



Test Report No. F690101/LF-CTSAYAA20-19805R1

Issued Date : 2020. 04. 02

Page 1 of 20

YOUNG YIEL PRECISION CO., LTD

132, Beotkkot-ro
Geumcheon-gu, Seoul
Korea

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

SGS File No. : AYAA20-19805R1
Product Name : Ni Plating Heat Spreader
Item No./Part No. : N/A
Client Reference Data : HEAT STIFFENER, SLUG, SINK, HAT TYPE, FLAT LID, FORGED LID, SINGLE WINDOW
Received Date : 2020. 03. 20
Test Period : 2020. 03. 20 to 2020. 04. 02
Report Comments : By the applicant's request, item No.s/part No.s & client reference information are stated/added on report.
Supersede/Referral : The test report supersedes previous report number, "F690101/LF-CTSAYAA20-19805" issued by SGS Korea Co., Ltd.
Test Results : For further details, please refer to following page(s)

SGS Korea Co., Ltd.

Tommy Oh / Chemical Lab Mgr

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/en/terms-and-conditions/terms-e-document>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s).



Test Report No. F690101/LF-CTSAYAA20-19805R1

Issued Date : 2020. 04. 02

Page 2 of 20

Sample No. : AYAA20-19805R1.001
Sample Description : Ni Plating Heat Spreader
Item No./Part No. : N/A
Materials : N/A

Heavy Metals

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	N.D.
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013 (Determination of Mercury by ICP-OES)	2	N.D.
Antimony (Sb)	mg/kg	With reference to EPA 3052(1996), US EPA 6010B(1996), ICP	10	N.D.
Arsenic (As)	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	5	N.D.
Hexavalent Chromium (Cr VI)*	µg/cm ²	With reference to IEC 62321-7-1:2015 (Determination of CrVI by UV-Vis)	0.1	N.D.

Flame Retardants-PBBs/PBDEs

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

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/en/terms-and-conditions/terms-e-document>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s).



Test Report No. F690101/LF-CTSAYAA20-19805R1

Issued Date : 2020. 04. 02

Page 3 of 20

Sample No. : AYAA20-19805R1.001
Sample Description : Ni Plating Heat Spreader
Item No./Part No. : N/A
Materials : N/A

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (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 , GC/MS	50	N.D.
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-isobutyl phthalate (DIBP)	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-isononyl phthalate (DINP)	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(C7-C11 alkyl)phthalate] linear and branched (DHNUP)	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.
Bis(2-methoxyethyl) phthalate (BMP, BMEP, DMEP)	mg/kg	With reference to IEC 62321-8 ; 2017 , GC/MS	50	N.D.

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.

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.

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/en/terms-and-conditions/terms-e-document>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s).



Test Report No. F690101/LF-CTSAYAA20-19805R1

Issued Date : 2020. 04. 02

Page 4 of 20

Sample No. : AYAA20-19805R1.001
Sample Description : Ni Plating Heat Spreader
Item No./Part No. : N/A
Materials : N/A

Chlorinated Organic Substances

Test Items	Unit	Test Method	MDL	Results
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(Cl)	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.
Iodine(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	ISO 17353 , GC/MS	1	N.D.
Triphenyltin (TPhT)	mg/kg	ISO 17353 , GC/MS	1	N.D.
Dibutyltin (DBT)	mg/kg	ISO 17353 , GC/MS	1	N.D.
Diocetyl tin(DOT)	mg/kg	ISO 17353 , GC/MS	1	N.D.
Bis (tributyltin)oxide (TBTO)	mg/kg	ISO 17353 , GC/MS	1	N.D.

Ozone Depleting Substances

Test Items	Unit	Test Method	MDL	Results
Carbon Tetrachloride	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Trichlorofluoromethane (CFC-11)	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Pentachlorofluoroethane (CFC-111)	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Tetrachlorodifluoroethane (CFC-112)	mg/kg	US EPA 8260B , GC/MS	1	N.D.
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	mg/kg	US EPA 8260B , GC/MS	1	N.D.

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/en/terms-and-conditions/terms-e-document>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s).



