

Heraeus Materials Singapore Pte Ltd
26 Pioneer Crescent #06-11/12 West Park Bizcentral Singapore 628558

THIS REPORT IS TO SUPERSEDE TEST REPORT NO.: 10525285(1) DATED 29-Oct-2021

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

Sample Name : Solder Wire PbSn2Ag2.5

Sample Receiving Date : 15-Oct-2021
Testing Period : 15-Oct-2021 to 26-Oct-2021 and 03 Nov 2021 to 05 Nov 2021

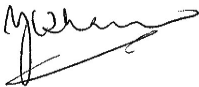
Test Requested : Selected test(s) as requested by client.

Test Method : Please refer to next page(s)

Test Result(s) : Please refer to next page(s).

Conclusion : Based on the performed tests on submitted sample(s), the results of Cadmium, Lead, Mercury, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) and Phthalates such as Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP) **comply** with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Signed for and on behalf of
SGS Testing & Control Services Singapore Pte Ltd



Y.C. Tham
Technical Manager, Multi-Lab



Test Location: 30 Boon Lay Way, #02-02, Singapore 609957

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Test Result(s):

Sample Description : Silver colored metal wire

Test Item(s):	Unit	Method	Results	MDL	RoHS Limit
Cadmium(Cd)	mg/kg	With reference to IEC62321-5 :2013. Analysis was performed by ICP/OES	n.d.	2	100
Lead (Pb)	mg/kg	With reference to IEC62321-5 :2013. Analysis was performed by ICP/OES	954948.5 ⁺	2	1000
Mercury (Hg)	mg/kg	With reference to IEC62321-4 :2013+A1:2017. Analysis was performed by ICP/OES	n.d.	2	1000
Hexavalent Chromium (Cr(VI)) #	µg/cm2	With reference to IEC62321-7-1 :2015. Analysis was performed by UV-Vis Spectrometry.	n.d.	0.1	-
Sum of PBBs	mg/kg	With reference to IEC62321-6 :2015. Analysis was performed by GC/MS	n.d.	-	1000
Monobromobiphenyl	mg/kg		n.d.	5	-
Dibromobiphenyl	mg/kg		n.d.	5	-
Tribromobiphenyl	mg/kg		n.d.	5	-
Tetrabromobiphenyl	mg/kg		n.d.	5	-
Pentabromobiphenyl	mg/kg		n.d.	5	-
Hexabromobiphenyl	mg/kg		n.d.	5	-
Heptabromobiphenyl	mg/kg		n.d.	5	-
Octabromobiphenyl	mg/kg		n.d.	5	-
Nonabromobiphenyl	mg/kg		n.d.	5	-
Decabromobiphenyl	mg/kg		n.d.	5	-
Sum of PBDEs	mg/kg		n.d.	-	1000
Monobromodiphenyl ether	mg/kg		n.d.	5	-
Dibromodiphenyl ether	mg/kg		n.d.	5	-
Tribromodiphenyl ether	mg/kg		n.d.	5	-
Tetrabromodiphenyl ether	mg/kg		n.d.	5	-
Pentabromodiphenyl ether	mg/kg		n.d.	5	-
Hexabromodiphenyl ether	mg/kg		n.d.	5	-
Heptabromodiphenyl ether	mg/kg		n.d.	5	-
Octabromodiphenyl ether	mg/kg		n.d.	5	-
Nonabromodiphenyl ether	mg/kg	n.d.	5	-	
Decabromodiphenyl ether	mg/kg	n.d.	5	-	

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Test Result(s):

Sample Description : Silver colored metal wire

Test Item(s):	Unit	Method	Results	MDL	Limit
BBP (Benzyl butyl phthalate)	mg/kg	With reference to IEC 62321-8: 2017. Analysis was performed by GC/MS	n.d.	50	1000
DBP (Di-butyl phthalate)	mg/kg	With reference to IEC 62321-8: 2017. Analysis was performed by GC/MS	n.d.	50	1000
DEHP (Di-(2-ethylhexyl) phthalate)	mg/kg	With reference to IEC 62321-8: 2017. Analysis was performed by GC/MS	n.d.	50	1000
DIBP (Di-isobutyl Phthalate)	mg/kg	With reference to IEC 62321-8: 2017. Analysis was performed by GC/MS	n.d.	50	1000

