

Samtec  
520 Park East Blvd.  
New Albany, IN 47151  
United States

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

**Ribbon Cable – Multi-Color PVC Outer Insulation Jackets – Copper Conductors with Tin Plating**  
**Model/Part No.: Multi-Color 100-C**  
**Country of Destination: USA**

Sample Received Date: **7/26/2018**

Testing Period: **7/30/2018 – 8/10/2018**

Test Requested : Please refer to the result summary.

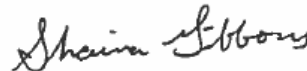
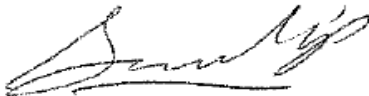
Test Method & Results : Please refer to next page(s).

Result Summary :

Test Requested	Comment
1. RoHS Directive 2011/65/EU Annex II	PASS
2. Directive (EU) 2015/863 of amending RoHS Directive 2011/65/EU	PASS
3. Phthalate Content (As requested by Client)	See Test Results
4. Total Phosphorous Content (as requested by Client)	See Test Results

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

Prepared By:



Sandip Ramolia  
Senior Analytical Chemist, Chemistry Laboratory

Shaina Gibbons  
Report Writer, Chemistry Laboratory

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**1. RoHS Directive 2011/65/EU Annex II**

Test Item(s):	Unit	Test Method	Results		MDL	Limit
			1	2		
Cadmium(Cd)	mg/kg	With reference to IEC 62321-5:2013	ND	ND	2	100
Lead (Pb)	mg/kg	(Determination of Cd and Pb by ICP-OES and /or ICP-MS)	ND	2.03	2	1000
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013 (Determination of Hg by ICP-OES and/ or ICP-MS)	ND	ND	2	1000
Hexavalent Chromium (CrVI)	mg/kg	With reference to IEC 62321; EPA 3060A (Determination of CrVI by UV-VIS)	ND*	ND*	2	1000
<b>Sum of PBBs</b>	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB and PBDE by GC-MS)	ND	ND	-	1000
Monobromobiphenyl	mg/kg		ND	ND	5	-
Dibromobiphenyl	mg/kg		ND	ND	5	-
Tribromobiphenyl	mg/kg		ND	ND	5	-
Tetrabromobiphenyl	mg/kg		ND	ND	5	-
Hexabromobiphenyl	mg/kg		ND	ND	5	-
Pentabromobiphenyl	mg/kg		ND	ND	5	-
Heptabromobiphenyl	mg/kg		ND	ND	5	-
Octabromobiphenyl	mg/kg		ND	ND	5	-
Nonabromobiphenyl	mg/kg		ND	ND	5	-
Decabromobiphenyl	mg/kg		ND	ND	5	-
<b>Sum of PBDEs</b>	mg/kg		ND	ND	-	1000
Monobromodiphenyl ether	mg/kg		ND	ND	5	-
Dibromodiphenyl ether	mg/kg		ND	ND	5	-
Tribromodiphenyl ether	mg/kg		ND	ND	5	-
Tetrabromodiphenyl ether	mg/kg		ND	ND	5	-
Pentabromodiphenyl ether	mg/kg		ND	ND	5	-
Hexabromodiphenyl ether	mg/kg		ND	ND	5	-
Heptabromodiphenyl ether	mg/kg		ND	ND	5	-
Octabromodiphenyl ether	mg/kg		ND	ND	5	-
Nonabromodiphenyl ether	mg/kg	ND	ND	5	-	
Decabromodiphenyl ether	mg/kg	ND	ND	5	-	
<b>Conclusion</b>	/	/	PASS	PASS	/	/

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Test Item(s):	Unit	Test Method	Results	MDL	Limit
			3		
Cadmium(Cd)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Cd and Pb by ICP-OES and /or ICP-MS)	ND	2	100
Lead (Pb)	mg/kg		9.53	2	1000
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013 (Determination of Hg by ICP-OES and/ or ICP-MS)	ND	2	1000
Hexavalent Chromium (CrVI)	mg/kg	With reference to IEC 62321; EPA 3060A (Determination of CrVI by UV-VIS)	ND*	2	1000
<b>Conclusion</b>	/	/	PASS	/	/