Test Report No. F690101/LF-CTSAYAA20-19805R1

Issued Date : 2020. 04. 02

Page 5 of 20

Sample No. : AYAA20-19805R1.001
Sample Description : Ni Plating Heat Spreader
Item No./Part No. : N/A
Materials : N/A

Ozone Depleting Substances

Test Items	Unit	Test Method	MDL	Results
Dichlorotetrafluoroethane (CFC-114)	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Chloropentafluoroethane (CFC-115)	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Dichlorodifluoromethane (CFC-12)	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Chlorotrifluoromethane (CFC-13)	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Heptachlorofluoropropane (CFC-211)	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hexachlorodifluoropropane (CFC-212)	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Pentachlorotrifluoropropane (CFC-213)	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Tetrachlorotetrafluoropropane (CFC-214)	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Trichloropentafluoropropane (CFC-215)	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Trichlorohexafluoropropane (CFC-216)	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Chloroheptafluoropropane (CFC-217)	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Methyl bromide (Halon-1001)	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Bromochloromethane (Halon-1011)	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Dibromodifluoromethane (Halon-1202)	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Bromochlorodifluoromethane (Halon-1211)	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Bromotrifluoromethane (Halon-1301)	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Dibromotetrafluoroethane (Halon-2402)	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-121	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-122	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-123	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-124	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-131	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-132b	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-133a	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-141b	mg/kg	US EPA 8260B , GC/MS	1	N.D.

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/en/terms-and-conditions/terms-e-document>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s).



Test Report No. F690101/LF-CTSAYAA20-19805R1

Issued Date : 2020. 04. 02

Page 6 of 20

Sample No. : AYAA20-19805R1.001
Sample Description : Ni Plating Heat Spreader
Item No./Part No. : N/A
Materials : N/A

Ozone Depleting Substances

Test Items	Unit	Test Method	MDL	Results
Hydrochlorofluorocarbon-21	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-22	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-221	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-222	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-223	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-224	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-225ca	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-225cb	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-226	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-231	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-232	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-233	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-234	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-235	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-241	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-242	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-243	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-244	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-251	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-252	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-253	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-261	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-262	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-271	mg/kg	US EPA 8260B , GC/MS	1	N.D.
Hydrochlorofluorocarbon-31	mg/kg	US EPA 8260B , GC/MS	1	N.D.

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/en/terms-and-conditions/terms-e-document>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s).



Test Report No. F690101/LF-CTSAYAA20-19805R1

Issued Date : 2020. 04. 02

Page 7 of 20

Sample No. : AYAA20-19805R1.001
Sample Description : Ni Plating Heat Spreader
Item No./Part No. : N/A
Materials : N/A

Ozone Depleting Substances

Test Items	Unit	Test Method	MDL	Results
1,1,1 -Trichloroethane	mg/kg	US EPA 8260B , GC/MS	1	N.D.

Flame Retardants

Test Items	Unit	Test Method	MDL	Results
Tetrabromobisphenol A	mg/kg	US EPA 3540C, GC/MS	10	N.D.
Hexabromocyclododecane (HBCDD)	mg/kg	USEPA 3540C, LC/MS	5	N.D.

Azo Dyes

Test Items	Unit	Test Method	MDL	Results
o-Toluidine	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.
2,4-Xylidine	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.
2,6-Xylidine	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.
o-Anisidine	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.
p-Chloroaniline	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.
p-Cresidine	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.
2,4,5-Trimethylaniline	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.
4-Chloro-o-Toluidine	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.
2,4-Toluenediamine	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.
2,4-Diaminoanisole	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.
2-Naphthylamine	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.
2-Amino-4-Nitrotoluene	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.
4-Aminodiphenyl	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.
4,4'-Oxydianiline	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.
Benzidine	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.
4,4'-diaminodiphenylmethane	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.
o-Aminoazotoluene	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.
3,3-Dimethyl-4,4'-diaminodiphenyl methane	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.
3,3-Dimethylbenzidine	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/en/terms-and-conditions/terms-e-document>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s).



Test Report No. F690101/LF-CTSAYAA20-19805R1

Issued Date : 2020. 04. 02

Page 8 of 20

Sample No. : AYAA20-19805R1.001
Sample Description : Ni Plating Heat Spreader
Item No./Part No. : N/A
Materials : N/A

Azo Dyes

Test Items	Unit	Test Method	MDL	Results
4,4'-Thiodianiline	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.
3,3'-Dichlorobenzidine	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.
4,4'-Methylen-bis-(2-chloroaniline)	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.
3,3-Dimethoxybenzidine	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.
4-Aminoazobenzene	mg/kg	With reference to EN 14362-1, GC/MS & HPLC	5	N.D.

Other(s)

Test Items	Unit	Test Method	MDL	Results
Benzotriazole (UV-320)	mg/kg	US EPA 3540C, GC/MS	5	N.D.

