

Test Report No. : CE/2020/94510 Date : 2020/10/06 Page : 1 of 16

HAESUNGDS CO., LTD.

(SEONGJU-DONG) 726, UNGNAM-RO, SEONGSAN-GU, CHANG-WON-SI, GYEONGSANGNAM-DO, KOREA

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

Sample Submitted By : HAESUNGDS CO., LTD.

Sample Description : LEAD FRAME
SGS Korea File No. : AYGA20-05056
Style/Item No. : C194UPG
Sample Material : METAL ALLOY

Sample Receiving Date : 2020/09/26

Testing Period : 2020/09/26 to 2020/10/06

Test Requested

- (1) As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample(s).
- (2) Please refer to next pages for the other item(s).

Test Result(s) : Please refer to following pages.

Troy Chang / Manager - Vec SGS
Signed for and behalf of
SGS TAIWAN LTD.
Chemical Laboratory - Taipei



PIN CODE: 468143BA



Test Report No.: CE/2020/94510 Page: 2 of 16 Date: 2020/10/06

HAESUNGDS CO., LTD.

(SEONGJU-DONG) 726, UNGNAM-RO, SEONGSAN-GU, CHANG-WON-SI, GYEONGSANGNAM-DO, KOREA

Test Result(s)

PART NAME No.1 : SILVER COLORED METAL SHEET (EXCLUDING THE FRAME)

Test Item(s)	Unit	Method	MDL	Result
. ,				No.1
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5: 2013 and performed by ICP-OES.	2	n.d.
Lead (Pb)	mg/kg	With reference to IEC 62321-5: 2013 and performed by ICP-OES.	2	13.4
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013+ AMD1:2017 and performed by ICP-OES.	2	n.d.
Hexavalent Chromium Cr(VI)(#2)	μg/cm²	With reference to IEC 62321-7-1: 2015 and performed by UV-VIS.	0.10	n.d.
Sum of PBBs	mg/kg		-	n.d.
Monobromobiphenyl	mg/kg		5	n.d.
Dibromobiphenyl	mg/kg		5	n.d.
Tribromobiphenyl	mg/kg		5	n.d.
Tetrabromobiphenyl	mg/kg		5	n.d.
Pentabromobiphenyl	mg/kg		5	n.d.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321-6: 2015 and	5	n.d.
Heptabromobiphenyl	mg/kg		5	n.d.
Octabromobiphenyl	mg/kg		5	n.d.
Nonabromobiphenyl	mg/kg		5	n.d.
Decabromobiphenyl	mg/kg		5	n.d.
Sum of PBDEs	mg/kg	performed by GC/MS.	-	n.d.
Monobromodiphenyl ether	mg/kg		5	n.d.
Dibromodiphenyl ether	mg/kg		5	n.d.
Tribromodiphenyl ether	mg/kg		5	n.d.
Tetrabromodiphenyl ether	mg/kg		5	n.d.
Pentabromodiphenyl ether	mg/kg		5	n.d.
Hexabromodiphenyl ether	mg/kg		5	n.d.
Heptabromodiphenyl ether	mg/kg		5	n.d.
Octabromodiphenyl ether	mg/kg		5	n.d.
Nonabromodiphenyl ether	mg/kg		5	n.d.
Decabromodiphenyl ether	mg/kg		5	n.d.



Test Report No.: CE/2020/94510 Page: 3 of 16 Date: 2020/10/06

HAESUNGDS CO., LTD.