**Sample Description:**

1. Outer Clear PVC Laminate
2. Red PVC Dielectric Conductors
3. Copper Conductor with Tin Plating

**Note :**

- (a) mg/kg = ppm ; 0.1wt% = 1000ppm
- (b) ND= not detected
- (c) MDL = Method Detection Limit
- (d) - = not regulated
- (e) \* = Total Chromium analysis by ICP-MS and/or ICP-OES was not detected in submitted sample. Therefore, Hexavalent Chromium determination using UV-Visible Spectroscopy was not performed.
- (f) 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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**2. Directive (EU) 2015/863 of amending RoHS Directive 2011/65/EU**

Test Item(s):	Unit	Test Method	Results		MDL	Limit
			1	2		
Bis (2-ethylhexyl) Phthalate (DEHP)	mg/kg	IEC 62321-8:2017 (Determination of DEHP, BBP, DBP and DIBP by GC-MS)	340	68	50	1000
Butyl benzyl Phthalate (BBP)	mg/kg		ND	ND	50	1000
Dibutyl Phthalate (DBP)	mg/kg		ND	ND	50	1000
Diisobutyl Phthalate (DIBP)	mg/kg		ND	ND	50	1000
<b>Conclusion</b>	/	/	PASS	PASS	/	/

**Sample Description:**

1. Outer Clear PVC Laminate
2. Red PVC Dielectric Conductors

**Note :**

- (a) mg/kg = ppm ; 0.1wt% = 1000ppm
- (b) ND= not detected
- (c) MDL = Method Detection Limit
- (d) - = not regulated
- (e) 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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**3. Phthalate Content (As requested by Client)**

Method : With reference IEC 62321-8:2017. Analysis was performed by Gas Chromatography / Mass Spectrometry.

Test Item	Result (%)		Detection Limit (%)
	1	2	
Di-n-hexyl Phthalate (DnHP)	ND	ND	0.005
Di-nOctyl Phthalate (DNOP)	ND	ND	0.005
Diisodecyl Phthalate (DIDP)	16.1	29.7	0.005
Diisononyl Phthalate (DINP)	1.50	0.901	0.005

**Sample Description:**

1. Outer Clear PVC Laminate
2. Red PVC Dielectric Conductors

Note: 1. % = percentage by weight  
 2. ND = Not detected

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**4. Total Phosphorous Content (as requested by Client)**

Method: EPA 3050B/EPA 3052 followed by analysis using Inductively Coupled Argon Plasma Spectrometry.

Test Item	Result (mg/kg)		Detection Limit (mg/kg)
	1	2	
Phosphorous (P)	561	375	20

Sample Description:

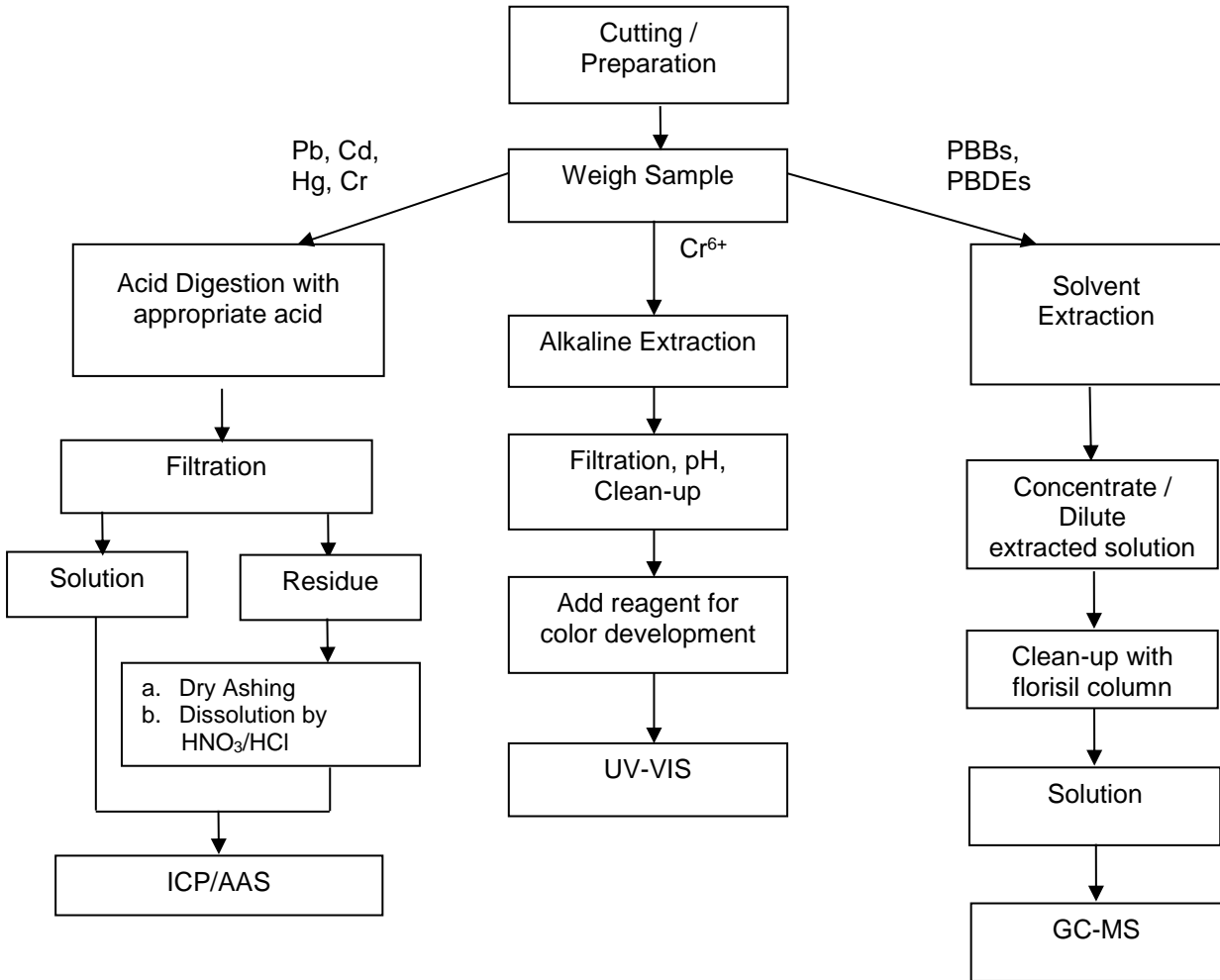
1. Outer Clear PVC Laminate
2. Red PVC Dielectric Conductors

Note :

1. ND = Not Detected = denoted less than reporting limit
2. 1 mg/kg = 1 ppm

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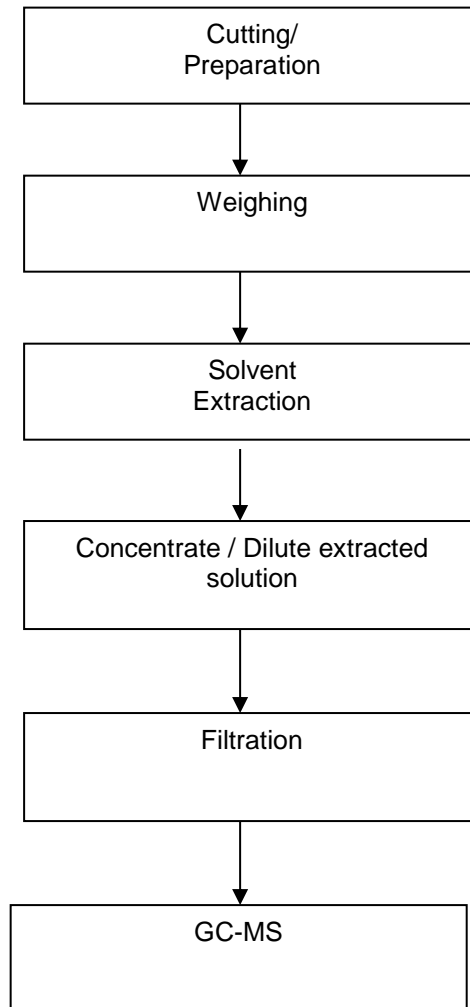
**Flowchart for RoHS Testing:**



- Note : 1. Cr<sup>6+</sup> is performed only when total Cr is detected  
 2. The Cr, Cd, Pb and Hg contents test on polymeric samples were dissolved totally by pre-conditioning method according to above flow chart.

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### Flowchart for Phthalates



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**Sample Photo(s):**

SGS authenticates the photo(s) on the original report only

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

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