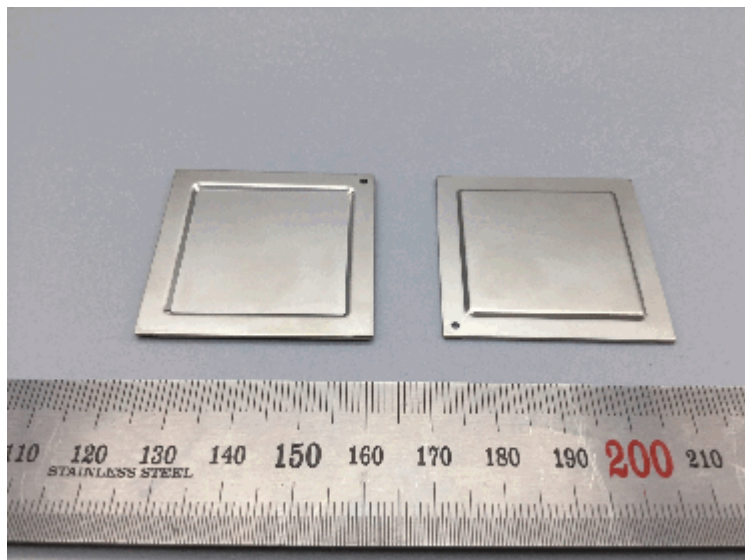
Other(s)

Test Items	Unit	Test Method	MDL	Results
PFOA (Perfluorooctanoic acid)	mg/kg	US EPA 3540C/3550C, LC/MS	1	N.D.
PFOS (Perfluorooctane Sulfonates-Acid/Metal Salt/Amide)	mg/kg	US EPA 3540C/3550C, LC/MS	1	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.
 - (8) The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test report is not related to KS Q ISO/IEC 17025 and Korea Laboratory Accreditation Scheme.

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/en/terms-and-conditions/terms-e-document>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s).

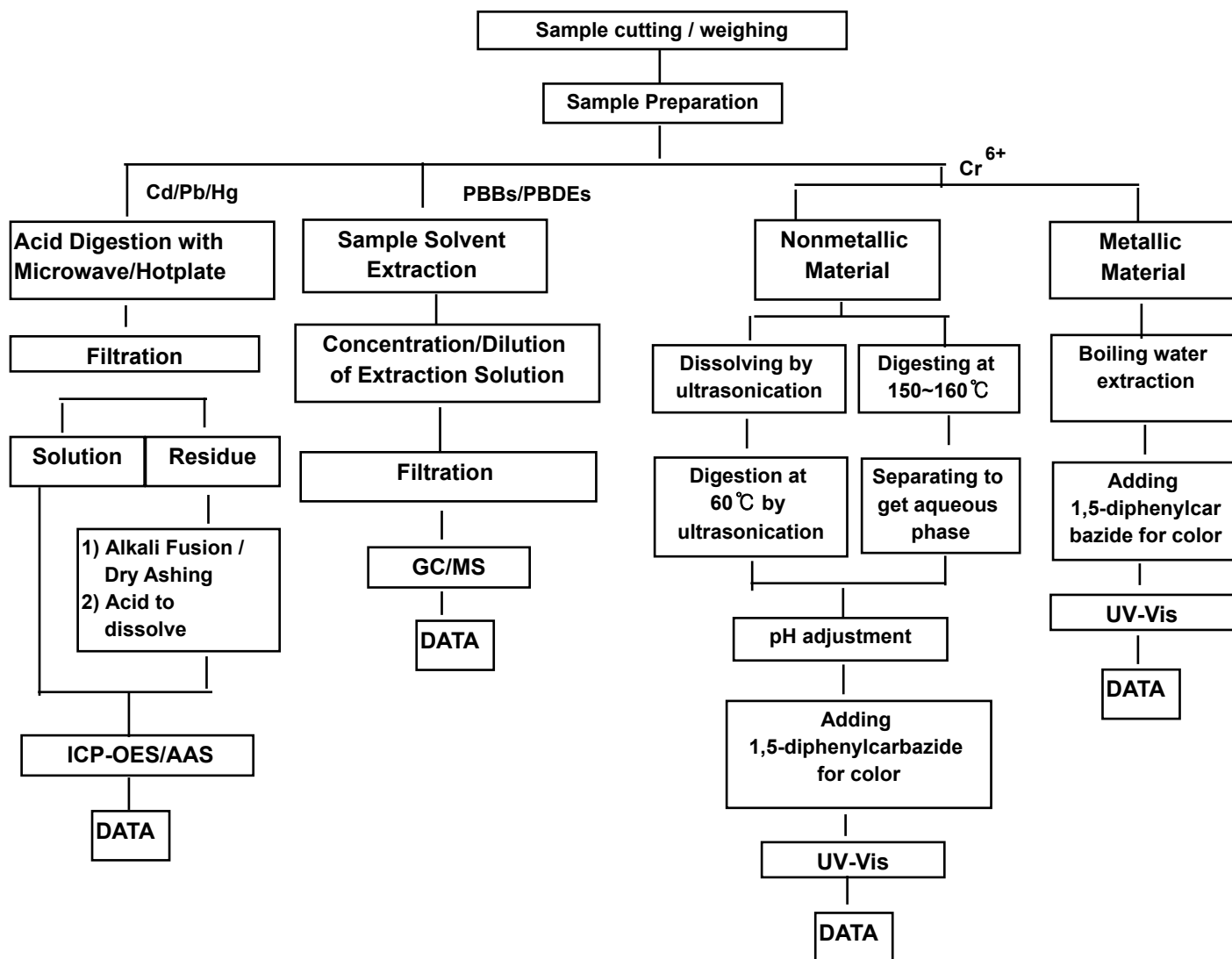
Picture of Sample as Received:



AYAA20-19805R1.001

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/en/terms-and-conditions/terms-e-document>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s).

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

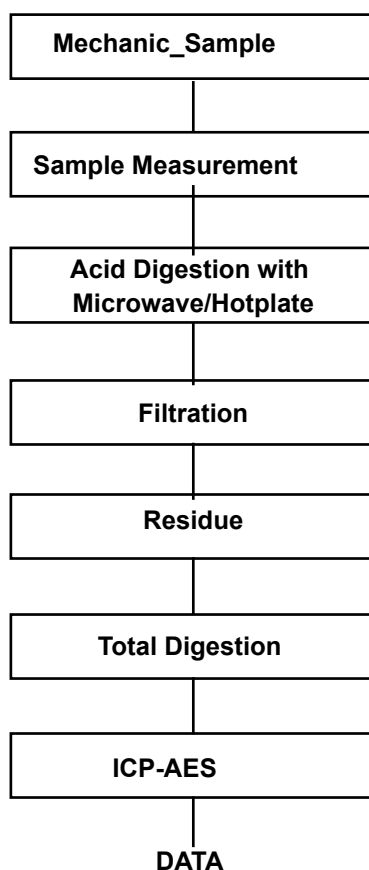


The samples were dissolved totally at the acid digestion step of the above flow chart for Cd,Pb,Hg
 Section Chief : Minkyu Park



