



GT-21-443

QUALIFICATION TEST REPORT FOR

PART NUMBER	DESCRIPTION
970-001NF18-4S2-1	Connector, Plug, Cable plug, Socket crimp removable
970-001ZR20-7S1-1	Connector, Plug, Cable plug, Socket crimp removable
970-001Z120-7P2-1	Connector, Plug, Cable plug, Pin crimp removable
970-001Z124-A6S2-1	Connector, Plug, Cable plug, Socket crimp removable
970-001NF28-4S2-1	Connector, Plug, Cable plug, Socket crimp removable
970-001NF28-4S1-1	Connector, Plug, Cable plug, Socket crimp removable
970-001ZR28-15S2-1	Connector, Plug, Cable plug, Socket crimp removable
970-001Z132-2P2-1	Connector, Plug, Cable plug, Pin crimp removable
970-001NF40-5S2-1	Connector, Plug, Cable plug, Socket crimp removable
970-001NF40-5S1-1	Connector, Plug, Cable plug, Socket crimp removable
970-001Z140-21S2-1	Connector, Plug, Cable plug, Socket crimp removable
970-003NF18-4P2N-1	Connector, Recept, Square flange panel mount, Pin crimp removable
970-003ZR20-7P1N-1	Connector, Recept, Square flange panel mount, Pin crimp removable
970-003NF28-4P2N-1	Connector, Recept, Square flange panel mount, Pin crimp removable
970-003NF28-4P1N-1	Connector, Recept, Square flange panel mount, Pin crimp removable
970-003ZR28-15P2N-1	Connector, Recept, Square flange panel mount, Pin crimp removable
970-003NF40-5P2N-1	Connector, Recept, Square flange panel mount, Pin crimp removable
970-003NF40-5P1N-1	Connector, Recept, Square flange panel mount, Pin crimp removable
970-012Z120-7S2N-1	Connector, Recept, Square flange panel mount, hermetic solder cup
970-012Z124-A6P2N-1	Connector, Recept, Square flange panel mount, hermetic solder cup
970-012Z132-2S2N-1	Connector, Recept, Square flange panel mount, hermetic solder cup
970-012Z140-21P2N-1	Connector, Recept, Square flange panel mount, hermetic solder cup



Approval Page:

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10/18/2021
Date

Mike Ghara
Director of Engineering
Glenair, Inc.

10/20/21
Date



Revision Page:

Rev/Sym	Description of Change	Originator	Date	Approval
A	Initial Release	T. Kusunoki	10/18/21	-
B	Add detail to Group 1 Sample 1-6 IR failure, and Group 2 test result discussion (sheet 5). Correct GT-19-342 description paragraph 2.2 (sheet 8). Add Sample 1-6 detail to paragraph 6.6.3 test result (sheet 15). Add note for issues with Sample 2-1 to paragraph 6.8 (sheet 15).	T. Kusunoki	10/26/21	Mike Ghara



TABLE OF CONTENTS

Cover Page	1
Approval Page	2
Revision Page	3
Table of Contents	4
Test Result Discussion	5
Purpose	7
Reference Documents	7
Test Conditions / Test Site	8
Test Summary	9
Test Group Samples	11
Results of Tests	12
Appendix A: Vertical Laboratories Test Report 21219R1DTV1	



TEST RESULT DISCUSSION

In accordance with Glenair test plan GT-19-342, seven mated pairs consisting of 970-001 cable plugs mated to 970-003 square flanged receptacles were terminated with M22759/43 series wire and assembled with 620PS076 series straight strain relief backshells for Group 1, and four pairs of 970-001 cable plugs mated to 970-012 square flange hermetic receptacles were terminated to M22759/43 series wire for Group 2.

Group 1 test samples passed all applicable test inspections except for Sample 1-6, which shall be discussed here. During Group 1 testing, the grommet for Sample 1-6P had gotten damaged while inspecting contact retention, requiring rework to replace the grommet. After rework, moisture was accidentally trapped inside Sample 1-6P cavities while preparing the sample for, but prior to, Altitude Immersion testing. The moisture was discovered through initial Insulation Resistance testing and rectified with a bakeout as detailed in test deviation 21219DV1DTV1. Group 1 testing continued until Moisture Resistance, where sample 1-6P/S recorded an Insulation Resistance failure during the last cycle while at high humidity. Sample 1-6P/S then passed Insulation Resistance after recovering at ambient for 24 hours without unmating, in accordance with paragraph 7.10e of GT-19-342. The failure of Sample 1-6P/S is not the result of a fault in the design since Sample 1-7P/S had experienced the same conditions in the same chamber and passed, and Sample 1-7P/S is identical to 1-6P/S except for contact finish. The recovery of Insulation Resistance values in 1-6P/S after allowing the mated connectors to sit at ambient for 24 hours indicates the area of low IR affected by moisture is exposed to the outside environment where moisture was able to evaporate into the atmosphere (i.e., moisture did not intrude and get trapped inside the connector seals). Sample 1-6P/S proceeded with and passed subsequent Insert Retention and External Bending Moment test examinations. Glenair will investigate the cause of low IR after completion of Group 1 testing.

Group 2 test samples passed all applicable test inspections with the following notes and observations. During Group 2 testing, it was noted that Sample 2-1S (part number 970-012Z120-7S2N-1) had been built incorrectly due to an error on the BOM. Arrangement 20-7 contains 3 size 8 and 4 size 16 contacts. However, 970-012Z120-7S2N-1 was incorrectly assembled using 3 size 12 and 4 size 16 socket contacts. Since the 970-012 series hermetic connectors have contacts permanently fixed in place, the size 8 pin contacts were removed from test mate Sample 2-1P and contact resistance was measured on size 16 contacts only. A new test sample pair 2-4P/S (970-001Z140-21S2-1 and 970-012Z140-21P2N-1) containing 21 size 8 contacts was added so size 8 contact resistance data could be gathered. While tears in the grommets were noted during Contact Insertion and Removal Force testing, Glenair determined they would not affect the subsequent Contact Resistance test inspection and proceeded to complete Group 2 testing. In parallel, Glenair will investigate revisions to the grommet design and/or revisions to the extraction tools to address the grommet tears for future builds.

Conclusion: PowerTrip Series 970 connectors meet the applicable performance requirements of AS50151 and MIL-DTL-38999 as outlined in GT-19-342.



The following is a brief explanation of the test deviations. These deviations are listed and explained in detail in Appendix A.

- 21219DV1DTV1 – Prior to the start of Altitude Immersion testing, sample set 1-6P/S failed Insulation Resistance at sea level. Leading up to Altitude Immersion testing, the test sample had been subjected to Contact Retention, and Dielectric Withstanding Voltage at sea level. Moisture would not have been introduced to the test sample at any point during these tests, so Glenair had concluded that the moisture had been introduced during sample preparation. The sample was unmated and placed into an oven to bakeout at 50C for 3 hours. Sample 1-6P/S passed the retest of Insulation Resistance.
- 21219DV2DTV1 – While performing Durability testing, Group 1 connectors exhibited excessive wear on the shell and contact finish. Upon review, Glenair determined that the applicable requirement from the relevant reference specification AS50151E is only 100 mating cycles. Any connectors that have been subjected to mating cycles greater than 100 will stop Durability testing, and remaining connectors will proceed only to 100 cycles. Debris from wear on samples exceeding 100 cycles were cleaned using dry nitrogen and isopropyl alcohol to mitigate the effects of exceeding the recommended number of durability cycles on subsequent Group 1 test inspections, and test samples proceeded with the next test inspection.
- 21219DV3DTV1 – During Moisture Resistance, it was discovered that the insulation resistance (IR) measurement prior to test start per paragraph 7.10 of test plan GT-19-342 had accidentally been omitted for all test samples (1-1P/S, 1-2P/S, 1-3P/S, 1-4P/S, 1-5P/S, 1-6P/S, and 1-7P/S). Since the test samples had already begun preconditioning by the time the omission was discovered, Glenair agreed to continue testing as is and take IR measurements after preconditioning. Post preconditioning IR values will be compared against the last recorded IR values for each test sample in the event of a failure.
- 21219DV4DTV1 – During Moisture Resistance testing, a malfunction with the humidity chamber containing samples 1-1P/S, 1-2P/S, and 1-5P/S had occurred during the first step of EIA-364-31F Method IV. The malfunction caused the chamber to drop to 33% relative humidity (RH) and hold at 38.9C instead ramping up to 65C and 90-98% RH, and the test samples were exposed to this condition for approximately 48 hours. After the malfunction was observed, the test samples were removed and repairs made to the humidity chamber. The 48 hours at 38.9C and 33% RH effectively acted as the sample precondition in this case, and testing resumed without preconditioning per EIA-364-31F, paragraph 5.5.1a.
- 21219DV5DTV1 – During Moisture Resistance testing, it was discovered that the humidity chamber for samples 1-1P/S, 1-2P/S, and 1-5P/S was unable to accurately control the relative humidity (RH) during step 7 of EIA-364-31F Method IV, allowing the RH to oscillate around the target of 92%. During the oscillations, the RH would temporarily drop below the minimum of 90%. Because the median RH during this step remained aligned with the set target of 92%, the decision was made to allow a lower RH limit reaching a minimum of 85.3% and continue with testing.



- 21219DV6DTV1 – In the setup for External Bending Moment testing, it was discovered that the equipment available at Vertical Laboratories would not be able to control the load application of 10 pounds per second, and instead could only control the rate in inches/minute at which the load cell would move to apply the load. Through trial testing, Vertical Laboratories had determined a rate of 0.180 inches/minute produces a load application close to the required 10 pounds per second. Glenair made the determination that the rate of load application is not as critical as achieving the target bending moment, provided the load is applied in a controlled manner. External Bending Moment proceeded using the rate of 0.180 inches/minute, and all connectors passed.

TEST REPORT

1.0 Purpose:

Testing was performed on 970-001 cable plug connectors with crimp contacts, 970-003 square flange receptacles with crimp contacts, and 970-012 hermetic square flange receptacles to determine compliance to applicable requirements of SAE AS50151, MIL-DTL-38999, and Series 970 catalog for contact retention, shock, durability, insert retention, moisture resistance, bending moment, altitude immersion, and hermetic contact resistance.

2.0 Reference Documents:

The following documents form a part of this document to the extent specified herein. The latest issue of this document shall apply. In the event of a conflict between the text of this document and references cited herein, the text of this document takes precedence.