(SEONGJU-DONG) 726, UNGNAM-RO, SEONGSAN-GU, CHANG-WON-SI, GYEONGSANGNAM-DO, KOREA

Tool Hama(a)			MD:	Result
Test Item(s)	Unit	Method	MDL	No.1
Polychlorinated Biphenyls (PCBs) (CAS No.: 1336-36-3)	mg/kg	With reference to US EPA 3550C: 2007. Analysis was performed by GC/MS.	0.5	n.d.
Polychlorinated Naphthalene (PCNs)	mg/kg	With reference to US EPA 3550C: 2007. Analysis was performed by GC/MS.	5	n.d.
Polychlorinated Terphenyls (PCTs)	mg/kg	With reference to US EPA 3550C: 2007. Analysis was performed by GC/MS.	0.5	n.d.
Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins) (CAS No.: 85535-84-8)	mg/kg	With reference to US EPA 3550C: 2007. Analysis was performed by GC/MS.	100	n.d.
Tributyl Tin (TBT)	mg/kg	With reference to ISO 17353: 2004. Analysis was performed by GC/FPD.	0.03	n.d.
Bis(tributyltin)oxide (TBTO) (CAS No.: 56-35-9)	mg/kg	With reference to ISO 17353: 2004. Analysis was performed by GC/FPD. Calculated from the result of Tributyl Tin (TBT).	0.03 (▲)	n.d.
Triphenyl Tin (TphT)	mg/kg	With reference to ISO 17353: 2004. Analysis was performed by GC/FPD.	0.03	n.d.
Dibutyl Tin (DBT)	mg/kg	With reference to ISO 17353: 2004. Analysis was performed by GC/FPD.	0.03	n.d.
Dioctyl Tin (DOT)	mg/kg	With reference to ISO 17353: 2004. Analysis was performed by GC/FPD.	0.03	n.d.
Halogen				
Halogen-Fluorine (F) (CAS No.: 14762-94-8)	mg/kg	With reference to BS EN 14582: 2016. Analysis was performed by IC.	50	n.d.
Halogen-Chlorine (CI) (CAS No.: 22537-15-1)	mg/kg	With reference to BS EN 14582: 2016. Analysis was performed by IC.	50	n.d.
Halogen-Bromine (Br) (CAS No.: 10097-32-2)	mg/kg	With reference to BS EN 14582: 2016. Analysis was performed by IC.	50	n.d.
Halogen-lodine (I) (CAS No.: 14362-44-8)	mg/kg	With reference to BS EN 14582: 2016. Analysis was performed by IC.	50	n.d.
Antimony (Sb)	mg/kg	With reference to US EPA 3052: 1996. Analysis was performed by ICP-OES.	2	n.d.
Arsenic (As)	mg/kg	With reference to US EPA 3052: 1996. Analysis was performed by ICP-OES.	2	n.d.
Beryllium (Be)	mg/kg	With reference to US EPA 3052: 1996. Analysis was performed by ICP-OES.	2	n.d.



Test Report No.: CE/2020/94510 Page: 4 of 16 Date: 2020/10/06

HAESUNGDS CO., LTD.

(SEONGJU-DONG) 726, UNGNAM-RO, SEONGSAN-GU, CHANG-WON-SI, GYEONGSANGNAM-DO, KOREA

Test Item(s)	Unit	Method	MDL	Result No.1
PFOS and its salts (CAS No.: 1763-23-1 and its salts)	mg/kg	With reference to CEN/TS 15968: 2010. Analysis was performed by LC/MS.	0.01	n.d.
PFOA and its salts (CAS No.: 335-67-1 and its salts)	mg/kg	With reference to CEN/TS 15968: 2010. Analysis was performed by LC/MS.	0.01	n.d.
Polyvinyl chloride (PVC)	**	Analysis was performed by FTIR and FLAME Test.	-	Negative
DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	mg/kg	With reference to IEC 62321-8: 2017. Analysis was performed by GC/MS.	50	n.d.
BBP (Butyl Benzyl phthalate) (CAS No.: 85-68-7)	mg/kg	With reference to IEC 62321-8: 2017. Analysis was performed by GC/MS.	50	n.d.
DEHP (Di- (2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	mg/kg	With reference to IEC 62321-8: 2017. Analysis was performed by GC/MS.	50	n.d.
DIBP (Di-isobutyl phthalate) (CAS No.: 84-69-5)	mg/kg	With reference to IEC 62321-8: 2017. Analysis was performed by GC/MS.	50	n.d.
DIHP (1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich) (CAS No.: 71888-89-6)	mg/kg	With reference to IEC 62321-8: 2017. Analysis was performed by GC/MS.	50	n.d.
DHNUP (1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters) (CAS No.: 68515-42-4)	mg/kg	With reference to IEC 62321-8: 2017. Analysis was performed by GC/MS.	50	n.d.
DMEP (Bis (2-methoxyethyl) phthalate) (CAS No.: 117-82-8)	mg/kg	With reference to IEC 62321-8: 2017. Analysis was performed by GC/MS.	50	n.d.
DNPP (Di-n-pentyl phthalate) (CAS No.: 131-18-0)	mg/kg	With reference to IEC 62321-8: 2017. Analysis was performed by GC/MS.	50	n.d.
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α-HBCDD, β-HBCDD, γ-HBCDD) (CAS No.: 25637-99-4 and 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	mg/kg	With reference to IEC 62321: 2008. Analysis was performed by GC/MS.	5	n.d.