Flow Chart for Inorganic Elements Testing

Inorganic Elements

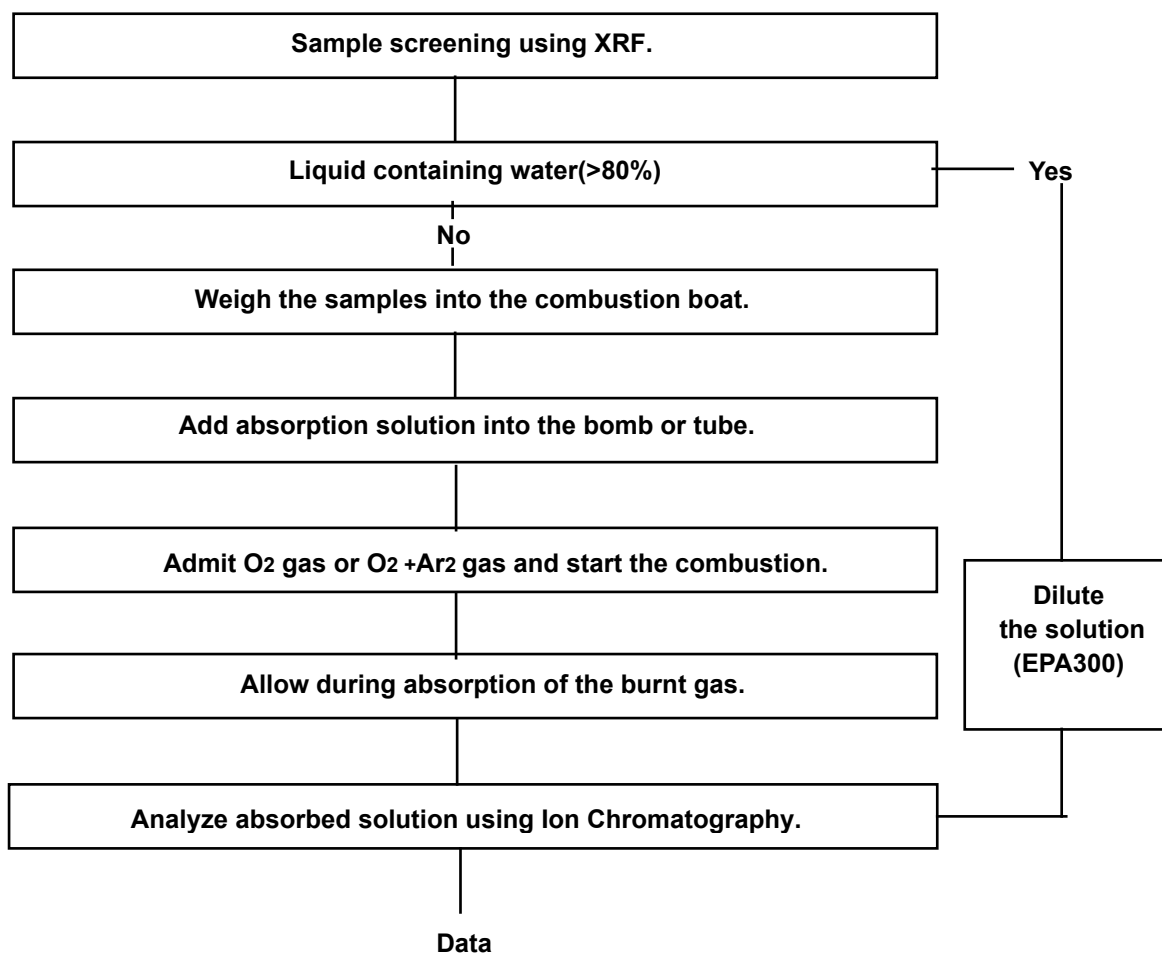


Major Inorganic Heavy Metals	Antimony(Sb) , Beryllium(Be) , Phosphorus(P) , Arsenic(As) etc.
------------------------------	---

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/en/terms-and-conditions/terms-e-document>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s).



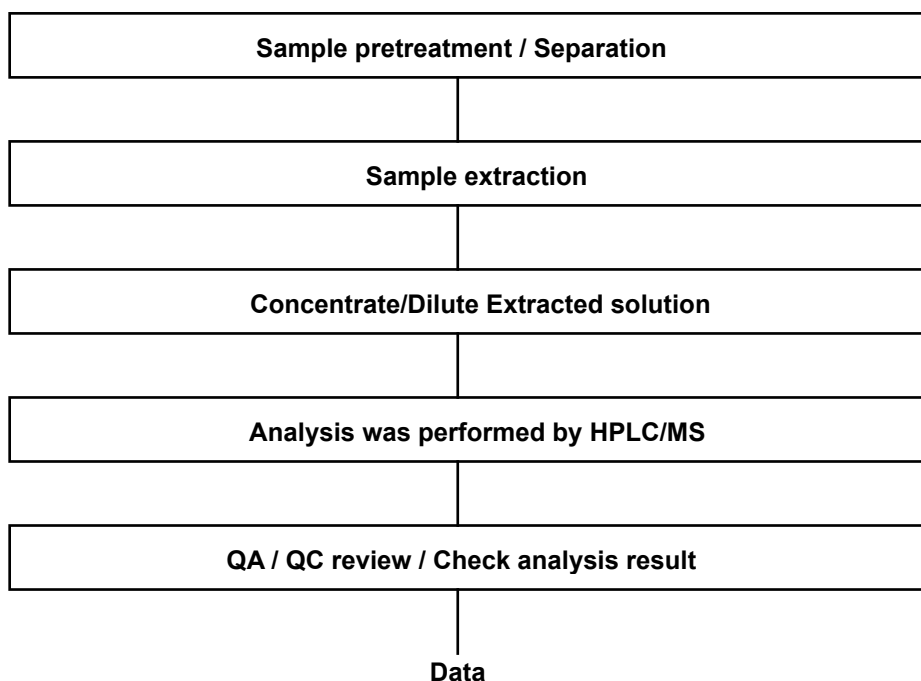
Flow Chart for Halogen Test



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/en/terms-and-conditions/terms-e-document>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s).



