# CeeLok FAS-T Circular, High Speed Connector

## 1. INTRODUCTION

### 1.1 Purpose

Testing was performed on the TE Connectivity* (TE) CeeLok FAS-T Circular, High Speed Connector to determine its conformance to the requirements of Design Objective 108-2482, Rev. B.

### 1.2 Scope

This report covers the electrical, mechanical, and environmental performance of the TE CeeLok FAS-T Circular, High Speed Connector. Testing was performed at the Harrisburg Electrical Components Test Laboratory between Nov-1-2011 and Mar-6-2012. The test file numbers for this testing are EA20110815T and EA20120071T.

### 1.3 Conclusion

The TE CeeLok FAS-T Circular, High Speed Connectors listed in paragraph 1.5 conformed to the electrical, mechanical, and environmental performance requirements of Design Objective 108-2482, Rev. B.

### 1.4 Product Description

The TE Connectivity CeeLok FAS-T Connectors are a small, ruggedized high speed circular connector suitable for aerospace and military applications.

### 1.5 Test Specimens

The test specimens with the following part numbers were used for test:

**Table 1 – Test Specimens**

| Test Set | Test Groups | Qty | Part Number | Description |
|---|---|---|---|---|
| 1 | 1-11 | 22 | 2102354-1, Rev 2 | Receptacle Assembly, Jam Nut, EN Plate, Cat5E Cable |
| 1 | 1-11 | 22 | 2102355-1, Rev 2 | Plug Assembly, EN Plate, Cat5E Cable |
| 2 | 6 | 2 | 2102354-2, Rev 2 | Receptacle Assembly, Black ZiNi Plate, Cat5E Cable |
| 2 | 6 | 2 | 2102355-2, Rev 2 | Plug Assembly, Black ZiNi Plate, Cat5E Cable |
| 3 | 10 | 1 | 2102452-1, Rev 2 | PCB Mount Receptacle, EN Plate |
| 3 | 10 | 1 | 2102355-1, Rev 2 | Plug Assembly, EN Plate, Cat5E Cable |
| 4 | 11 | 2 | 2102452-1, Rev 2 | PCB Mount Receptacle, EN Plate |
| 4 | 11 | 2 | 2102355-1, Rev 2 | Plug Assembly, EN Plate, Cat5E Cable |
| 5 | 2 | 2 | 2102354-1, Rev 2 | Receptacle Assembly, Jam Nut, EN Plate, Cat5E Cable<br>With Redesigned Contact Retention Clip |
| 5 | 2 | 2 | 2102355-1, Rev 2 | Plug Assembly, EN Plate, Cat5E Cable<br>With Redesigned Contact Retention Clip |

## 1.6 Test Sequence

Table 2 illustrates the test sequences.

**Table 2 – Test Sequence**

| Test or Examination | Test Group (a) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3(f) | 4 | 5 | 6(f) | 7 | 8(f) | 9 | 10(c) | 11(c) |
| | Test Sequence (b) | | | | | | | | | | |
| Examination of Product | 1, 12 | 1 | 1, 10 | 1 | 1 | 1 | 1, 11 | 1, 7 | 1 | 1 | 1 |
| LLCR | 3,8,14 | | | | | | 3,7,13 | | | 3, 8 | 3, 7 |
| Contact Resistance at Rated Current | 4,9,15 | | | | | | 4,8,14 | | | 4, 9 | 4, 8 |
| Insulation Resistance at Ambient | | 4, 8 | 2, 7(e),12(e) | | | | | | | | |
| Insulation Resistance at 175°C | | 10 | | | | | | | | | |
| Withstanding Voltage at Sea Level | | 5, 9 | 3, 8(e),13(e) | 3, 5 | | | | 10 | | | |
| Withstanding Voltage at Altitude | | | 3,9,14 | | | | | | | | |
| Shell to Shell Conductivity | | | | | | 5(d) | | 3, 5, 9 | | | |
| Braid to Shell Conductivity | | | | | | 3(d), 6(d) | | | | | |
| Indirect Lightning Strike | | | | | | | | 4 | | | |
| Random Vibration (1) | | | | | | | 5 | | | | 5 |
| Random Vibration (2) | | | | | | | 12 | | | | |
| Sinusoidal Vibration (1) | 6 | | | | | | | | | 6 | |
| Sinusoidal vibration (2) | 13 | | | | | | | | | | |
| Mechanical Shock | 7 | | | | | | 6 | | | 7 | 6 |
| Durability | 5 | | | | | | | | | 5 | |
| Magnetic Permeability | | | | | | 2 | | | | | |
| Coupling Torque | 2 | | | 2, 6 | | | 2 | 2, 8 | | 2 | 2 |
| Uncoupling Torque | 10 | | | | | | 9 | 6 | | 10 | 9 |
| Insert Retention | 11 | | | | | | 10 | | | 11 | 10 |
| Electrical Engagement | | 3 | | | | | | | | | |
| Contact Retention | | 2 | | | | | | | | | |
| Maintenance Aging | | | 5 | | | | | | | | |
| Thermal Shock | | 6 | | | | | | | | | |
| Humidity / Temperature Cycling | | 7 | | | | | | | | | |
| Slat Spray | | | | | | 4 | | | | | |
| Fluid Immersion | | | | 4 | | | | | | | |
| Dust | | | | | 2 | | | | | | |
| Water Jet Spray | | | | | | | | | 2 | | |
| Altitude Immersion | | | 6(g), 11(h) | | | | | | | | |
| Final Examination of Product | 16 | 11 | 15 | 7 | 3 | 8 | 15 | 11 | 3 | 12 | 11 |
| **Specimens Tested** | 2 | 2 | 2 | 4 | 2 | 2 | 2 | 1 | 2 | 1 | 2 |

