

HAESUNGDS CO., LTD.

Received Date

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Issued Date: 2025. 05. 08



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

SGS File No. : AYGA25-01868
Product Name : LEAD FRAME
Item No./Part No. : C7025_BARE

Test Period : 2025. 04. 28 to 2025. 05. 08

: 2025. 04. 28

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

Monet Jeong

Monet Jeong

Technical Manager / SGS Korea Co., Ltd

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Sample No. : AYGA25-01868.001

Sample Description : LEAD FRAME Item No./Part No. : C7025_BARE 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+AMD1:2017CSV, by ICP-OES	2	N.D.
Hexavalent Chromium (Cr VI)++	μg/cm²	With reference to IEC 62321-7-1 : 2015, by UV-Vis	0.1	N.D.

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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.
Arsenic (As)	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.

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.



Sample No. : AYGA25-01868.001

Sample Description : LEAD FRAME

Item No./Part No. : C7025_BARE

Materials : Metal Alloy

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
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.
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

Titilalatos				
Test Items	Unit	Test Method	MDL	Results
Di-isobutyl phthalate (DIBP)	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.
Bis(2-methoxyethyl) phthalate (BMP, BMEP, DMEP)	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.
Di-n-hexyl phthalate (DNHP)	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(C6-C8 alkyl)phthalate] branched (DIHP)	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-n-octyl phthalate (DNOP)	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(C7-C11 alkyl)phthalate] linear and branched (DHNUP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.

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Sample No. : AYGA25-01868.001

Sample Description : LEAD FRAME Item No./Part No. : C7025_BARE Materials : Metal Alloy

Chlorinated Paraffin

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

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Chlorinated Organic Substances

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

PCBs & PCTs

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.

Polymer Identification

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

Halogen Content

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

Organotin Compounds



Sample No. : AYGA25-01868.001

Sample Description : LEAD FRAME Item No./Part No. : C7025_BARE Materials : Metal Alloy

Organotin Compounds

Test Items	Unit	Test Method	MDL	Results
Dibutyltin (DBT)	mg/kg	With reference to ISO 17353:2004 , GC/MS	0.02	N.D.
Dioctyltin (DOT)	mg/kg	With reference to ISO 17353:2004 , GC/MS	0.02	N.D.
Tributyltin (TBT)	mg/kg	With reference to ISO 17353:2004 , GC/MS	0.02	N.D.
Triphenyltin (TPhT)	mg/kg	With reference to ISO 17353:2004 , GC/MS	0.02	N.D.
Tributyltin oxide (TBTO)	mg/kg	With reference to ISO 17353:2004, GC/MS	0.02	N.D.

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PFAS (Per-and polyfluoroalkyl substances)

Test Items	Unit	Test Method	MDL	Results
Perfluorootanoic acid (PFOA)	μg/kg	with reference to EN 17681-1:2022, HPLC/MS/MS	10	N.D.
Perfluorooctanesulfonic Acid (PFOS)	μg/kg	with reference to EN 17681-1:2022, HPLC/MS/MS	10	N.D.

Flame Retardants

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

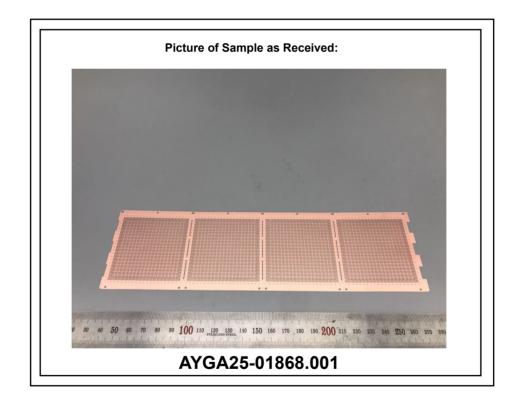
Sulfur

Test Items	Unit	Test Method	MDL	Results
Sulfur	mg/kg	With reference to BS EN 14582 : 2016, by IC	30	N.D.



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

- (2) mg/kg = ppm, ug/kg = ppb, mg/L = ppm
- (3) MDL = Method Detection Limit
- (4) = No regulation
- (5) ** = Qualitative analysis (No Unit)
- (6) Negative = Undetectable / Positive = Detectable
- (7) + = a. The result of Hexavalent Chromium (Cr(VI)) is "ND" as the result of Chromium (Cr) is "ND", and confirmation test of Hexavalent Chromium (Cr(VI)) is not required.
 - b. If the content of Total Chromium (Cr) is greater than the MDL of Hexavalent Chromium (Cr(VI)), it is the result of hexavalent Chromium by UV-VIS.
- (8) ++= a. The sample is positive for Cr VI if the Cr VI concentration is greater than 0.13 ug/cm2. The sample coating is considered to contain Cr VI.
 - b. The sample is negative for Cr VI if Cr VI is ND(concentration less than 0.10 ug/cm2). The coating is considered a non-Cr VI 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.



