



Test Report No. F690101/LF-CTSAYAA13-06964R1

Issued Date: 2013. 02. 14 Page 1 of 8

To: **LUBRIZOL ADVANCED MATERIALS**
142-35
Samsung-dong
Gangnam-gu
Seoul
Korea

The following merchandise was submitted and identified by the client as :

SGS File No. : AYAA13-06964R1
Product Name : Estane
Item No./Part No. : N/A
Client Reference Data : T365A, T370A, T460AH, T465A, T470A, S175A, S175AH, S180A, S185A, S190A, S195A, S198A, S160D, S168D, S385AH, S385A, S392A, S392AH, S395A, S398A, S398AH, S360D, S360DH, S364DH, S368D, S375D, BK62, UV500, A1010NAT045, T5075NAT025, NOV-6-BK-20, GP85AE, GP85AB, GP95AE, GP80ABM, X590A-2FR, X595A-3FR, X585A-4, X595A-11, 58213NAT027, 58315NAT035, 58237NAT024, 58237WHT131, 58245NAT031, 58887, 5717, R185A-14FR, ISOPLAST101NAT, ISOPLAST300E. ISOPLAST202EZ
Received Date : 2013. 02. 06
Test Period : 2013. 02. 07 to 2013. 02. 14
Test Results : For further details, please refer to following page(s)
Test Performed : SGS Korea tested the sample(s) selected by applicant with following results.
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-CTSAYAA13-06964" issued by SGS Korea Co., Ltd.

Timothy Jeon
Jinhee Kim
Cindy Park
Jerry Jung/ Testing Person

SGS Korea Co., Ltd.

Jeff Jang / Chemical Lab Mgr



Test Report No. F690101/LF-CTSAYAA13-06964R1

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Sample No. : AYAA13-06964R1.001
Sample Description : Estane
Item No./Part No. : N/A
Materials : Thermoplastic polyurethane

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	With reference to IEC 62321:2008, ICP	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 62321:2008, ICP	5	N.D.
Mercury (Hg)	mg/kg	With reference to IEC 62321:2008, ICP	2	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	With reference to IEC 62321:2008, UV-VIS	1	N.D.

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Dibromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tribromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Pentabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Heptabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Octabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Nonabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Decabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.

Phthalates

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) * = Boiling-water-extraction:
Negative = Absence of CrVI coating
Positive = Presence of CrVI coating; the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm² sample surface area.

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Sample No. : AYAA13-06964R1.001
Sample Description : Estane
Item No./Part No. : N/A
Materials : Thermoplastic polyurethane

Phthalates

Test Items	Unit	Test Method	MDL	Results
Di-(2-ethylhexyl) phthalate (DEHP)	mg/kg	US EPA 8061A , GC/MS	50	N.D.
Dibutyl phthalate (DBP)	mg/kg	US EPA 8061A , GC/MS	50	N.D.
Benzyl butyl phthalate (BBP)	mg/kg	US EPA 8061A , GC/MS	50	N.D.
Di-isodecyl phthalate (DIDP)	mg/kg	US EPA 8061A , GC/MS	50	N.D.
Di-isononyl phthalate (DINP)	mg/kg	US EPA 8061A , GC/MS	50	N.D.
Di-n-octyl phthalate (DNOP)	mg/kg	US EPA 8061A , GC/MS	50	N.D.
Di-ethyl phthalate(DEP)	mg/kg	US EPA 8061A , GC/MS	50	N.D.
Di-methyl phthalate (DMP)	mg/kg	US EPA 8061A , GC/MS	50	N.D.
Di-isobutyl phthalate (DIBP)	mg/kg	US EPA 8061A , GC/MS	50	N.D.

Halogen Contents

Test Items	Unit	Test Method	MDL	Results
Bromine(Br)	mg/kg	With reference to ASTM D 7359-08 , IC	30	N.D.
Chlorine(Cl)	mg/kg	With reference to ASTM D 7359-08 , IC	30	N.D.
Fluorine(F)	mg/kg	With reference to ASTM D 7359-08 , IC	30	N.D.
Iodine(I)	mg/kg	With reference to ASTM D 7359-08 , IC	50	N.D.