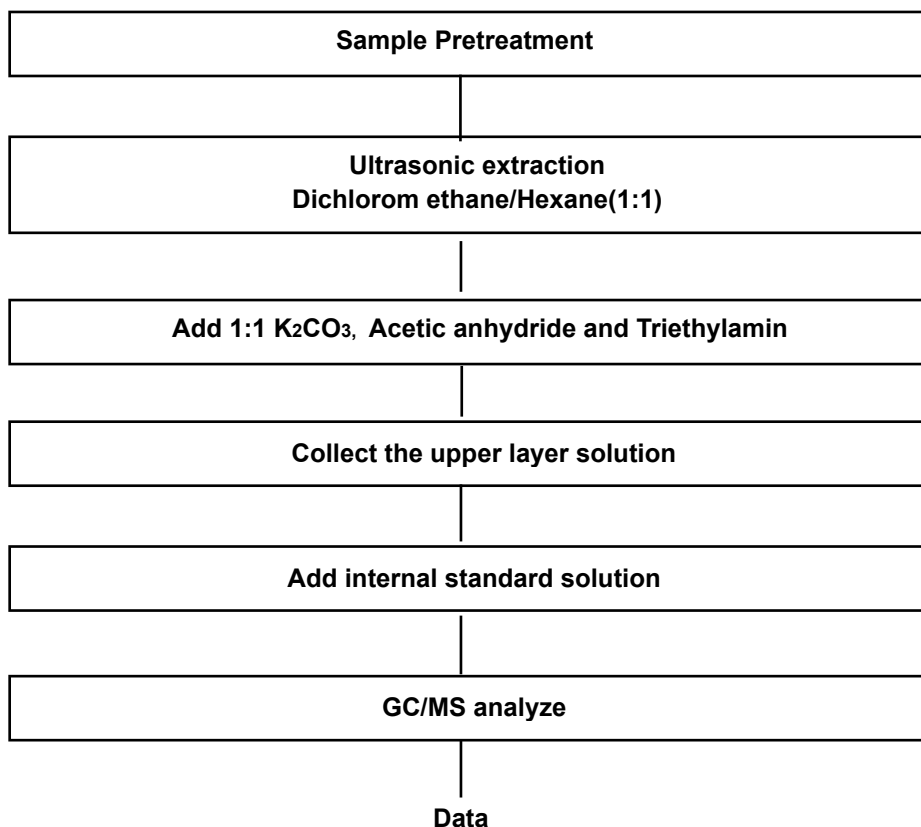
Flow Chart for PFOS/PFOA Test



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/en/terms-and-conditions/terms-e-document>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s).



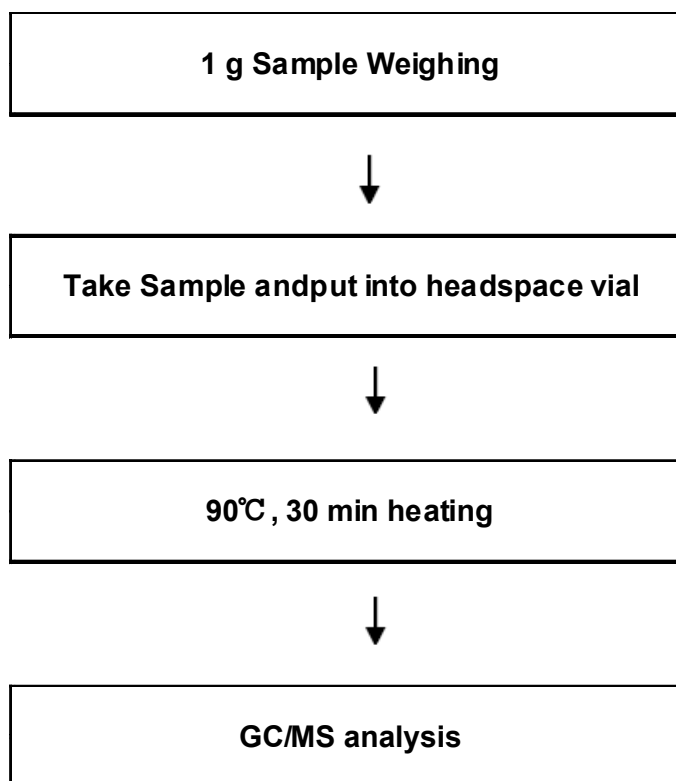
Flow Chart for TBBPA Test



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/en/terms-and-conditions/terms-e-document>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s).



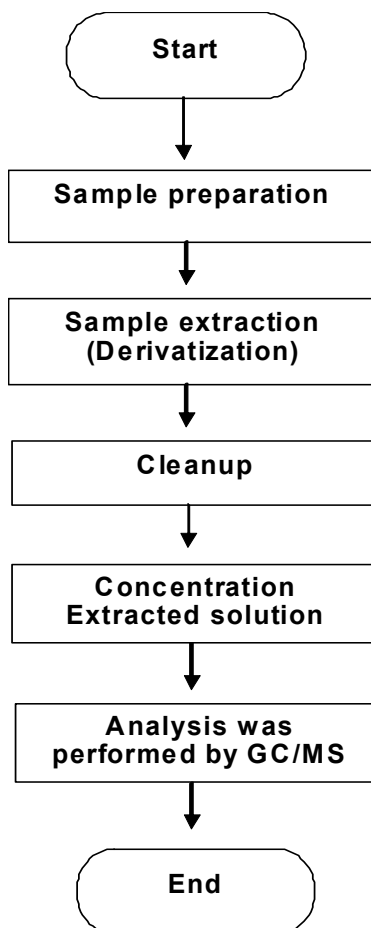
ODS Analysis Flow Chart



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/en/terms-and-conditions/terms-e-document>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s).