Test Report Page: 5 of 16 No.: CE/2020/94510 Date: 2020/10/06

HAESUNGDS CO., LTD.

(SEONGJU-DONG) 726, UNGNAM-RO, SEONGSAN-GU, CHANG-WON-SI, GYEONGSANGNAM-DO, KOREA

Note:

- 1. mg/kg = ppm; 0.1wt% = 1000ppm
- 2. MDL = Method Detection Limit
- 3. n.d. = Not Detected = less than MDL
- 4. " " = Not Regulated
- 5. ** = Qualitative analysis (No Unit)
- 6. Negative = Undetectable / Positive = Detectable (#2) =
 - a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13 µg/cm². The sample coating is considered to contain Cr(VI)
 - b. The sample is negative for Cr(VI) if Cr(VI) is n.d. (concentration less than 0.10 μg/cm²). The coating is considered a non-Cr(VI) based coating
 - c. The result between 0.10 µg/cm² and 0.13 µg/cm² is considered to be inconclusive unavoidable coating variations may influence the determination.
- 7. PFOS and its salts including CAS No.: 29081-56-9, 2795-39-3, 29457-72-5, 70225-14-8, 56773-42-3, 251099-16-8, 307-35-7.
- 8. PFOA and its salts including CAS No.: 3825-26-1, 335-95-5, 2395-00-8, 335-93-3, 335-66-0.
- 9. (A): The MDL was evaluated for element / tested substance.

Conversion Formula : $AX = A \times F$

AX	A	F
Bis(tributyltin)oxide (TBTO)	Tributyl Tin (TBT)	1.024

https://twap.sgs.com/sgsrsts/chn/download-REACH_tw.asp Parameter Conversion Table:



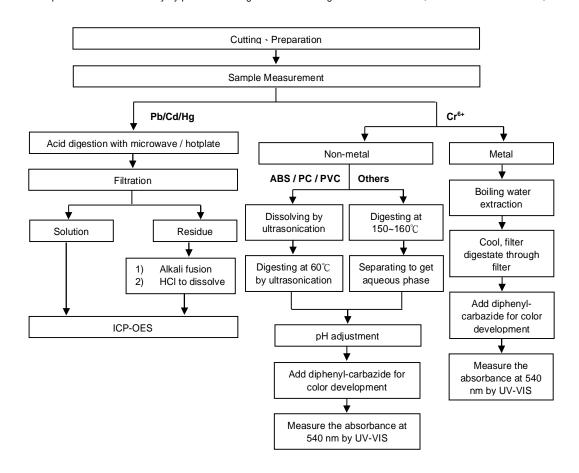
Test Report No.: CE/2020/94510 Page: 6 of 16 Date: 2020/10/06

HAESUNGDS CO., LTD.