2.1 Industry Specifications:

SAE-AS39029	Contacts, Electrical Connector, General Specification For
SAE-AS50151	Connectors, Electrical, Circular Threaded, AN Type, General Specification for
MIL-DTL-38999	Connectors, Electrical, Circular, Miniature, High Density, Quick Disconnect, Environment Resistant with Crimp Removable Contacts or Hermetically Sealed with Fixed, Solderable Contacts, General Specification For
EIA-364-03D	Altitude Immersion Test Procedure for Electrical Connectors
EIA-364-05C	Contact Insertion, Release and Removal Force Test Procedure for Electrical Connectors
EIA-364-06C	Contact Resistance Test Procedure for Electrical Connectors
EIA-364-09D	Durability Test Procedure for Electrical Connectors and Contacts
EIA-364-020F	Withstanding Voltage Test Procedure for Electrical Connectors, Sockets and Coaxial Contacts
EIA-364-021F	Insulation Resistance Test Procedure for Electrical Connectors, Sockets, and Coaxial Contacts



Qualification Test Report for Glenair 970 Series
Connectors

Test #: GT-21-443
Revision: B
Sheet 8 of 18

EIA-364-027C	Salt Spray Test Procedure for Electrical Connectors, Contacts and Sockets
EIA-364-029D	Contact Retention Test Procedure for Electrical Connectors
EIA-364-031F	Humidity Test Procedure for Electrical Connectors and Sockets
EIA-364-035C	Insert Retention Test Procedure for Electrical Connectors

2.2 Glenair Drawings/Specs:

970-001	Straight Plug, Series 97 Power Trip, Crimp, Rear Release
970-003	Flange Mount Receptacle, Series 97 Power Trip Crimp, Rear Release
970-012	Connector, Receptacle, Hermetic Wall Mount, Solder Cup
GT-19-342	Glenair Test Plan to test Series 970 PowerTrip straight plugs, square flange receptacles, jam nut receptacles, and hermetic receptacle connectors to requirements of AS50151 and MIL-DTL-38999

2.3 Vertical Test Report:

21219R1DTV1	Glenair 970 PowerTrip Connector Qual Testing
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3.0 **Test Conditions / Test Site:**

3.1 Unless otherwise specified, conditions for conducting the testing were as stated below.

Ambient (room) Temperature: 10°C to 35°C (50°F to 95°F)

Relative Humidity: 30 to 80 percent

Barometric Pressure: 650 to 800 mm of Mercury

3.2 Test Sites:

Following testing sites were used for this testing

Vertical Laboratories
1805 Flower Street
Glendale, CA 91201



4.0 Test Summary

**Table 1
Test Groups and Sequence**

Group 1	
Inspection / Test	Test Method and Condition
Visual	Inspect per Para. 8 workmanship requirements
Contact Retention	EIA-364-29
Insulation Resistance	EIA-364-21
Dielectric Withstanding Voltage (sea level)	EIA-364-20
Altitude immersion	EIA-364-03
Durability	EIA-364-09
Shock (Cond. A)	EIA-364-27
Moisture resistance	EIA-364-31
Insert retention	EIA-364-35
External bending moment	Para. 7.12
Post test examination	Inspect per Para. 8 and Para. 9

Group 2	
Inspection / Test	Test Method and Condition
Visual	Inspect per Para. 8 workmanship requirements
Contact insertion and removal forces	EIA-364-05
Contact resistance (hermetic with sockets only)	EIA-364-06



Table 2
Summary of Test Results

Group/Requirement Description	Pass/Fail	Comments
Group 1		
Visual	Pass	
Contact Retention	Pass	
Insulation Resistance	Pass	
Dielectric Withstanding Voltage	Pass	
Altitude Immersion	Pass	See Deviation 21219DV1DTV1
Durability	Pass	See Deviation 21219DV2DTV1
Shock (Condition A)	Pass	
Moisture Resistance	1-1, 1-2, 1-3, 1-4, 1-5, and 1-7 Pass, 1-6 Fail IR	See Deviation 21219DV3DTV1, 21219DV4DTV1, 21219DV5DTV1
Insert Retention	Pass	
External Bending Moment	Pass	See Deviation 21219DV6DTV1
Post Test Examination		
Group 2		
Visual	Pass	
Contact Insertion and Removal Forces	Pass	
Contact Resistance (hermetic with sockets only)	Pass	



5.0 Test Group Samples:

5.1 Test Samples

Table 3
Qualification Test Samples

GROUP 1			
SAMPLE #	PART NUMBER	WIRE	CONTACT
1-1P	970-001NF18-4S2-1	M22759/43-8-*	850-027-8-8-2
		M22759/43-12-*	850-038-12
1-1S	970-003NF18-4P2N-1	M22759/43-8-*	850-026-8-8-2
		M22759/43-12-*	850-037-12
1-2P	970-001ZR20-7S1-1	M22759/43-8-*	850-027-8-8-1
		M22759/43-16-*	850-038-16
1-2S	970-003ZR20-7P1N-1	M22759/43-8-*	850-026-8-8-1
		M22759/43-16-*	850-037-16
1-3P	970-001NF28-4S2-1	M22759/43-4-*	850-027-4-4-2
1-3S	970-003NF28-4P2N-1	M22759/43-4-*	850-026-4-4-2
1-4P	970-001NF28-4S1-1	M22759/43-4-*	850-027-4-4-1
1-4S	970-003NF28-4P1N-1	M22759/43-4-*	850-026-4-4-1
1-5P	970-001ZR28-15S2-1	M22759/43-16-*	850-038-16
1-5S	970-003ZR28-15P2N-1	M22759/43-16-*	850-037-16
1-6P	970-001NF40-5S2-1	M22759/43-01-*	850-027-0-0-2
1-6S	970-003NF40-5P2N-1	M22759/43-01-*	850-026-0-0-2
1-7P	970-001NF40-5S1-1	M22759/43-01-*	850-027-0-0-1
1-7S	970-003NF40-5P1N-1	M22759/43-01-*	850-026-0-0-1

GROUP 2			
SAMPLE #	PART NUMBER	WIRE	CONTACT
2-1P	970-001Z120-7P2-1	M22759/43-8-*	850-026-8-8-2
		M22759/43-16-*	850-037-16
2-1S	970-012Z120-7S2N-1	M22759/43-8-*	Solder
		M22759/43-16-*	Solder
2-2S	970-001Z124-A6S2-1	M22759/43-4-*	850-027-4-4-2
		M22759/43-12-*	850-038-12
2-2P	970-012Z124-A6P2N-1	M22759/43-4-*	Solder
		M22759/43-12-*	Solder
2-3P	970-001Z132-2P2-1	M22759/43-01-*	850-026-0-0-2
2-3S	970-012Z132-2S2N-1	M22759/43-01-*	Solder
2-4P	970-001Z140-21S2-1	M22759/43-8-*	850-027-8-8-2
2-4S	970-012Z140-21P2N-1	M22759/43-8-*	Solder



BACKSHELLS			
SHELL SIZE	QTY	PART NUMBER	DESCRIPTION
18	2	620PS076ME18	STRAIGHT STRAIN RELIEF CLAMP
20	2	620PS076MT20	
28	6	620PS076ME28B4	
40	4	620PS076ME40	

6.0 Results of Tests

6.1 Visual (All Groups)

6.1.1 Requirement: Inspect for defects per Paragraph 8 Workmanship Requirements of test plan GT-19-342.

DEFECT
INSERT/INSULATOR BODY INSERT TO SHELL POSITIONING AND ORIENTATION CRACKS, CHIPS, BUSTERS, PINHOLES MARKING
CONTACT POSITIONING CONSISTENT CENTERING BETWEEN CONTACTS SOLDERCUP MISALIGNMENT, REAR OF CONNECTOR
GROMMET NICKS, GOUGES, TEARS, FOLDS, DISCOLORATION MARKING
SHELL/BODY CRACKS, DENTS, BURRS, SHARP EDGES FINISH (PEELED OR BLISTERED PLATING, SCRATCHES / EXPOSED BASE METAL, CORROSION DISCOLORATION) MARKING COMPLETENESS, LEGIBILITY
THREADS COUPLING (NICKS, DENTS, VOIDS, BURRS)

6.1.2 Results: All Group 1 and Group 2 test samples passed Visual Examination.



6.2 Contact insertion and Removal Forces

6.2.1 Requirement: With the grommet relaxed, a minimum of 20% of the contacts (but not fewer than six contacts per connector mating half) shall be removed and reinserted using the applicable tools in accordance with M81969/15 or M81969/8. For connectors having six contacts or less, all contacts shall be used for the test. At least one contact shall be near the periphery and one near the center of the connector. The forces required to insert and remove the unlocked contacts shall be measured in accordance with EIA 364-05. The same contacts shall then be removed and reinserted nine more times. The contact insertion and removal forces shall be measured on the ninth cycle of half, but not less than three of the contacts selected for this test.

Forces required to insert and remove unlocked contacts shall not exceed the requirements specified in Table 4.

TABLE 4	
SIZE	MAX (LBS)
16	20
12	25
8	30
4	40
1/0	40

6.2.4 Results: All contacts tested passed with acceptable insertion and removal forces.

6.3 Contact Retention

6.3.1 Requirement: Contact retention shall be tested in accordance with test procedure EIA/ECA-364-29. The axial displacement of the contact shall not exceed .025 inch (0.64 mm). No damage to contacts or inserts shall result. The following details and exceptions shall apply:

- a. Number of samples - The test shall be performed on 20 percent of the contact complement; but not less than three contacts in each connector half (selected at random).
- b. Applied axial load - Preload to 3 pounds maximum, (13.6 Newtons). Apply load as specified in Table 3 below.
- c. Axial direction - The applicable forces shall be applied along the longitudinal axis of individual contacts in the direction tending to displace the contacts to the rear.

6.3.2 Results: All measured contacts passed contact retention.



6.4 Insulation Resistance (Room Temperature)

6.4.1 Requirement: Resistance shall be 5000 MegOhms minimum at 500 VDC when tested IAW EIA-364-21. Connectors shall be wired and mated. Simulated contacts and special techniques may be used.

After altitude immersion, insulation resistance shall be 1000 MegOhms minimum.
After moisture resistance, insulation resistance shall be 100 MegOhms minimum.

6.4.2 Results: All test samples passed initial Insulation Resistance measurement.

6.5 Dielectric Withstanding Voltage (Sea Level)

6.5.1 Requirement: Wired, unmated connectors shall be tested in accordance with test procedure EIA-364-20, method A. Fifty percent of the contacts shall be tested (selected at random), but in no case shall less than six dielectric withstanding voltage readings be taken. If the number of contacts is three or less, all contacts shall be tested. The test voltage shall be applied between each wired contact and each adjacent contact and the shell.