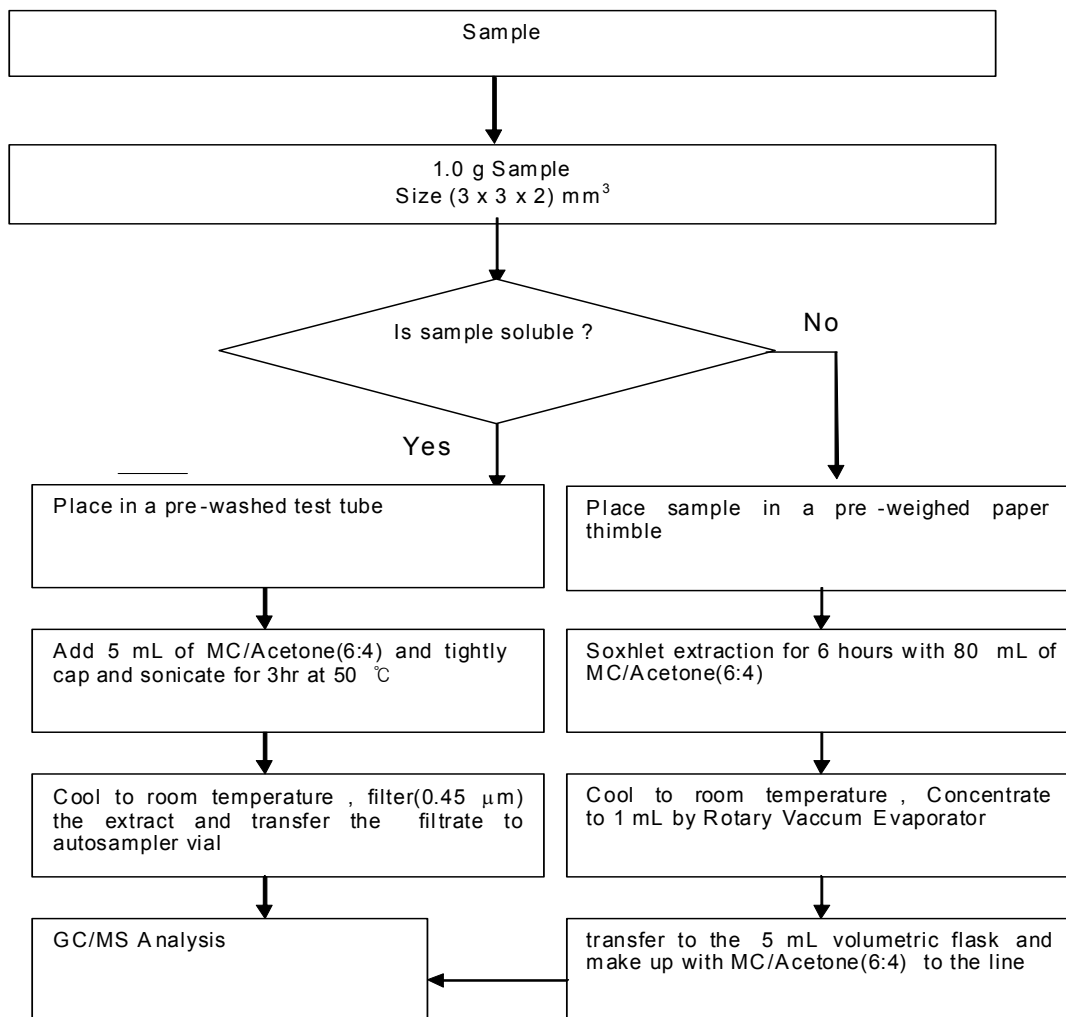


Organotin Flow Chart



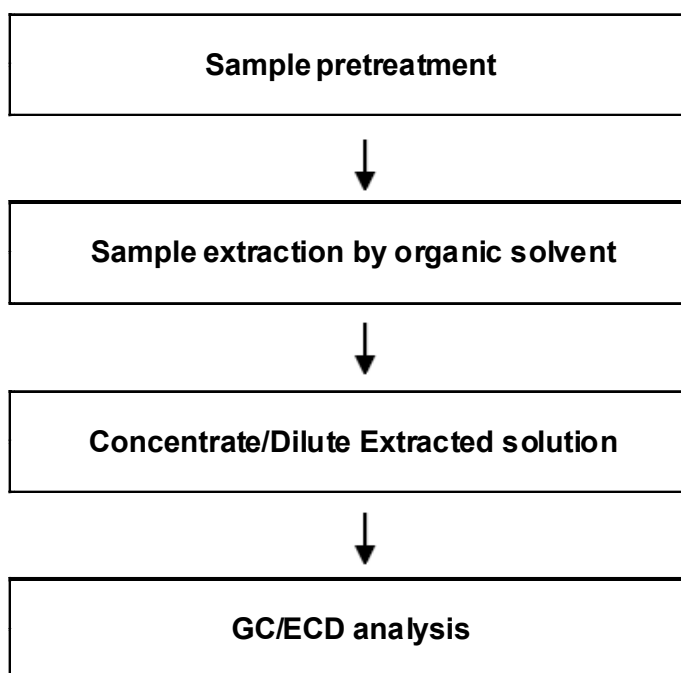
This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/en/terms-and-conditions/terms-e-document>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s).