***NOTE***

*(a) See paragraph 1.4 for specimens that are used for each test group*
*(b) Numbers indicate sequence in which tests were performed*
*(c) Specimens mounted on printed circuit boards prior to test*
*(d) No electrical measurements to be taken on specimens with Black Zinc Nickel Plating*
*(e) Measurements to be taken while specimens are in immersion fluid.*
*(f) Specimens to be torqued to 5 inch pounds minimum, 8 inch pounds maximum*
*(g) Altitude – 50,000 ft*
*(h) Altitude – 70,000 ft*

## 1.7 Environmental Conditions

Unless otherwise stated, the following environmental conditions prevailed during testing:

Temperature: 15°C to 35°C
Relative Humidity 20% to 80%

## 2. SUMMARY OF TESTING

### 2.1 Initial Examination of Product – All Groups

A Certificate of Conformance was issued by Quality Engineering stating that the specimens, with approved deviations, were deemed acceptable for testing. Where specified, specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

### 2.2 Low Level Contact Resistance - Groups 1, 7, 10, 11

All specimens met the initial requirement of 30 milliohms maximum. All specimens met the final requirement of a change in resistance (ΔR) of less than 10 milliohms maximum.

### 2.3 Contact Resistance at Rated Current- Groups 1, 7, 10, 11

All specimens met the requirement of 52 millivolts maximum at 2 amperes.

### 2.4 Insulation Resistance at Ambient- Groups 2, 3

All insulation resistance measurements were greater than the specified minimum of 5,000 megohms.

### 2.5 Insulation Resistance at 175°C- Group 2

All insulation resistance measurements at 175°C were greater than the specified minimum of 1,000 megohms.

### 2.6 Dielectric Withstanding Voltage at Sea Level – Groups 2, 3, 4, 8

No dielectric breakdown or flashover occurred.

### 2.7 Dielectric Withstanding Voltage at Altitude - Group 3

No dielectric breakdown or flashover occurred at altitude.

### 2.8 Shell to Shell Conductivity- Groups 6, 8

The specimens met the requirements of 5 millivolts maximum initial and 10 millivolts maximum final.

### 2.9 Braid to Shell Conductivity- Group 6

Specimens met the requirement of 1 milliohm maximum.

### 2.10 Indirect Lightning Strike- Group 8

Specimens showed no signs of damage as a result of indirect lightning strike.

### 2.11 Random Vibration (1) - Groups 7, 11

No discontinuities were detected during vibration. Following vibration, no cracks, breaks, or loose parts on the specimens were visible.

### 2.12 Random Vibration (2) – Group 7

No discontinuities were detected during vibration. Following vibration, no cracks, breaks, or loose parts on the specimens were visible.

### 2.13 Sinusoidal Vibration (1) - Groups 1, 10

No discontinuities were detected during vibration. Following vibration, no cracks, breaks, or loose parts on the specimens were visible.

### 2.14 Sinusoidal Vibration (2) - Group 1

No discontinuities were detected during vibration. Following vibration, no cracks, breaks, or loose parts on the specimens were visible.

