

Samtec Inc
520 Park East Blvd
New Albany, IN 47150
United States

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

COAX RIBBON CABLE
COLOR BLUE PVC OUTER INSULATION
JACKET FEP INNER DIELECTRIC COPPER
CONDUCTORS
WITH SILVER PLATING.
Model Part Number: TCF
Country of Destination: USA

Sample Received Date: **12/07/2021**

Testing Period: **12/07/2021 – 12/22/2021**

Test Requested : Please refer to the result summary.

Test Method & Results : Please refer to next page(s).

Result Summary :

Test Requested	Conclusion
1. RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU	PASS
2. Halogen Content (Cl, Br, I, F) of the submitted sample(s) with reference to BS EN 14582:2016	See Test Results

Signed for and on behalf of SGS North America, Inc.



Prepared By:



Ivan Chan
 Senior Laboratory manager, Chemistry laboratory

Suzie Banik
 Technical Report Writer, Chemistry Laboratory

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1. RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Testing was done at an SGS Affiliate Laboratory:

Test Part Description :

Specimen No.	SGS Sample ID	Description
1.	HKT21-061819.024	Blue soft plastic - Outer PVC blue insulation.
2.	HKT21-061819.025	Translucent green soft plastic - Inner FEP clear insulation.
3.	HKT21-061819.026	Metal w/ silvery plating (base: coppery metal) - Copper conductor.
4.	HKT21-061819.027	Metal w/ silvery plating (base: coppery metal) - copper shield.

Remarks :

- (1) 1 mg/kg = 1 ppm = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected (< MDL)
- (4) "-" = Not Regulated

RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Test Method : With reference to IEC 62321-4:2013+A1:2017, IEC62321-5:2013, IEC62321-7-2:2017, IEC62321-6:2015 and IEC62321-8:2017, analyzed by ICP-OES, UV-Vis and GC-MS.

(Decision

Rule: please refer to appendix 1: Category 1).

<u>Test Item(s)</u>	<u>Limit</u>	<u>Unit</u>	<u>MDL.</u>	<u>024.</u>	<u>025.</u>
Cadmium (Cd).	100	mg/kg.	2	ND	ND
Lead (Pb).	1,000	mg/kg.	2	ND	ND
Mercury (Hg).	1,000	mg/kg.	2	ND	ND
Hexavalent Chromium (Cr(VI)).	1,000	mg/kg.	8	ND	ND
Sum of PBBs.	1,000	mg/kg.	-	ND	ND
Monobromobiphenyl.	-	mg/kg.	5	ND	ND
Dibromobiphenyl.	-	mg/kg.	5	ND	ND
Tribromobiphenyl.	-	mg/kg.	5	ND	ND
Tetrabromobiphenyl.	-	mg/kg.	5	ND	ND
Pentabromobiphenyl.	-	mg/kg.	5	ND	ND
Hexabromobiphenyl.	-	mg/kg.	5	ND	ND
Heptabromobiphenyl.	-	mg/kg.	5	ND	ND
Octabromobiphenyl.	-	mg/kg.	5	ND	ND

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Test Report

No. 4853743-CH10

Date: January 10, 2022

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Nonabromobiphenyl ₂	-	mg/kg ₂	5	ND	ND
Decabromobiphenyl ₂	-	mg/kg ₂	5	ND	ND
Sum of PBDEs ₂	1,000	mg/kg ₂	-	ND	ND
Monobromodiphenyl ether ₂	-	mg/kg ₂	5	ND	ND
Dibromodiphenyl ether ₂	-	mg/kg ₂	5	ND	ND

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<u>Test Item(s)</u>	<u>Limit</u>	<u>Unit</u>	<u>MDL.</u>	<u>024.</u>	<u>025.</u>
Tribromodiphenyl ether.	-	mg/kg.	5	ND	ND
Tetrabromodiphenyl ether.	-	mg/kg.	5	ND	ND
Pentabromodiphenyl ether.	-	mg/kg.	5	ND	ND
Hexabromodiphenyl ether.	-	mg/kg.	5	ND	ND
Heptabromodiphenyl ether.	-	mg/kg.	5	ND	ND
Octabromodiphenyl ether.	-	mg/kg.	5	ND	ND
Nonabromodiphenyl ether.	-	mg/kg.	5	ND	ND
Decabromodiphenyl ether.	-	mg/kg.	5	ND	ND
Dibutyl Phthalate (DBP).	1,000	mg/kg.	50	ND	ND
Benzylbutyl Phthalate (BBP).	1,000	mg/kg.	50	ND	ND
Bis-(2-ethylhexyl) Phthalate (DEHP).	1,000	mg/kg.	50	377	ND
Diisobutyl Phthalate (DIBP).	1,000	mg/kg.	50	ND	ND

Notes :

(1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863. IEC 62321 series is equivalent to EN 62321 series

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ID:

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RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Test Method : With reference to IEC 62321-4:2013+A1:2017 and IEC62321-5:2013, analyzed by ICP-OES.

(Decision Rule: please refer to appendix 1: Category 1)

With reference to IEC62321-7-1:2015, analyzed by UV-Vis. (Decision Rule: please refer

to

appendix 1: Category 4).

