

Test Report

No.: ETR21602386

Date: 28-Jun-2021

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NANTONG HORNBY ELECTRONIC CO.,LTD
SMARTENGRAND LTD.

NO.8, XING YUAN ROAD,RUCHENG INDUSTRIAL ZONE, RUGAO CITY, JIANGSU PROVINCE, P. R. C.
NO. 168, SEC. 2, ZHONGZHENG ROAD, SANXIA DISTRICT, NEW TAIPEI CITY, TAIWAN, R. O. C.

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

Sample Submitted By : NANTONG HORNBY ELECTRONIC CO.,LTD
Sample Name : COPPER WIRE
Used for : PLEASE REFER TO PAGE 2

=====
Sample Receiving Date : 15-Jun-2021
Testing Period : 15-Jun-2021 to 24-Jun-2021

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 Results : Please refer to following pages.
Conclusion : (1) Based on the performed tests on submitted sample(s), the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

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



PIN CODE: D99AB834

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Used For

:

DIODE & BRIDGE RECTIFIERS(R-1 · A-405(H) · DO-41 · DO-15 · R-3 · DO-201AD · R-6 · R-7 · GBP · GBL · GBU · GBJ · KBL · KBP · KBU · KBJ · JA · JB · 2S · D3K · TSB-5 · S25VB10 · SKBPC · 2CL · CL · MD-M · MD-S · MD-F · DB-1 · DB-S · DF · DF-S · LBF · ABS · MSBS · YBS · YBSL · SBS · SBSL · SHBS · LDF · MBF(S/T1/T2) · WOM/RC-2 · MKBPC · MKBPC-W · KBPC-1 · KBPC-6 · KBPC-8 · KBPC · KBPC-W · MP · MP8 · MBR · MBR-W · BR · BR-W · BR-L · BR-6 · BR-8 · RA/RAS · CXA · TO-220AC · TO-220AB · ITO-220AC · ITO-220AB · TO-3P · TO-247(A/AD/S) · SMA-X · DO-214AC/SMA · SMA-F · SMA-L · SMA-S · SMA-HE · SMA-T · DO-214AA/SMB · SMB-F · SMB-S · SMB-L · DO-214AB/SMC · SMC-F · SMC-T3 · SMC-T4 · SMC-HE · DO-218(AB) · MINI-MELF · MELF · TO-92 · TO-126 · TO-252(A) · TO252-4L · TO-251 · TO-262 · D-PAK · TO-263 · D2PAK · SOD-123(FL/T/S/H1/HT/HE) · 1206(S) · SOD-323(FL/T/HE) · 0805 · SOD-523(FL) · 0603 · SOD-723(FL) · SOD-923(FL) · SOD-882 · 0402 · 0201 · SOT-23(-3/-3L/-3S/-5/-6/-6L) · SOT-26 · SOT-343 · SOT-353 · SOT-553 · SOT-363 · SOT-563 · SOT-223 · SOT-323(F) · SOT-523(F) · SOT-723(F) · SOT-883 · DFN1006-3L · 2928-8L · CP · SOT-143 · TO-277(A) · WBFBP · DFN1006-2 · DFN0603 · DSON10 · DFN2510(-10L) · DFN1608 · DFN1610 · DFN3810(-9L) · DFN5515(-18L) · DFN1515-6L · DFN1515-6L · DFN2020-6L · DFN1610-6L · DFN1713-8L · DFN2010-8L · TO-89 · SOP-8 · MSOP-8 · TSOP-6 · TSSOP-8 · MSOP-10 · DFN2626-10L · DFN3020-10L · DFN4120-10L · DFN3316-16 · LDFN4016-16L · PPAK2X3 · PPAK3X3 · DFN2X2-3L · DFN3X3(-8L) · DFN2X2-6 · DFN2X3-6 · DFN2X3-8 · PPAK5X6 · DFN5X6-8L

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Test Part Description

No.1 : COPPER COLORED METAL WIRE

Test Result(s)

Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
Cadmium (Cd) (CAS No.: 7440-43-9)	With reference to IEC 62321-5: 2013, analysis was performed by ICP-OES.	mg/kg	2	n.d.	100
Lead (Pb) (CAS No.: 7439-92-1)	With reference to IEC 62321-5: 2013, analysis was performed by ICP-OES.	mg/kg	2	n.d.	1000
Mercury (Hg) (CAS No.: 7439-97-6)	With reference to IEC 62321-4: 2013+ AMD1: 2017, analysis was performed by ICP-OES.	mg/kg	2	n.d.	1000
Hexavalent Chromium Cr(VI) (CAS No.: 18540-29-9) (#2)	With reference to IEC 62321-7-1: 2015, analysis was performed by UV-VIS.	µg/cm ²	0.1	n.d.	-
Monobromobiphenyl	With reference to IEC 62321-6: 2015, analysis was performed by GC/MS.	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	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 PBBs		mg/kg	-	n.d.	1000
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.	-
Sum of PBDEs	mg/kg	-	n.d.	1000	

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
Butyl benzyl phthalate (BBP) (CAS No.: 85-68-7)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	1000
Dibutyl phthalate (DBP) (CAS No.: 84-74-2)		mg/kg	50	n.d.	1000
Di-(2-ethylhexyl) phthalate (DEHP) (CAS No.: 117-81-7)		mg/kg	50	n.d.	1000
Diisobutyl phthalate (DIBP) (CAS No.: 84-69-5)		mg/kg	50	n.d.	1000
Diisodecyl phthalate (DIDP) (CAS No.: 26761-40-0, 68515-49-1)		mg/kg	50	n.d.	-
Diisononyl phthalate (DINP) (CAS No.: 28553-12-0, 68515-48-0)		mg/kg	50	n.d.	-
Di-n-octyl phthalate (DNOP) (CAS No.: 117-84-0)		mg/kg	50	n.d.	-
Di-n-hexyl phthalate (DNHP) (CAS No.: 84-75-3)		mg/kg	50	n.d.	-
Medium Chain Chlorinated Paraffins(C14-C17) (MCCP) (CAS No.: 85535-85-9)	With reference to ISO 18219: 2015, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
Antimony (Sb) (CAS No.: 7440-36-0)	With reference to US EPA 3050B: 1996, analysis was performed by ICP-OES.	mg/kg	2	n.d.	-

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. (#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.
6. The statement of compliance conformity is based on comparison of testing results and limits.

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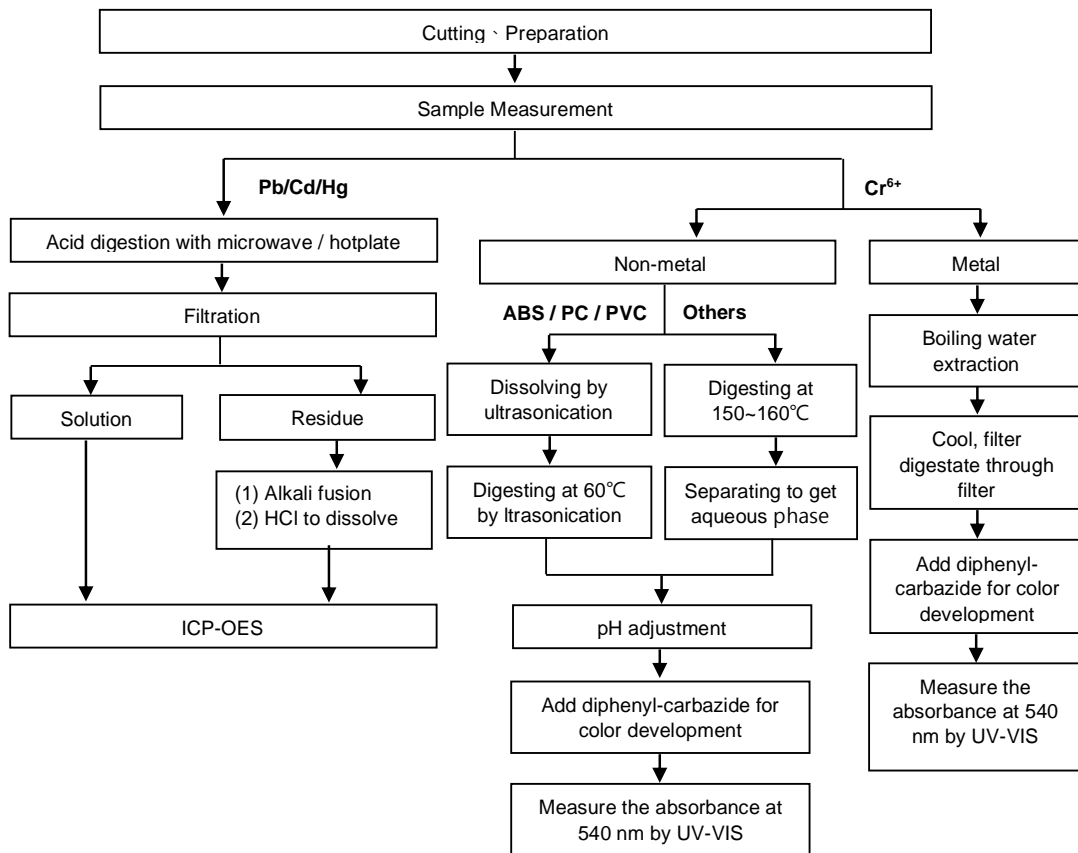
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Analytical flow chart of Heavy Metal