### 2.15 Mechanical Shock - Groups 1, 7, 10, 11

No discontinuities were detected during mechanical shock. Following mechanical shock testing, no cracks, breaks, or loose parts on the specimens were visible.

### 2.16 Durability – Groups 1, 10

Specimens completed 500 durability cycles and showed no signs of damage or excessive wear.

### 2.17 Magnetic Permeability- Group 6

Specimens successfully completed magnetic permeability testing. Specimens did not pull the magnet from the specified 2μ pellet.

### 2.18 Coupling Torque- Groups 1, 4, 7, 8, 10, 11

Specimens met the requirement of 8 lbf-in maximum.

### 2.19 Uncoupling Torque- Groups 1, 7, 8, 10, 11

Specimens met the requirement of 2 lbf-in minimum.

### 2.20 Insert Retention- Groups 1, 7, 10, 11

Specimens were able to maintain the requirement of 25 pounds axial load for 6 seconds without becoming dislodged from the housing.

### 2.21 Electrical Engagement- Group 2

Specimens met the requirements set forth of 0.05 inches minimum engagement.

### 2.22 Contact Retention- Group 2

Specimens met the requirements of 6 lbf minimum force and 0.012 in maximum displacement.

### 2.23 Maintenance Aging- Group 3

Specimens showed no signs of damage as a result of the maintenance aging test procedure.

### 2.24 Thermal Shock - Group 2

No evidence of physical damage was visible as a result of exposure to thermal shock.

### 2.25 Humidity-Temperature Cycling - Group 2

No evidence of physical damage was visible as a result of exposure to humidity-temperature cycling.

### 2.26 Salt Spray - Group 6

Specimens showed no signs of damage that would be detrimental to operation.

### 2.27 Fluid Immersion- Group 4

Specimens completed fluid immersion testing and showed no signs of damage detrimental to the products performance.

### 2.28 Dust- Group 5

Specimens showed no signs of dust contamination at the separable interface of the connectors.

### 2.29 Water Jet Spray- Group 9

Specimens passed IPX6 water jet testing with no leakage observed.

### 2.30 Altitude Immersion- Group 3

Specimens showed no signs of leaks as well as passed Insulation Resistance and Dielectric testing following the exposure.

### 2.31 Final Examination of Product - All Groups

Where specified following testing, specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

## 3. TEST METHODS

### 3.1 Examination of Product- All Groups

A Certification of Conformance was issued stating that all specimens in this test package have been produced, inspected, and accepted as conforming to product drawing requirements with deviations as noted in Paragraph 2.1, and made using the same core manufacturing processes and technologies as production parts.

### 3.2 Low Level Contact Resistance- Groups 1, 7, 10, 11

Specimens were tested in accordance with EIA-364-23. Low level contact resistance measurements at low level current were made using a four terminal measuring technique. The test current was maintained at 100 milliamperes maximum with a 20 millivolt maximum open circuit voltage. Specimens were measured from cable end to cable end. The amount of wire bulk that was included in the measurements was calculated and removed.

### 3.3 Contact Resistance at Rated Current- Groups 1, 7 10 11

Specimens were tested in accordance with EIA-364-6. Contact resistance measurements at rated current were made using a four terminal measuring technique. The test current was maintained at 2 amperes with a 1 millivolt maximum open circuit voltage. Specimens were measured from cable end to cable end. The amount of wire bulk that was included in the measurements was calculated and removed.

### 3.4 Insulation Resistance at Ambient- Group 2, 3

Mated specimens were tested in accordance with EIA-364-21. A voltage potential of 500 volts DC was applied between adjacent contacts for 2 minutes. At the end of the 2 minute period the insulation resistance was recorded in ohms. All contact pairs were tested as well as all adjacent contacts to the shield.

### 3.5 Insulation Resistance at 175°C- Group 2

Mated specimens were tested in accordance with EIA-364-21. A voltage potential of 500 volts DC was applied between adjacent contacts for 2 minutes. At the end of the 2 minute period the insulation resistance was recorded in ohms. All contact pairs were test as well as all adjacent contacts to the shield. Measurements on specimens were taken while the specimens were exposed to 175°C. The specimens were exposed to 175°C for 30 minutes prior to taking measurements.

### 3.6 Dielectric Withstanding Voltage at Sea Level- Group 2, 3, 4, 8

Mated specimens were tested in accordance with EIA-364-20 Method A, Condition I. A voltage potential of 500 volts AC was applied between adjacent contacts for 1 minute. At the end of the 1 minute period the leakage current was recorded in micro amperes. All contact pairs were test as well as all adjacent contacts to the shield.

