

# TEST REPORT

**RoHS**

## Test Report

**Applicant:** Shanghai Richeng Electronic Co., Ltd.

**Address:** Xinsheng Industrial Area, Zhelin, Fengxian, Shanghai

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

**Sample Name:** Metal Flexible Conduit

**Model No.(P.O No.):** MCR-HF,BG/PE,BG/PEV0,BG/PP,BG/PPV0,BG/PA,  
BG/PAV0,BGR

**Verification Period:** 10.11 ,2015----- 20.11, 2015

**Verification Requested:** Verification testing of RoHS Directive 2002/95/EC, and its amendment directives  
2011/65/EU Annex II

**Verification Method:** (1) Screening by XRF Spectroscopy  
With reference to IEC62321 Edition 1.0 :2008 method: Regulated Substances  
Content of test process with Electrical & Electronic Products

- (2) Wet Chemical Test Method  
Reference to IEC 62321 Edition 1.0 :2008, 111/95/CDV, "Electrotechnical  
Products- Determination of Levels of Six Regulated Substances"  
a. Determination of Lead & Cadmium by ICP and AAS  
b. Determination of Mercury by ICP  
c. Determination of Hexavalent Chromium by UV-Vis  
d. Determination of PBB and PBDE by GC/MS

**Verification Conclusion:** Based on the verification results of the submitted sample,  
The contents of hazardous substances in the submitted samples  
Comply with the RoHS Directive 2002/95/EC and its amendment directives  
2011/65/EU Annex II

**Testing Laboratory name:** DELTA TESTING & CERTIFICATION LIMITED

**Address:** NO.505 TianSheng Road, Ningbo City, Zhejiang, China

**Approved By:**

*Jack Chung*

Jack Chung Director

Nov. 20, 2015

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**Remark:**

(1) (a) It is the result on total Br while test item on restricted substances is PBBs/PBDEs. It is the result on total Cr while test item on restricted substances is Cr<sup>6+</sup>

(b) Results are obtained by EDXRF for primary screening, and further chemical testing by ICP (for Cd, Pb, Hg), UV-VIS (for Cr<sup>6+</sup>) and GC/MS (for PBBs, PBDEs) is recommended to be performed, if the concentration exceeds the below warning value according to IEC 62321 Ed.1 2<sup>nd</sup>, 111/95/CDV Annex D

(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) OL = Over Limit, BL = Below Limit, IN = Inconclusive, LOD = Limit of Detection, -- = Not applicable, for example, PBBs and PBDEs will not be tested in metal samples

(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) (a) mg/kg = ppm=0.0001%, ND= not detected (<MDL), --- = not conducted

(b) Unit and Method Detection Limit (MDL) in wet chemical test

Test Items	Units	MDL	Limit
Lead (Pb)	mg/kg	2	1000
Cadmium (Cd)	mg/kg	2	100
Mercury (Hg)	mg/kg	2	1000
Cr VI	mg/kg	NA	1000
<b>PBBs</b>			
Bromobiphenyl			
Dibromobiphenyl			
Tribromobiphenyl	mg/kg	5	1000
Tetrabromobiphenyl			
Pentabromobiphenyl			

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Test Items	Units	MDL	Limit
Hexabromobiphenyl Heptabromobiphenyl Octabromobiphenyl Nonabromobiphenyl Decabromobiphenyl	mg/kg	5	1000
<b>PBDEs</b> Bromodiphenyl ether Dibromodiphenyl ether Tribromodiphenyl ether Tetrabromodiphenyl ether Pentabromodiphenyl ether Hexabromodiphenyl ether Heptabromodiphenyl ether Octabromodiphenyl ether Nonabromodiphenyl ether Decabromodiphenyl ether	mg/kg	5	1000

The MDL for single compound of PBBs & PBDEs is 5 mg/kg and MDL of Cr6+ for polymer & composite sample is 2 mg/kg