<u>Test Item(s)</u>	<u>Limit</u>	<u>Unit</u>	<u>MDL.</u>	<u>026.</u>	<u>027.</u>
Cadmium (Cd).	100	mg/kg.	2	ND	ND
Lead (Pb).	1,000	mg/kg.	5	ND	ND
Mercury (Hg).	1,000	mg/kg.	2	ND	ND
Hexavalent Chromium (Cr(VI)) ▼.	-	µg/cm ² .	0.10	ND	ND

Notes :

(1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863. 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_

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- (2) ▼ = a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13 μ g/cm². The sample coating is considered to contain Cr(VI)
- b. The sample is negative for Cr(VI) if Cr(VI) is ND (concentration less than 0.10 μ g/cm²). The coating is considered a non-Cr(VI) based coating
- c. The result between 0.10 μ g/cm² and 0.13 μ g/cm² is considered to be inconclusive - unavoidable

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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..

2. Halogen.

Testing was done at an SGS Affiliate Laboratory:

Test Method : With reference to EN 14582:2016, analysis was performed by IC..

<u>Test Item(s)</u>	<u>Limit</u>	<u>Unit</u>	<u>MDL.</u>	<u>025.</u>
Fluorine (F).	-	mg/kg.	50	200000
Chlorine (Cl).	-	mg/kg.	50	ND
Bromine (Br).	-	mg/kg.	50	ND
Iodine (I).	-	mg/kg.	50	ND

Notes :

- (1) The measurement report of the expanded uncertainty with confident level 95% by coverage factor
 $k=2$, is 20% for each analyte of Fluorine, Chlorine, Bromine and Iodine..

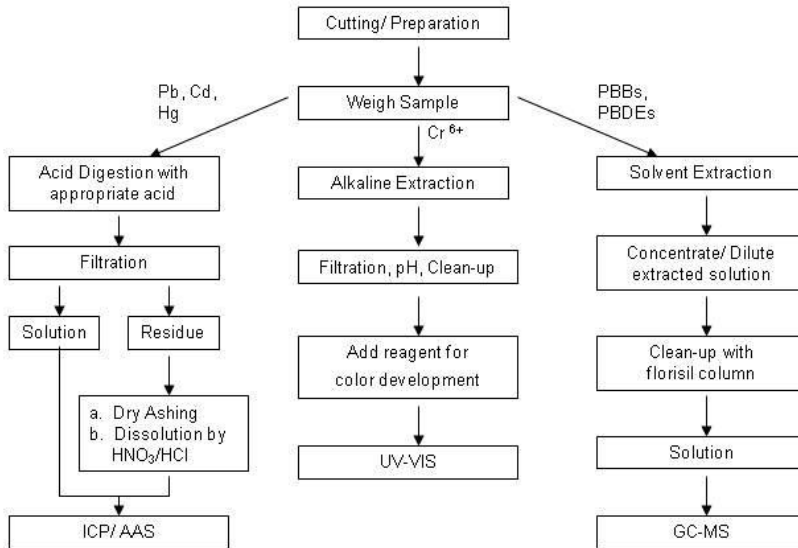
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Appendix 1

Category	Decision Rule Statement
1	The decision rule for conformity reporting is based on the non-binary statement with guard band (is equal to the expanded measurement uncertainty with a 95% coverage probability, $w = U95$) in ILAC-G8:09/2019 Clause 4.2.3. A. "Pass - the measured value is within (or below / above) the acceptance limit, where the acceptance limit is below / above to the guard band." or "Pass - The measured values were observed in tolerance at the points tested. The specific false accept risk is up to 2.5%." B. "Conditional Pass - The measured values were observed in tolerance at the points tested. However, a portion of the expanded measurement uncertainty intervals about one or more measured values exceeded / out of tolerance. When the measured result is close to the tolerance, the specific false accept risk is up to 50%." C. "Conditional Fail - One or more measured values were observed out of tolerance at the points tested. However, a portion of the expanded measurement uncertainty intervals about one or more measured values were in tolerance. When the measured result is close to the tolerance, the specific false reject risk is up to 50%." D. "Fail - the measured value is out of (or below / above) the tolerance limit added / subtracted to the guard band." or "Fail - One or more measured values were observed out of tolerance at the points tested". The specific false reject risk is up to 2.5%.
2	The decision rule for conformity reporting is based on BS EN 1811:2011+A1:2015: Reference test method for release of nickel from all post assemblies which are inserted into pierced parts of the human body and articles intended to come into direct and prolonged contact with the skin in Section 9.2 interpretation of results.
3	The decision rule for conformity reporting is based on the general consideration of simple acceptance as stated in ISO/IEC Guide 98-3: "Uncertainty of measurement - Part 3: Guide to the expression of uncertainty in measurement (GUM 1995)", and more specifically for analytical measurements to the EURACHEM/CITAC Guide 2012 "Quantifying Uncertainty in Analytical Measurement".
4	The decision rule for conformity reporting is according to the IEC 62321-7-1 Edition 1.0 2015-09 Section 7: Table 1-(comparison to standard and interpretation of result)
5	The decision rule for conformity reporting is according to the IEC 62321-3-1 Edition 1.0 2013-06 Annex A.3 interpretation of result.
6	The decision rule for conformity reporting is according to the GB/T 26125-2011 Annex A to H
7	The decision rule for conformity reporting is according to the requested specification or standard (ASTM F963-17 section 4.3.5)
8	The decision rule for conformity reporting is according to the requested specification or standard (AS/NZS ISO 8124 Part 3 section 4.2)
Remark	If the decision rule is not feasible to be used and the uncertainty of the result is able to be provided, the uncertainty range of the result will be shown in the report. Otherwise, only result will be shown in the report.