### 3.7 Dielectric Withstanding Voltage at Altitude - Group 3

Mated specimens were tested in accordance with EIA-364-20 Method A, Condition III. A voltage potential of 100 volts AC was applied between adjacent contacts for 1 minute while the specimens were exposed to an altitude of 50,000ft AND 70,000ft as specified. At the end of the 1 minute period the leakage current was recorded in micro amperes. All contact pairs were tested as well as all adjacent contacts to the shield.

### 3.8 Shell to Shell Conductivity- Groups 6, 8

Specimens were tested in accordance with EIA-364-83. Specimens were energized with 1 amp. The millivolt drop of the mated specimens was measured using probes with a minimum spherical radius of 1.27mm.

### 3.9 Braid to Shell Conductivity- Group 6

Unmated specimens were tested in accordance with EIA-364-6. Specimens were energized with 1 amp. The overall resistance of the cables outer shield and the shield to shell interface was measured. The outer shield of a 10 inch wire length was measured in order to calculate and remove the bulk wire resistance that was included in the overall measurement of each specimen.

### 3.10 Indirect Lightning Strike- Group 8

Specimens were tested in accordance with EIA-364-75A with the exception of the current pulse duration.
Due to unavailability of the proper generator for EIA-364-75A, an alternate surge pulse was used for design verification testing and substitution for the original required pulse. The Keytek ECAT E501 module used is capable of an open circuit Voltage of 6000 volts at 1.2 x 50 µsec and a short circuit current pulse of approximately 300 amps at 8 x 20 µsec. This current pulse correlates in amplitude to Level 1 as noted in Table 2 - Type B, indirect effect waveform in referenced document EIA-364-75A, however the specified pulse in EIA-364-75A is noted as 50 x 500 µsec in duration.

### 3.11 Random Vibration (1) - Groups 7, 11

The test specimens were tested in accordance with specification EIA-364-28F, test condition “V”, test condition letter “J”. The parameters of this test condition are specified by a random vibration spectrum with excitation frequency bounds of 50 and 2,000 Hertz (Hz). The power spectral density (PSD) at 50 Hz is 0.25 G²/Hz. The spectrum slopes up at 6 dB per octave to a PSD of 1.00 G²/Hz at 100 Hz. The spectrum is flat at 1.00 G²/Hz from 100 Hz to 1,000 Hz. The spectrum slopes down at 6 dB per octave to a PSD of 0.25 G²/Hz at the upper bound frequency of 2000 Hz. The root-mean square amplitude of the excitation was 37.80 GRMS. The test specimens were subjected to this test for 1.5 hours in each of the three mutually perpendicular axes, for a total test time of 4.5 hours per test specimen. The test specimens were monitored for discontinuities of 1 microsecond or greater using an energizing current of 100 milliamperes.

### 3.12 Random Vibration (2) - Group

Mated specimens were subjected to a random vibration test in accordance with specification EIA-364-28F, test condition “VI, test condition letter J. The parameters of this test condition are specified by a random vibration spectrum with excitation frequency bounds of 50 and 2,000 Hertz (Hz). The power spectral density (PSD) at 50 Hz is 0.25 G²/Hz. The spectrum slopes up at 6 dB per octave to a PSD of 1.0 G²/Hz at 100 Hz. The spectrum is flat at 1.0 G²/Hz from 100 Hz to the upper bound frequency of 2,000 Hz. The root-mean square amplitude of the excitation was 43.92 GRMS. The test specimens were subjected to this test for 1.5 hours in each of the three mutually perpendicular axes, for a total test time of 4.5 hours per test specimen. The test specimens were monitored for discontinuities of 1 microsecond or greater using an energizing current of 100 milliamperes.

### 3.13 Sinusoidal Vibration (1) - Groups 1 and 10

The test specimens were tested in accordance with specification MIL-STD-202, Method 4, Condition G. The parameters of this test condition are a simple harmonic motion having amplitude of either 0.06 inch double amplitude (maximum total excursion) or 30 gravity unit (g's peak) whichever is less. The vibration frequency was varied logarithmically between the approximate limits of 10 to 2,000 Hertz (Hz). The entire frequency range of 10 to 2,000 Hz and return to 10 Hz was traversed in approximately 20 minutes. This cycle was performed 12 times in all three mutually perpendicular axes (total of 36 times), so that the motion was applied for a total period of approximately twelve hours. The test specimens were monitored for discontinuities of 1 microsecond or greater using an energizing current of 100 milliamperes.

