

Test Report No. 4833928

Date : 5-Feb-2021

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Client : Oriental Copper Co.,Ltd.
27 th FL, Bangkok Insurance / Y.W.C.A. Building , 25 Sathon Rd.
Thungmahamek , Sathon Bangkok 10120 Thailand

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

Sample Name : Cu-Ag Copper Busbar
 Sample Description : Copper Busbar
 Manufacturer/Vendor : Oriental Copper Co.,Ltd.
 Country of Origin : Thailand
 Country of Destination : Domestic & Export

The following sample(s) was/were identified by SGS as:

SGS Sample No. : 5022333
 Sample Condition : Sample is contained in a plastic bag.
 Quantity Submitted : 1 pc

Sample Receiving Date : 29-Jan-2021
 Testing Period : 29-Jan-2021 to 05-Feb-2021

Test Requested : In accordance with the RoHS Directive 2011/65/EU (Annex II) [amended by Directive (EU) 2015/863] .Selected test (s) as requested by client.

Test Method : (1) IEC 62321-5 edition 1.0 : 2013 for Lead content, Analyzed by ICP-OES.
 (2) IEC 62321-5 edition 1.0 : 2013 for Cadmium content, Analyzed by ICP-OES.
 (3) IEC 62321-4 ,edition 1.1 : 2017 for Mercury Content, Analyzed by ICP-OES.
 (4) IEC 62321-7-1 edition 1.0 : 2015 for Hexavalent Chromium Content,Analyzed by UV/Vis Spectrometry.
 (5) IEC 62321-6 edition 1.0 : 2015 for PBBs/PBDEs content, Analyzed by GC/MS.
 (6) IEC 62321-8 edition 1.0 : 2017 for Phthalates content,Analyzed was performed by GC/MS.

Test Results : Please refer to next page.

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CONCLUSION

Based on the performed tests on submitted sample(s), the results of Cadmium (Cd), Lead (Pb), Mercury (Hg), Hexavalent chromium (Cr-VI), 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 (Thailand) Limited



Patcharee Treeporncharoen
Laboratory manager - Chemical

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TEST RESULTS

Test results by chemical method (Unit: mg/kg)

Test Item (s):	Method (Refer to)	Result (1)	MDL	RoHS Limit
Lead (Pb)	(1)	n.d.	2	1000
Cadmium (Cd)	(2)	n.d.	2	100
Mercury (Hg)	(3)	n.d.	2	1000
Hexavalent Chromium (CrVI) by boiling water extraction # (Unit : (ug/cm2))	(4)	n.d.	0.10	-

Test Part Description
Result (1) metal

Note :

(a) mg/kg = ppm ; 0.1wt% = 1000 ppm

(b) ug/cm2 = microgram/centremeter square

(c) n.d. = Not Detected

(d) MDL = Method Detection Limit

(e) # = 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

(f) "-" = Not regulated

(g) For corrosion protection coatings on metals: Information on storage conditions and production date of the tested sample is unavailable and thus results of Cr(VI) represent status of the sample at the time of testing represent status of the sample at the time of testing.

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TEST RESULTS

Test results by chemical method (Unit: mg/kg)

Test Item (s):	Method (Refer to)	Result (1)	MDL	RoHS Limit
Sum of PBBs	(5)*	n.d.	-	1000
Monobromobiphenyl		n.d.	5	-
Dibromobiphenyl		n.d.	5	-
Tribromobiphenyl		n.d.	5	-
Tetrabromobiphenyl		n.d.	5	-
Pentabromobiphenyl		n.d.	5	-
Hexabromobiphenyl		n.d.	5	-
Heptabromobiphenyl		n.d.	5	-
Octabromobiphenyl		n.d.	5	-
Nonabromobiphenyl		n.d.	5	-
Decabromobiphenyl		n.d.	5	-

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TEST RESULTS

Test results by chemical method (Unit: mg/kg)