There shall be no evidence of electric breakdown or flashover, and corona shall not be considered as breakdown. The following details and exceptions apply:

- a) The magnitude of the test voltage shall be 2000 VAC.
- b) The maximum leakage current shall be 4 milliamperes.
- c) The test voltage shall be maintained at the specified value for 60 seconds minimum.

6.5.2 Results: All test samples passed Dielectric Withstanding Voltage at sea level.

6.6 Altitude Immersion

6.6.1 Requirement: After immersion, the mated connector's insulation resistance shall be not less than 1000 MΩ. Any evidence of dielectric breakdown or flashover shall be cause for rejection.

6.6.2 Test Details/Setup: Mated connectors shall be tested in accordance with EIA 364-03. The following details shall apply:

- a) All wire ends shall be located within the chamber and exposed to the chamber atmosphere, but not submerged or sealed.
- b) At the end of the third cycle while the mated connectors are still submerged in the solution, the insulation resistance shall be measured as specified in 7.4 and the dielectric withstanding voltage test at sea level shall be performed as specified in 7.5.
- c) The connector examination and value and observatory requirements of EIA 364-03 shall not apply.



6.6.3 **Results:** All test samples passed Insulation Resistance and Dielectric Withstanding Voltage while submerged at the end of the third cycle. Sample 1-6P/S experienced an IR failure prior to Altitude Immersion due to moisture introduced during sample preparation, and subsequently passed IR after bakeout of moisture. See test deviation 21219DV1DTV1 and Test Result Discussion on Sheet 5 of this report for details.

6.7 Shock

6.7.1 **Requirement:** Mated connectors shall be tested in accordance with EIA 364-027, test condition A. Connectors shall be mounted and mated. All contacts shall be wired in a series circuit with a current that shall be not greater than 100 mA. The wire bundles or cables shall be clamped to structures that move with the connectors. A minimum of 8 inches of wire or cable shall be unsupported behind the rear of each connector.

There shall be no loosening of parts, nor shall there be an interruption of electrical continuity longer than 10 μ s during the exposure to mechanical shock.

6.7.2 **Results:** All test samples passed without electrical discontinuity greater than 10 μ s or loosening or damage.

6.8 Contact Resistance (Hermetic Sockets)

6.8.1 **Requirement:** Contacts of mated connectors with hermetic socket contacts shall be tested in accordance with test procedure EIA-364-06. Contacts in the mated condition shall not exceed the maximum voltage drop in millivolts listed in Table 5 for silver coated copper wire at 25°C \pm 3°C. Appropriate compensation may be made for resistance in the measured value, which is due to an additional length of wire included in the measurement. The following details shall apply:

- a) Sample 2-1P shall have all 3 size 8 pin contacts and wires removed from the connector during test. 1/
- b) Pair 2-1P/S shall measure contact resistance of size 16 contacts only. 1/

6.8.2 **Results:** All contacts passed with acceptable voltage drops in each contact size.

1/ Note: Only size 16 contacts were evaluated for Sample 2-1P/S due to the hermetic receptacle Sample 2-1S being assembled with the wrong contacts. See Group 2 Test Result Discussion on Sheet 5 of this report for details.



Table 5				
Contact Resistance				
SAMPLE #	PART NUMBER	CONTACT SIZE	MAX VOLTAGE DROP (mV)	MAX MEASURED VOLTAGE DROP (mV)
2-1P/S	970-001Z120-7P2-1	#8	283	n/a 1/
	970-012Z120-7S2N-1	#16	539	55.8
2-2P/S	970-001Z124-A6S2-1	#4	253	33.2
	970-012Z124-A6P2N-1	#12	462	59.7
2-3P/S	970-001Z132-2P2-1 970-012Z132-2S2N-1	#1/0	231	31.9
2-4P/S	970-001Z140-21S2-1 970-012Z140-21P2N-1	#8	283	42.9

6.9 Durability

6.9.1 Requirement: The wired, assembled plug and receptacle connectors shall be mated and unmated 100 times at a rate that shall not be greater than 300 cycles per hour in accordance with EIA 364-09. Connectors shall show no mechanical or electrical defects detrimental to the operation of the connector after 100 cycles of coupling and uncoupling and shall meet subsequent test requirements.

6.9.2 Results: All samples were subjected to a minimum of 100 cycles of coupling and uncoupling without detriment to subsequent test requirements.

6.10 Moisture Resistance

6.10.1 Requirement: Mated connectors with rear accessory hardware assembled shall maintain an insulation resistance of 100 MΩ or greater at 25 °C (77 °F) after being subjected to the moisture resistance test.

6.10.2 Test Details/Setup: Wired, mated connectors shall be tested in accordance with EIA 364-031. Connectors shall be wired and mated to the counterpart connectors. They shall be mounted vertically with the wires descending into the backshell with no drip loops or splices within the chamber. The wires shall leave the chamber through vapor tight seals.

Prior to the beginning of the test, and at the end of the test period and while at the high humidity, the insulation resistance between each contact and other contacts shall be determined as specified in EIA-364-31. The following details and exceptions shall apply:

- a. Test procedure – EIA-364-031, method IV.
- b. The mated connectors shall be mounted in a vertical position.



- c. Step 7a shall be performed during the last cycle, as prescribed in Test Method IV and as shown in Figure 1 of EIA-364-31.
- d. Three hours minimum after the start of step 7a, during the final cycle and while the connectors are still subjected to high humidity, the insulation resistance shall be measured when the chamber temperature reaches $20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ ($68\text{ }^{\circ}\text{F} \pm 9\text{ }^{\circ}\text{F}$) and condensation is observed on the connector.
- e. Post testing, after the connectors have been brought back to ambient, the insulation resistance shall be measured.
- f. Insulation resistance readings shall be made on a minimum of 50% of the circuits.

6.10.3 Results:

6.10.3.1 After Precondition:

All samples passed insulation resistance after preconditioning in a dry oven at 50C for 24 hours.

6.10.3.2 At Elevated Relative Humidity:

Sample 1-6P/S failed Insulation Resistance while at elevated relative humidity. All other samples passed.

6.10.3.3 At Ambient 24 Hours after Moisture Resistance:

All samples passed after recovering at ambient for 24 hours without unmating.

6.11 Insert Retention

6.11.1 Requirement: Unmated connectors shall be tested in accordance with EIA 364-035. The maximum pressure shall be as specified in Table 6. Inserts shall not be dislocated from their original positions or damaged when they are subjected to the pressures specified.

TABLE 6		
SHELL SIZE	PRESSURE (PSI)	
	ENVIRONMENTAL PLUG AND RECPT	HERMETIC RECEPT.
18	100	200
20	75	
24	60	
28	60	
32	45	
40	45	

6.11.2 Results: All connectors passed. Inserts were not dislodged or damaged when pressure was applied from the rear or the front.



6.12 External Bending Moment

6.12.1 Requirement: Connectors shall exhibit no evidence of damage, as revealed by inspection with 3X magnification, when stressed using the applicable bending moment.

6.12.2 Test Details/Setup: The receptacles shall be mounted to a rigid panel. Before mating the plug to the receptacle, a bending moment test arm shall be threaded onto the rear of the plug shell. The fixture shall be of any design which will permit the application of the load except it must not provide support for the connector shell in front of the engaged threads. After mating the plug and receptacle, the bending moment listed in Table 7 measured from the panel shall be applied. The load shall be applied at a rate of 10 pounds/second until the required load is applied. The load shall then be held for 1 minute.

6.12.3 Results:

Table 7			
External Bending Moment Results			
SAMPLE #	PART NUMBER	Required Torque (in-lb)	Result
1-1P	970-001NF18-4S2-1	420	Pass
1-1S	970-003NF18-4P2-1		
1-2P	970-001ZR20-7S1-1	450	Pass
1-2S	970-003ZR20-7P1-1		
1-3P	970-001NF28-4S2-1	630	Pass
1-3S	970-003NF28-4P2-1		
1-4P	970-001NF28-4S1-1	630	Pass
1-4S	970-003NF28-4P1-1		
1-5P	970-001ZR28-15S2-1	630	Pass
1-5S	970-003ZR28-15P2-1		
1-6P	970-001NF40-5S2-1	870	Pass
1-6S	970-003NF40-5P2-1		
1-7P	970-001NF40-5S1-1	870	Pass
1-7S	970-003NF40-5P1-1		

APPENDIX A

VERTICAL LABORATORIES TEST REPORT

21219R1DTV1

Glenair 970 PowerTrip Connector Qual Testing

GT-19-342 Series 970 Gulfstream
21219R1DTV1
Version 1
10/15/2021

Prepared By: Danny Tan
Test Engineer

Reviewed By: Mehrdad Mostoufi 10/15/2021
Engineering Manager Date

Approved By: Dennis Smith 10/15/2021
Quality Management Rep. Date



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Table of Contents

Table of Contents	2
Version History	3
Test Deviations	4
Testing Summary	6
Test Sample Identification	7
Test Sequence	8
Test Equipment List	10
Test Parameters	12
Engineering Notes	23
Test Sample Conditions	27
Test Results	28
Test Plots	68
Test Photos	86
Appendix	120
Final Page	127

Version History

Version	Date	Comments	Prepared By	Reviewed By	Approved By
1	10/15/2021	Initial release	Danny Tan	Mehrdad Mostoufi	Dennis Smith

Test Deviations

Deviation No.	Test Name	Description
21219DV1	Insulation Resistance and Dielectric Withstanding Voltage	<p>Sample 1-6P/S failed initial Insulation Resistance at sea level. Connector was unmated to investigate; moisture was discovered at the contact interface. IR test was performed before altitude immersion testing.</p> <p>Resolution: After moisture was found in the contact interface, customer met and instructed to bake the unmated connectors and retest the samples. The unmated connector pairs were placed into an oven to bakeout at 50°C for 3 hours. Connector passed insulation resistance retest.</p>
21219DV2	Durability	<p>The original QTP requirements were to perform 500 cycles. After observing excessive wear on the connector shell and contacts, Glenair was notified and advised to complete only 100 cycles. Another approval to proceed to 500 cycles was received to reverse the previous instruction. Upon completion of some durability, further instruction was received to perform only 100 cycles. Connector samples went through various amounts of durability with signs of excessive wear on the contacts and the connector shell. Durability cycles are listed for each sample as follows: 1-1, 1-2, 1-4, and 1-5 underwent 500 cycles, 1-3 underwent 360 cycles, 1-6 underwent 100 cycles, 1-7 underwent 141 cycles.</p> <p>Resolution: After inspecting the connector samples and a discussion with the customers, a review of the controlling document was performed. Customers agreed to change the durability requirement from 500 cycles to 100 cycles of mating and unmating in accordance with AS50151E Section 3.16. For the samples that underwent over 100 cycles of durability, dry nitrogen and isopropyl alcohol shall be used to remove some of the debris between the contacts from the connector face. The intent is to eliminate an additional creep path that may have been introduced due to the excessive wear.</p>
21219DV3	Moisture Resistance	<p>Perform initial insulation resistance measurement prior to any precondition. Precondition samples at 50°C for 24 hours. Measure IR after 24 hour recovery period at ambient conditions. Cycle temperature and humidity per EIA-364-31F Method IV. Measure IR at elevated humidity a minimum of 3 hours after the start of step 7a (EIA-364-31F 5.5.3). Final IR measurement shall be taken after connectors have been brought back to ambient conditions.</p> <p>Resolution: Customers were notified and agreed to continue testing. Insulation resistance measurement after preconditioning will be compared to last IR measurement for any discrepancies. If any failures are detected the root cause will be investigated.</p>