- Note:
- (1) mg/kg = ppm ; 0.1wt% = 1000ppm
 - (2) n.d.= Not Detected
 - (3) MDL = Method Detection Limit
 - (4) “-“ = Not regulated
 - (5) * : Exceeds limit
 - (6) # = a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13µg/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 0.10µg/cm².
 The coating is considered a non-Cr(VI) based coating
 c. The result between 0.10µg/cm² and 0.13µg/cm² is considered to be inconclusive
 - unavoidable coating variations may influence the determination
 - (7) Reference information: The limits of Benzyl butyl phthalate (BBP), Di-butyl phthalate (DBP), Di-(2-ethylhexyl) phthalate (DEHP) , Di-isobutyl phthalate (DIBP) as set by G/TBT/N/EU/256 of WTO/TBT .

***Exemption: The received sample is exempted under directive 2011/65/EC Annex III Article 4(1): 7(a)lead in high melting temperature solder type solders (i.e. tin-lead solder alloys containing more than 85% of lead).**

Remarks: Sample received was totally dissolved by preconditioning method.

Lab Analyst(s): Auni, Joela and SJ

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Test Result(s):

Sample Description : Silver colored metal wire

Test Item(s):	Unit	Method	Results	MDL
Antimony (Sb)	mg/kg	With reference to US EPA 3050B. Analysis was performed by ICP/AES	n.d.	2
Beryllium (Be)	mg/kg	With reference to US EPA 3050B. Analysis was performed by ICP/AES	n.d.	2
PFOS and its salts* (CAS No.: 1763-23-1 and its salts)	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by LC/MS.	n.d.	10
PFOA and its salts* (CAS No.: 335-67-1 and its salts)	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by LC/MS.	n.d.	10
Halogen				
Halogen - Bromine (Br)	mg/kg	With reference to BS EN 14582. Analysis was performed by IC	n.d.	50
Halogen - Chlorine (Cl)	mg/kg	With reference to BS EN 14582. Analysis was performed by IC	n.d.	50
Halogen - Fluorine (F)	mg/kg	With reference to BS EN 14582. Analysis was performed by IC	n.d.	50
Halogen - Iodine (I)	mg/kg	With reference to BS EN 14582. Analysis was performed by IC	n.d.	50

- Note:
- (1) mg/kg = ppm ; 0.1wt% = 1000ppm
 - (2) n.d.= Not Detected
 - (3) MDL = Method Detection Limit
 - (4) PFOS and its salts including CAS No.: 29081-56-9, 2795-39-3, 29547-72-5, 70225-14-8, 56773-42-3, 251099-16-8, 307-35-7.
 - (5) PFOA and its salts including CAS No.: 3825-26-1, 335-95-5, 2395-00-8, 335-93-3, 335-66-0.

Lab Analyst(s): Joela and Amalina

* Tested by SGS lab (EKR21A01540)

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Sample photo:

Sample Description : Silver colored metal wire

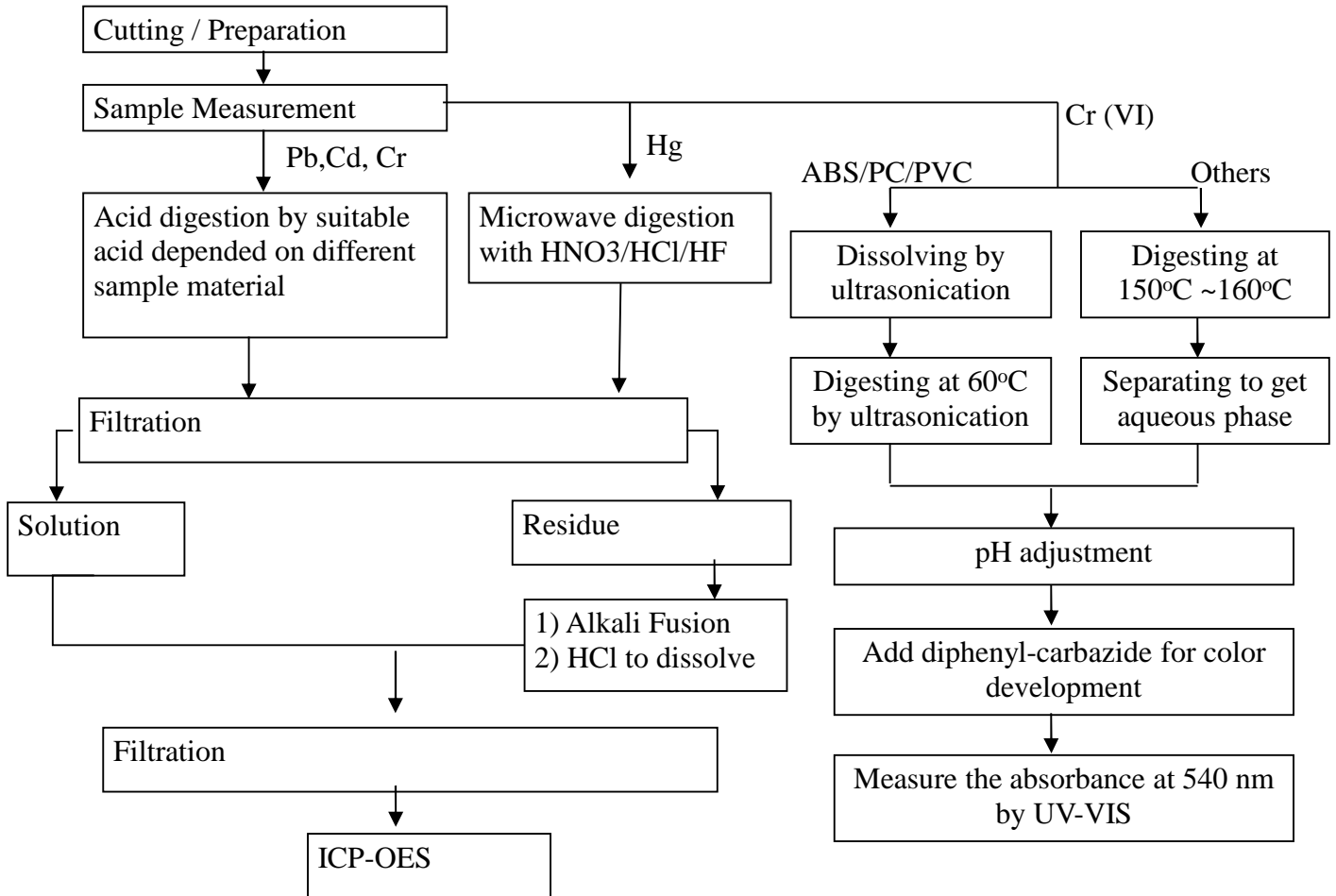
SGS authenticate the photo on original report only



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Process Flow of IEC 62321 (Pb, Cd, Hg, Cr & Cr(VI))



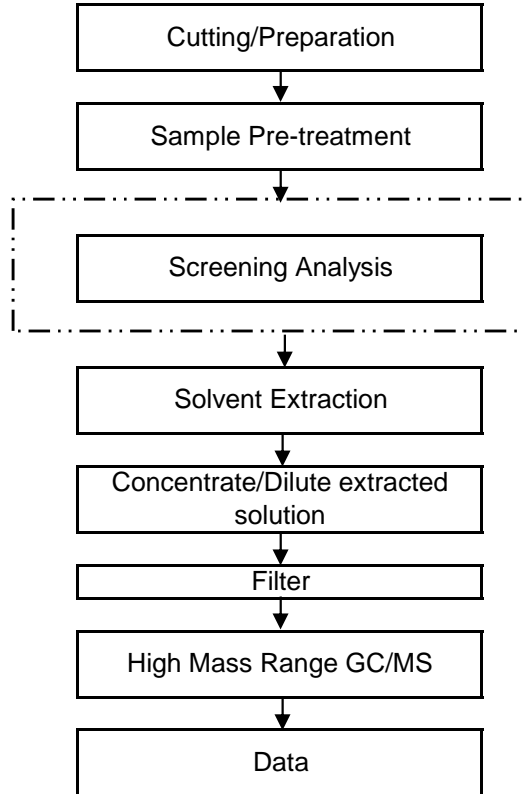
Remarks: Sample received was totally dissolved by preconditioning method. (CrVI method excluded)