Test Item (s):	Method (Refer to)	Result (1)	MDL	RoHS Limit
Sum of PBDEs	(5)*	n.d.	-	1000
Monobromodiphenyl ether		n.d.	5	-
Dibromodiphenyl ether		n.d.	5	-
Tribromodiphenyl ether		n.d.	5	-
Tetrabromodiphenyl ether		n.d.	5	-
Pentabromodiphenyl ether		n.d.	5	-
Hexabromodiphenyl ether		n.d.	5	-
Heptabromodiphenyl ether		n.d.	5	-
Octabromodiphenyl ether		n.d.	5	-
Nonabromodiphenyl ether		n.d.	5	-
Decabromodiphenyl ether		n.d.	5	-

Test Part Description

Result (1) metal

Note :

(a) mg/kg = ppm ; 0.1 wt% = 1000 ppm

(b) n.d. = Not Detected

(c) MDL = Method Detection Limit

(d) "-" = Not regulated

(e) Test done on client submitted sample

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TEST RESULTS

Phthalates Content for RoHS Directive 2011/65/EU Annex II [amended by Directive (EU) 2015/863], Analysis was performed by GC/MS.

Analysis	Method (Refer to 6)	Result (1) (mg/kg)	MDL	RoHS Limit (mg/kg)
DEHP (Di-2-ethylhexyl phthalate)* (CAS No.: 117-81-7)	IEC 62321-8, Edition 1.0, 2017	n.d.	50	1000
BBP (Benzyl butyl phthalate)* (CAS No.: 85-68-7)	IEC 62321-8, Edition 1.0, 2017	n.d.	50	1000
DBP (Di-butyl phthalate)* (CAS No.: 84-74-2)	IEC 62321-8, Edition 1.0, 2017	n.d.	50	1000
DIBP (Di-isobutyl phthalate)* (CAS No.: 84-69-5)	IEC 62321-8, Edition 1.0, 2017	n.d.	50	1000

Note :

- (a) mg/kg = ppm ; 0.1 wt% = 1000 ppm
- (b) n.d. = Not Detected
- (c) MDL = Method Detection Limit
- (d) Result (1) metal
- (e) Test done on client submitted sample

Remarks:

- (1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.
- (2) IEC 62321 series is equivalent to EN 62321 series.
https://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101::FSP_ORG_ID,FSP_LANG_ID:1258637,25
- (3) The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, from 22 July 2021.

Test(s) marked * on this report are not included in the Accreditation Scope.

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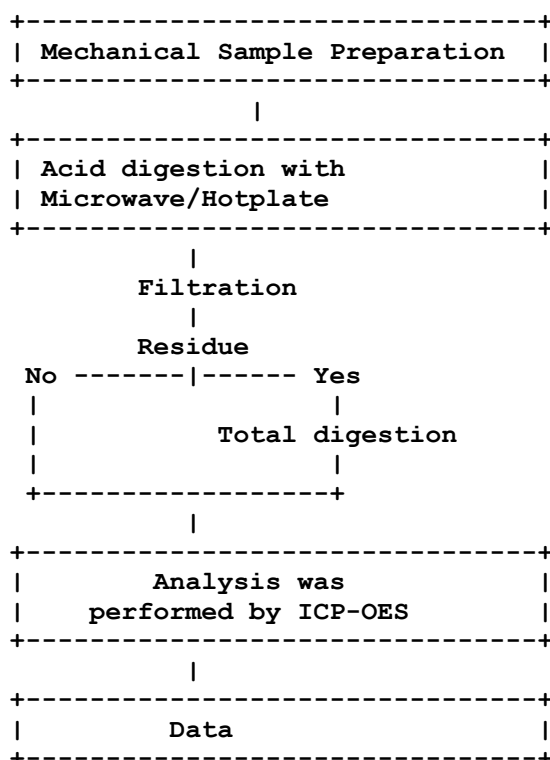
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Flow chart of Pb,Cd,Hg Testing

(Test method : IEC 62321)