Test Deviations

Deviation No.	Test Name	Description
21219DV4	Moisture Resistance	<p>During the first ramp up step from 25°C to 65°C and 50% humidity to 94% humidity, the humidity chamber held the temperature at 38.9°C and experienced a drop in humidity at 63% RH. The parts in the chamber were exposed to 38.9°C and humidity around 33%RH for approximately 48 hours.</p> <p>Resolution: The samples were removed from the humidity chamber. Repairs were made to the humidity chamber. An overnight test run confirmed the performance of the chamber. Because the samples were exposed to 38.9°C and 33%RH, the precondition will not be performed again. Moisture resistance testing was restarted.</p>
21219DV5	Moisture Resistance	<p>During step 7 in the 24 hour cycle of EIA-364-31F Method IV, the relative humidity (RH) of the chamber fluctuated and fell below the required RH of 90%RH. The lowest humidity are listed as follows for each cycle at the 25°C 90-98% humidity dwell step (1-10): 87.1, 86.6, 86.6, 87.1, 85.5, 85.3, 86.1, 87.6, 86.2, and 88.5.</p> <p>Resolution: Customer was alerted of the decreased RH and agreed to accept the lower humidity value for this step.</p>
21219DV6	External Bending Moment	<p>The rate of load application was changed to adapt to the settings of the equipment in use. Testing was done to obtain a rate of in/min that would fall below the 10 pounds/second application listed in the test plan.</p> <p>Resolution: After testing and discussions with customer, a rate of 0.180 in/minute was agreed upon.</p>

Job Name	GT-19-342 Series 970 Gulfstream
Job No.	21219
Client	Glenair
Address	1211 Air Way, Glendale, CA 91201
Contact Name	Tom Kusunoki
Telephone No.	(818) 247-6000
Email	tkusunoki@glenair.com
Controlling Document	GT-19-342 Rev 8

Test Name	Group	Start Date	End Date	Pass	Fail
Visual	1	8/31/2021	8/31/2021	X	-
Contact Retention	1	8/31/2021	9/1/2021	X	-
Insulation Resistance	1	9/2/2021	9/10/2021	X	-
Dielectric Withstanding Voltage	1	9/2/2021	9/10/2021	X	-
Altitude Immersion	1	9/8/2021	9/13/2021	X	-
Durability	1	9/10/2021	9/15/2021	X	-
Shock	1	9/16/2021	9/21/2021	X	-
Moisture Resistance	1	9/23/2021	10/9/2021	X	1-6 Fail IR
Insert Retention	1	10/8/2021	10/10/2021	X	-
External Bending Moment	1	10/12/2021	10/12/2021	X	-
Post Test Examination	1	10/12/2021	10/13/2021	X	-

Test Name	Group	Start Date	End Date	Pass	Fail	Record
Visual	2	8/31/2021	10/5/2021	X	-	-
Contact Insertion and Removal Forces	2	9/16/2021	9/30/2021	X	-	-
Contact Resistance	2	10/1/2021	10/8/2021	X	-	-

Summary of Testing
<p>All samples passed testing with the exception of sample 1-6 which showed a failure during insulation resistance (IR) at elevated humidity.</p> <p>Below is some notable damage and failures:</p> <p>Samples 1-6P/S failed IR at elevated humidity. Further investigative testing will be performed at a later date.</p> <p>Samples 1-2P/S and 1-4P/S showed signs of corrosion from residual salt post altitude immersion testing.</p> <p>Samples 1-3P/S was damaged in the process of removing the backshells from the connectors.</p>

Date Received	8/30/2021
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Test Group	Part Name	Part No.	Serial No.
1	18-4 Plug	970-001NF18-4S2-1	1-1P
1	18-4 Receptacle	970-003NF18-4P2N-1	1-1S
1	20-7 Plug	970-001ZR20-7S1-1	1-2P
1	20-7 Receptacle	970-003ZR20-7P1N-1	1-2S
1	28-4 Plug	970-001NF28-4S2-1	1-3P
1	28-4 Receptacle	970-003NF28-4P2N-1	1-3S
1	28-4 Plug	970-001NF28-4S1-1	1-4P
1	28-4 Receptacle	970-003NF28-4P1N-1	1-4S
1	28-15 Plug	970-001ZR28-15S2-1	1-5P
1	28-15 Receptacle	970-003ZR28-15P2N-1	1-5S
1	40-5 Plug	970-001NF40-5S2-1	1-6P
1	40-5 Receptacle	970-003NF40-5P2N-1	1-6S
1	40-5 Plug	970-001NF40-5S1-1	1-7P
1	40-5 Receptacle	970-003NF40-5P1N-1	1-7S
2	20-7 Plug	970-001Z120-7P2-1	2-1P
2	20-7 Receptacle	970-012Z120-7S2N-1	2-1S
2	24-6 Plug	970-001Z124-A6S2-1	2-2P
2	24-6 Receptacle	970-012Z124-A6P2N-1	2-2S
2	32-2 Plug	970-001Z132-2P2-1	2-3P
2	32-2 Receptacle	970-012Z132-2S2N-1	2-3S
2	40-21 Plug	970-001Z140-21S2-1	2-4P
2	40-21 Receptacle	970-012Z140-21P2N-1	2-4S

Test Sequence

#	Test Name	Serial No.	Group 1	Group 2
1	Visual Inspection GT-19-342 Para 8	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S	X	-
2	Contact Retention EIA-364-29D	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S	X	-
3	Insulation Resistance EIA-364-21F	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S	X	-
4	Dielectric Withstanding Voltage EIA-364-20F Method B	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S	X	-
5	Altitude Immersion EIA-364-03D	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S	X	-
6	Durability EIA-364-09D	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S	X	-
7	Shock EIA-364-27C, Condition A	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S	X	-
8	Moisture Resistance EIA-364-31F, Method IV	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S	X	-
9	Insert Retention EIA-364-35C	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S	X	-
10	External Bending Moment GT-19-342 Para. 7.12	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S	X	-

Test Sequence

#	Test Name	Serial No.	Group 1	Group 2
1	Visual Inspection GT-19-342 Para 8	2-1P, 2-1S, 2-2P, 2-2S, 2-3P, 2-3S, 2-4P, 2-4S	-	X
2	Contact Insertion and Removal Forces EIA-364-05C	2-1P, 2-2P, 2-3P	-	X
3	Contact Resistance EIA-364-06C	2-1P, 2-1S, 2-2P, 2-2S, 2-3P, 2-3S, 2-4P, 2-4S	-	X

ID No.	Equipment Name	Manufacturer	Model No.	Cal. Date	Cal. Due
CP028	DIGITAL FORCE GAUGE (50 LBF)	CHATILLON	DFS II	10/30/2020	10/31/2021
CP026	DIGITAL FORCE GAUGE (0 - 10 LBF)	CHATILLON	DFS2-010	1/25/2021	1/31/2022
DM025	ABSOLUTE DIGIMATIC VERTICAL SCALE	MITUTOYO	572-311-10	10/29/2020	10/31/2021
DM024	ABSOLUTE DIGIMATIC VERTICAL SCALE	MITUTOYO	572-311-10	10/29/2020	10/31/2021
EM012	DIELECTRIC WITHSTAND TESTER	ASSOCIATED RESEARCH INC	3770	2/26/2021	2/28/2022
EM032	DIELECTRIC WITHSTAND TESTER	ASSOCIATED RESEARCH INC	3870	11/2/2020	11/30/2021
PV014	VACUUM GAUGE (0 - 40 TORR)	US VACUUM	USCG - 040	3/3/2021	3/31/2022
CE039	VIBRATION CONTROLLER	VIBRATION RESEARCH	VR9500 REVOLUTION	7/16/2021	7/31/2022
EM016	DISCONTINUITY MONITOR (100 MA, 1/4 S. B. 115VAC 60HZ)	MERTRONICS	DM600-10A	9/24/2021	9/30/2022
EM008	DISCONTINUITY MONITOR	MERTRONICS	DM600-10A	9/14/2021	9/30/2022
SK05	ELECTRODYNAMIC SHAKER	LDS	V8-440	-	-
TQ002	DIAL TORQUE WRENCH (0-150 IN-LBS)	CDI TORQUE PRODUCTS	1502LDIN	11/16/2020	11/30/2021
TQ026	TORQUE WRENCH	NORBAR	15015	4/20/2021	4/30/2022
TQ014	DIAL TORQUE WRENCH	CDI TORQUE PRODUCTS	751LDIN	11/5/2020	11/30/2021
CP029	DIGITAL FORCE GAUGE (300 LBF)	MARK-10	M5-300	3/17/2021	3/31/2022
CE027	TEMPERATURE AND HUMIDITY CHAMBER	TEST EQUITY	100H	2/16/2021	2/28/2022
CP035	DIGITAL FORCE/TORQUE INDICATOR	MARK-10	M71	12/23/2020	12/31/2021

