

## Verification Report

No. HKGEC1800789604

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RUBADUE WIRE CO., INC.

5610 BOEING DR. LOVELAND, CO 80538 USA

Sample Name : SINGLE AND MULTI LAYER INSULATED WINDING WIRE TCA COVER WITH SILVER PLATED COPPER WIRE, TIN PLATED COPPER WIRE, BARE COPPER WIRE, MW-79 OR MW-80 WIRE (WITH WHITE, BLUE, ORANGE, GRAY AND VIRGIN)

SGS Job No. : 4190536 – HK

Item No. Given by Client : TCA1, TCA2, TCA3

Data of Sample Received : 05 Oct 2018

Verification Period : 05 Oct 2018 – 26 Oct 2018

Verification Requested: : With reference to RoHS Directive 2015/863/EU amending 2011/65/EU.

Verification Method : Please refer to next page(s)

Verification Results : Please refer to next page(s)

Verification Conclusion : Based on the verification results of the submitted samples, the results of Lead, Mercury, Cadmium, 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.

Note : The test results are related only to the tested items. The report shall not be reproduced except in full without the written approval of the testing laboratory.

Signed for and on behalf of  
SGS Hong Kong Ltd



Lam Ka Yung, Allen  
Chemist

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### Verification Method:

1. With reference to IEC 62321-2:2013, review was performed for the samples disjointed from the submitted articles.
2. With reference to IEC 62321-1:2013, tests were performed for the samples indicated by the photos in this report
  - (1) With reference to IEC 62321-3-1:2013, screening by EDXRF spectroscopy
  - (2) Wet chemical test method
    - a. With reference to IEC 62321-5:2013, determination of Cadmium by ICP-OES
    - b. With reference to IEC 62321-5:2013, determination of Lead by ICP-OES
    - c. With reference to IEC 62321-4:2013, determination of Mercury by ICP-OES
    - d. With reference to IEC 62321-7-1:2015, IEC 62321-7-2:2017 & ISO 17075-1:2017, determination of Hexavalent chromium by Colorimetric method using UV-Vis.
    - e. With reference to IEC 62321-6:2015, determination of PBBs and PBDEs by GC-MS
3. With reference to IEC 62321-8:2017, determination of phthalates by GC-MS.

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**Details on Verification**

Part No.	Part Description	BOM No.	Restricted Substances	Results of EDXRF <sup>(1)</sup>	Screening Result of PHTH <sup>(2)</sup>	Result of Wet Chemical Testing <sup>(3)</sup> (mg/kg)	Conclusion on EU RoHS	Sample Submitted / Resubmitted Date
1.	Pellet – White Plastic		Cd	BL	---	---	Comply	05 Oct 2018
			Pb	BL	---	---	Comply	
			Hg	BL	---	---	Comply	
			Cr(VI)▼	BL	---	---	Comply	
			PBBs	BL	---	---	Comply	
			PBDEs	BL	---	---	Comply	
			DBP	---	BL	---	Comply	
			BBP	---	BL	---	Comply	
DEHP	---	BL	---	Comply				
DIBP	---	BL	---	Comply				
2.	Pellet – Blue Plastic		Cd	BL	---	---	Comply	05 Oct 2018
			Pb	BL	---	---	Comply	
			Hg	BL	---	---	Comply	
			Cr(VI)▼	BL	---	---	Comply	
			PBBs	BL	---	---	Comply	
			PBDEs	BL	---	---	Comply	
			DBP	---	BL	---	Comply	
			BBP	---	BL	---	Comply	
DEHP	---	BL	---	Comply				
DIBP	---	BL	---	Comply				
3.	Pellet – Orange Plastic		Cd	BL	---	---	Comply	05 Oct 2018
			Pb	BL	---	---	Comply	
			Hg	BL	---	---	Comply	
			Cr(VI)▼	BL	---	---	Comply	
			PBBs	BL	---	---	Comply	
			PBDEs	BL	---	---	Comply	
			DBP	---	BL	---	Comply	
			BBP	---	BL	---	Comply	
DEHP	---	BL	---	Comply				
DIBP	---	BL	---	Comply				
4.	Pellet – Grey Plastic		Cd	BL	---	---	Comply	05 Oct 2018
			Pb	BL	---	---	Comply	
			Hg	BL	---	---	Comply	
			Cr(VI)▼	BL	---	---	Comply	
			PBBs	BL	---	---	Comply	
			PBDEs	BL	---	---	Comply	
			DBP	---	BL	---	Comply	
			BBP	---	BL	---	Comply	
DEHP	---	BL	---	Comply				
DIBP	---	BL	---	Comply				

