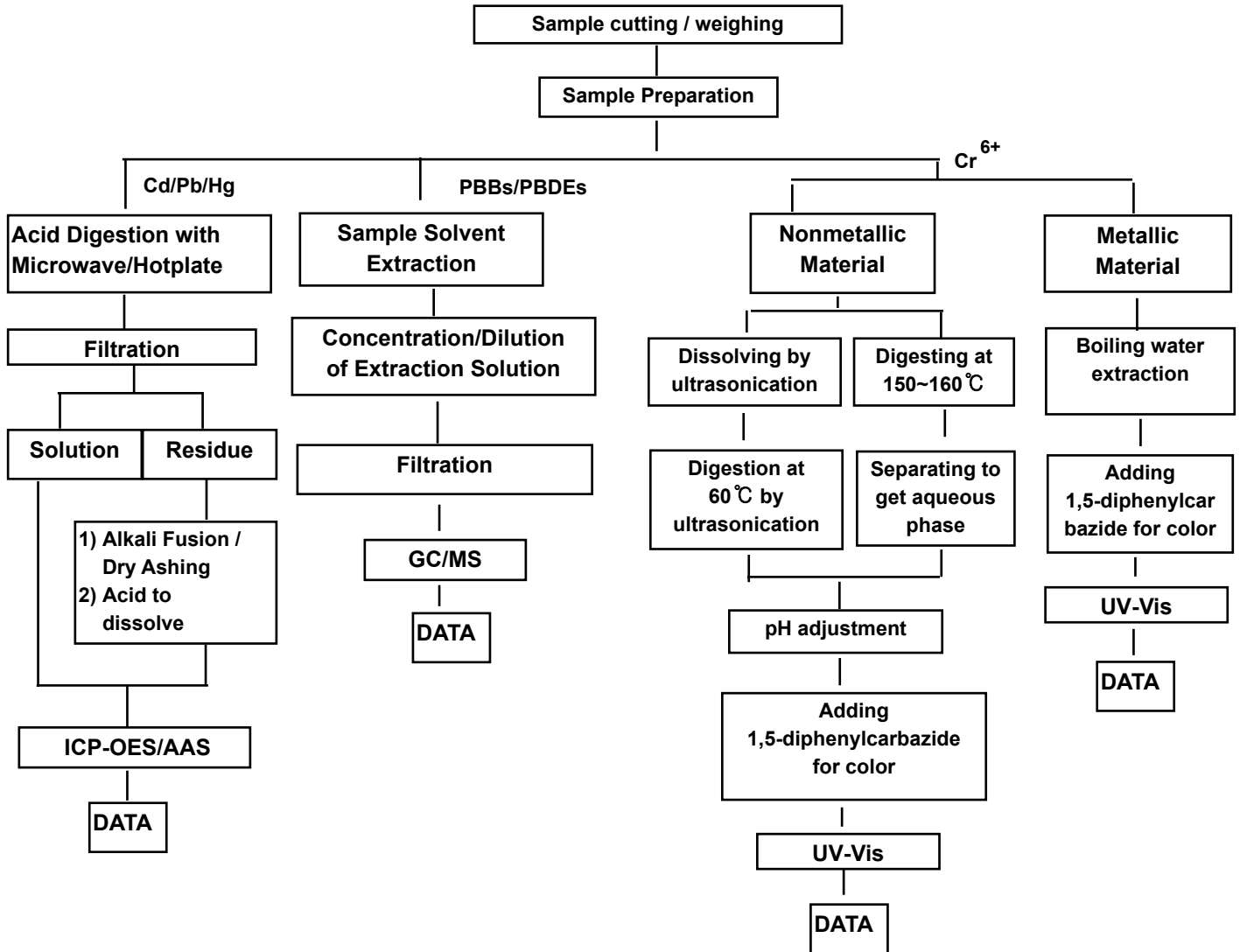
**Picture of Sample as Received:**



**AYGU23-09414.001**

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Testing Flow Chart for RoHS: Cd/Pb/Hg/Cr<sup>6+</sup> /PBBs&PBDEs Testing

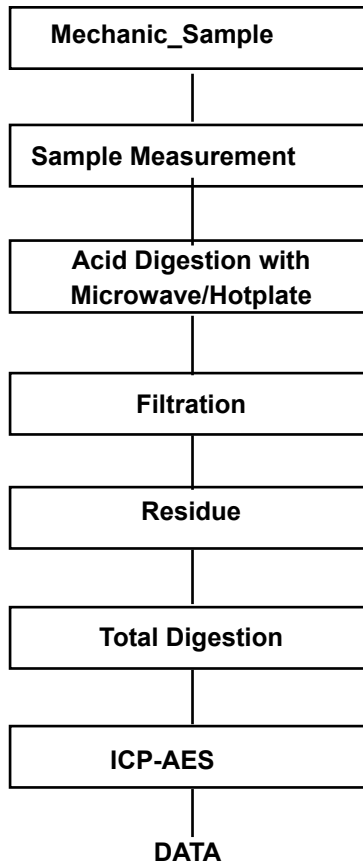


The samples were dissolved totally at the acid digestion step of the above flow chart for Cd,Pb,Hg  
 Section Chief : Taehee Kang