Chlorinated Paraffin

Test Items	Unit	Test Method	MDL	Results
Alkanes, C10~13, Short Chain Chlorinated Paraffins	mg/kg	EPA 3540 C , GC/MS	100	N.D.

Chlorinated Organic Substances

Test Items	Unit	Test Method	MDL	Results
Polychlorinated Biphenyls (PCBs)	mg/kg	USEPA 8082 , GC/MS	3	N.D.

Organotin Compounds

Test Items	Unit	Test Method	MDL	Results
Tributyltin (TBT)	mg/kg	DIN 38407-13 , GC/MS	0.1	N.D.

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Sample No. : AYAA13-06964R1.001
Sample Description : Estane
Item No./Part No. : N/A
Materials : Thermoplastic polyurethane

Organotin Compounds

Test Items	Unit	Test Method	MDL	Results
Triphenyltin (TPhT)	mg/kg	DIN 38407-13 , GC/MS	0.1	N.D.
Dibutyltin (DBT)	mg/kg	DIN 38407-13 , GC/MS	0.1	N.D.
Dioctyltin(DOT)	mg/kg	DIN 38407-13 , GC/MS	0.1	N.D.
Monobutyltin (MBT)	mg/kg	DIN 38407-13 , GC/MS	0.1	N.D.
Bis (tributyltin)oxide (TBTO)	mg/kg	DIN 38407-13 , GC/MS	0.1	N.D.

Alkylphenol Ethoxylates

Test Items	Unit	Test Method	MDL	Results
Octylphenol	mg/kg	In-House method , LC/MS	10	N.D.
Nonylphenol	mg/kg	In-House method , LC/MS	10	N.D.
Octylphenol ethoxylate	mg/kg	In-House method , LC/MS	50	N.D.
Nonylphenol ethoxylate	mg/kg	In-House method , LC/MS	50	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-Naphtylamine	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.

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Sample Description : Estane
Item No./Part No. : N/A
Materials : Thermoplastic polyurethane

Azo Dyes

Test Items	Unit	Test Method	MDL	Results
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.
4,4'-Thioaniline	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)

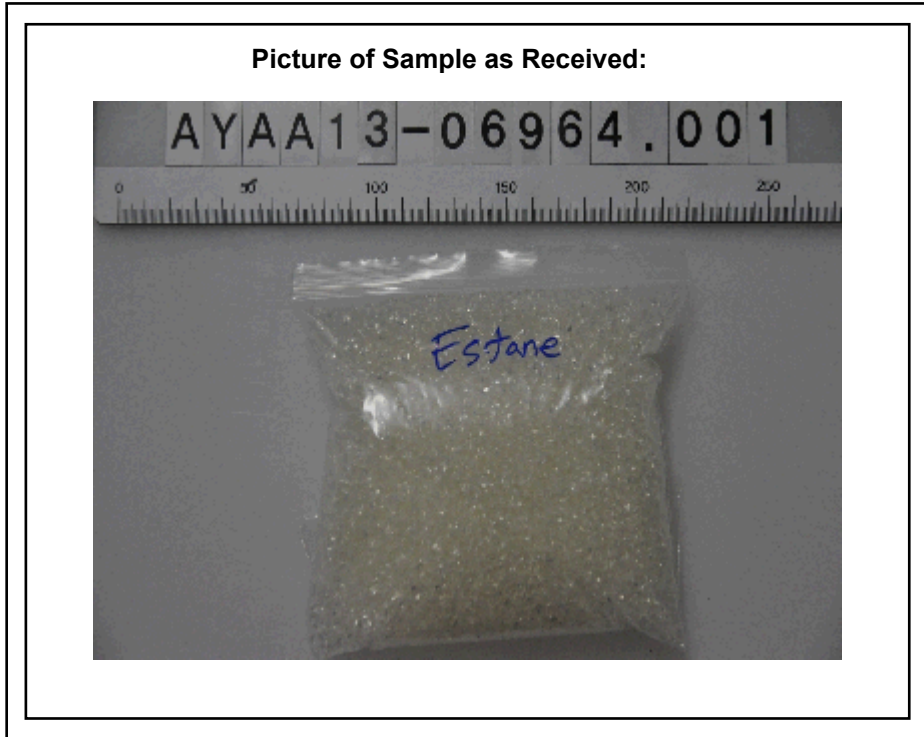
Test Items	Unit	Test Method	MDL	Results
Bisphenol A	mg/kg	In-House, HPLC/DAD	10	N.D.
Tetrachlorophenol (TeCP)	mg/kg	In-House method, KOH extraction, GC/MSD	0.05	N.D.
Pentachlorophenol (PCP)	mg/kg	In-House method, KOH extraction, GC/MSD	0.05	N.D.
Di-methyl-fumarate	mg/kg	In-House, GC/MS	0.1	N.D.

