

HAESUNGDS CO., LTD.

(Seongju-dong) 726 Ungnam-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. : AYGA18-06256

Product Name : Ni Plating

Item No./Part No. : Ni Plating

Received Date : 2018. 11. 09

Received Date . 2010: 11: 00

**Test Period** : 2018. 11. 09 to 2018. 11. 16

**Test Results**: For further details, please refer to following page(s)

SGS Korea Co., Ltd.

Issued Date: 2018. 11. 16

Jeff Jang / Chemical Lab Mgr

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**Sample No.** : AYGA18-06256.001

Sample Description : Ni Plating
Item No./Part No. : Ni Plating
Materials : Metal Alloy

#### Heavy Metals

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Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Cadmium by ICP-OES)	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Lead by ICP-OES)	5	26.5
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013 (Determination of Mercury by ICP-OES)	2	N.D.
Hexavalent Chromium (Cr VI)*	μg/cm²	With reference to IEC 62321-7-1:2015 (Determination of CrVI by UV-Vis)	0.1	N.D.
Antimony (Sb)	mg/kg	With reference to EPA 3052(1996), US EPA 6010B(1996), ICP	10	N.D.
Beryllium (Be)	mg/kg	With reference to EPA 3052(1996), US EPA 6010B(1996), ICP	0.5	N.D.
Arsenic (As)	mg/kg	With reference to EPA 3052(1996), US EPA 6010B(1996), ICP	10	N.D.

## Flame Retardants-PBBs/PBDEs

Unit	Test Method	MDL	Results
mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
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**Sample No.** : AYGA18-06256.001

Sample Description : Ni Plating
Item No./Part No. : Ni Plating
Materials : Metal Alloy

### Flame Retardants-PBBs/PBDEs

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<b>Test Items</b> Monobromodiphenyl ether	<b>Unit</b> mg/kg	Test Method With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	<b>MDL</b> 5	<b>Results</b> N.D.
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.

#### **Phthalates**

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

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**Sample No.** : AYGA18-06256.001

Sample Description : Ni Plating
Item No./Part No. : Ni Plating
Materials : Metal Alloy

## Chlorinated Paraffin

Test Items	Unit	Test Method	MDL	Results
Alkanes, C10~13, Short Chain Chlorinated Paraffins(SCCP)	mg/kg	With reference to ISO 18219	50	N.D.

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### **Chlorinated Organic Substances**

Test Items	Unit	Test Method	MDL	Results
Polychlorinated Biphenyls (PCBs)	mg/kg	With reference to US EPA 8082,(US EPA 3550C), by GC/MS	3	N.D.
Polychlorinated terphenyls (PCTs)	mg/kg	With reference to US EPA 8082,(US EPA 3550C), by GC/MS	3	N.D.
Polychlorinated Naphthalene (PCN)	mg/kg	With reference to US EPA 8081 A(US EPA 3550C), by GC/MS	5	N.D.

### Polymer Identification

Test Items	Unit	Test Method	MDL	Results
PVC	**	FT-IR		Negative

### Halogen Content

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

### Organotin Compounds

Test Items	Unit	Test Method	MDL	Results
Tributyltin (TBT)	mg/kg	With reference to ISO 17353, GC/MS	0.02	N.D.
Triphenyltin (TPhT)	mg/kg	With reference to ISO 17353, GC/MS	0.02	N.D.
Dibutyltin (DBT)	mg/kg	With reference to ISO 17353, GC/MS	0.02	N.D.
Dioctyltin (DOT)	mg/kg	With reference to ISO 17353, GC/MS	0.02	N.D.
Tributyltin oxide (TBTO)	mg/kg	With reference to ISO 17353, GC/MS	0.02	N.D.

### PFCs

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Test Items	Unit	Test Method	MDL	Results



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Sample Description : Ni Plating
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### **PFCs**

Test Items	Unit	Test Method	MDL	Results
Perfluorootanoic acid (PFOA)	mg/kg	CEN/TS 15968 : 2010, HPLC/MS	1	N.D.
PFOS^	mg/kg	CEN/TS 15968 : 2010, HPLC/MS	1	N.D.

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#### Flame Retardants

Test Items	Unit	Test Method	MDL	Results
Hexabromocyclododecane (HBCDD)	mg/kg	USEPA 3540C, LC/MS	5	N.D.