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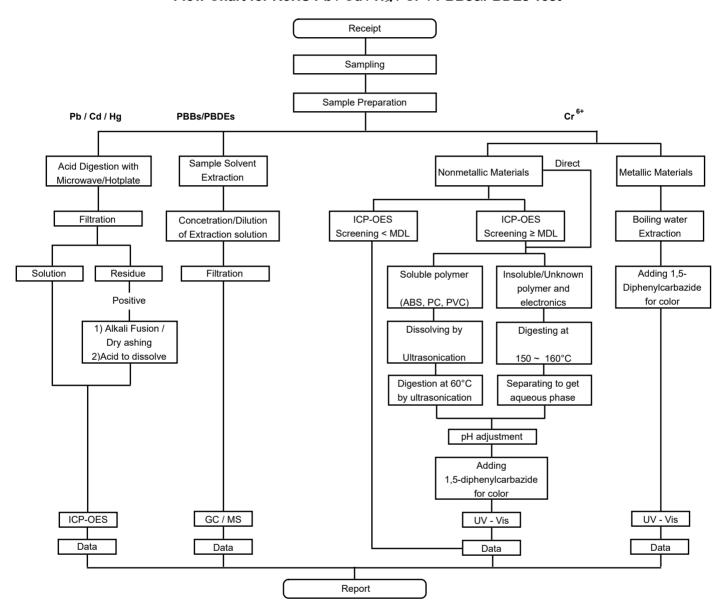
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Flow Chart for RoHS Pb / Cd / Hg / Cr⁶⁺/ PBBs&PBDEs Test

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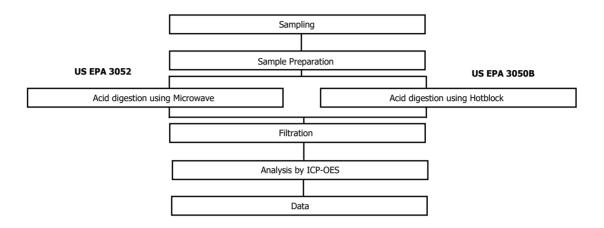
The samples were dissolved totally at the acid digestion step of the above flow chart for Cd, Pb, Hg.



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Flow Chart for Heavy metal

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Major Inorganic
Heavy Metals

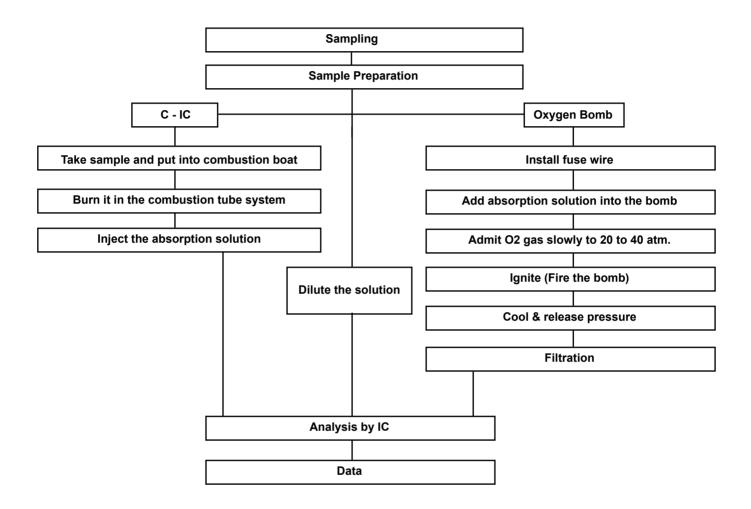
Antimony(Sb) , Beryllium(Be) , Phosphorus(P) , Arsenic(As) etc.