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.

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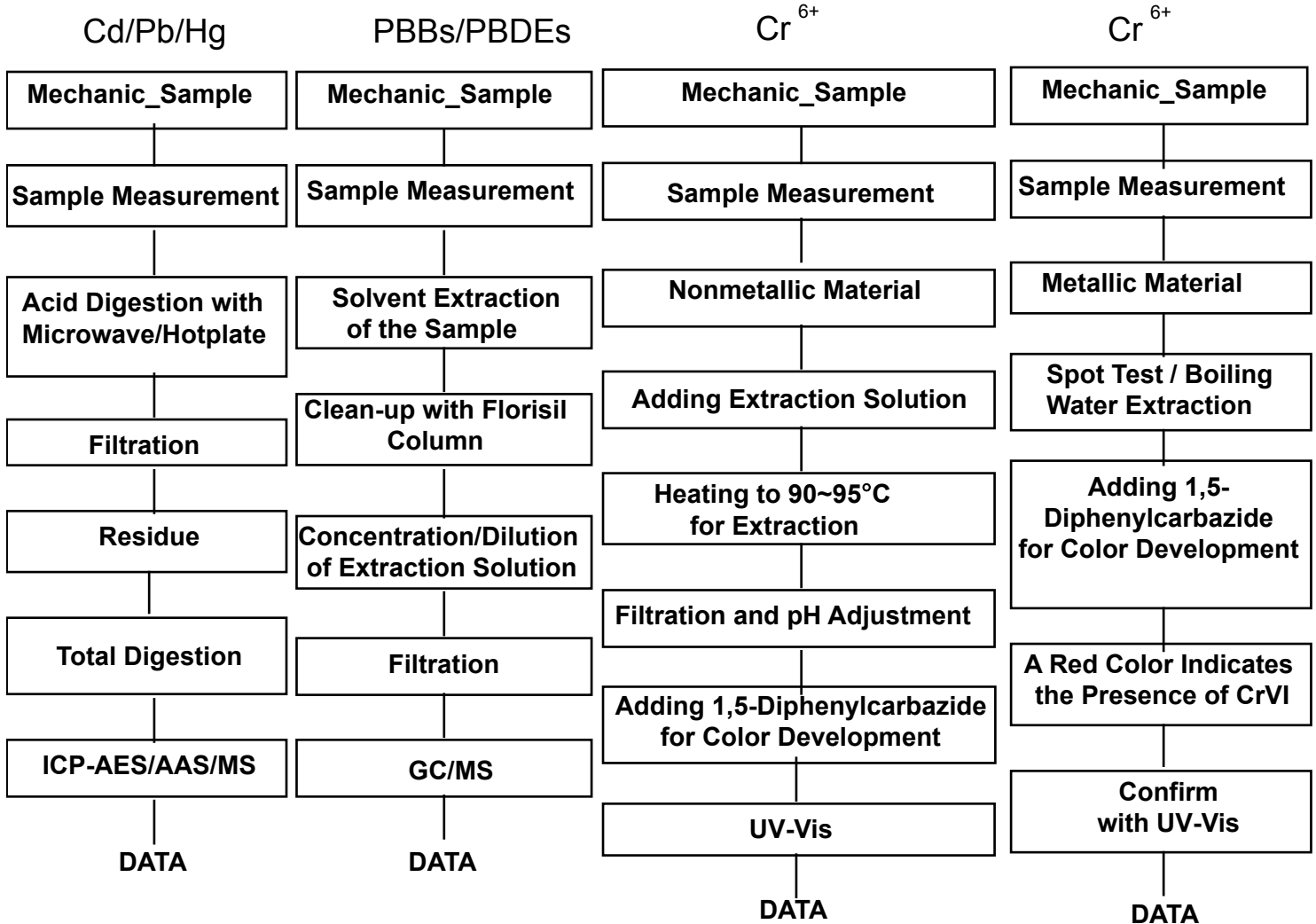