NOTE: (1) N.D. = Not detected.(<MDL)

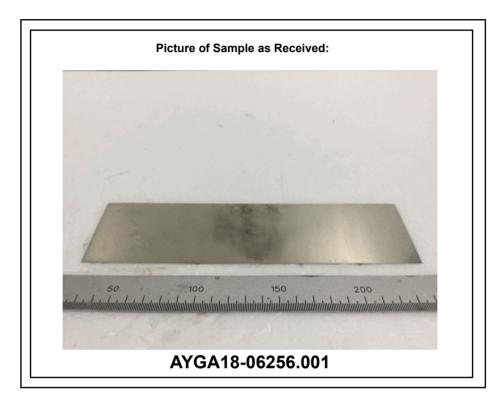
- (2) mg/kg = ppm
- (3) MDL = Method Detection Limit
- (4) = No regulation
- (5) Negative = Undetectable / Positive = Detectable
- (6) \*\* = Qualitative analysis (No Unit)
- (7) \* = a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 ug/cm2. The sample coating is considered 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.

<sup>^</sup> PFOS refer to Perfluoroctanesulfonic acid and its derivatives including Perfluoroctanesulfonic acid, Perfluoroctane sulfonamide, N-Methylperfluoroctane sulfonamide, N-Ethylperfluoroctane sulfonamidoethanol and N-Ethylperfluoroctane sulfonamidoethanol



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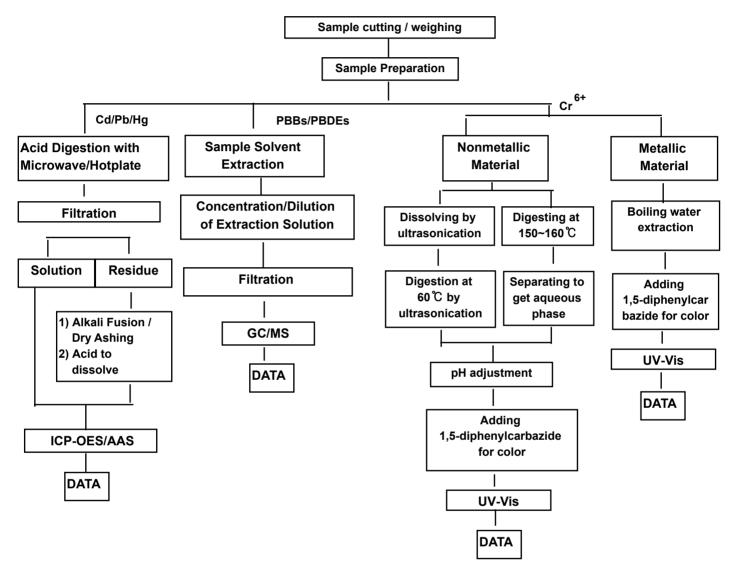




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# Testing Flow Chart for RoHS:Cd/Pb/Hg/Cr6+ /PBBs&PBDEs Testing

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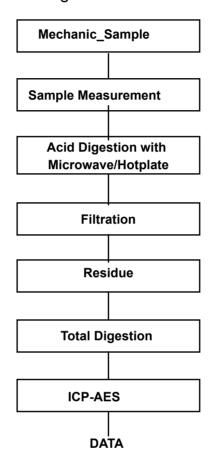
The samples were dissolved totally at the acid digestion step of the above flow chart for Cd,Pb,Hg Section Chief: Minkyu Park



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## Flow Chart for Inorganic Elements Testing

## **Inorganic Elements**

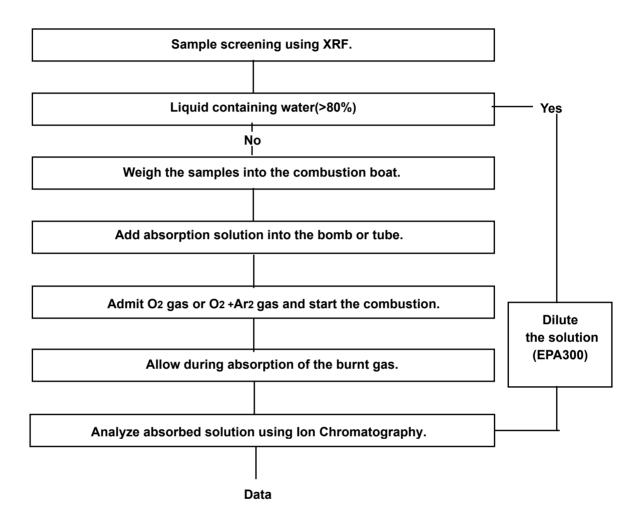


Major Inorganic Antimony(Sb) , Beryllium(Be) , Phosphorus(P) ,
Heavy Metals Arsenic(As) etc.