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Flow Chart for Halogen Test

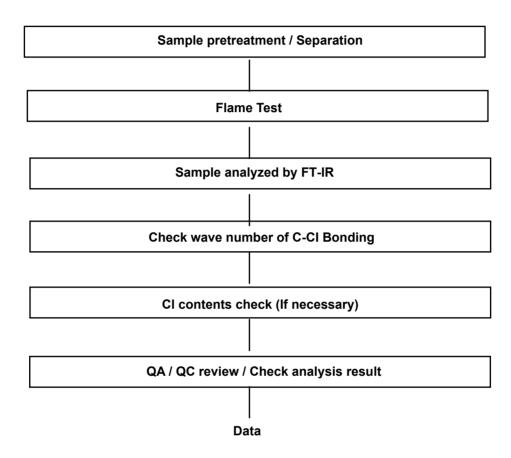




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Flow Chart for PVC Test

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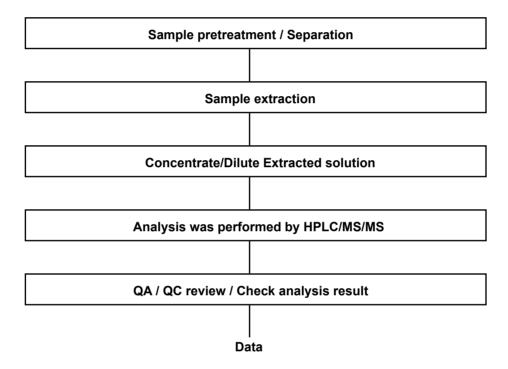




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Flow Chart for PFOS/PFOA Test

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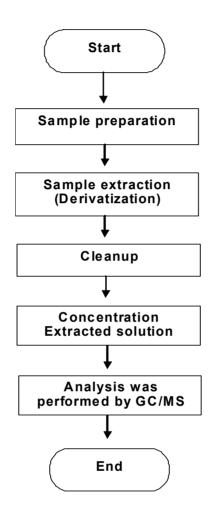




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Organotin Flow Chart

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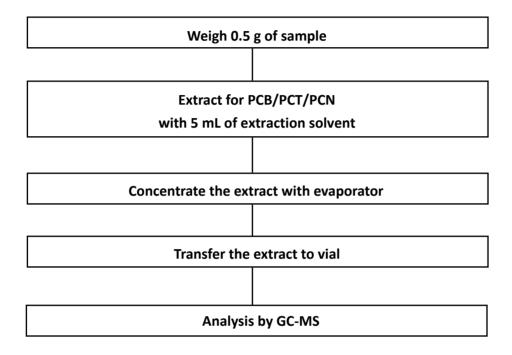




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Flow Chart for (PCB/PCT/PCN)

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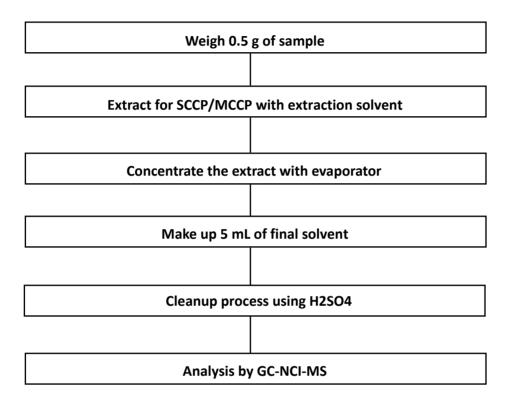




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Flow Chart for SCCP/MCCP

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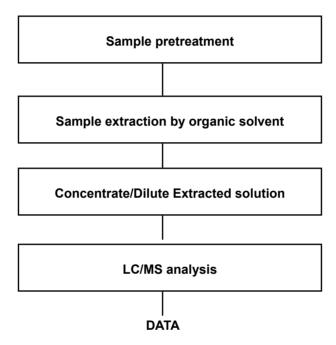




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Testing Flow Chart for HBCD

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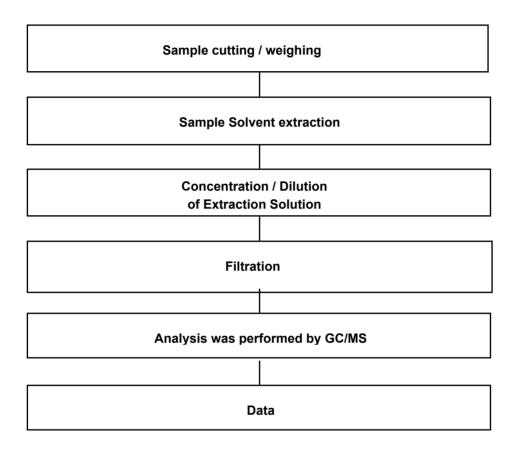




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Flow Chart for PhthalateTest



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