### 3.14 Sinusoidal Vibration (2) - Group

Mated specimens were subjected to a sinusoidal vibration test as stated in Military Specification MIL-DTL-38999L. The following exception applies. Note: Normally this specification calls out for the vibration testing to be performed at ambient room temperature, -55ºC and +175ºC. However, testing was only performed at ambient room temperature. The parameters of this test condition are specified by a simple harmonic motion from 10 to 2,000 Hz in each of three mutually perpendicular axes. The level of vibration shall be a velocity of 254 mm/sec from 10 to 50 Hz; 1.5 mm double amplitude from 50 to 140 Hz, and 60 G from 140 to 2,000 Hz. The entire frequency range from 10 to 2,000 Hz and back shall be traversed in 20 minutes. The vibration shall be applied for a duration of 4 hours in each of the three mutually perpendicular axes for a total of 12 hours. Vibration testing was only performed at ambient room temperature. The test specimens were monitored for discontinuities of 1 microsecond or greater using an energizing current of 100 milliamperes.

### 3.15 Mechanical Shock - Groups 1, 7, 10, 11

Specimens were in accordance with specification EIA-364-27B; Test Condition D. The parameters of this test condition are a half-sine waveform with acceleration amplitude of 300 gravity units (g's peak) and duration of 3 milliseconds. Three shocks in each direction were applied along the three mutually perpendicular axes of the test specimens, for a total of eighteen shocks. The test specimens were monitored for discontinuities of 1 microsecond or greater using an energizing current of 100 milliamperes.

### 3.16 Durability – Groups 1, 10

Specimens were tested in accordance with EIA-364-9. Specimens were manually cycled 500 times at a rate of approximately 500 cycles per hours.

### 3.17 Magnetic Permeability- Group 6

Testing was done in accordance with EIA-364-54. The magnet of a hand held indicator was applied and delicately removed from all surfaces of the shell of mated specimens. As specified in EIA-364-54 and DO 108-2482 a 2.0µ pellet was used.

### 3.18 Coupling Torque- Groups 1, 4, 7, 8, 10, 11

The specimens were mounted in the vibration fixture to ensure they were mounted securely for testing. Test fixture PN 1824028-1, which was supplied by the requestor, was used to grasp the loose half of the connector. This fixture is used to grasp the connector and provide a means of attachment to the measurement equipment. The specimens were mated to the point that the fully mated indicator line on the receptacle connector was no longer visible, and the maximum torque necessary to mate them was recorded in lbf-in. Testing was performed in accordance with Test Specification EIA-364-13, Method A.

### 3.19 Uncoupling Torque- Groups 1, 7, 8, 10, 11

The specimens were mounted in the vibration fixture to ensure they were mounted securely for testing. Test fixture PN 1824028-1, which was supplied by the requestor, was used to grasp the loose half of the connector. This fixture is used to grasp the connector and provide a means of attachment to the measurement equipment. The specimens were unmated and the maximum torque necessary to unmate them was recorded in lbf-in. Testing was performed in accordance with Test Specification EIA-364-13, Method A.

### 3.20 Insert Retention- Groups 1, 7, 10, 11

Specimens were tested in accordance with EIA-364-35. The connector half was mounted in a vise that was attached to the base of the tensile/compression machine. A force probe was lowered onto the insert. A force of 25 pounds was applied at a rate of 0.5 inches per minute in a direction that would cause the insert to be dislodged from the housing. This force was maintained for 6 seconds before the load was returned to zero. Maximum load was recorded in pounds.

### 3.21 Electrical Engagement- Group 2

Specimens were tested in accordance with MIL-STD-38999. The specimens were wired in a fashion that all individual circuits were series wired to create a single circuit. This circuit was attached to a continuity meter. The connector was slowly mated until a point at which the series circuit was completed and confirmed with the continuity meter. The mating operation was held at this point and the overall length of the connector was measured. The mating operation was then continued until the connector was completely mated. A second overall measurement length measurement was then taken using the same reference points that were used during the first measurement. The difference of the two measurements was calculated and that number was considered the total electrical engagement.