(c) According to IEC 62321 Ed.1 2nd, 111/95/CDV, result on Cr6+ for metal sample is shown as Positive/Negative. Negative = Absence of Cr6+ coating, Positive = Presence of Cr6+ coating

- (3) \* As declared by the client, the materials fall into exemption items according to EU directive 2002/95/EC and its subsequent amendments 2011/65/EU Annex II
- (4) ▲ Test results was based on the part of amelioration

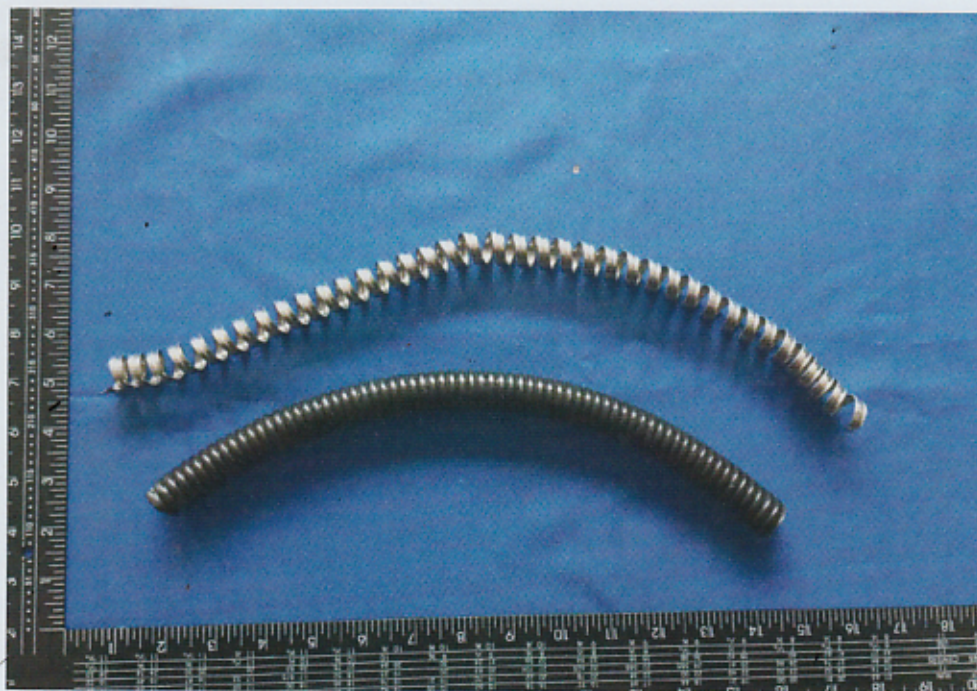
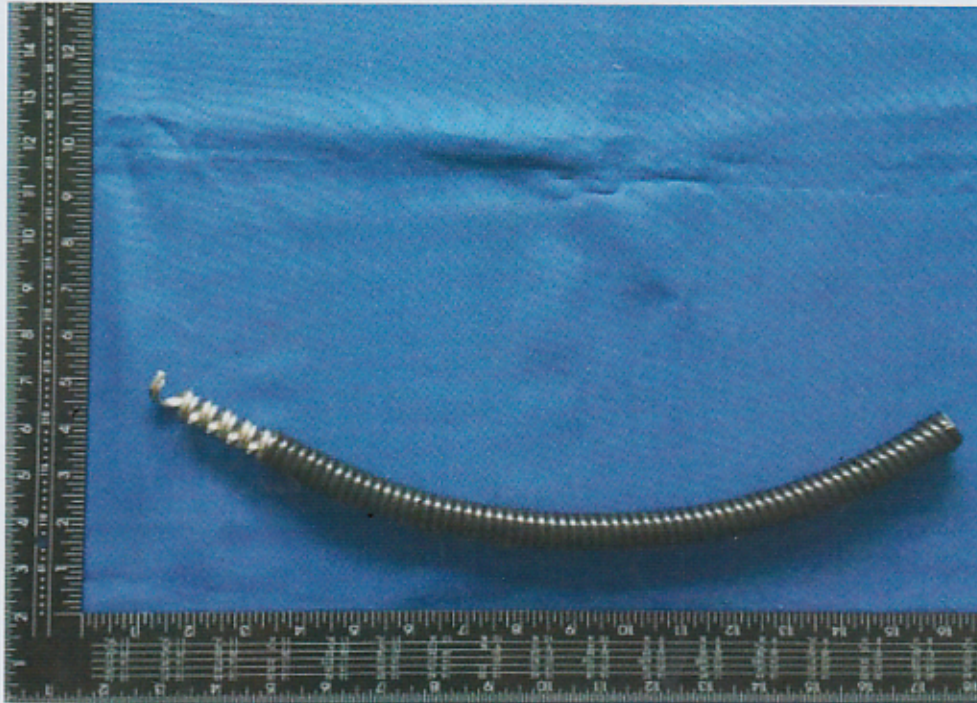
## Test Report