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## Flow Chart for Halogen Test

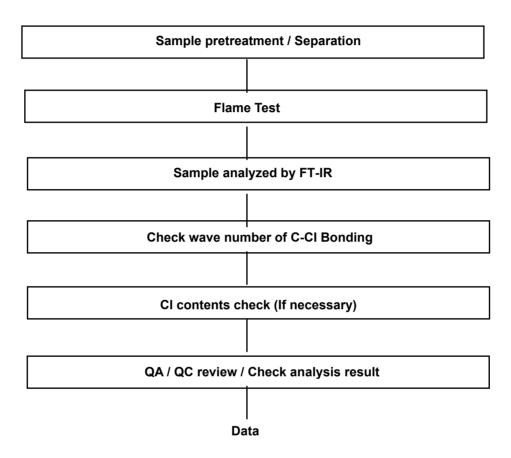


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## **Flow Chart for PVC Test**

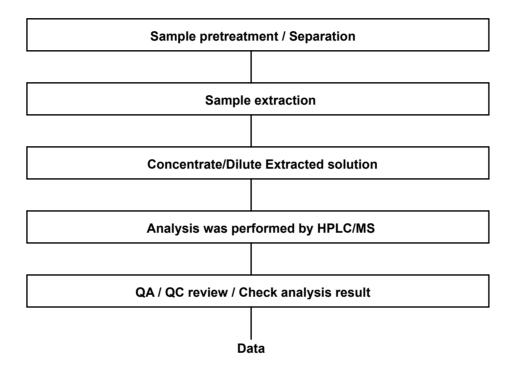




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## Flow Chart for PFOS/PFOA Test

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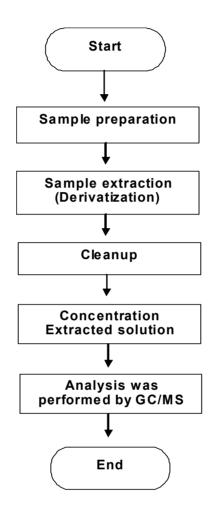




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## **Organotin Flow Chart**

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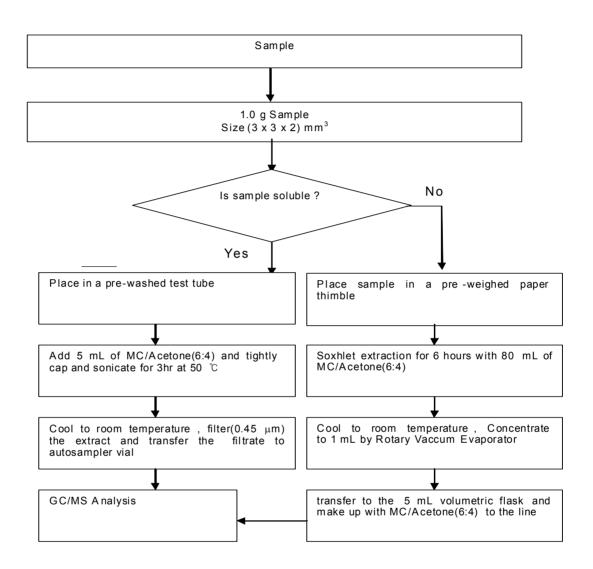




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## PCBs,PCTs,PCNs Flow Chart

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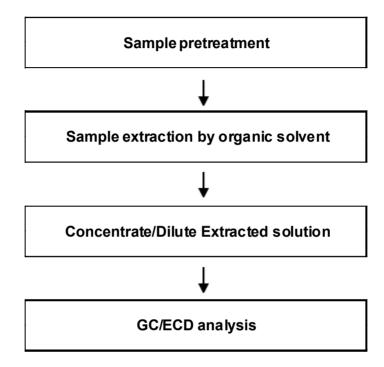




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## **SCCP Analysis Flow Chart**

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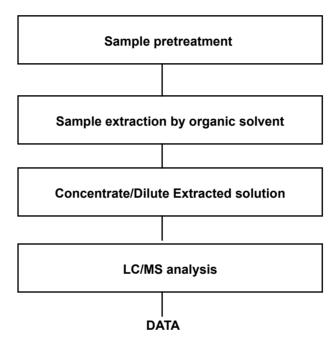




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## **Testing Flow Chart for HBCD**

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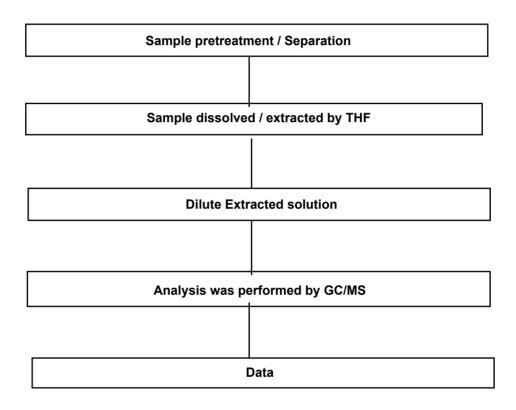




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## Flow Chart for Phthalate Test

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