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

(Cr⁶⁺ test method excluded)

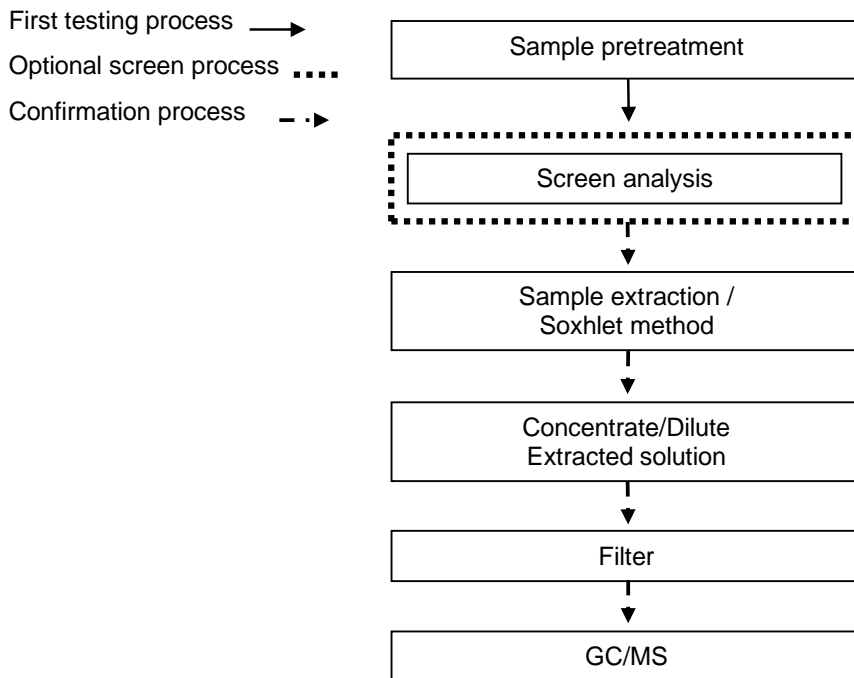


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Analytical flow chart – PBBs / PBDEs



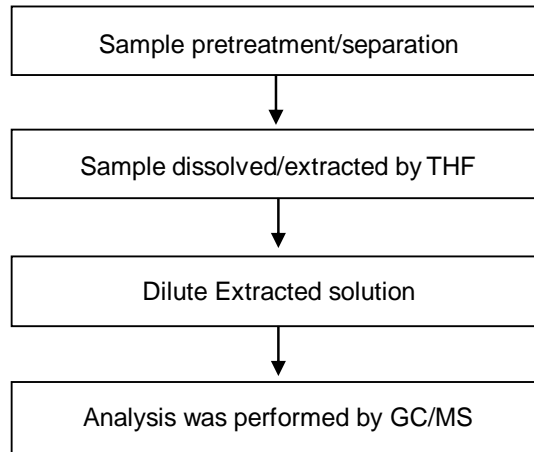
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Analytical flow chart - Phthalate