### Verification Results

Part No.	Part Name	Restricted Substances	Results of EDXRF(1)	Result of Wet Chemical Testing(2)	Conclusion
1	Metal	Cd	BL	N.D.	Pass
		Pb	BL	N.D.	Pass
		Hg	BL	N.D.	Pass
		Cr6+	BL	N.D.	Pass
		PBBs	/	--	--
		PBDEs		--	--
2	Plastic	Cd	BL	N.D.	Pass
		Pb	BL	N.D.	Pass
		Hg	BL	N.D.	Pass
		Cr6+	BL	N.D.	Pass
		PBBs	BL	N.D.	Pass
		PBDEs		N.D.	Pass

**ANNEX**

**Overall view of Metal Flexible Conduit**



===== End of Test Report =====

## ANNEX EXEMPTION LIST

- 1 Mercury in single capped (compact) fluorescent lamps not exceeding (per burner):
  - 1(a) For general lighting purposes < 30W: 5mg (expires on 31 December 2011; 3.5mg may be used per burner after 31 December 2011 Until 31 December 2012; 2.5mg shall be used per burner after 31 December 2012)
  - 1(b) For general lighting purposes  $\geq$  30W and <50W: 5mg (expires on 31 December 2011; 3.5mg may be used per burner after 31 December 2011)
  - 1(c) For general lighting purposes  $\geq$  50W and <150W: 5mg
  - 1(d) For general lighting purposes  $\geq$  150W: 15mg
  - 1(e) For general lighting purposes with circular or square structural shape and tube diameter  $\leq$  17mm (no limitation of use until 31 December 2011; 7mg may be used per burner after 31 December 2011)
  - 1(f) For special purposes: 5mg
- 2(a) Mercury in double-capped linear fluorescent lamps for general lighting purposes not exceeding (per lamp):
  - 2(a)(1) Tri-band phosphor with normal lifetime and a tube diameter < 9mm (e.g. T2): 5mg (expires on 31 December 2011; 4mg may be used per lamp after 31 December 2011)
  - 2(a)(2) Tri-band phosphor with normal lifetime and a tube diameter  $\geq$  9mm and  $\leq$  17mm (e.g. T5): 5mg (expires on 31 December 2011; 3mg may be used per lamp after 31 December 2011)
  - 2(a)(3) Tri-band phosphor with normal lifetime and a tube diameter > 17mm and  $\leq$  28mm (e.g. T8): 5mg (expires on 31 December 2011; 3.5mg may be used per lamp after 31 December 2011)
  - 2(a)(4) Tri-band phosphor with normal lifetime and a tube diameter > 28mm (e.g. T12): 5mg (expires on 31 December 2012; 3.5mg may be used per lamp after 31 December 2012)
  - 2(a)(5) Tri-band phosphor with long lifetime ( $\geq$  25000h): 8mg (expires on 31 December 2011; 5mg may be used per lamp after 31 December 2011)
- 2(b) Mercury in other fluorescent lamps not exceeding (per lamp):
  - 2(b)(1) Linear halo phosphate lamps with tube > 28mm (e.g. T10 and T12): 10mg (expires on 13 April 2012)
  - 2(b)(2) Non-linear halo phosphate lamps (all diameters): 15mg (expires on 13 April 2016)