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### Flow Chart for Inorganic Elements Testing

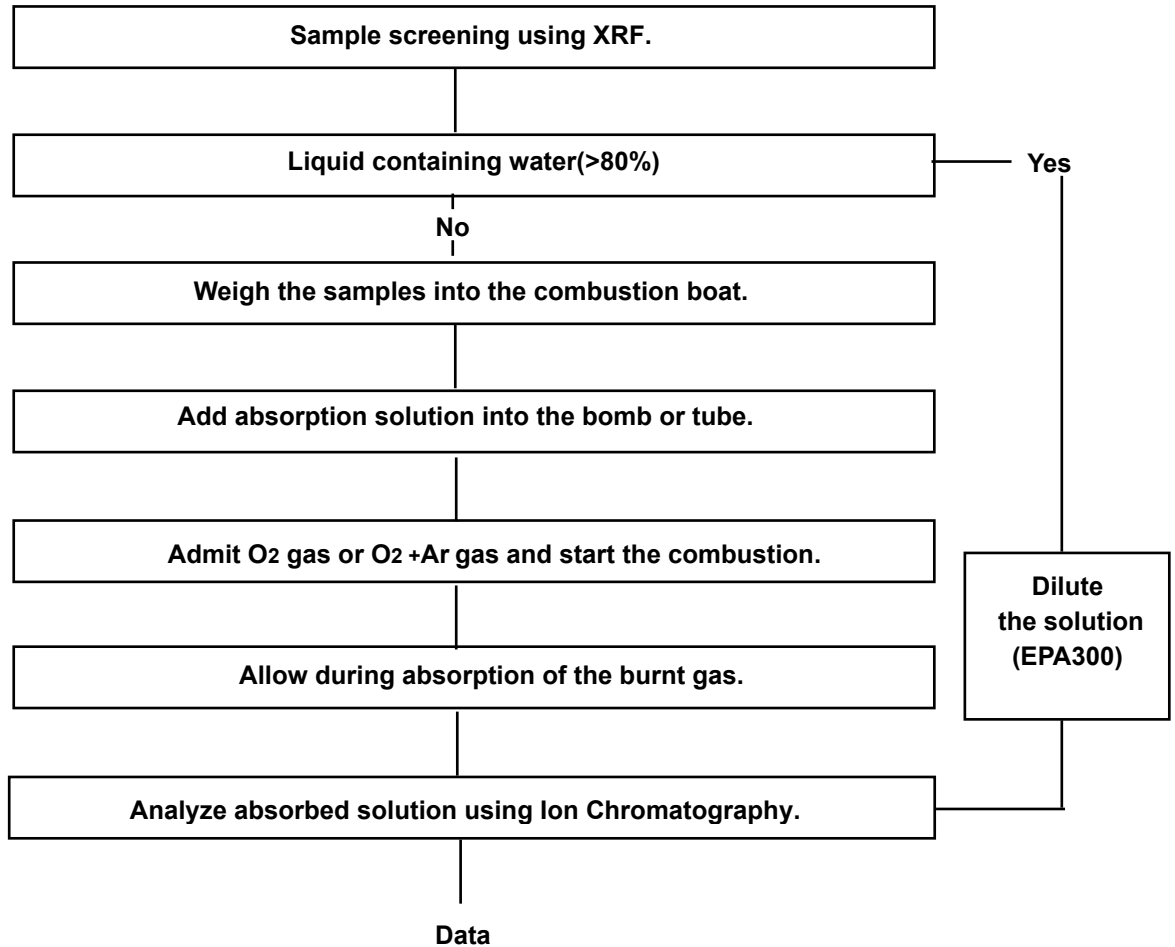
#### Inorganic Elements



Major Inorganic Heavy Metals	Antimony(Sb) , Beryllium(Be) , Phosphorus(P) , Arsenic(As) etc.
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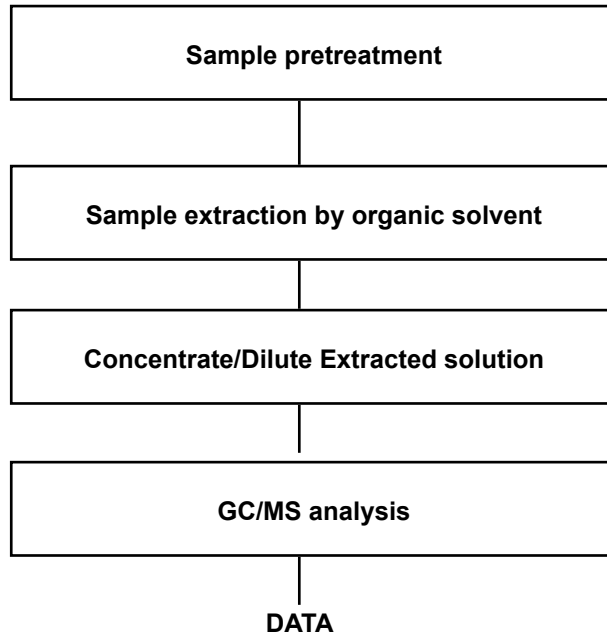
**Flow Chart for Halogen Test**