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Process Flow of PBBs and PBDEs by GC/MS (IEC 62321)

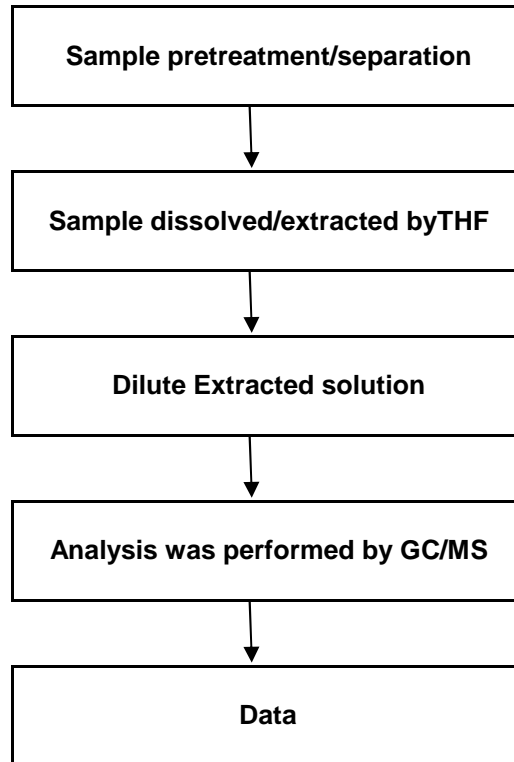
First Testing Process → Optional screen process Confirmation process ...→



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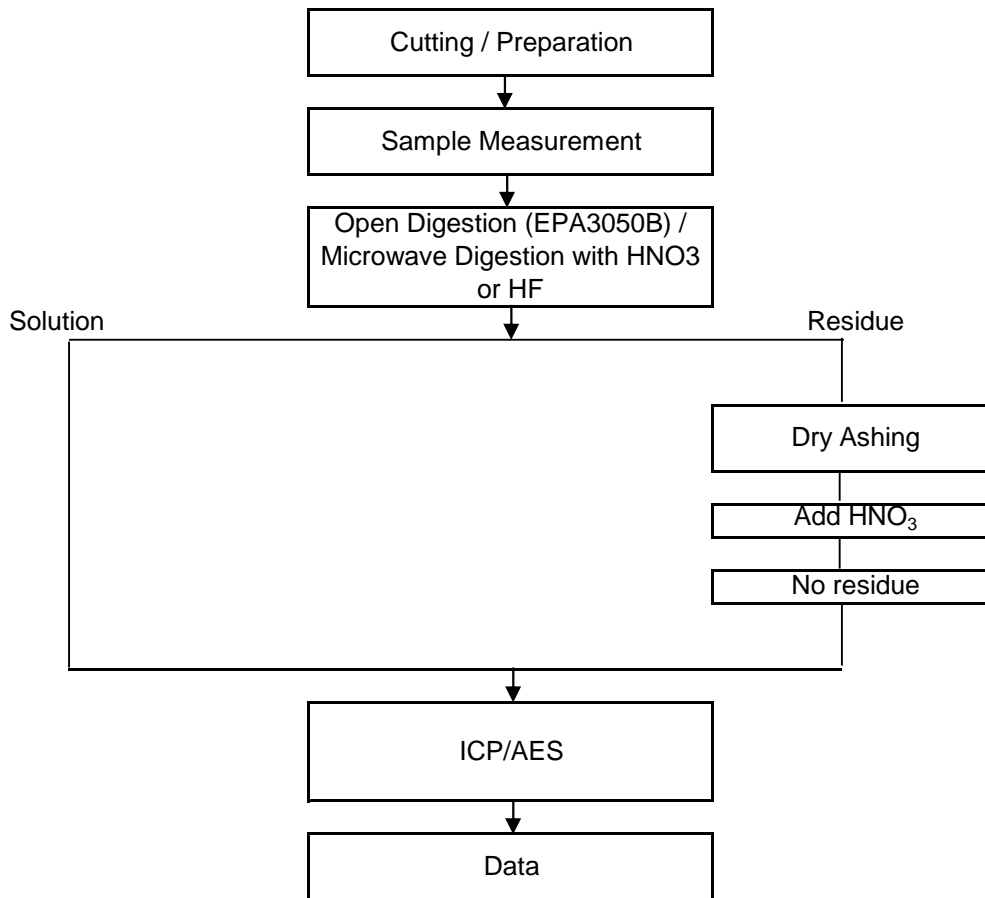
Analytical flow chart - Phthalate