Test Equipment List

ID No.	Equipment Name	Manufacturer	Model No.	Cal. Date	Cal. Due
CP035A	FORCE SENSOR (1500 LBF)	MARK-10	MR01-1500-1	1/14/2021	1/31/2022
CE056	MOTORIZED TEST STAND	MARK-10	ESM1500	4/28/2021	4/30/2022
AC034	ACCELEROMETER	DYTRAN	3056D1T	11/13/2020	11/30/2021
Rental 32805	TEMP/HUMIDITY CHAMBER	TEST EQUITY	TEST-1007H	01/05/21	03/23/22
DM022	6" FLEXIBLE RULER, 5R	PRODUCTS ENGINEERING	501-006CT	2/15/2021	2/28/2026
DM003	ADVANCED ONSITE SENSOR (AOS) DIGIMATIC CALIPER (8)	MITUTOYO	500-197-30	11/5/2020	11/30/2021
EM003	TRUE RMS MULTIMETER	FLUKE	287	11/30/2020	11/30/2021
EM004	TRUE RMS MULTIMETER	FLUKE	287	3/18/2021	3/31/2022
EM007	TRUE RMS CLAMP ON AMMETER	FLUKE	376	12/31/2021	12/31/2022
TC045	CHAMBERS PI MONITOR	AOSONG ELECTRONICS	DHT22	3/4/2021	3/31/2022
EM040	TRIPLE OUTPUT DC POWER SUPPLY	KEYSIGHT TECHNOLOGIES	E36313A	11/30/2020	11/30/2021
EM022	TRUE RMS MULTIMETER	FLUKE	87 SERIES V	10/9/2020	10/31/2021
EM017	AC/DC/IR HIPOT TESTER	ASSOCIATED RESEARCH INC	3770	4/22/2021	4/30/2022
EM037	SYSTEM DC POWER SUPPLY	KEYSIGHT TECHNOLOGIES	N5741A	1/4/2021	1/31/2022
WT005	F4T DIN CONTROLLER BOX	WATLOW	F4T	7/29/2021	7/31/2022
TC044	RESISTANCE PI MONITOR	AOSONG ELECTRONICS	DHT22	4/8/2021	4/30/2022
TC046	SHAKE AND MAKE PI MONITOR	AOSONG ELECTRONICS	DHT22	3/4/2021	3/31/2022

Test Parameters

Test Name	Contact Retention
Specification	EIA-364-29D
Method / Procedure	Method A
Figure / Table	-

Test Requirements
<p>Contact Retention was setup and performed according to EIA-364-29 method A.</p> <ol style="list-style-type: none"> 1. Unmated connectors are clamped in a vice. 2. A gauge pin is attached to the force gauge. 3. The connector is placed under the force gauge and contact is aligned with the gauge pin. Gauge pin is positioned by eye to cover the entire area of the pin contact. 4. Gauge pin is placed on the surface of the contact and displacement is zeroed. Force gauge is lifted above the connector and zeroed. 5. Force is applied to a preload of 3.0 lbf 6. Displacement and force is zeroed. 7. Force is applied at a rate of 1in/min until required force is reached. 8. Applied force is held for 6 ± 1 seconds. 9. Displacement is measured 10. Gauge pin is disengaged from contact. 11. Max force applied is measured. 12. Connector is removed form vice.

Test Parameters

Test Name	Insulation Resistance
Specification	EIA-364-21F
Method / Procedure	-
Figure / Table	-

Test Requirements
<p>Insulation resistance is setup and performed according to EIA-364-21. Connectors 1-1, 1-2, and 1-5 are tested with the automated insulation resistance tester. All other samples have individual connections tested manually.</p> <ol style="list-style-type: none"> 1. The connector is mated and the other opposing end of the connector wires are spread out to ensure that there is no physical contact between wires ends. 2. Pin to pin connections have probes attached to the respective exposed wires. <ol style="list-style-type: none"> a. For automated testing, the exposed wire ends are connected to terminal blocks with the inclusion of a clip that is attached to the connector shell. 3. Insulation resistance is ran measuring the resistance between one contact, the surrounding contacts, and the shell. (500VDC, 120s dwell, resistance is measured). Resistance shall be at minimum 5000MΩ at ambient. Resistance post altitude immersion shall be 1000MΩ minimum. Resistance post moisture resistance shall be 100MΩ minimum. 4. Dielectric withstanding voltage is performed directly after the completion of IR testing. <p>*For IR results: EM012 has a capacity of 10GΩ, thus some results using this equipment will be measured at >10GΩ. EM032 has a capacity of 50GΩ, thus some results using this equipment will be measured at >50GΩ.</p>

Test Parameters

Test Name	Dielectric Withstanding Voltage
Specification	EIA-364-20F
Method / Procedure	Method B
Figure / Table	-

Test Requirements
<p>Dielectric withstanding voltage is setup and performed according to EIA-364-20. Connectors 1-1, 1-2, and 1-5 are tested with the automated hipot tester. All other samples have individual connections tested manually. Fifty percent of contacts are tested with a minimum of six dielectric withstanding voltage measurements.</p> <ol style="list-style-type: none"> 1. The connector is mated and the other opposing end of the connector wires are spread out to ensure that there is no physical contact between wires ends. 2. Pin to pin connections have probes attached to the respective exposed wires. <ol style="list-style-type: none"> a. For automated testing, the exposed wire ends are connected to terminal blocks with the inclusion of a clip that is attached to the connector shell. 3. Dielectric withstanding voltage is ran measuring the resistance between one contact, the surrounding contacts, and the shell. (2000VDC, 60s dwell, resistance is measured). Leakage current shall be at maximum 4mA.

Test Parameters

Test Name	Altitude Immersion
Specification	EIA-364-03D
Method / Procedure	-
Figure / Table	-

Test Requirements
<p>Altitude immersion is setup and performed in accordance with EIA-364-03.</p> <ol style="list-style-type: none"> 1. 5% by weight salt water solution is composed. 2. The testing vessel is filled with salt water solution sufficient to submerge the connectors within 1 inch of the surface of the water. 3. Connectors are secured to crossbar to ensure that the connector remains in the same position throughout the duration of the test. 4. The pressure is decreased to 25.4 torr, +0.0 torr, -5 torr. Pressure is reached within 5 minutes. 5. Vacuum pressure is maintained for 30 minutes. 6. Pressure is increased to ambient ~760torr. 7. Ambient pressure is maintained for 30 minutes. 8. Pressure is cycled two more times for a total of three total cycles. Steps 4-7 are repeated for each altitude immersion cycle. 9. Insulation resistance and dielectric withstanding voltage are performed while the connector is submerged in the salt water solution.

Test Parameters

Test Name	Durability
Specification	EIA-364-09D
Method / Procedure	-
Figure / Table	-

Test Requirements
<p>Durability is setup and performed in accordance with EIA-364-09.</p> <ol style="list-style-type: none"> 1. Connectors are secured in a vise or bird cage to fix the receptacle in place. 2. Mating and unmating cycles are performed manually at a rate of 300 cycles per hour. 3. The required durability originally required 500 cycles. During testing, the durability requirement was reduced to 100 cycles. 4. Increased force and excessive wear was recorded.

Test Parameters

Test Name	Shock
Specification	EIA-364-27C
Method / Procedure	Condition A
Figure / Table	-

Test Requirements
<p>Mechanical shock is setup and performed in accordance to EIA-364-27.</p> <ol style="list-style-type: none"> 1. Connector is mated and backshells are installed. All are torqued to required force. 2. Connectors are mounted to fixture plates and afixed to the shaker to allow for 8 inches of unsupported wire from the rear of the connector. 3. The connector is subjected to 3 shocks in positive and negative directions for all three axes (x, y, and z) for a total of 18 shocks. 4. All connections are monitored for electrical discontinuity with a maximum of 10μs. The maximum applied current is 100mA.

Test Name	Moisture Resistance
Specification	EIA-364-31F
Method / Procedure	Method IV
Figure / Table	Figure 1

Test Requirements
<p>Moisture resistance is setup and performed in accordance with EIA-364-31 Method IV. Figure 1 of EIA-364-31 Method IV is depicted below.</p> <ol style="list-style-type: none"> 1. Samples are placed into the humidity chamber with 2 inches between each connector and any other chamber surface. 2. Connector wires are fed through the vapor tight seals of the chamber. 3. Connectors are subjected to a precondition of 50°C for 24 hours followed by a recovery period of 24 hours of room ambient. 4. Perform insulation resistance at ambient conditions. 5. Connectors are subjected to a humidity cycling with 24 hour cycle durations with steps as follows: <ol style="list-style-type: none"> a. Ramp time of 2 hours 30 minutes from 25°C to 65°C with 90-98% relative humidity. b. Dwell time of 3 hours at 65°C with 90-98% relative humidity. c. Ramp time of 2 hours 30 minutes from 65°C to 25°C with 80-98% relative humidity. d. Ramp time of 2 hours 30 minutes from 25°C to 65°C with 90-98% relative humidity. e. Dwell time of 3 hours at 65°C with 90-98% relative humidity. f. Ramp time of 2 hours 30 minutes from 65°C to 25°C with 80-98% relative humidity. g. Dwell time of 8 hours at 25°C with 90-98% relative humidity. h. Repeat steps 5a-5g 8 times for a total of 9 cycles. i. Perform final cycle by repeating steps 5a-5f. j. Decrease temperature to -10°C and maintain for dwell time of 3 hours with humidity uncontrolled. k. Increase temperature to 25°C with 90-98% relative humidity within 1 hour. l. Dwell at 25°C with 90-98% relative humidity for 5 hours.

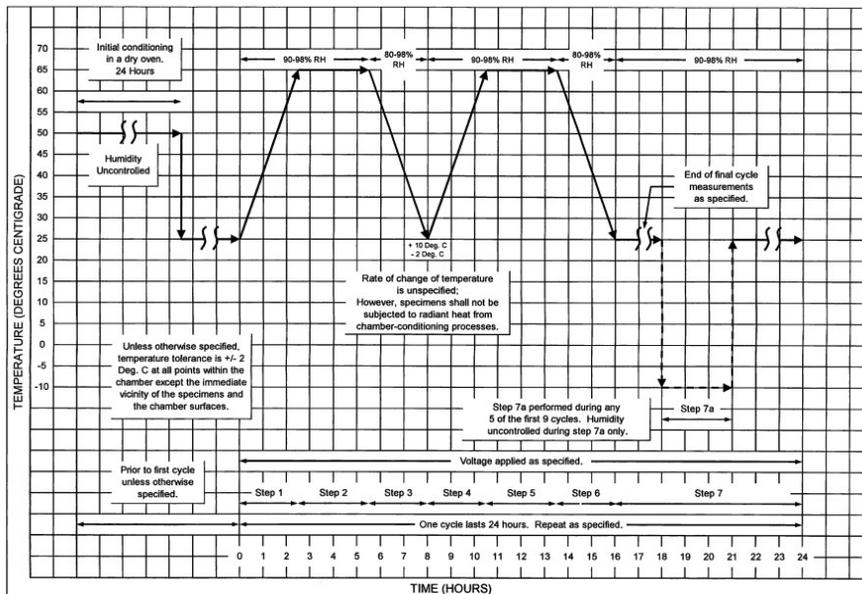


Figure 1 – Graphical representation of method IV, cycling temperature – humidity with optional cold shock

Test Parameters

Test Name	Insert Retention
Specification	EIA-364-35C
Method / Procedure	-
Figure / Table	-

Test Requirements
<p>Insert retention is setup and performed in accordance with EIA-364-35.</p> <p>Insert Retention in the Rear Direction:</p> <ol style="list-style-type: none"> 1. Unmated connector is inserted into hose. 2. Connector is clamped to create secure seal around accessory threads. 3. Connector is placed inside pressure testing cabinet. 4. Hose is pressurized to required air pressure. Pressure is held for 10 seconds. Hose is depressurized. 5. Connector is examined for any displacement of the insert. 6. Connector is removed from hose. <p>Insert Retention on the Face of Connector:</p> <ol style="list-style-type: none"> 1. Unmated onnector is secured in vice. 2. Connecor insert is placed onto surface of connector. 3. Force is applied using a lever arm and is monitored in realtime with a force gauge. 4. Once required force is reached, the applied force is held for approximately 6 seconds. 5. Force is released. 6. Connector is removed from vise and examined for any displacement of the insert.