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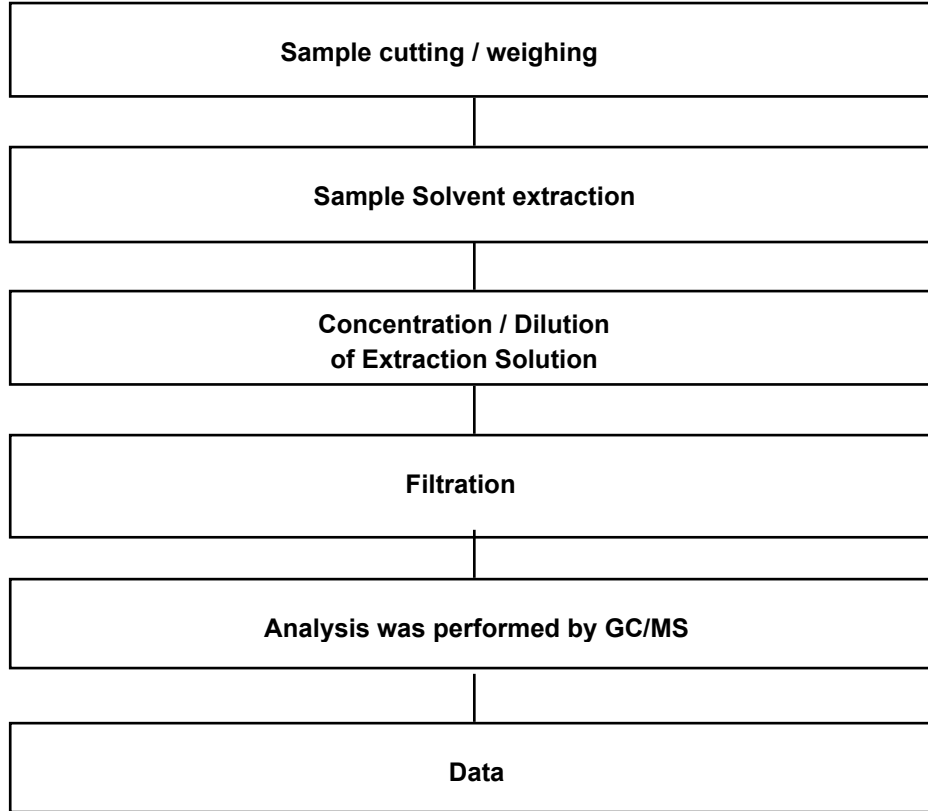


### Testing Flow Chart for HBCD



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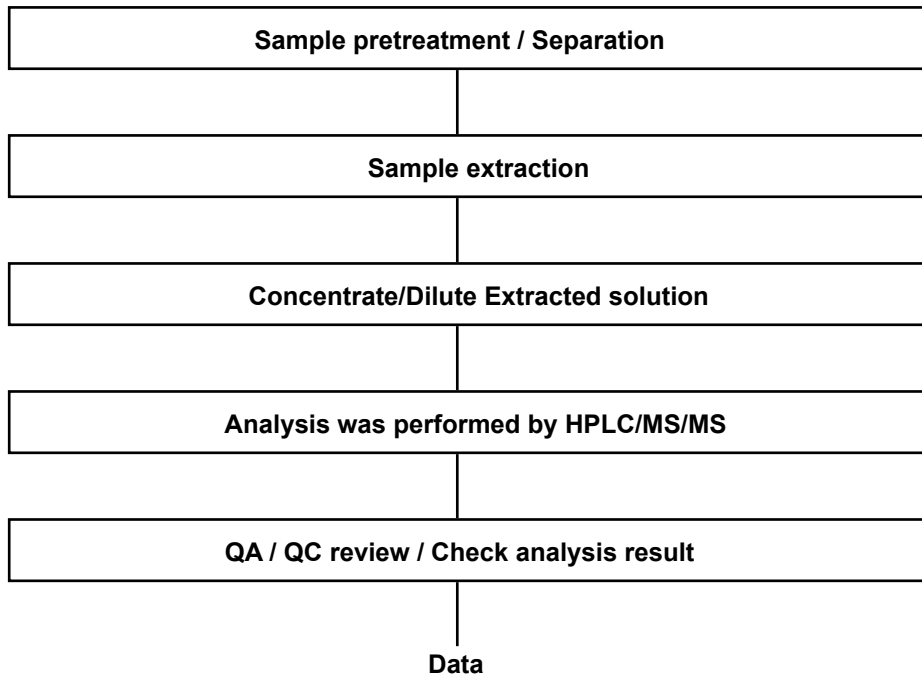
### Flow Chart for Phthalate Test



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### Flow Chart for PFOS/PFOA Test



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

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