

**SAMHWA NON-FERROUS METAL IND. CO., LTD.**  
156 Ojanggol-gil, Gunbuk-myeon  
Haman-gun, Gyeongnam  
Korea



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

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**SGS File No.** : AYGU22-02032  
**Product Name** : Pb Free Solder  
**Item No./Part No.** : N/A  
**Received Date** : 2022. 01. 14  
**Test Period** : 2022. 01. 14 to 2022. 01. 19  
**Test Results** : For further details, please refer to following page(s)

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

**Dongju Lee / Technical Manager**

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MQP-708-001-F12 (01)

**Sample No.** : AYGU22-02032.001  
**Sample Description** : Pb Free Solder  
**Item No./Part No.** : N/A  
**Materials** : Sn,Cu

**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	205
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.
Antimony (Sb)	mg/kg	With reference to EPA 3052 : 1996,With reference to EPA 6010B : 1996, by ICP-OES	10	25.5
Beryllium (Be)	mg/kg	With reference to EPA 3052 : 1996,With reference to EPA 6010B : 1996, by ICP-OES	5	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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**Sample No.** : AYGU22-02032.001  
**Sample Description** : Pb Free Solder  
**Item No./Part No.** : N/A  
**Materials** : Sn,Cu

**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-(2-ethylhexyl) phthalate (DEHP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
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-isobutyl phthalate (DIBP)	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.

- 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.

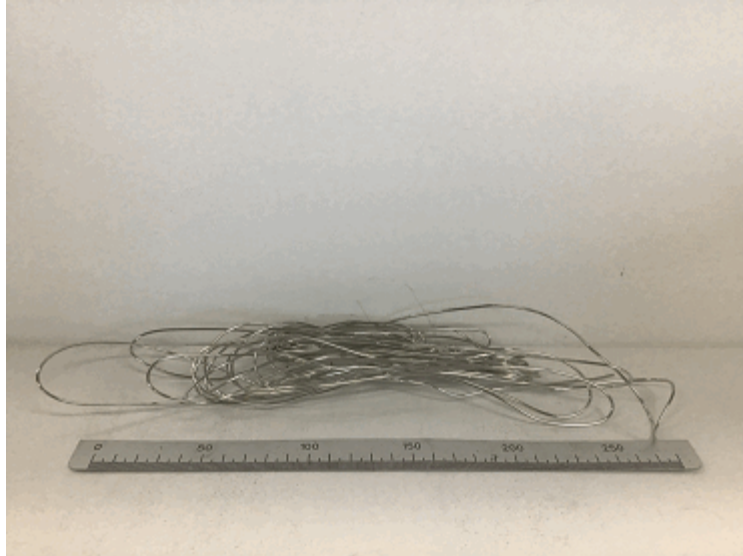
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## Picture of Sample as Received:



AYGU22-02032.001

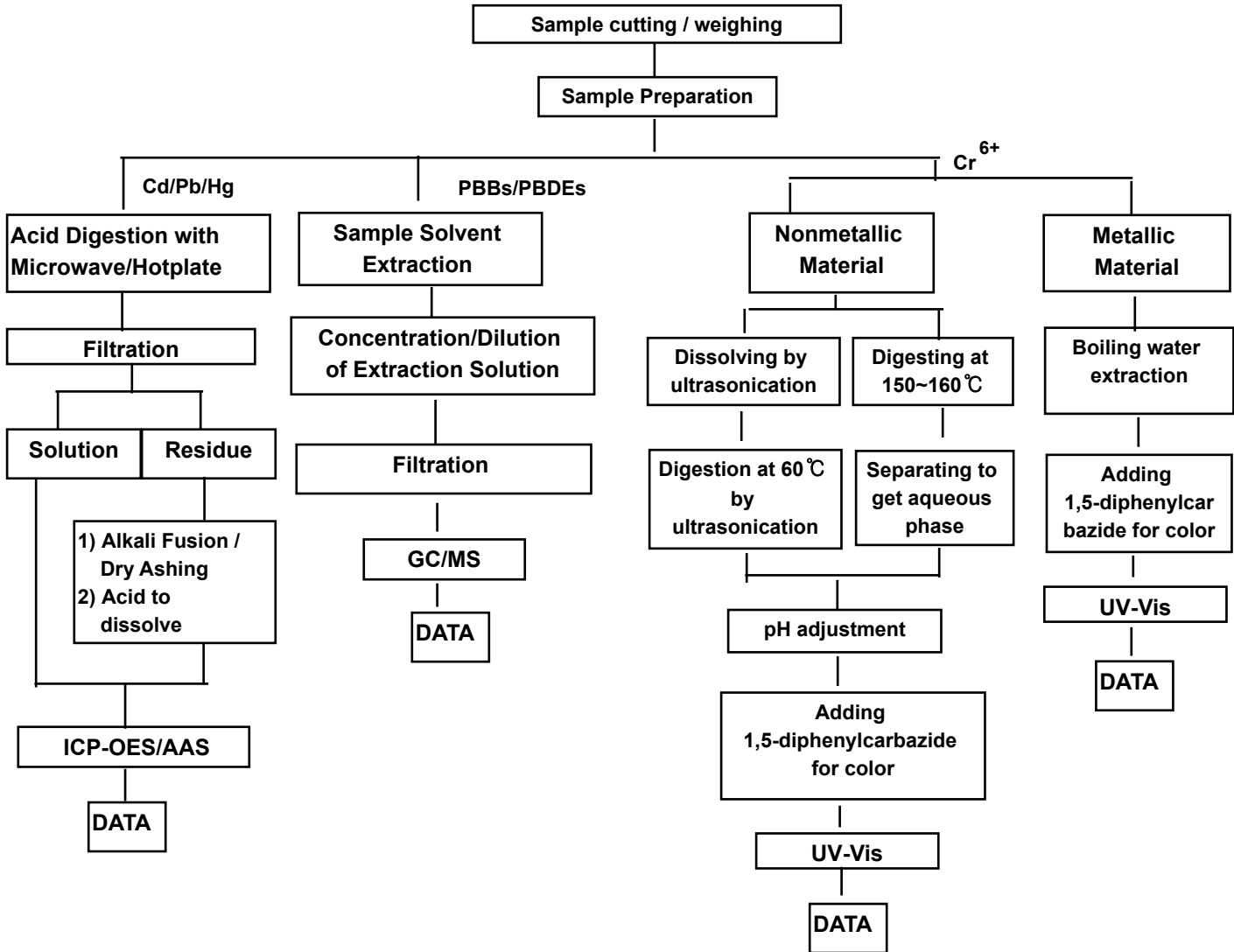
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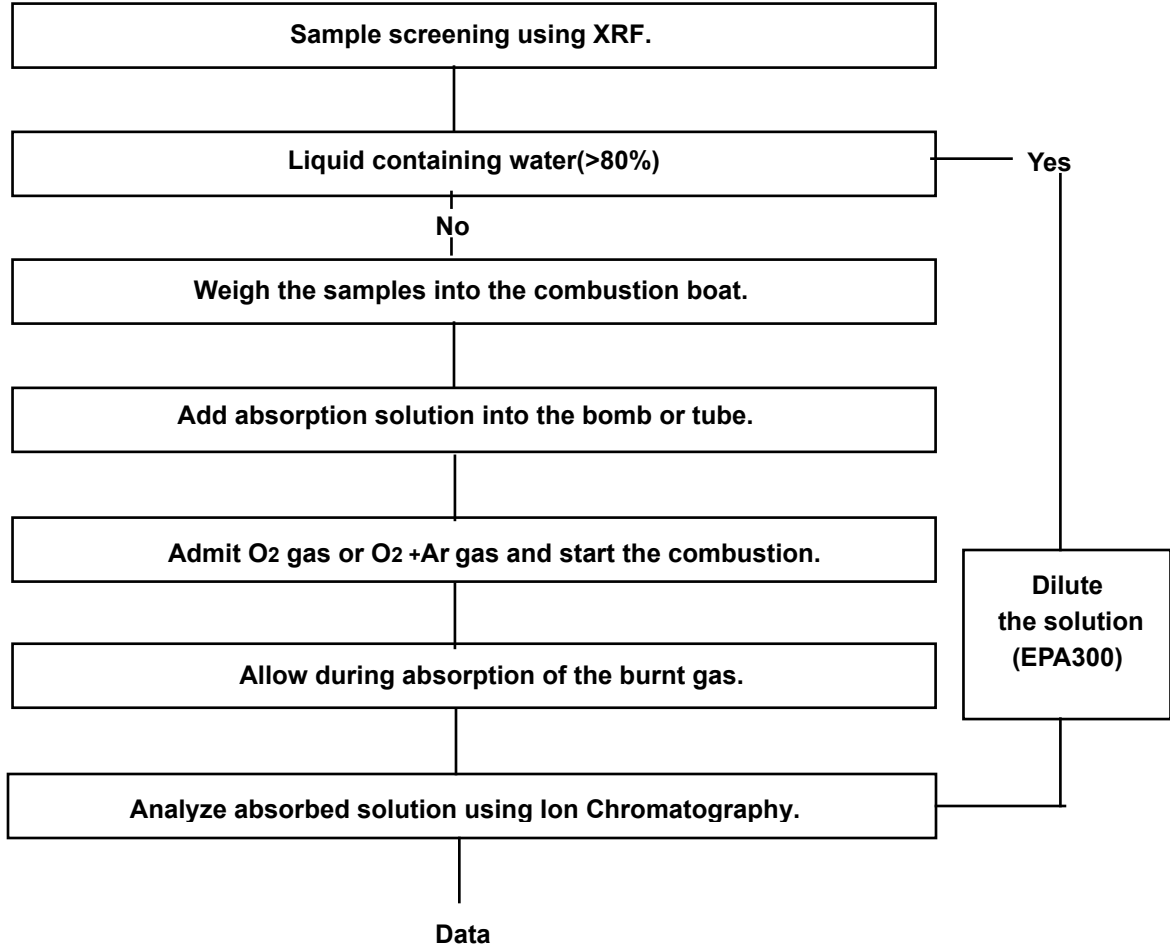
### Testing Flow Chart for RoHS:Cd/Pb/Hg/Cr<sup>6+</sup> /PBBs&PBDEs Testing