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Flowchart:



- Note : 1) Boiling water test method was also performed for the analysis of Cr (VI) in metal sample.
 2) The polymeric samples were dissolved totally by pre-conditioning method according to above flow chat for Cd, Pb and Hg contents analysis.

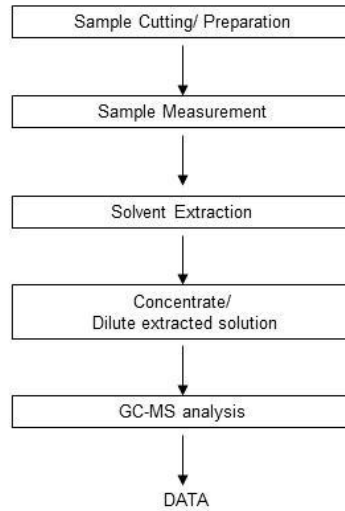
Operator: Chiu Kan Yuen/ Tang Koon Pang (Acid digestion)
Chiu Kan Yuen (Dry Ashing)
Nick Liu (Hexavalent Chromium)
Kent Wan (PBBs and PBDEs)

Section Chief: Chan Chun Kit, Dickson

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Flowchart for Phthalates measurement

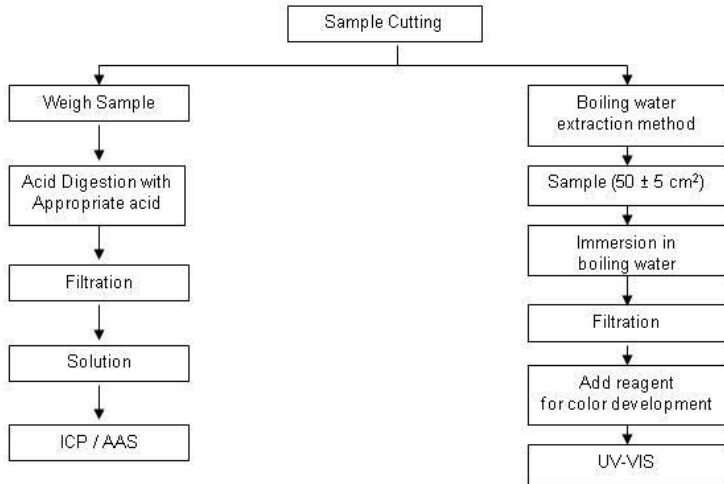
Method: IEC 62321-8:2017



Tested by : Lumpy Lee
Checked by : Edmund Kwan

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Flowchart of IEC 62321 for metal analysis



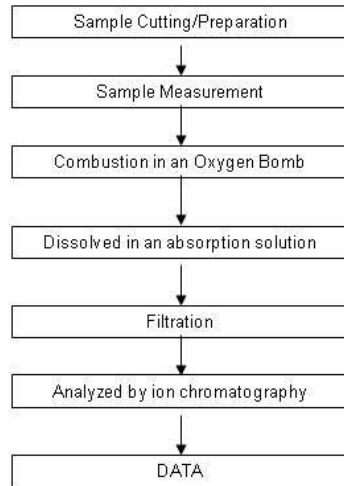
The metallic samples were dissolved totally by pre-conditioning method according to above flow chart for Cd, Pb and Hg contents analysis.

Operator : Nick Liu (Hexavalent Chromium)
Tang Koon Pang / Chiu Kan Yuen (Acid digestion)
 Section Chief : Chan Chun Kit, Dickson

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Flowchart for Halogen Free Test

Method: BS EN14582:2016



Operator: Tang Ying Sam
Supervisor: Chan Chun Kit (Dickson)

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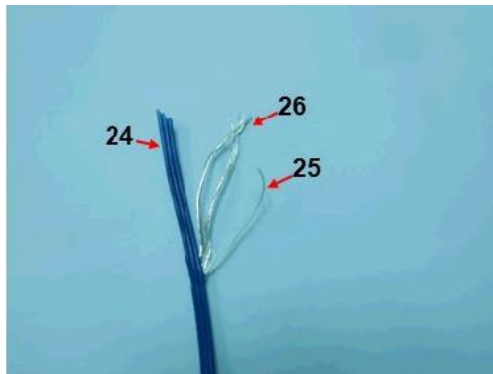
Sample photo:

Photo was taken at an SGS Affiliate Laboratory



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HKTEC2106181910

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SGS authenticate the photo on original report only

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