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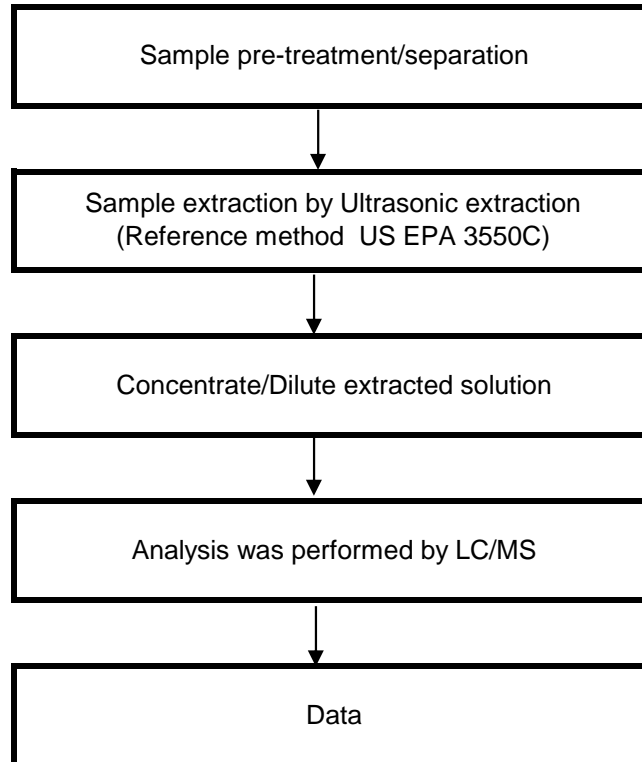
Process Flow of US EPA 3050B/3051A/3052



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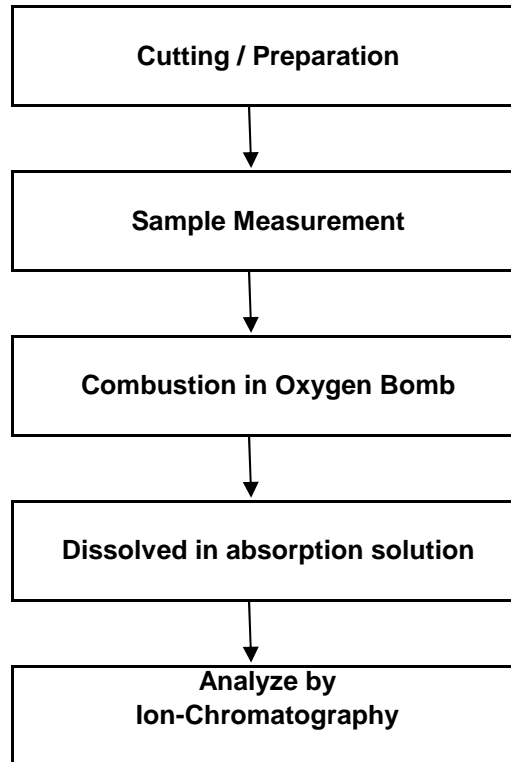
Analytical flow chart -PFOA/PFOS



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Process Flow of BS EN 14582 (Halogen Analysis)



End of Report

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