

**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 Dark Blue – THV Outer Insulation Jacket – FEP Inner Dielectric – Copper Conductors with Silver Plating**  
**Model/Part No.: TCF-T**  
**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.

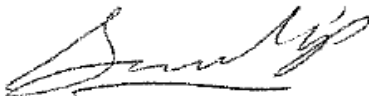
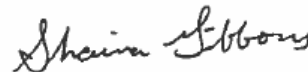
Test Method & Results : Please refer to next page(s).

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)                                | ND      | ND   | 2   | 1000  |
| Mercury (Hg)               | mg/kg | With reference to IEC 62321-4:2013<br>(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<br>(Determination of CrVI by UV-VIS)           | ND*     | ND*  | 2   | 1000  |
| <b>Sum of PBBs</b>         | mg/kg | With reference to IEC 62321-6:2015<br>(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<br>(Determination of DEHP, BBP, DBP and DIBP by GC-MS) | ND      | 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      | 2      |
|---|-------|------------------------|--------|--------|
| Halogen – <b>Chlorine</b> (Cl)<br>CAS # 007782-50-5 | mg/kg | 50                     | ND     | ND     |
| Halogen – <b>Bromine</b> (Br)<br>CAS # 007726-95-6  | mg/kg | 50                     | ND     | ND     |
| Halogen – <b>Fluorine</b> (F)<br>CAS # 007782-41-4  | mg/kg | 50                     | 532000 | 549000 |
| Halogen – <b>Iodine</b> (I)<br>CAS # 007553-56-2    | mg/kg | 50                     | ND     | ND     |

Sample Description:

1. Conductor Outer PVC Blue Insulation
2. 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) | 34.0           | 44.5 | 20                      |

Sample Description:

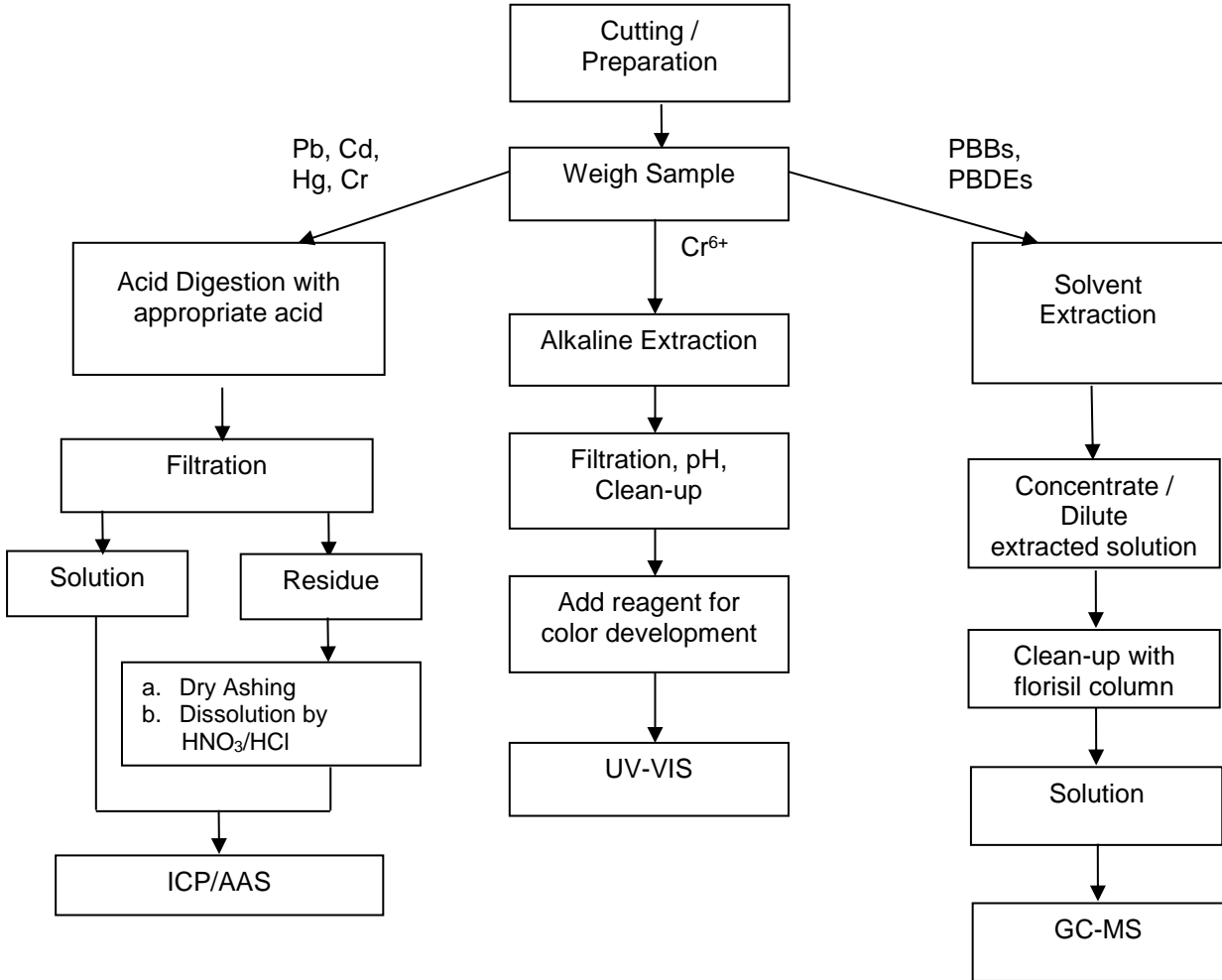
1. Conductor Outer PVC Blue Insulation
2. Inner FEP Clear Insulation

