GT-21-132

Resistance of Glenair Products to Gamma Radiation Exposure (Ref. QTP-939)

Revision	Description of Changes	Date	Author
1	Initial Release	3/15/2021	Micah Summers
2	Added wire bend test data in Table 3	10/31/2022	Micah Summers

1. Scope

This test report documents the change in Insulation Resistance (IR), Dielectric Withstanding Voltage (DWV), Insert Retention, Contact Retention and Hermeticity of selected Glenair finished products following exposure to 5 kGy (0.5 MRad), 10 kGy (1 MRad), 100 kGy (10 MRad), and 1000 kGy (100 MRad) of gamma radiation exposure, where applicable. All tests were performed according to QTP-939 Revision B.

2. Applicable Standards/Specifications

ASTM D 3032	Standard Test Method for Hookup Wire Insulation
EIA-364-20	Dielectric Withstanding Voltage Test Procedure for Electrical Connectors, Sockets and Coaxial Contacts
EIA-364-29	Contact Retention Test Procedure for Electrical Connectors
EIA-364-35	Insert Retention Test Procedure for Electrical Connectors
EIA-364-02	Air Leakage Test Procedure for Electrical Connectors

3. Test Specimens

The part numbers and full description of the parts tested are listed in Table 1.

Table 1: Test Item Description

Part Number	Description
961-037-T-C-1	Siltem on Turboflex™ wire 8 AWG (0.016” wall thickness)
961-004-N-C-2	Duralectric™ on Turboflex™ wire 8 AWG (0.030” wall thickness)
961-033-N-F-0	Duralectric™ K on Turboflex™ wire 2 AWG (0.061” wall thickness)
961-041-N-C-6	Duralectric™ Light on Turboflex™ wire 8 AWG (0.030” wall thickness)
806-012-Z19-11SMA, 806-020-Z19-11PMA	Mighty Mouse Series 806 mated connector assembly
790-024PB-9MN, 790-025SB-9NMN	Series 79 mated connector assembly
233-250ME19-11PN	Generation III Code Red unmated connector assembly

4. Summary of Results

The results of the tests are summarized in Tables 2 – 4.

Pass result indicates no significant change in performance of parts after exposure to gamma radiation.

Table 2: Electrical Testing of Wire Insulation

	IR, 500 VDC 60 seconds, ASTM D3032 (5000 MΩ min.)	DWV, 500 VDC 60 seconds, ASTM D3032 (Leakage Current 0.5 mA max.)
Siltem on Turboflex™ wire (P/N: 961-037-T-C-1)		
Original Properties	>10,000	0.0
After 5 kGy (0.5 MRad)	Pass	Pass
After 10 kGy (1 MRad)	Pass	Pass
After 100 kGy (10 MRad)	Pass	Pass
After 1000 kGy (100 MRad)	Pass	Pass
Duralectric™ on Turboflex™ (P/N: 961-004-N-C-2)		
Original Properties	>10,000	0.0
After 5 kGy (0.5 MRad)	Pass	Pass
After 10 kGy (1 MRad)	Pass	Pass
After 100 kGy (10 MRad)	Pass	Pass
After 1000 kGy (100 MRad)	Pass	Pass
Duralectric™ K on Turboflex™ (P/N: 961-033-N-F-0)		
Original Properties	>10,000	0.0
After 5 kGy (0.5 MRad)	Pass	Pass
After 10 kGy (1 MRad)	Pass	Pass
After 100 kGy (10 MRad)	Pass	Pass
After 1000 kGy (100 MRad)	Pass	Pass
Duralectric™ Light on Turboflex™ (P/N: 961-041-N-C-6)		
Original Properties	>10,000	0.0
After 5 kGy (0.5 MRad)	Pass	Pass
After 10 kGy (1 MRad)	Pass	Pass
After 100 kGy (10 MRad)	Pass	Pass
After 1000 kGy (100 MRad)	Pass	Pass