(SEONGJU-DONG) 726, UNGNAM-RO, SEONGSAN-GU, CHANG-WON-SI, GYEONGSANGNAM-DO, KOREA

Analytical flow chart of Heavy Metal

These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr⁶⁺ test method excluded)



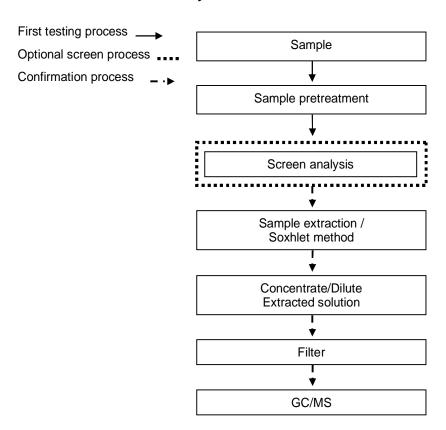


Test Report No.: CE/2020/94510 Page: 7 of 16 Date: 2020/10/06

HAESUNGDS CO., LTD.

(SEONGJU-DONG) 726, UNGNAM-RO, SEONGSAN-GU, CHANG-WON-SI, GYEONGSANGNAM-DO, KOREA

Analytical flow chart - PBB / PBDE





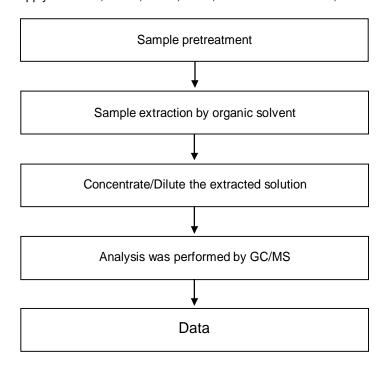
Test Report No.: CE/2020/94510 Page: 8 of 16 Date: 2020/10/06

HAESUNGDS CO., LTD.

(SEONGJU-DONG) 726, UNGNAM-RO, SEONGSAN-GU, CHANG-WON-SI, GYEONGSANGNAM-DO, KOREA

Analytical flow chart

* Apply to: PCBs, PCNs, PCTs, Mirex, Chlorinated Paraffins, DBBT



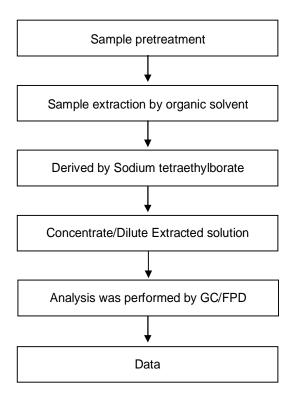


Test Report No.: CE/2020/94510 Page: 9 of 16 Date: 2020/10/06

HAESUNGDS CO., LTD.

(SEONGJU-DONG) 726, UNGNAM-RO, SEONGSAN-GU, CHANG-WON-SI, GYEONGSANGNAM-DO, KOREA

Analytical flow chart - Organic-Tin



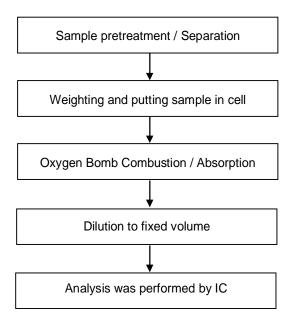


Test Report Page: 10 of 16 No.: CE/2020/94510 Date: 2020/10/06

HAESUNGDS CO., LTD.

(SEONGJU-DONG) 726, UNGNAM-RO, SEONGSAN-GU, CHANG-WON-SI, GYEONGSANGNAM-DO, KOREA

Analytical flow chart - Halogen





Test Report No.: CE/2020/94510

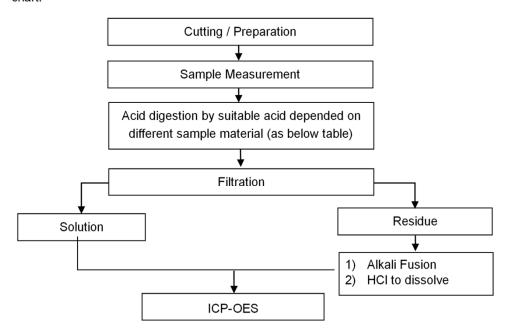
Page: 11 of 16 Date: 2020/10/06

HAESUNGDS CO., LTD.