PCBs,PCTs,PCNs Flow Chart





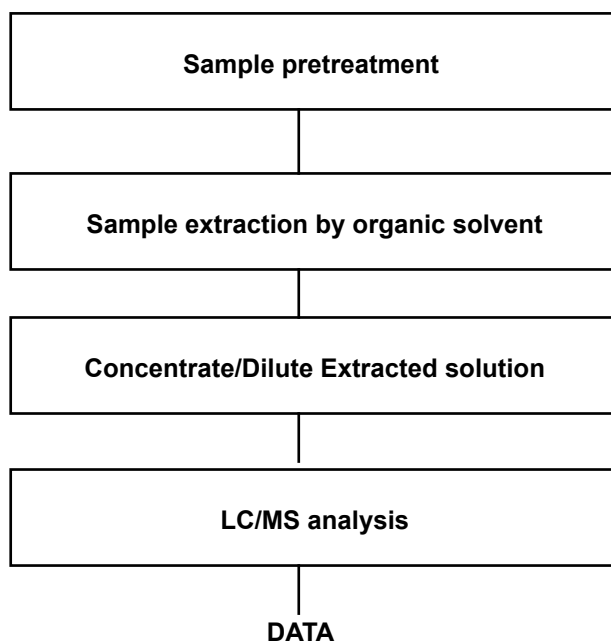
SCCP Analysis Flow Chart



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/en/terms-and-conditions/terms-e-document>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s).



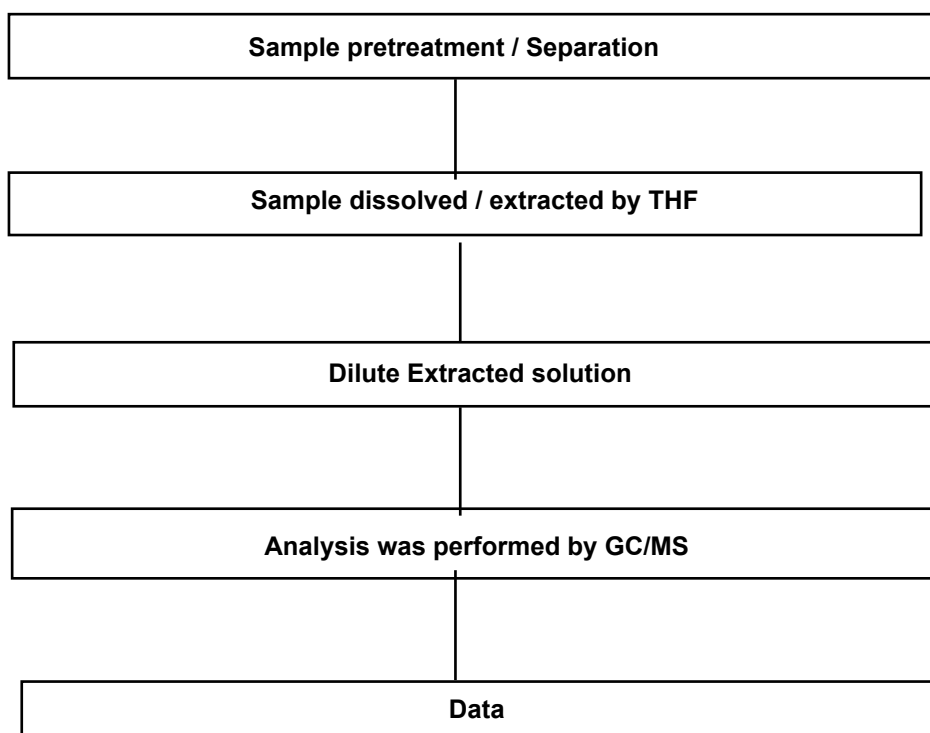
Testing Flow Chart for HBCD



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/en/terms-and-conditions/terms-e-document>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s).



Flow Chart for Phthalate Test



*** End of Report ***

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/en/terms-and-conditions/terms-e-document>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s).