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5.	Wire – Coppery Metal w/ Silvery Plating		Cd	BL	---	---	Comply	05 Oct 2018
			Pb	BL	---	---	Comply	
			Hg	BL	---	---	Comply	
			Cr(VI)▼	BL	---	---	Comply	
			PBBs	BL	---	---	Comply	
			PBDEs	BL	---	---	Comply	
			DBP	---	BL	---	Comply	
			BBP	---	BL	---	Comply	
DEHP	---	BL	---	Comply				
DIBP	---	BL	---	Comply				
6.	Wire – Coppery Metal w/ Silvery Plating		Cd	BL	---	---	Comply	05 Oct 2018
			Pb	BL	---	---	Comply	
			Hg	BL	---	---	Comply	
			Cr(VI)▼	BL	---	---	Comply	
			PBBs	BL	---	---	Comply	
			PBDEs	BL	---	---	Comply	
			DBP	---	BL	---	Comply	
			BBP	---	BL	---	Comply	
DEHP	---	BL	---	Comply				
DIBP	---	BL	---	Comply				
7.	Wire – Coppery Metal		Cd	BL	---	---	Comply	05 Oct 2018
			Pb	BL	---	---	Comply	
			Hg	BL	---	---	Comply	
			Cr(VI)▼	BL	---	---	Comply	
			PBBs	BL	---	---	Comply	
			PBDEs	BL	---	---	Comply	
			DBP	---	BL	---	Comply	
			BBP	---	BL	---	Comply	
DEHP	---	BL	---	Comply				
DIBP	---	BL	---	Comply				
8.	Wire – Coppery Metal		Cd	BL	---	---	Comply	05 Oct 2018
			Pb	BL	---	---	Comply	
			Hg	BL	---	---	Comply	
			Cr(VI)▼	BL	---	---	Comply	
			PBBs	BL	---	---	Comply	
			PBDEs	BL	---	---	Comply	
			DBP	---	BL	---	Comply	
			BBP	---	BL	---	Comply	
DEHP	---	BL	---	Comply				
DIBP	---	BL	---	Comply				

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9.	Wire – Coppery Metal w/ Red Plating		Cd	BL	---	---	Comply	05 Oct 2018
			Pb	BL	---	---	Comply	
			Hg	BL	---	---	Comply	
			Cr(VI) ▼	BL	---	---	Comply	
			PBBs	BL	---	---	Comply	
			PBDEs	BL	---	---	Comply	
			DBP	---	BL	---	Comply	
			BBP	---	BL	---	Comply	
			DEHP	---	BL	---	Comply	
DIBP	---	BL	---	Comply				

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**Remark**

- (1) (a) There are the results on total Br while test items on restricted substances are PBBs and PBDEs. There is the result on total Cr while test item on restricted substances is Cr(VI).
- (b) Results are obtained by EDXRF for primary screening, and further chemical testing by ICP-OES (for Cd, Pb, Hg), UV-Vis (for Cr(VI)) and GC-MS (for PBBs, PBDEs) is recommended to be performed if the concentration exceeds the below warning value according to IEC62321-3-1:2013 (unit: mg/kg).