【Test method: IEC 62321-8】



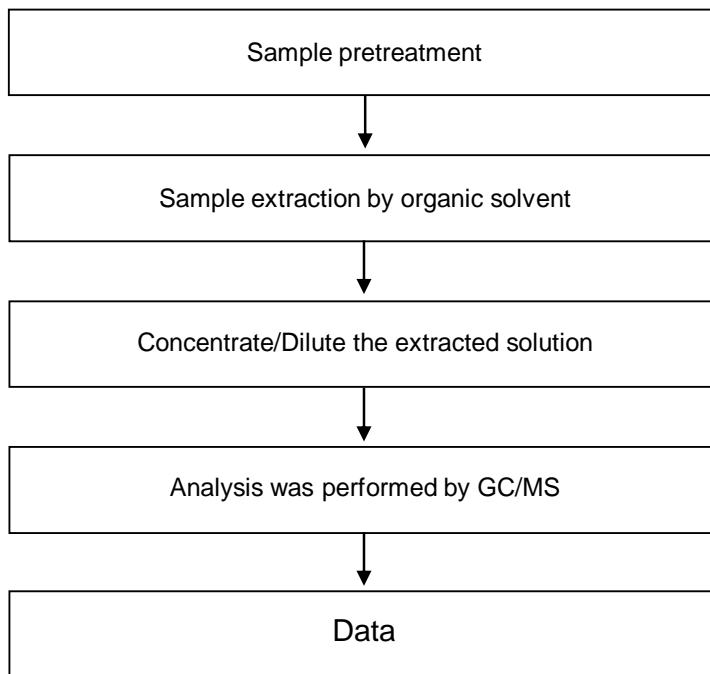
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Analytical flow chart

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



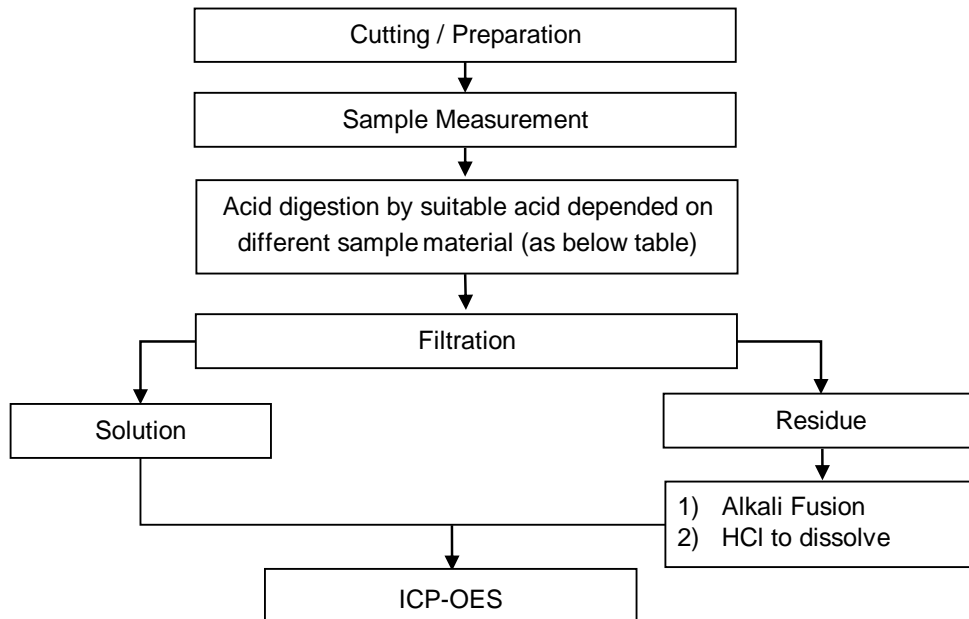
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Flow Chart of digestion for the elements analysis performed by ICP-OES

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



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

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

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** End of Report **

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