MCX Series Coaxial Connectors for Flexible Cables – Cable Retention

1.0 Introduction

1.1 Purpose

Testing was performed on the Tyco/Greenpar MCX series coaxial connectors for flexible cables to determine their conformance to the minimum cable retention when terminated to a Tyco Raychem Coaxial Cable.
** Rev B: Additional tests we performed on Tyco Madison RG174 coax cable.*

1.2 Scope

This report covers the axial mechanical cable retention performance of the Tyco/Greenpar MCX series coaxial connectors manufactured in accordance with CECC 22 220 for use in ground based aerospace, industrial and commercial applications. Testing was performed at the Tyco Electronics AMP Italia Laboratory between 2 August 2004 and 21 September 2004. The test file number for this testing is 04/MCX. This documentation is on file at and available from the AMP Italia EMEA Region Laboratory.
** Rev B: Additional tests were performed and completed 8 November 2006. Test File ADD04/MCX*

1.3 Conclusion

The Tyco/Greenpar MCX series coaxial cable connectors when terminated to the Tyco Raychem coax cable as specified below met and exceeded the cable retention requirement of 53N as specified in CECC 22 220 & Tyco Product Specification 108-3640.
** Rev B: Additional testing performed on Tyco Madison RG174 coax cable also met and exceeded the specification.*

1.4 Product Description

Connector: Tyco Greenpar MCX Straight Cable Plug Solder Centre Contact Hex Crimp for RG174 and similarly dimensioned coax cables.
Cable: Tyco Raychem Cheminax Single Braid Coax Cable with Thermorad Jacket
**Rev B Cable: Tyco Madison Single Braid Coax Cable RG174 Type*

1.5 Test Samples

The test samples (see table 1) were selected from normal production lots and the following part numbers were used for test. The connectors were terminated to 500 mm of cable in accordance with Tyco Assembly Spec No. 411-3247, using Crimp Hand Tool 9-1478240-0 and Die Set 9-1478248-0. The centre conductor was soldered. **Rev B: Crimp termination for Tyco Madison CD15403001 centre conductor.*

Table 1

Test Group	Qty	Part Number	Description
1	1	6-1337580-0	MCX Straight Plug Crimp Brass/Gold RG174
2	1	6-1337580-0	MCX Straight Plug Crimp Brass/Gold RG174
3	1	6-1337580-0	MCX Straight Plug Crimp Brass/Gold RG174
4	1	6-1337580-0	MCX Straight Plug Crimp Brass/Gold RG174
5	1	6-1337580-0	MCX Straight Plug Crimp Brass/Gold RG174
1-5	5x0.5M	5024A1311-0	Cheminax Single Braid Coax Cable with Theromrad Jacket
**1-5*	*5x0.5M*	*CD15403001*	*Tyco Madison Single Braid Coax Cable RG174 Type*

1.6 Qualification Test Sequence

Table 2					
Test or Examination	Test Group (a)				
	1	2	3	4	5
	Test Sequence (b)				
Examination of product	1	1	1	1	1
Contact resistance, centre contact	2, 5	2, 5	2, 5	2, 5	2, 5
Contact resistance, braid to housing	3, 6	3, 6	3, 6	3, 6	3, 6
Cable Retention	4	4	4	4	4
Tensile Load Failure Point	8	8	8	8	
Post test examination of product	7, 9	7, 9	7, 9	7, 9	7, 9

Note
(a) See paragraph 3.0
(b) Numbers indicate sequence in which tests were performed

2.0 Summary of Testing

2.1 Examination of Product – All Groups

All samples submitted for testing were selected from normal current production lots. They were inspected and accepted by the product assurance department.

2.2 Resistance Test

The following tests were carried-out in accordance with the test sequence noted in Table 2.

Braid: A current of 50 milliamps maximum and 20 millivolts maximum was applied to the braid and a reading of less than 1.5 milliohms was determined. This test was repeated after cable retention tests were performed and a variance of less than 5 milliohms was recorded.

Centre Contact: A current of 50 milliamps maximum and 20 millivolts maximum was applied to the centre contact and a reading of less than 5.0 milliohms was determined. This test was repeated after cable retention tests were performed and a variance of less than 5 milliohms was recorded.

2.3 Cable Retention

The test sample was inserted into a suitable Instron test jig where the cable and connector were individually retained. A vertical axial tensile load was applied to the cable at a maximum rate of 12.7 mm per minute. The load was applied until 53N was attained. This procedure was repeated on all test samples.

2.4 Tensile Load Failure Point

The test sample was re-loaded into the test jig. Test probes were attached to the sample to establish electrical continuity for the braid and centre contact. A vertical axial tensile load was applied to the cable at a maximum rate of 12.7 mm per minute until an open electrical circuit occurred. The operation was repeated on all test samples with a failure occurrence from 155N onwards. ** Rev B: failure occurrence from 152N onwards for Tyco Madison CD15403001*

2.5 Post Test Examination of Product

Cable Retention: All samples were examined for stress or damage to the braid termination point. No visible degradation was apparent and the outer jacket showed no sign of pull back. The centre contact was examined for correct placement within the dielectric of the connector interface and no visible retraction had occurred.
Tensile Load Failure Point: All samples were examined for stress or damage. The following observations were made when the first open circuit occurred. These failures were noted after a tensile load of 155N had been reached: ** Rev B: failure occurrence from 152N onwards for Tyco Madison CD15403001*

Centre contact pull back: Zero (0)
Centre contact to conductor failure: Zero (0)
Cable insulation pull back creating short circuits: Zero (0)
Braid to body failure: Five (5)

(See Table 2 for the correct sequence).

