

**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:

**Coax Ribbon Cable – Color Blue – PVC Outer Insulation Jacket – FEP Inner Dielectric – Copper Conductors with Silver Plating**  
**Model/Part No.: TTF**  
**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.

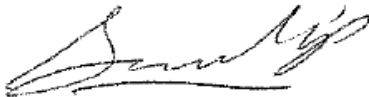
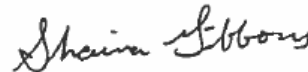
Test Method & Results : Please refer to next page(s).

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. Halogen Content (Cl, Br, I, F) of the submitted sample(s) with reference to BS EN 14582:2016	See Test Results
5. Total Phosphorous Content (as requested by Client)	See Test Results

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

Prepared By:

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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)	85.8	ND	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	4		
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	ND	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>Conclusion</b>	/	/	PASS	PASS	/	/

**Sample Description:**

1. Conductor Outer PVC Blue Insulation
2. Inner FEP Clear Insulation
3. Copper Conductor
4. Copper Shield

**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)	400	ND	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. Conductor Outer PVC Blue Insulation
2. Inner FEP Clear Insulation

**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)	ND	ND	0.005
Diisononyl Phthalate (DINP)	ND	ND	0.005

**Sample Description:**

1. Conductor Outer PVC Blue Insulation
2. Inner FEP Clear Insulation

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

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**4. Halogen Content (Cl, Br, I, F) of the submitted sample(s) with reference to BS EN 14582:2016:**

With reference to **BS EN 14582:2016** "Characterization of waste – Halogen and sulfur content – Oxygen Combustion in closed systems and determination methods". Analysis was performed by Ion Chromatography.

Test Items	Unit	Method Detection Limit	1
Halogen – <b>Chlorine</b> (Cl) CAS # 007782-50-5	mg/kg	50	<b>ND</b>
Halogen – <b>Bromine</b> (Br) CAS # 007726-95-6	mg/kg	50	<b>ND</b>
Halogen – <b>Fluorine</b> (F) CAS # 007782-41-4	mg/kg	50	<b>526000</b>
Halogen – <b>Iodine</b> (I) CAS # 007553-56-2	mg/kg	50	<b>ND</b>

Sample Description:

1. Inner FEP Clear Insulation

Note: 1. mg/kg = ppm  
2. ND = Not Detected, reported when the reading is less than the detection limit value.

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**5. 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)	582	314	20

Sample Description:

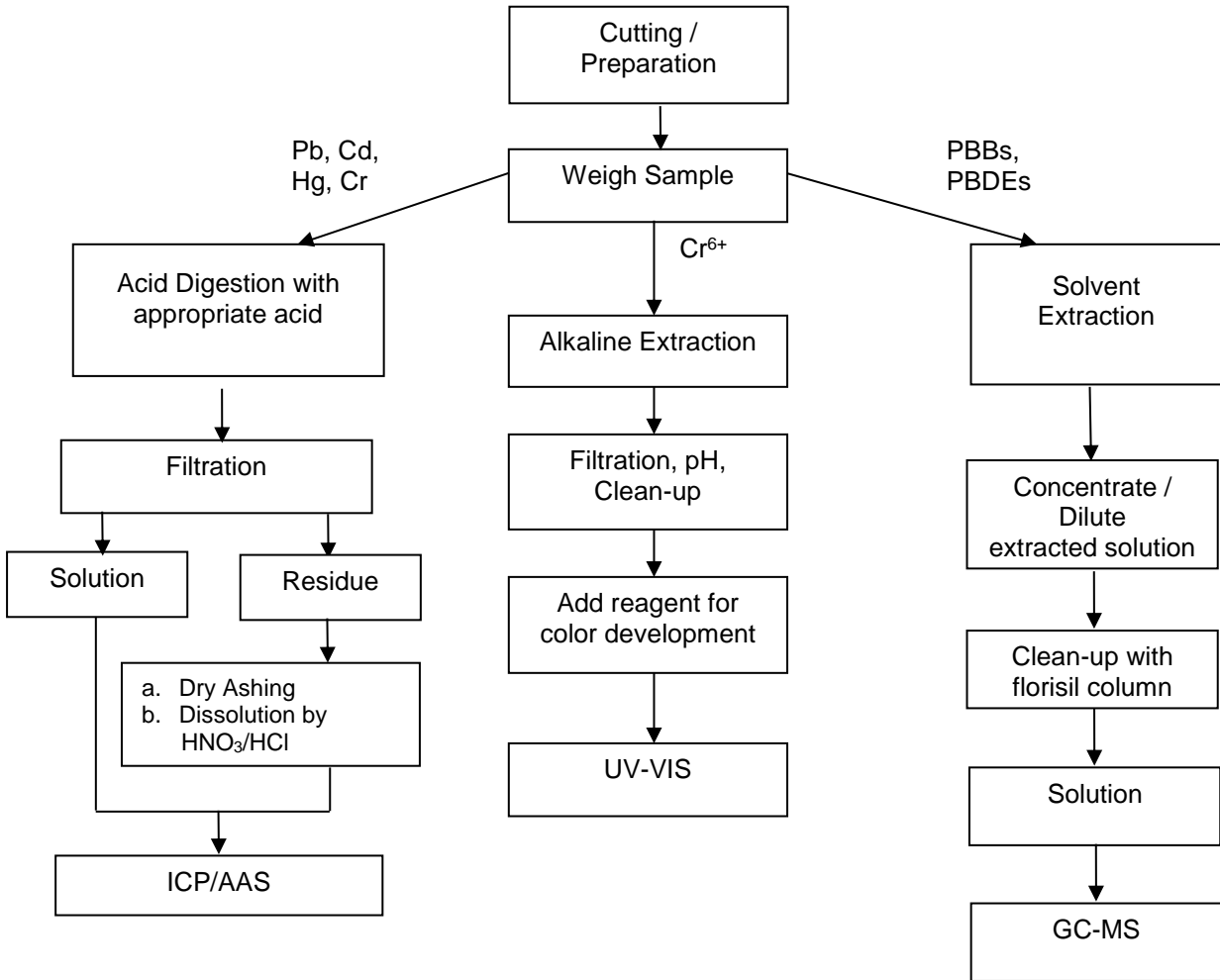
1. Conductor Outer PVC Blue Insulation
2. Inner FEP Clear Insulation