Test Parameters

Test Name	External Bending Moment
Specification	SAE AS50151 Rev E
Method / Procedure	GT-19-342 Para. 7.12
Figure / Table	-

Test Requirements
<p>External bending moment was performed in accordance to SAE AS50151 and GT-19-342 Para. 7.12.</p> <ol style="list-style-type: none"> 1. Connector is mated and backshell is torqued to required force. 2. Connector is mounted to fixture plate. 3. Backshell of connector is installed behind fixture plate. 4. Fixture plate is mounted into test setup. 5. Fixture is aligned and lever arm distance is measured and verified. 6. Force is applied to back shell to achieve the required bend moment. 7. The applied force is maintained for a minimum of 60 seconds. 8. During the dwell, the connector is examined for any signs of damage. 9. Tensile tester travels upwards until the tensile tester is disengaged.

Test Parameters

Test Name	Contact Insertion and Removal Forces
Specification	EIA-364-05C
Method / Procedure	-
Figure / Table	-

Test Requirements
<p>Contact insertion and removal forces are performed in accordance with EIA-364-05.</p> <ol style="list-style-type: none"> 1. Connector is secured in vise. 2. Insertion/extraction tool is inserted into the cavity under test. Isopropyl alcohol is used to reduce damage to the grommet. 3. The wired contact is removed from the connector and the force is measured with a force gauge. 4. The wired contact is then inserted into the connector and the force is measured. 5. Steps 2-4 are repeated 9 more times. Measurement is only taken on the 9th cycle. 6. Damage to the grommet is noted.

Test Parameters

Test Name	Contact Resistance
Specification	EIA-364-06C
Method / Procedure	-
Figure / Table	-

Test Requirements
<p>Contact resistance is setup and performed in accordance with EIA-364-06.</p> <ol style="list-style-type: none"> 1. Connector is mated. 2. The wires under test are attached to the power supply with clips or directly with lugs. This connection acts as the source probes. 3. Clips are attached to the wire under test on the inside of the source clips as the sense probes. 4. The contacts under test are energized to the required current. The lowest voltage required to achieve this current is utilized. 5. The voltage drop across the wire is measured. 6. Sample is deenergized and the connections are removed. 7. Steps 2-6 are repeated until all contacts are tested. 8. A 6 inch wire sample is subjected to the same current as the corresponding test sample. 9. The measurement is used to calculate a voltage drop per inch value. 10. The excess length of wire of each sample is measured. 11. The voltage drop of the excess wire is calculated and subtracted from the measured voltage drop of the sample.

Date	Time	Notes
8/31/21	8:00 AM	Setup and performed contact retention on samples 1-1S, 1-2S, 1-3S, 1-4S, 1-6S, 1-7S, and 1-6P.
9/1/21	8:00 AM	Altered setup to perform contact retention on larger shell size plug samples.
9/1/21	10:00 AM	Investigated samples 1-6P after contact failed retention. Sample had contact A removed. In the process the grommet was damaged. Contacts were removed and connector was sent to Glenair to replace grommet.
9/1/21	11:00 AM	Performed contact retention on samples 1-1P, 1-2P, and 1-5S.
9/1/21	1:00 PM	Performed contact retention on samples 1-3P, 1-4P, 1-5P, and 1-7P. Backshells were installed to clamp into vise.
9/2/21	8:00 AM	Discussed requirements for backshell and connector to connector torque. Installed backshells.
9/2/21	10:00 AM	Performed insulation resistance and dielectric withstanding voltage for samples 1-1, 1-3, 1-4, and 1-5.
9/3/21	8:00AM	Performed IR and DWV for samples 1-2 and 1-7.
9/7/21	8:00AM	Ran test run for altitude immersion. Pulled vacuum overnight to reduce air trapped in water.
9/7/21	1:00 PM	Received reworked part (1-6P) from customer.
9/8/21	9:45 AM	Began altitude immersion testing for samples 1-1, 1-2, 1-3, and 1-4.
9/8/21	1:00 PM	Completion of altitude immersion third cycle.
9/8/21	1:05 PM	Performed IR and DWV for samples 1-1, 1-2, 1-3, and 1-4.
9/9/21	9:30 AM	Performed IR and DWV on sample 1-6.
9/9/21	11:09 AM	Alerted customer of IR failure for sample 1-6.
9/9/21	12:39 PM	Began altitude immersion testing for samples 1-5 and 1-7.
9/9/21	3:55 PM	Completion of altitude immersion third cycle.
9/9/21	4:00 PM	Performed IR and DWV for samples 1-5 and 1-7.
9/10/21	8:00 AM	Customer arrived to inspect sample 1-6.
9/10/21	8:30 AM	Performed IR and DWV to demonstrate failure. Connector was uncoupled and moisture was discovered at the contact interface. Further investigation suggested the moisture was water from an unknown source. Damage to sample 1-6S cavity B grommet was noted.
9/10/21	9:00AM	Customer agreed on a test deviation to bakeout the unmated connector at 50C for 3 hours total.
9/10/21	10:00 AM	Setup and performed durability for samples 1-1, 1-2, and 1-4 (500 cycles). Performed 203 cycles on sample 1-3.
9/10/21	5:09 PM	Alerted customer of excessive wear of connector shell and contacts. Received instruction to pause durability for customer to examine samples.
9/13/21	8:00 AM	Setup durability for sample 1-7.

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Date	Time	Notes
9/13/21	9:00 AM	Customer examined parts and gave approval to perform 100 cycles of durability.
9/13/21	10:20 PM	Began altitude immersion testing 1-6.
9/13/21	1:25 PM	Received instruction from customer to continue to 500 cycles of durability on remaining samples.
9/13/21	1:40 PM	Completion of altitude immersion third cycle.
9/13/21	1:45 PM	Performed IR and DWV for samples 1-6.
9/13/21	3:00 PM	Performed 200 cycles on sample 1-5. Performed 30 cycles on sample 1-7.
9/14/21	8:00 AM	Performed 300 cycles on sample 1-5 (total 500). Performed 111 durability cycles on sample 1-7 (total 141).
9/14/21	3:00 PM	Performed 157 cycles of durability on sample 1-3 (total 360).
9/14/21	3:07 PM	Received instruction from customer to perform only 100 cycles for remaining samples in accordance to AS50151.
9/14/21	5:00 PM	Performed 70 cycles on sample 1-6.
9/15/21	7:00 AM	Performed 30 cycles on sample 1-6 (total 100). Damage to sample 1-6 cavities D and E grommet were noted.
9/15/21	8:00 AM	Customers discussed and agreed to a test deviation for the samples that exceeded 100 cycles of durability. Samples had debris cleaned from connector face, only in between contacts.
9/15/21	1:00 PM	Performed checkout runs on shaker for shock.
9/16/21	8:00 AM	Setup for contact insertion and removal forces for group 2.
9/16/21	3:18 PM	Performed shock on sample 1-1 all axes. No discontinuities observed.
9/16/21	4:30 PM	Performed insertion and removal forces on sample 2-1P on cavities A, B, D, and E.
9/17/21	8:00 AM	Completed testing for sample 2-1P.
9/17/21	11:00 AM	Began insertion and removal testing for sample 2-3P. After one removal and insertion, damage to grommet was reported to customer and testing was paused for the sample.
9/17/21	12:50 PM	Attempted to remove size 4 contact in cavity A. Damaged cavity and alerted customer.
9/17/21	1:00 PM	Performed testing for sample 2-2S. Tested all size 16 contact sample sizes.
9/17/21	3:52 PM	Completed shock testing for samples 1-2 and 1-5 all axes. No discontinuities observed.
9/17/21	4:00 PM	Attempted to remove size 4 contact in cavity C. Damaged cavity and alerted customer.
9/20/21	3:04 PM	Completed shock testing for samples 1-6 all axes. No discontinuities observed.
9/21/21	11:31 AM	Completed shock testing for samples 1-7 all axes. No discontinuities observed.
9/22/21	3:16 PM	Completed shock testing for samples 1-3 and 1-4 all axes. No discontinuities observed.
9/22/21	4:40 PM	Began moisture resistance precondition.

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Date	Time	Notes
9/23/21	4:40 PM	Began moisture resistance recovery period.
9/24/21	5:00 PM	Insulation resistance post moisture resistance precondition.
9/25/21	8:56 AM	Began moisture resistance cycle.
9/25/21	9:09 AM	Moisture resistance initial IR test deviation sent to customer.
9/27/21	1:08 PM	Notified customer of test deviation for moisture resistance for samples 1-1, 1-2, and 1-5.
9/27/21	2:00 PM	Repairs were made to humidity chamber. Test profile was run to confirm performance.
9/28/21	10:44 AM	Received approval to restart moisture resistance testing without precondition retest.
9/28/21	11:05 AM	Started moisture resistance testing for samples 1-1, 1-2, and 1-5.
9/29/21	7:51 AM	Humidity chamber fluctuates out of tolerance. Relative humidity falls below 90%RH. Discussed with customer. Customer agreed to monitor fluctuations and accept lowest RH.
9/30/21	1:21 PM	Received approval to continue insertion and removal testing for group 2.
9/30/21	4:00 PM	Performed insertion and removal testing for sample 2-3P cavity A.
9/30/21	4:38 PM	Contacted customer and notified of further damage to grommet.
10/1/21	11:00 AM	Performed insertion and removal testing for sample 2-3P cavity B and sample 2-2S.
10/1/21	3:00 PM	Performed contact resistance on sample 2-1. Size 16 wire was tested and witnessed by customer.
10/4/21	9:38 AM	Performed contact resistance on sample 2-2. Size 4 and size 12 wire were tested.
10/4/21	4:23 PM	Performed insertion and removal forces in sample 2-1P cavity B and sample 2-2S cavity B.
10/5/21	10:00 AM	Performed insulation resistance at elevated humidity for mated samples 1-3, 1-4, 1-6, and 1-7. Sample 1-6 failed IR at multiple connections. Discussed failure with customer and agreed to wait for IR post 24 hour recovery period results to further investigate.
10/5/21	2:02 PM	Received sample 2-4P/S for contact resistance testing from customer.
10/6/21	11:50AM	Performed insulation resistance post 24 hour recovery period. All samples passed. Unmated connector to investigate failure. No moisture was observed in the contact interface.
10/7/21	9:00 AM	Removed backshells and unmated connectors for samples 1-3, 1-6, and 1-7. In the process of removing the backshells, sample 1-3 was damaged. The insert of 1-3S was cracked. Sample 1-3P experienced a broken EMI spring and sheared keyways.
10/7/21	11:11 AM	Contacted customer and notified of damage to connector. Discussed path forward to remove backshell from sample 1-4P.
10/7/21	1:24 PM	Sample 1-4 was unmated and backshell was removed.
10/8/21	9:00 AM	Customers view damage to sample 1-3P/S. Customers agreed to exclude sample from further testing due to the damage. All previous test data for the sample is to be reported.
10/8/21	10:43 AM	Performed insulation resistance at elevated humidity for samples 1-1P/S, 1-2P/S, and 1-5P/S.