(SEONGJU-DONG) 726, UNGNAM-RO, SEONGSAN-GU, CHANG-WON-SI, GYEONGSANGNAM-DO, KOREA

Flow Chart of digestion for the elements analysis performed by ICP-OES

These samples were dissolved totally by pre-conditioning method according to below flow chart.



Steel, copper, aluminum, solder	Aqua regia, HNO ₃ , HCI, HF, H ₂ O ₂
Glass	HNO₃/HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO ₃
Plastic	H ₂ SO ₄ , H ₂ O ₂ , HNO ₃ , HCI
Others	Added appropriate reagent to total digestion

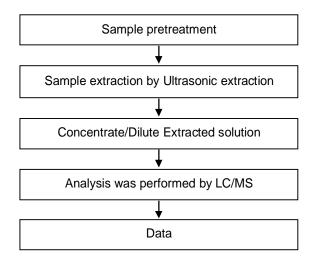


Test Report No.: CE/2020/94510 Page: 12 of 16 Date: 2020/10/06

HAESUNGDS CO., LTD.

(SEONGJU-DONG) 726, UNGNAM-RO, SEONGSAN-GU, CHANG-WON-SI, GYEONGSANGNAM-DO, KOREA

Analytical flow chart - PFOA/PFOS



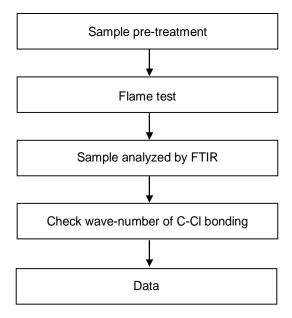


Test Report No.: CE/2020/94510 Page: 13 of 16 Date: 2020/10/06

HAESUNGDS CO., LTD.

(SEONGJU-DONG) 726, UNGNAM-RO, SEONGSAN-GU, CHANG-WON-SI, GYEONGSANGNAM-DO, KOREA

Analysis flow chart - PVC





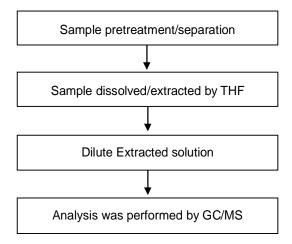
Test Report No.: CE/2020/94510 Page: 14 of 16 Date: 2020/10/06

HAESUNGDS CO., LTD.

(SEONGJU-DONG) 726, UNGNAM-RO, SEONGSAN-GU, CHANG-WON-SI, GYEONGSANGNAM-DO, KOREA

Analytical flow chart - Phthalate

[Test method: IEC 62321-8]



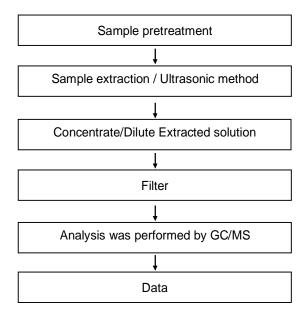


Test Report No.: CE/2020/94510 Page: 15 of 16 Date: 2020/10/06

HAESUNGDS CO., LTD.

(SEONGJU-DONG) 726, UNGNAM-RO, SEONGSAN-GU, CHANG-WON-SI, GYEONGSANGNAM-DO, KOREA

Analytical flow chart - HBCDD





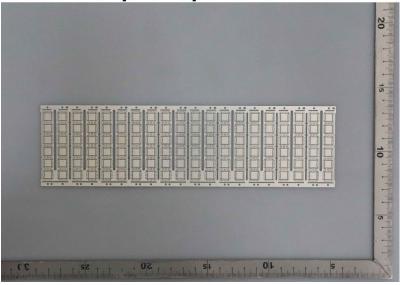
Test Report Page: 16 of 16 No.: CE/2020/94510 Date: 2020/10/06

HAESUNGDS CO., LTD.

(SEONGJU-DONG) 726, UNGNAM-RO, SEONGSAN-GU, CHANG-WON-SI, GYEONGSANGNAM-DO, KOREA

* The tested sample / part is marked by an arrow if it's shown on the photo. *

CE/2020/94510



** End of Report **