Note :

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

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**Flowchart for RoHS Testing:**

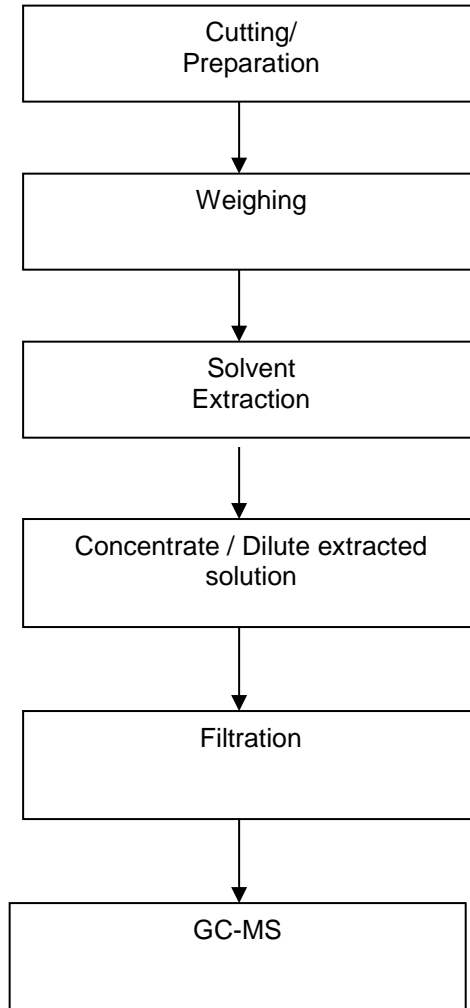


- Note : 1. Cr<sup>6+</sup> is performed only when total Cr is detected  
 2. The Cr, Cd, Pb and Hg contents test on polymeric samples were dissolved totally by pre-conditioning method according to above flow chart.

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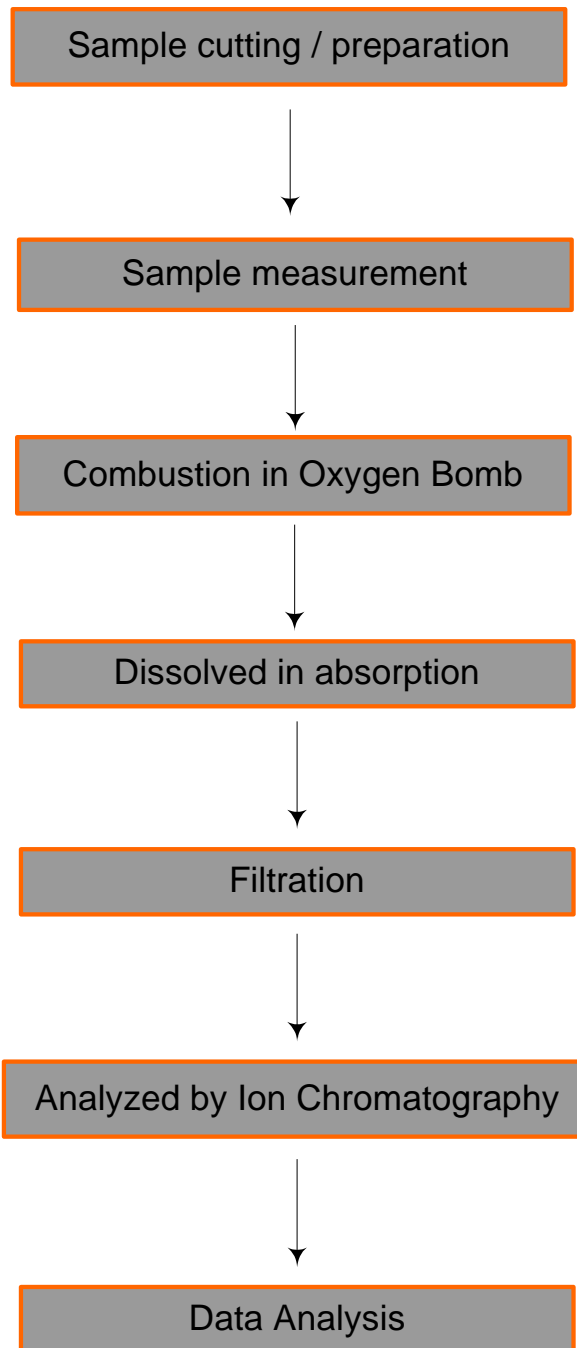


### Flowchart for Phthalates



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Halogen Testing Flow Chart



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**Sample Photo(s):**

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

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