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Testing Flow Chart for RoHS:Cd/Pb/Hg/Cr⁶⁺ /PBBs&PBDEs Testing

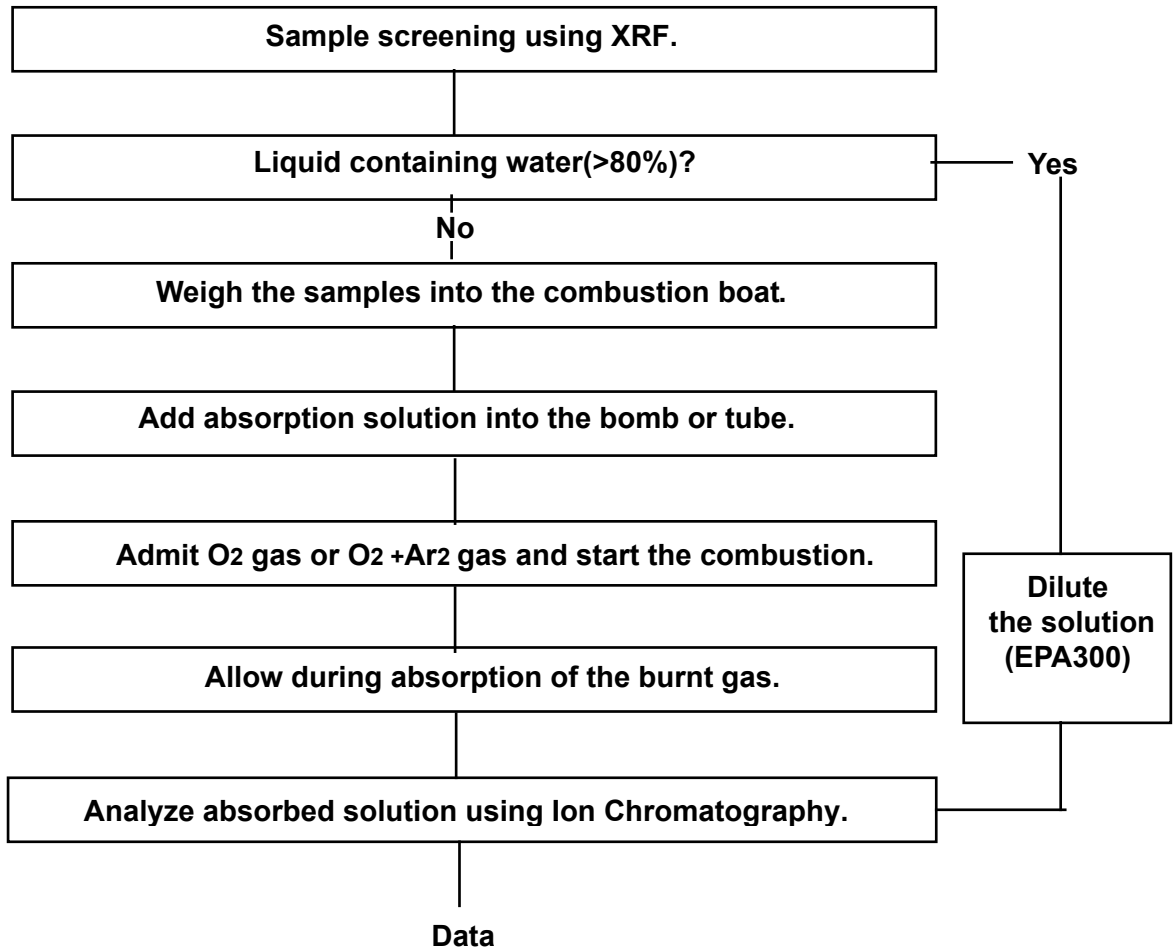


The samples were dissolved totally by pre-conditioning method according to above flow chart for Cd,Pb,Hg.
Section Chief : Gilsae Yi

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Flow Chart for Halogen Test



*** End ***

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