Element	Polymer	Metal	Composite Materials
Cd	$BL \leq (70-3\sigma) < X < (130+3\sigma) \leq OL$	$BL \leq (70-3\sigma) < X < (130+3\sigma) \leq OL$	$LOD < X < (150+3\sigma) \leq OL$
Pb	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (500-3\sigma) < X < (1500+3\sigma) \leq OL$
Hg	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (500-3\sigma) < X < (1500+3\sigma) \leq OL$
Br	$BL \leq (300-3\sigma) < X$	--	$BL \leq (250-3\sigma) < X$
Cr	$BL \leq (700-3\sigma) < X$	$BL \leq (700-3\sigma) < X$	$BL \leq (500-3\sigma) < X$

- (c) BL = Below Limit, OL = Over Limit, IN = Inconclusive, LOD = Limit of Detection, -- = Not regulated.
- (d) The XRF screening test for RoHS elements – The reading may be different to the actual content in the sample be of non-uniformity composition.
- (2) Screening results of PHTH are for primary screening, and further chemical testing by GC-MS (for DBP, BBP, DEHP and DIBP) are recommended to be performed if the concentration exceeds the below warning value (unit: mg/kg).

Compound	Polymer
DBP	$BL \leq 600 < X$
BBP	$BL \leq 600 < X$
DEHP	$BL \leq 600 < X$
DIBP	$BL \leq 600 < X$

- (3) (a) mg/kg = 0.0001%, MDL=Method detection Limit, ND = Not Detected (<MDL), --- = Not conducted, - = Without BOM.

(b) Unit and MDL in wet chemical test

Test Item	Pb	Cd	Hg	DBP	BBP	DEHP	DIBP
Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
MDL	10	10	10	100	100	100	100

The MDL for single compound of PBBs and PBDEs is 100 mg/kg,

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MDL of Cr(VI) for polymer and composite sample is 10 mg/kg.

MDL of Cr(VI) for metal sample is 0.10µg/cm<sup>2</sup>.

- (c) ▼ =Metal sample
- a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 µg/cm<sup>2</sup>.  
The sample coating is considered to contain CrVI
  - b. The sample is negative for CrVI if CrVI is ND (concentration less than 0.10 µg/cm<sup>2</sup>).  
The coating is considered a non-CrVI based coating
  - c. The result between 0.10 µg/cm<sup>2</sup> and 0.13 µg/cm<sup>2</sup> is considered to be inconclusive  
- unavoidable coating variations may influence the determination

Information on storage conditions and production date of the tested sample is unavailable and thus Cr(VI) results represent status of the sample at the time of testing.

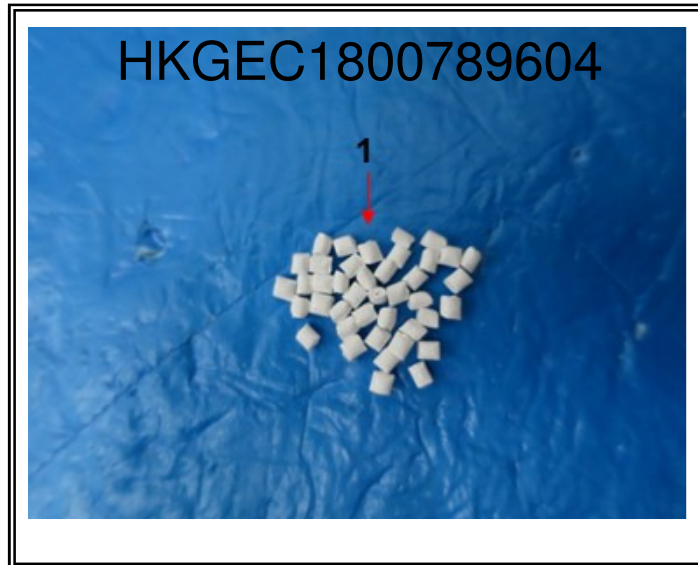
IEC 62321 series is equivalent to EN 62321 series

[http://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101:::FSP\\_ORG\\_ID,FSP\\_LANG\\_ID:1258637,25](http://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101:::FSP_ORG_ID,FSP_LANG_ID:1258637,25)

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Sample photo :



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