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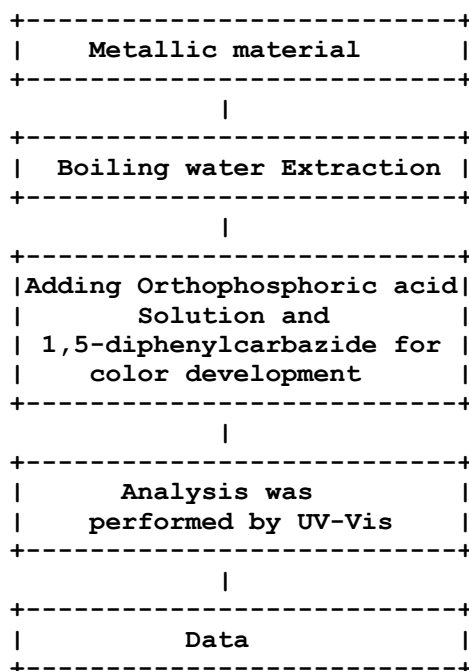
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Flow chart of Hexavalent Chromium Testing

(Test method : IEC 62321)



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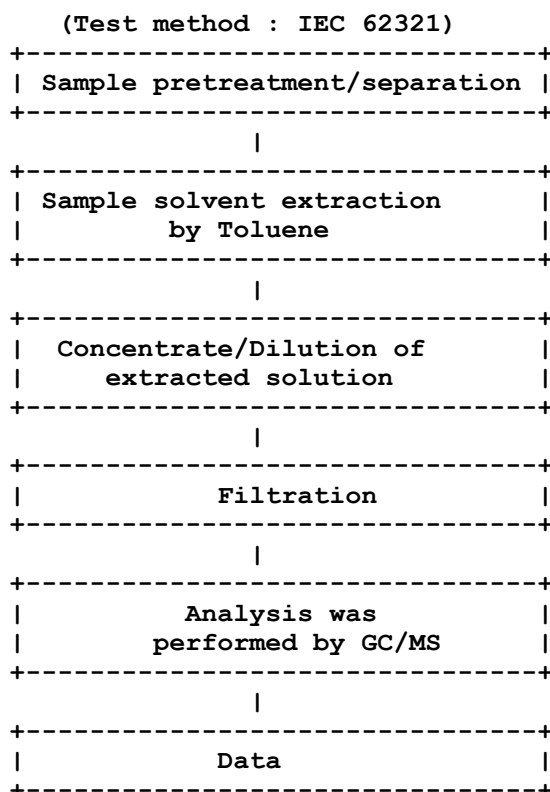
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Flow chart of PBBs, PBDEs Testing



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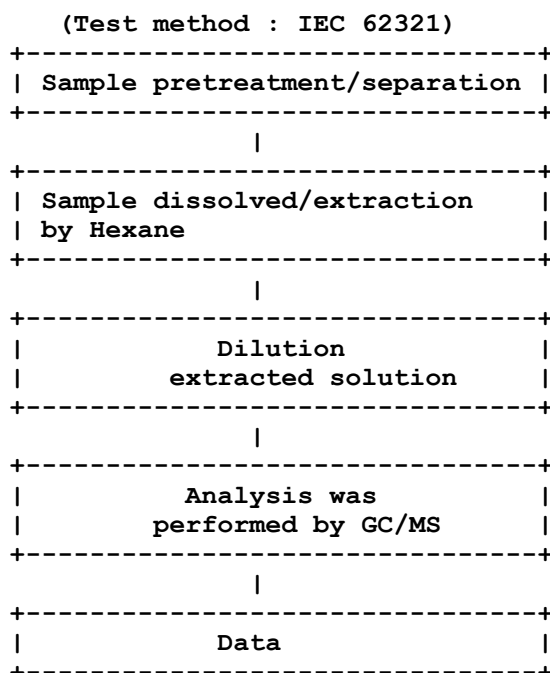
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Flow chart of Phthalates Testing



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SAMPLE/ATTACHMENT PICTURE



***** End of Report *****

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