  - 2(b)(3) Non-linear tri-band phosphor lamps with tube diameter > 17mm (e.g. T9) (no limitation of use until 31 December 2011; 15mg may be used per lamp after 31 December 2011)
  - 2(b)(4) Lamps for other general lighting and special purposes (e.g. induction lamps) (no limitation of use until 31 December 2011; 15mg may be used per lamp after 31 December 2011)
- 3 Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for special purposes not exceeding (per lamp):
  - 3(a) Short length ( $\leq$  500mm) (No limitation of use until 31 December 2011; 3.5mg may be used per lamp after 31 December 2011)
  - 3(b) Medium length (> 500mm and  $\leq$  1500mm) (No limitation of use until 31 December 2011; 5mg may be used per lamp after 31 December 2011)
  - 3(c) Long length (> 1500mm) (No limitation of use until 31 December 2011; 13mg may be used per lamp after 31 December 2011)
- 4(a) Mercury in other low pressure discharge lamps (per lamp) (no limitation of use until 31 December 2011; 15mg may be used per lamp after 31 December 2011)
- 4(b) Mercury in High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding (per burner) in lamps with improved colour rendering index  $R_a > 60$ :
  - 4(b)-I  $P \leq 155W$  (no limitation of use until 31 December 2011; 40mg may be used per burner after 31 December 2011)
  - 4(b)-II  $155W < P \leq 405W$  (no limitation of use until 31 December 2011; 40mg may be used per burner after 31 December 2011)
  - 4(b)-III  $P > 405W$  (no limitation of use until 31 December 2011; 40mg may be used per burner after 31 December 2011)
- 4(c) Mercury in other High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding (per burner):
  - 4(c)-I  $P \leq 155W$  (no limitation of use until 31 December 2011; 25mg may be used per burner after 31 December 2011)
  - 4(c)-II  $155W < P \leq 405W$  (no limitation of use until 31 December 2011; 30mg may be used per burner after 31 December 2011)
  - 4(c)-III  $P > 405W$  (no limitation of use until 31 December 2011; 40mg may be used per burner after 31 December 2011)
- 4(d) Mercury in High Pressure Mercury (vapour) lamps (HPMV) (expires on 13 April 2015)
- 4(e) Mercury in metal halide lamps (MH)
- 4(f) Mercury in other discharge lamps for special purposes not specifically mentioned in this Annex
- 5(a) Lead in glass of cathode ray tubes
- 5(b) Lead in glass of fluorescent tubes not exceeding 0.2% by weight
- 6(a) Lead as an alloying element in steel for machining purposes and in galvanized steel containing up to 0.35% lead by weight