Test Operator	Danny Tan
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**Ambient environmental data controlled and maintained by Vertical Laboratories. Specific data can be provided upon customer request.*

Date	Time	Notes
10/8/21	1:30 PM	Began insert retention testing for samples 1-4P/S, 1-6P/S, and 1-7P/S. Test setup and testing of sample 1-6P insert retention in the rear direction.
10/8/21	3:19 PM	Completed insert retention in the rear direction for samples 1-4P/S, 1-6P/S, and 1-7P/S.
10/8/21	4:00 PM	Performed contact resistance on sample 2-4P/S.
10/9/21	9:37 AM	Performed insert retention on samples 1-4P/S, 1-6P/S, and 1-7P/S on the face of connector.
10/9/21	1:33 PM	Performed insulation resistance post 24 hour recovery for samples 1-1P/S, 1-2P/S, and 1-5P/S.
10/10/21	8:00 AM	Unmated and removed backshells from samples 1-1P/S, 1-2P/S, and 1-5P/S. In the process of removing the backshell from sample 1-1P, the wing of the backshell sheared off. Customer was alerted. Damage was noted. Customer agreed to switch backshells with 1-1S to perform external bending moment.
10/10/21	10:21 AM	Performed insert retention for samples 1-1P/S, 1-2P/S, and 1-5P/S in the rear direction.
10/10/21	11:53 AM	Performed insert retention for samples 1-1P/S, 1-2P/S, and 1-5P/S on the face of the connectors.
10/11/21	5:00 PM	Tested rate of application of load for external bending moment.
10/12/21	10:33 AM	Customer agreed to test deviation for external bending moment. Rate was changed from 10 pounds/second to 0.180 in/minute to comply with the settings of the equipment available.
10/12/21	11:47 AM	Insert retention was reperfomed in the rear direction after previous test was discovered to only reach 94 psi.
10/12/21	11:43 AM	Performed external bending moment on sample 1-2P/S.
10/12/21	1:28 PM	Performed external bending moment on sample 1-4P/S.
10/12/21	1:44 PM	Performed external bending moment on sample 1-5P/S.
10/12/21	2:46 PM	Performed external bending moment on sample 1-6P/S.
10/12/21	2:51 PM	Performed external bending moment on sample 1-7P/S.
10/12/21	3:26 PM	Performed external bending moment on sample 1-1P/S.
10/12/21	3:35 PM	Visually examined samples 1-1P/S and 1-7P/S for post test examination. Samples were unmated and had backshells removed. Samples were then tested to ensure that connector can mate and install and remove backshells with no issues.
10/13/21	8:00 AM	Visually examined samples 1-2P/S, 1-3P/S, 1-4P/S, 1-5P/S, and 1-6P/S for post test examination. Samples were unmated and had backshells removed. Samples were then tested to ensure that connector can mate and install and remove backshells with no issues.
10/13/21	3:00 PM	Visually examined samples 2-1P/S, 2-2P/S, 2-3P/S, and 2-4P/S for post test examination.

Test Operator	Danny Tan
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**Ambient environmental data controlled and maintained by Vertical Laboratories. Specific data can be provided upon customer request.*

Pre-test sample conditions

Samples Passed Visual Inspection.

Post-test sample conditions

Samples Passed Final Visual Inspection.

Damage to note:

Sample 1-1P/S: Some salt residue remained on the plating of the connector.

Sample 1-2P/S: Some corrosion damage to plating on connector body 1-2S due to residual salt from altitude immersion.

Mating indicator stripe damaged due to corrosion.

Sample 1-3P/S: Insert was damaged for 1-3S. Sample 1-3P had the keyways sheared and the EMI spring broken.

Sample 1-4P/S: Some corrosion damage to plating on connector body 1-2S due to residual salt from altitude immersion.

Mating indicator stripe damaged due to corrosion.

Sample 1-5P/S: Some salt residue remained on the plating of the connector.

Sample 1-6P/S: Some salt residue remained on the plating of the connector.

Sample 1-7P/S: Some salt residue remained on the plating of the connector.

Test Name	Contact Retention
Specification	EIA-364-29 Rev D Method B
Environmental Conditions	Ambient Lab Conditions
Test Equipment	CP028, DM025, CP026, DM024
Date	8/31/21-9/1/21

Sample	Pin	Force (lbf)	Δy (in)	Pass/Fail	Notes	Sample	Pin	Force (lbf)	Δy (in)	Pass/Fail	Notes
1-1P	A	30.125	0.0015	Pass	-	1-3P	A	60.1	0.0080	Pass	-
	B	50.095	0.0020	Pass	-		B	60.4	0.0100	Pass	Damage to insert edge
	C	30.245	0.0050	Pass	-		C	60.3	0.0075	Pass	-
	D	50.055	0.0010	Pass	-		D	60.4	0.0145	Pass	-
1-1S	A	30.310	0.0020	Pass	-	1-3S	A	60	0.0105	Pass	-
	B	50.000	0.0035	Pass	-		B	~60	0.0135	Pass	-
	C	30.315	0.0015	Pass	-		C	~60	0.0115	Pass	-
	D	50.000	0.0040	Pass	-		D	60.2	0.0850	Pass	-
1-2P	A	50.465	0.0060	Pass	-	1-4P	A	61.3	0.0215	Pass	-
	B	25.465	0.0030	Pass	-		B	60.5	0.0140	Pass	-
	C	25.630	0.0080	Pass	-		C	60.6	0.0175	Pass	-
	D	50.125	0.0055	Pass	-		D	60.3	0.0120	Pass	-
	E	50.050	0.0055	Pass	-	1-4S	A	60.8	0.0110	Pass	-
	F	25.335	0.0065	Pass	-		B	~60	0.0145	Pass	-
	G	25.380	0.0025	Pass	-		C	60.7	0.0135	Pass	Slip @ 41.4lbf
1-2S	A	50.200	0.0040	Pass	-	D	60.3	0.0085	Pass	-	
	B	25.255	0.0030	Pass	-	1-5P	A	25.1	0.0050	Pass	-
	C	25.350	0.0060	Pass	-		E	25.66	0.0045	Pass	-
	D	50.100	0.0060	Pass	-		H	25.08	0.0075	Pass	-
	E	50.200	0.0060	Pass	-		L	26.36	0.0045	Pass	-
	F	25.295	0.0055	Pass	-		N	25.12	0.0035	Pass	-
	G	25.525	0.0060	Pass	-		1-5S	A	25.035	0.0040	Pass
					E			25.215	0.0050	Pass	-
					H	25.250		0.0040	Pass	-	
					L	26.015		0.0050	Pass	-	
					N	25.175		0.0030	Pass	-	

Test Name	Contact Retention
Specification	EIA-364-29 Rev DMethod B
Environmental Conditions	Ambient Lab Conditions
Test Equipment	CP028, DM025, CP026, DM024
Date	8/31/21-9/1/21

Sample	Pin	Force (lbf)	Δy (in)	Pass/Fail	Notes
1-6P	A	75.2	0.0090	Pass	-
	B	75.7	0.0150	Pass	-
	C	76.4	0.0210	Pass	-
	D	75.5	0.0130	Pass	-
	E	75.1	0.0115	Pass	-
1-6S	A	~75	0.0175	Pass	-
	B	~75	0.0130	Pass	-
	C	75.1	0.0095	Pass	-
	D	75.1	0.0095	Pass	-
	E	75.3	0.0085	Pass	-
1-7P	A	~75	0.0115	Pass	-
	B	75.1	0.0090	Pass	-
	C	75.8	0.0075	Pass	-
	D	75.4	0.0165	Pass	-
	E	75.1	0.0135	Pass	-
1-7S	A	~75	0.0130	Pass	-
	B	75.1	0.0130	Pass	-
	C	75.1	0.0080	Pass	-
	D	75.2	0.0135	Pass	-
	E	75.4	0.0095	Pass	-

Test Name	Insulation Resistance Initial
Specification	EIA-364-21F
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM012
Date	9/2/21-9/3/21

Sample 1-1P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>10G	Pass
A	D			>10G	Pass
B	C			>10G	Pass
B	D			>10G	Pass
C	D			>10G	Pass
A	Shell			>10G	Pass
B	Shell			>10G	Pass
C	Shell			>10G	Pass
D	Shell			>10G	Pass

Sample 1-2P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>10G	Pass
A	C			>10G	Pass
A	D			>10G	Pass
A	E			>10G	Pass
A	F			>10G	Pass
A	G			>10G	Pass
B	C			>10G	Pass
B	D			>10G	Pass
C	D			>10G	Pass
D	E			>10G	Pass
E	F			>10G	Pass
E	G			>10G	Pass
F	G			>10G	Pass
A	Shell			>10G	Pass
B	Shell			>10G	Pass
C	Shell			>10G	Pass
D	Shell			>10G	Pass
E	Shell			>10G	Pass
F	Shell			>10G	Pass
G	Shell			>10G	Pass

Test Results

Test Name	Insulation Resistance Initial
Specification	EIA-364-21F
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM032
Date	9/2/21-9/3/21

Sample 1-3P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>50G	Pass
A	C			>50G	Pass
A	D			48744M	Pass
B	C			29541M	Pass
B	D			35194M	Pass
C	D			27544M	Pass
A	Shell			>50G	Pass
B	Shell			23970M	Pass
C	Shell			20411M	Pass
D	Shell			21987M	Pass

Sample 1-4P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>50G	Pass
A	C			39424M	Pass
A	D			35723M	Pass
B	C			>50G	Pass
B	D			>50G	Pass
C	D			27882M	Pass
A	Shell			26939M	Pass
B	Shell			41848M	Pass
C	Shell			27047M	Pass
D	Shell			17103M	Pass