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

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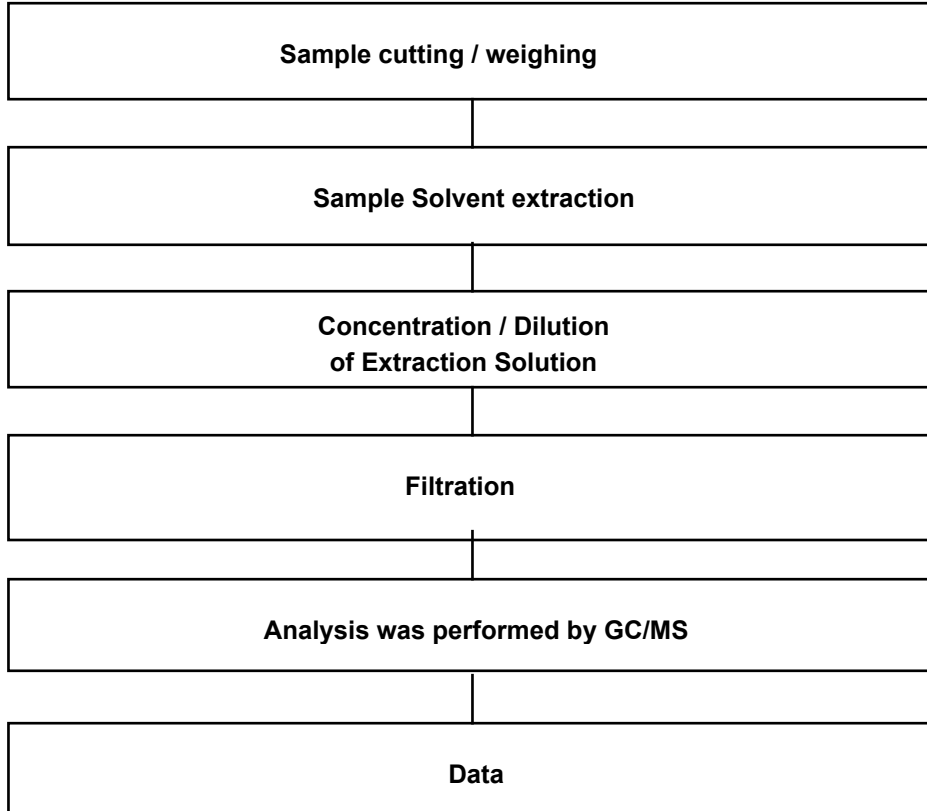
### Flow Chart for Halogen Test



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### Flow Chart for Phthalate Test



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

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