### 3.22 Contact Retention- Group 2

Testing was done in accordance with EIA-364-29, Method B. Specimens were mounted in a vise that was attached to the base of the tensile/compression machine. A probe was used to apply force to the contact. Six pounds of force was applied at a rate of 0.10 inches per minute for a period of 6 seconds. Specimens were to be preloaded with 3 pounds prior to taking the measurements used to determine maximum deflection. A load marker was placed at 3 pounds and this was used as the first deflection measurement point. A second load marker was placed at the maximum distance achieved during testing. Marker 1 was subtracted from marker 2 to determine the maximum amount of travel achieved following the required 3 pound preload.

### 3.23 Maintenance Aging- Group 3

Testing was done in accordance with EIA-364-24 with the exception that force measurements were not taken.
Six contacts per specimen were tested. Each of the 6 contacts tested was removed and replaced 5 times. Only contacts in half of each connector were tested. The contacts tested are as follows in Table 3.

**Table 3 – Contacts Tested**

| Specimen | Connector Half | Contact Tested |
|---|---|---|
| 1 | Plug | 1, 2, 3, 4, 5, 7 |
| 2 | Receptacle | 1, 3, 5, 6, 7, 8 |

### 3.24 Thermal Shock - Group 2

Specimens were tested in accordance with EIA-364-32, Method A, Condition V, Duration A. Mated specimens were subjected to 5 cycles between -65 and 175°C with 30 minute dwells at each extreme. Transition time was less than 1 minute between extremes.

### 3.25 Humidity-Temperature Cycling - Group 2

Specimens were tested in accordance with EIA-364-31, Method IV. Mated specimens were subjected to 10 cycles (10 days) between 25 and 65°C at 80-100% RH. Optional cold shocks were not performed.

### 3.26 Salt Spray - Group 6

Nickel plated specimens (Test Set 1) were subjected to Salt Spray exposure in accordance with EIA-364-26 Condition B for 48 hours. Black zinc nickel plated specimens (Test Set 2) were subjected to Salt Spray exposure in accordance with EIA-364-26 Condition C for 500 hours.

### 3.27 Fluid Immersion- Group 4

Mated specimens were subjected to a fluid immersion test in accordance EIA364-10. Specimens were immersed in fluid for 5 minutes then removed and allowed to drain for one hour at ambient conditions. Then specimens were cured for 6 hours. See Table 4 for details of the immersion fluid, exposure, cure conditions, and number of cycles.

**Table 4 – Immersion parameters per EIA-364-10**

| Test Condition | Fluid | Immersion | | Drain | Oven Cure | | Cycles |
|---|---|---|---|---|---|---|---|
| | | Time (Min) | Temp (°C) | Time (Hrs) | Time (Hrs) | Temp (°C) | |
| A | Hydraulic Fluid MIL-PRF-5606 | 5 | 85 | 1 | 6 | 100 | 7 |
| B | Turbine Fluid JP-8 | 5 | 25 | 1 | 6 | 55 | 7 |
| E | Defrosting Fluid SAE AMS 1424 | 5 | 65 | 1 | 6 | 100 | 7 |
| I | One Part Isoprpyl TT-I-735 Grade A or B Three Parts Mineral Spirits MIL-PRF-680 type 1 | 5 | 25 | 1 | 6 | NA | 5 |

### 3.28 Dust- Group 5

Specimens were tested in accordance with IEC 60529. Specimens were exposed to test IP5X, Protection against solid foreign objects (Dust). Specimens were subjected to testing for 8 hours with out pressure. The amount of talcum powder that was used as the dust contaminate was 2kg per cubic meter of test chamber volume. Following the exposure the exterior of the specimens were gently cleaned with a small brush. This was done to eliminate excess dust that could contaminate the interface when unmated. The specimens were unmated and the interface was evaluated for signs of dust contamination.

### 3.29 Water Jet Spray- Group 9

Un-mated receptacle connectors were tested in accordance with IEC 529 IPX6. Specimens were placed in the top panel of an IP66 rated sealed box with a maximum thickness of 1/8". The jam nut was tightened to 30 inch pounds. The connector was subjected to testing with a flow rate of 100 l/min +/- 5% for three minutes. The sealed box was then opened and checked for ingress of moisture.

### 3.30 Altitude Immersion- Group 3

Testing was done in accordance with EIA-364-3. Mated specimens were submerged in a 5% salt solution. Specimens were subjected to 3 cycles between ambient and 50,000ft and then again between ambient and 70,000ft as specified with 30 minute dwells at each pressure extreme and 1 minute maximum transition between extremes.

### 3.31 Final Examination of Product - All Groups

Where specified following testing, specimens were visually examined.