Note :

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

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**Flowchart for RoHS Testing:**

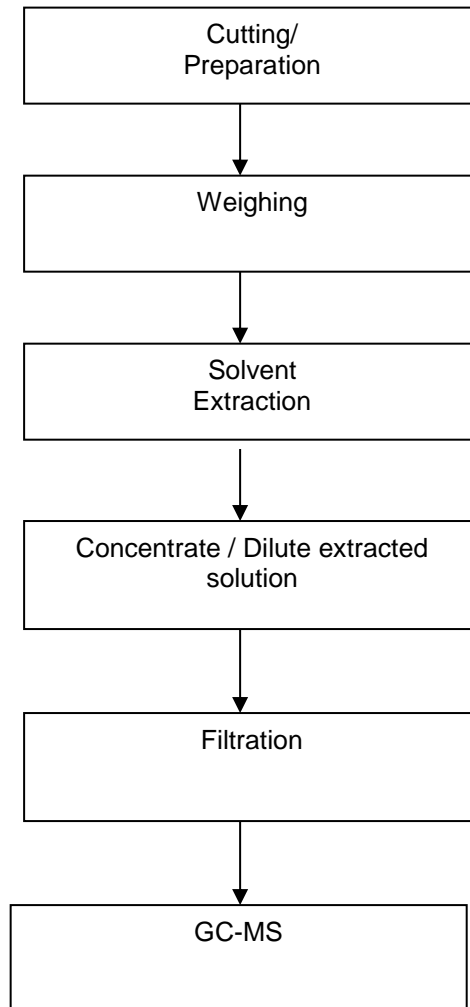


- Note : 1. Cr<sup>6+</sup> is performed only when total Cr is detected  
 2. The Cr, Cd, Pb and Hg contents test on polymeric samples were dissolved totally by pre-conditioning method according to above flow chart.

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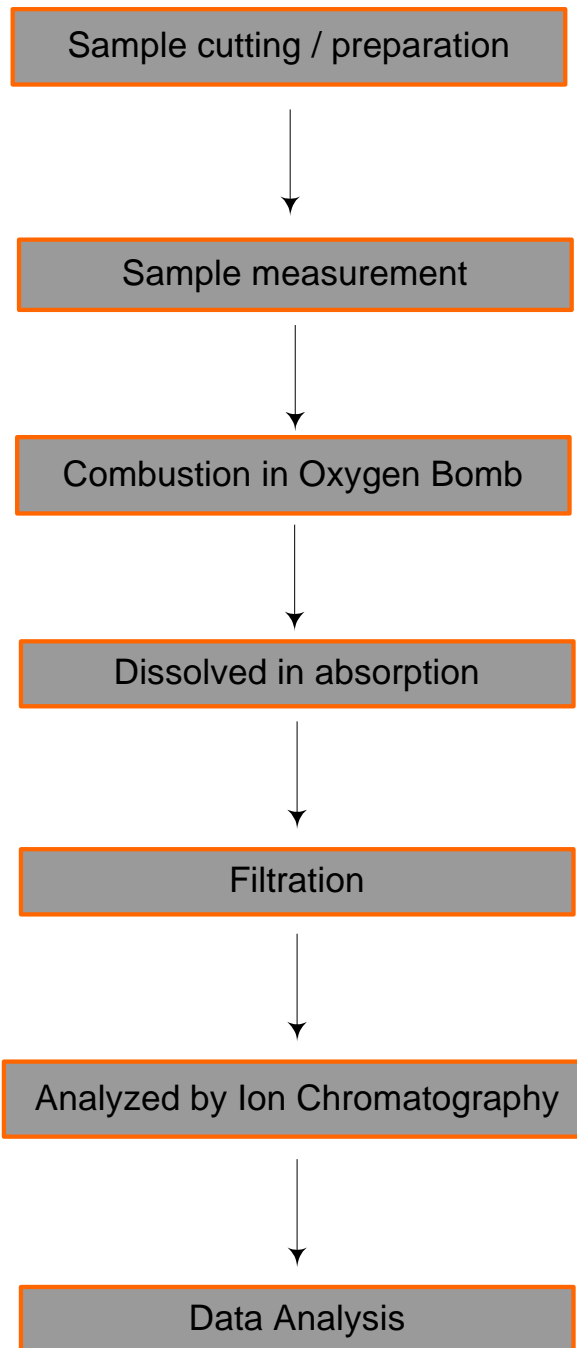