**ANNEX**  
EXEMPTION LIST

Continued

- 6(b) Lead as an alloying element in aluminium containing up to 0.4% lead by weight
- 6(c) Copper alloy containing up to 4% lead by weight.
- 7(a) Lead in high melting temperature type solders (i.e. lead based alloys containing 85% by weight or more lead)
- 7(b) Lead in solders for servers, storage and storage array systems, network infrastructure equipment for switching, signalling, transmission, and network management for telecommunications
- 7(c)-I Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectric devices, or in a glass or ceramic matrix compound
- 7(c)-II Lead in dielectric ceramic in capacitors for a rated voltage of 125V AC or 250V DC or higher
- 7(c)-III Lead in dielectric ceramic in capacitors for a rated voltage of less than 125V AC or 250V DC (expires on 1 January 2013 and after that date may be used in spare parts for EEE placed on the market before 1 January 2013).
- 7(c)-IV Lead in PZT based dielectric ceramic materials for capacitors being part of integrated circuits or discrete semiconductors
- 8(a) Cadmium and its compounds in one shot pellet type thermal cut-offs (expires on 1 January 2012 and after that date may be used in spare parts for EEE placed on the market before 1 January 2012)
- 8(b) Cadmium and its compounds in electrical contacts
- 9 Hexavalent chromium as an anti-corrosion agent of the carbon steel cooling system in absorption refrigerators up to 0.75% by weight in the cooling solution
- 9(b) Lead in bearing shells and bushes for refrigerant-containing compressors for heating, ventilation, air conditioning and refrigeration (HVACR) applications
- 11(b) Lead used in other than C-press compliant pin connector systems (expires on 1 January 2013 and after that date may be used in spare parts for EEE placed on the market before 1 January 2013)
- 13(a) Lead in white glasses used for optical applications
- 13(b) Cadmium and lead in filter glasses and glasses used for reflectance standards
- 14 Lead in solders consisting of more than two elements for the connection between the pins and the package of microprocessors with a lead content of more than 80% and less than 85% by weight (expires on 1 January 2011 and after that date may be used in spare parts for EEE placed on the market before 1 January 2011)
- 15 Lead in solders to complete a viable electrical connection between semiconductor die and carrier within integrated circuit Flip Chip packages
- 16 Lead in linear incandescent lamps with silicate coated tubes (expires on 1 September 2013)
- 17 Lead halide as radiant agent in High Intensity Discharge (HID) lamps used for professional reprography applications
- 18(a) Lead as activator in the fluorescent powder (1% lead by weight or less) of discharge lamps when used as speciality lamps for diazoprinting reprography, lithography, insect traps, photochemical and curing processes containing phosphors such as SMS ((Sr,Ba)<sub>2</sub>MgSi<sub>2</sub>O<sub>7</sub>:Pb) (expires on 1 January 2011)
- 18(b) Lead as activator in the fluorescent powder (1% lead by weight or less) of discharge lamps when used as sun tanning lamps containing phosphors such as BSP (BaSi<sub>2</sub>O<sub>5</sub>:Pb)
- 19 Lead with PbBiSn-Hg and PbInSn-Hg in specific compositions as main amalgam and with PbSn-Hg as auxiliary amalgam in very compact Energy Saving Lamps (ESL) (expire on 1 June 2011)
- 20 Lead oxide in glass used for bonding front and rear substrates of flat fluorescent lamps used for Liquid Crystal Displays (LCDs) (expires on 1 June 2011)
- 21 Lead and cadmium in printing inks for the application of enamels on glasses, such as borosilicate and soda lime glass
- 24 Lead in solders for the soldering to machined through hole discoidal and planar array ceramic multilayer capacitors
- 25 Lead oxide in surface conduction electron emitter displays (SED) used in structural elements, notably in the seal frit and frit ring
- 26 Lead oxide in the glass envelope of Black Light Blue (BLB) lamps (expires on 1 June 2011)
- 29 Lead bound in crystal glass as defined in Annex 1 (Categories 1, 2, 3 and 4) of Council Directive 69/493/EEC
- 30 Cadmium alloys as electrical/mechanical solder joints to electrical conductors located directly on the voice coil in transducers used in high-powered loudspeakers with sound pressure levels of 100 dB (A) and more
- 31 Lead in soldering materials in mercury free flat fluorescent lamps (which e.g. are used for liquid crystal displays, design or industrial lighting)
- 32 Lead oxide in seal frit used for making window assemblies for Argon and Krypton laser tubes
- 33 Lead in solders for the soldering of thin copper wires of 100 µm diameter and less in power transformers
- 34 Lead in cermet-based trimmer potentiometer elements
- 37 Lead in the plating layer of high voltage diodes on the basis of a zinc borate glass body
- 38 Cadmium and cadmium oxide in thick film pastes used on aluminium bonded beryllium oxide
- 39 Cadmium in colour converting II-VI LEDs (< 10 µg Cd per mm<sup>2</sup> of light-emitting area) for use in solid state illumination or display systems (expires on 1 July 2014)
- 40 Cadmium in photoresistors for analogue optocouplers applied in professional audio equipment.