3.0 Test Methods

3.1 Examination of Product

Product drawings and inspection plans were used to examine the samples. They were examined visually and functionally.

3.2 Termination Resistance

Termination resistance measurements at low level current were made using a milliohm meter as shown in the graphic. See Figure 3. The test current was maintained at 50 milliamperes DC with an open circuit voltage of 20 millivolts DC.

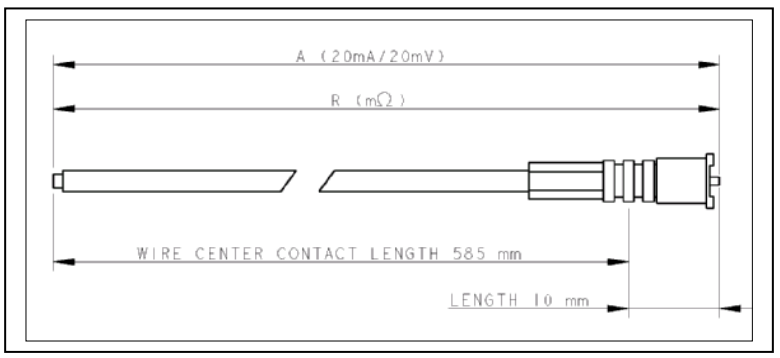

Figure 3
(Typical Termination Resistance Measurement Points)

3.3 Cable Retention

To test the cable retention an Instron tensile tester and appropriate jigs were used. The test sample cable assembly was securely held at both ends in a vertical plain in the jigs. The connector was held by the lower jig, the free cable end was attached securely to the

vertical load. The test consisted of applying a tensile load in an upward direction at a maximum rate of 12.7mm per minute. (See figure 4).

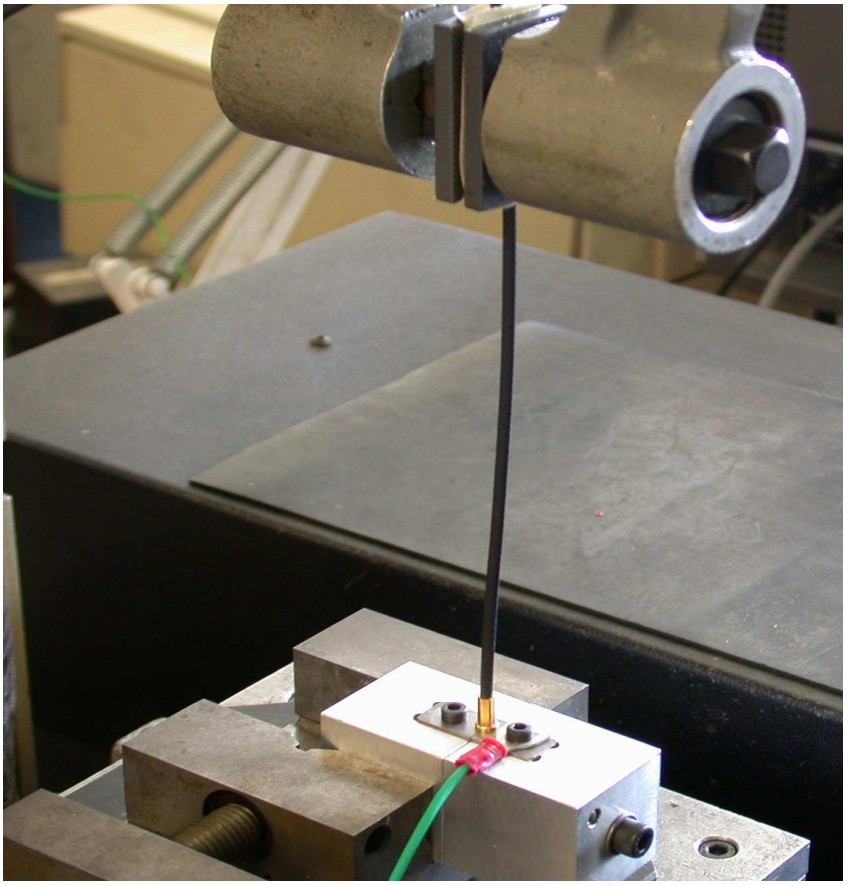

Figure 4

(Typical Tensile Load Test)

3.4 Electrical Resistance / Continuity

Suitable test probes were attached to the cable conductor and centre contact to create a circuit ensuring that no cross circuits could occur at the free cable end. The same procedure was repeated for the braid to outer body circuit. These two circuits were then used to determine either resistance or electrical continuity.