### Flowchart for Phthalates

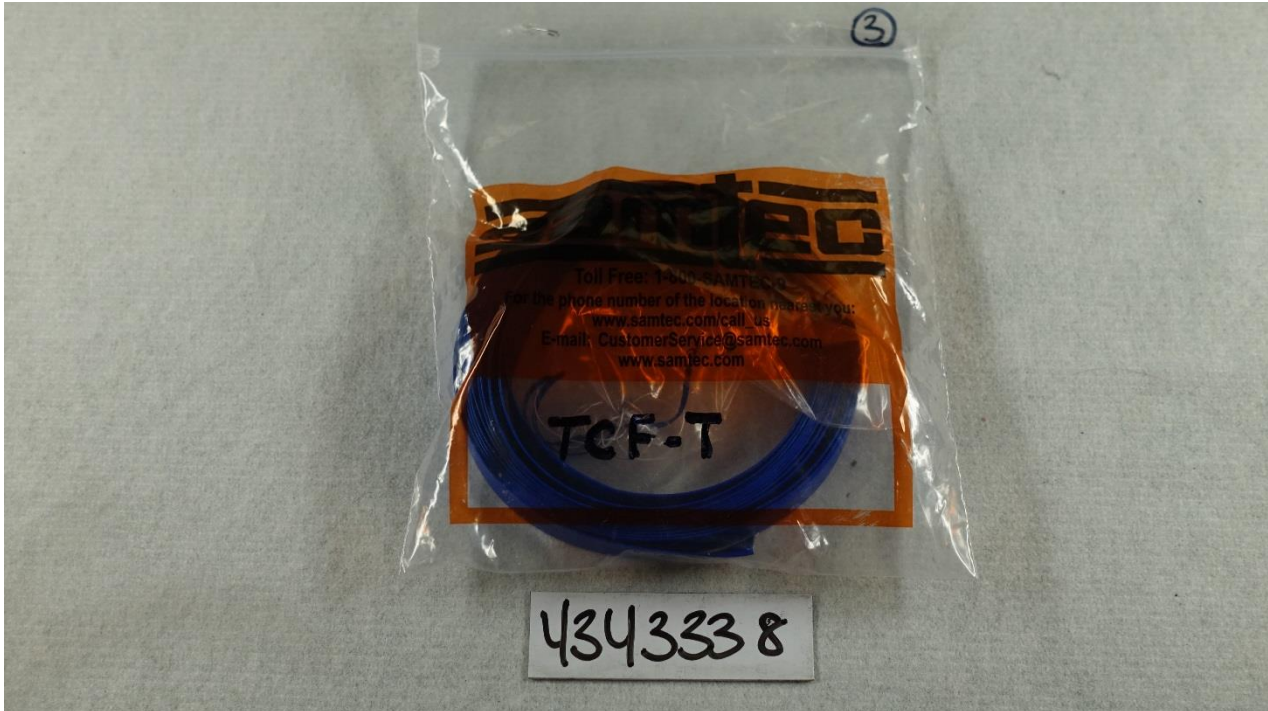


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Halogen Testing Flow Chart



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**Sample Photo(s):**

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

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

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