Table 3: Wire Bend Test after 1000 kGy (100 MRad) Gamma Radiation Exposure

Test Sample	Bend Test, AS4373 Method 712 (Average Results)
Siltem on Turboflex™ wire (P/N: 961-037-T-C-1)	No cracks or damages to insulation
Duralectric™ on Turboflex™ (P/N: 961-004-N-C-2)*	Additional crack formed due to sharp turn of sample around mandrel
Duralectric™ K on Turboflex™ (P/N: 961-033-N-F-0)*	No additional cracks or damages to insulation
Duralectric™ Light on Turboflex™ (P/N: 961-041-N-C-6)*	Additional crack formed due to sharp turn of sample around mandrel

*Pre-existing cracks and scratches were found on samples prior to performing the bend test. Damages could be due to shipping/handling of product.

Table 4: Electrical and Mechanical Testing of Connectors

Property	Test Method	Result
Mighty Mouse Series 806 (P/N: 806-012-Z19-11SMA, 806-020-Z19-11PMA)		
Original Properties		
IR, 500 VDC 60 seconds (5000 MΩ min.)	EIA-364-20	>10,000
DWV, 1300 VAC 60 seconds (Leakage Current 2 mA max.)	EIA-364-20	0.0
Insert Retention, 25 ± 2 lbf min. at 1 lbf/sec. to 10 sec.	EIA-364-35	Pass
Contact Retention, 10 ± 1 lbf min. at 1 lbf/sec. for 10 sec.	EIA-364-29	Pass
After 5 kGy (0.5 MRad)		
IR, 500 VDC 60 seconds	EIA-364-20	Pass
DWV, 1300 VAC 60 seconds	EIA-364-20	Pass
Insert Retention	EIA-364-35	Pass
Contact Retention	EIA-364-29	Pass
After 10 kGy (1 MRad)		
IR, 500 VDC 60 seconds	EIA-364-20	Pass
DWV, 1300 VAC 60 seconds	EIA-364-20	Pass
Insert Retention	EIA-364-35	Pass
Contact Retention	EIA-364-29	Pass

Property	Test Method	Result
Series 79 (P/N: 790-024PB-9MN and 790-025SB-9NMN)		
Original Properties		
IR, 500 VDC 60 seconds (5000 MΩ min.)	EIA-364-20	>10,000
DWV, 750 VAC 60 seconds (Leakage Current 2 mA max.)	EIA-364-20	0.0
Insert Retention, 25 ± 2 lbf min. at 1 lbf/sec. to 10 sec.	EIA-364-35	Pass
Contact Retention, 10 ± 1 lbf min. at 1 lbf/sec. for 10 sec.	EIA-364-29	Pass
After 5 kGy (0.5 MRad)		
IR, 500 VDC 60 seconds	EIA-364-20	Pass
DWV, 750 VAC 60 seconds	EIA-364-20	Pass
Insert Retention	EIA-364-35	Pass
Contact Retention	EIA-364-29	Pass
After 10 kGy (1 MRad)		
IR, 500 VDC 60 seconds	EIA-364-20	Pass
DWV, 750 VAC 60 seconds	EIA-364-20	Pass
Insert Retention	EIA-364-35	Pass
Contact Retention	EIA-364-29	Pass
38999 Generation III Code Red (P/N: 233-250ME19-11PN)		
Original Properties		
IR, 500 VDC 60 seconds (5000 MΩ min.)	EIA-364-20	50,000
DWV, 2300 VAC 60 seconds (Leakage Current 2 mA max.)	EIA-364-20	0.08
Hermeticity (Helium Leak Detection, 1.00E-07 cc/seconds max.)	EIA-364-02	1.60E-09
After 5 kGy (0.5 MRad)		
IR, 500 VDC 60 seconds	EIA-364-20	Pass
DWV, 2300 VAC 60 seconds	EIA-364-20	Pass
Hermeticity (Helium Leak Detection)	EIA-364-02	Pass
After 10 kGy (1 MRad)		
IR, 500 VDC 60 seconds	EIA-364-20	Pass
DWV, 2300 VAC 60 seconds	EIA-364-20	Pass
Hermeticity (Helium Leak Detection)	EIA-364-02	Pass