Test Results

Test Name	Insulation Resistance Initial
Specification	EIA-364-21F
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM012
Date	9/2/21-9/3/21

Sample 1-5P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>10G	Pass
A	K			>10G	Pass
A	L			>10G	Pass
B	C			>10G	Pass
B	L			>10G	Pass
B	M			>10G	Pass
C	D			>10G	Pass
C	M			>10G	Pass
C	N			>10G	Pass
D	E			>10G	Pass
D	M			>10G	Pass
D	N			>10G	Pass
E	F			>10G	Pass
E	N			>10G	Pass
E	P			>10G	Pass
F	G			>10G	Pass
F	N			>10G	Pass
F	P			>10G	Pass
G	H			>10G	Pass
G	P			>10G	Pass
G	R	>10G	Pass		
H	J	>10G	Pass		
H	P	>10G	Pass		
H	R	>10G	Pass		
J	K	>10G	Pass		
J	L	>10G	Pass		
J	R	>10G	Pass		

Sample 1-5P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
K	L	500 V	120 s	>10G	Pass
K	R			>10G	Pass
L	M			>10G	Pass
L	N			>10G	Pass
L	P			>10G	Pass
L	R			>10G	Pass
M	N			>10G	Pass
M	P			>10G	Pass
M	R			>10G	Pass
N	P			>10G	Pass
N	R			>10G	Pass
P	R			>10G	Pass
A	Shell			>10G	Pass
B	Shell			>10G	Pass
C	Shell			>10G	Pass
D	Shell			>10G	Pass
E	Shell			>10G	Pass
F	Shell			>10G	Pass
G	Shell			>10G	Pass
H	Shell			>10G	Pass
J	Shell	>10G	Pass		
K	Shell	>10G	Pass		
L	Shell	>10G	Pass		
M	Shell	>10G	Pass		
N	Shell	>10G	Pass		
P	Shell	>10G	Pass		
R	Shell	>10G	Pass		

Test Results

Test Name	Insulation Resistance Initial
Specification	EIA-364-21F
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM032
Date	9/2/21-9/3/21

Sample 1-6P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120s	513.2M	Fail
A	E			552.5M	Fail
B	C			912.6M	Fail
C	D			732.8M	Fail
D	E			389.9M	Fail
A	Shell			395.8M	Fail
B	Shell			374.9M	Fail
C	Shell			489.3M	Fail
D	Shell			180.4M	Fail
E	Shell			236.9M	Fail

Sample 1-7P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120s	12542M	Pass
A	E			13189M	Pass
B	C			9850M	Pass
C	D			11993M	Pass
D	E			11666M	Pass
A	Shell			10852M	Pass
B	Shell			8567M	Pass
C	Shell			9689M	Pass
D	Shell			8102M	Pass
E	Shell			9157M	Pass

Test Name	Insulation Resistance Initial Retest
Specification	EIA-364-21F
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM032
Date	9/10/2021

Sample 1-6P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120s	19657M	Pass
A	E			13674M	Pass
B	C			19929M	Pass
C	D			13277M	Pass
D	E			6380M	Pass
A	Shell			10833M	Pass
B	Shell			14985M	Pass
C	Shell			10320M	Pass
D	Shell			7788M	Pass
E	Shell			8318M	Pass

Test Name	Dielectric Withstanding Voltage Initial
Specification	EIA-364-20F Method A
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM012
Date	9/2/21-9/3/21

Sample 1-1P/S					
Pin to Pin		Test Level	Duration	Leakage Current (mA)	Pass/Fail
A	B	2kVAC	60 s	0.085	Pass
A	D			0.075	Pass
B	C			0.084	Pass
B	D			0.101	Pass
C	D			0.075	Pass
A	Shell			0.067	Pass
B	Shell			0.079	Pass
C	Shell			0.068	Pass
D	Shell			0.080	Pass

Sample 1-2P/S					
Pin to Pin		Test Level	Duration	Leakage Current (mA)	Pass/Fail
A	B	2kVAC	60 s	0.076	Pass
A	C			0.074	Pass
A	D			0.083	Pass
A	E			0.084	Pass
A	F			0.064	Pass
A	G			0.057	Pass
C	B			0.060	Pass
C	D			0.063	Pass
E	D			0.081	Pass
E	F			0.065	Pass
G	F			0.060	Pass
A	Shell			0.063	Pass
C	Shell			0.055	Pass
E	Shell			0.069	Pass
G	Shell			0.055	Pass

Test Name	Dielectric Withstanding Voltage Initial
Specification	EIA-364-20F Method A
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM032
Date	9/2/21-9/3/21

Sample 1-3P/S					
Pin to Pin		Test Level	Duration	Leakage Current (mA)	Pass/Fail
A	B	2kVAC	60 s	0.063	Pass
A	C			0.061	Pass
A	D			0.056	Pass
B	C			0.059	Pass
B	D			0.054	Pass
C	D			0.059	Pass
A	Shell			0.063	Pass
B	Shell			0.066	Pass
C	Shell			0.065	Pass
D	Shell			0.061	Pass

Sample 1-4P/S					
Pin to Pin		Test Level	Duration	Leakage Current (mA)	Pass/Fail
A	B	2kVAC	60 s	0.074	Pass
A	C			0.063	Pass
A	D			0.077	Pass
B	C			0.065	Pass
B	D			0.067	Pass
C	D			0.069	Pass
A	Shell			0.062	Pass
B	Shell			0.061	Pass
C	Shell			0.058	Pass
D	Shell			0.062	Pass

Test Name	Dielectric Withstanding Voltage Initial
Specification	EIA-364-20F Method A
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM012
Date	9/2/21-9/3/21

Sample 1-5P/S					
Pin to Pin		Test Level	Duration	Leakage Current (mA)	Pass/Fail
A	B	2kVAC	60 s	0.074	Pass
A	K			0.050	Pass
A	L			0.053	Pass
C	D			0.087	Pass
C	M			0.051	Pass
C	N			0.050	Pass
E	F			0.062	Pass
E	N			0.058	Pass
E	P			0.051	Pass
G	H			0.058	Pass
G	P			0.049	Pass
G	R			0.048	Pass
J	K			0.060	Pass
J	L			0.056	Pass
J	R			0.080	Pass
L	M			0.053	Pass

Sample 1-5P/S					
Pin to Pin		Test Level	Duration	Leakage Current (mA)	Pass/Fail
L	N	2kVAC	60 s	0.049	Pass
L	P			0.047	Pass
L	R			0.051	Pass
N	P			0.057	Pass
N	R			0.049	Pass
P	R			0.055	Pass
A	Shell			0.064	Pass
C	Shell			0.062	Pass
E	Shell			0.065	Pass
G	Shell			0.062	Pass
J	Shell			0.063	Pass
L	Shell			0.054	Pass
N	Shell			0.058	Pass
P	Shell			0.061	Pass
R	Shell			0.059	Pass

Test Name	Dielectric Withstanding Voltage Initial
Specification	EIA-364-20F Method A
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM032
Date	9/2/21-9/3/21

Sample 1-6P/S					
Pin to Pin		Test Level	Duration	Leakage Current (mA)	Pass/Fail
A	B	2kVAC	60 s	0.076	Pass
A	E			0.095	Pass
C	D			0.078	Pass
C	B			0.089	Pass
E	D			0.098	Pass
A	Shell			0.088	Pass
C	Shell			0.082	Pass
E	Shell			0.090	Pass

Sample 1-7P/S					
Pin to Pin		Test Level	Duration	Leakage Current (mA)	Pass/Fail
A	B	2kVAC	60 s	0.073	Pass
A	E			0.082	Pass
C	D			0.079	Pass
C	B			0.065	Pass
E	D			0.060	Pass
A	Shell			0.069	Pass
C	Shell			0.068	Pass
E	Shell			0.067	Pass

Test Name	Dielectric Withstanding Voltage Initial Retest
Specification	EIA-364-20F Method A
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM032
Date	9/10/2021

Sample 1-6P/S					
Pin to Pin		Test Level	Duration	Leakage Current (mA)	Pass/Fail
A	B	2kVAC	60 s	0.093	Pass
A	E			0.074	Pass
C	D			0.097	Pass
C	B			0.076	Pass
E	D			0.082	Pass
A	Shell			0.075	Pass
C	Shell			0.082	Pass
E	Shell			0.073	Pass

Test Name	Insulation Resistance Post Altitude Immersion
Specification	EIA-364-21F
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM032
Date	9/8/2021

Sample 1-1P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>50G	Pass
A	D			>50G	Pass
B	C			>50G	Pass
B	D			>50G	Pass
C	D			>50G	Pass
A	Shell			>50G	Pass
B	Shell			>50G	Pass
C	Shell			>50G	Pass
D	Shell			>50G	Pass

Sample 1-2P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>50G	Pass
A	C			>50G	Pass
A	D			>50G	Pass
A	E			>50G	Pass
A	F			>50G	Pass
A	G			>50G	Pass
B	C			>50G	Pass
B	D			>50G	Pass
C	D			>50G	Pass
D	E			35232	Pass
E	F			>50G	Pass
E	G			>50G	Pass
F	G			>50G	Pass
A	Shell			>50G	Pass
B	Shell			>50G	Pass
C	Shell			>50G	Pass
D	Shell			>50G	Pass
E	Shell			>50G	Pass
F	Shell			>50G	Pass
G	Shell			>50G	Pass

Test Results

Test Name	Insulation Resistance Post Altitude Immersion
Specification	EIA-364-21F
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM032
Date	9/8/2021

Sample 1-3P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>50G	Pass
A	C			>50G	Pass
A	D			>50G	Pass
B	C			>50G	Pass
B	D			>50G	Pass
C	D			>50G	Pass
A	Shell			>50G	Pass
B	Shell			>50G	Pass
C	Shell			>50G	Pass
D	Shell			>50G	Pass

Sample 1-4P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>50G	Pass
A	C			>50G	Pass
A	D			>50G	Pass
B	C			>50G	Pass
B	D			>50G	Pass
C	D			>50G	Pass
A	Shell			>50G	Pass
B	Shell			>50G	Pass
C	Shell			>50G	Pass
D	Shell			>50G	Pass

Test Results

Test Name	Insulation Resistance Post Altitude Immersion
Specification	EIA-364-21F
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM012
Date	9/9/2021

Sample 1-5P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>10G	Pass
A	K			>10G	Pass
A	L			>10G	Pass
B	C			>10G	Pass
B	L			>10G	Pass
B	M			>10G	Pass
C	D			>10G	Pass
C	M			>10G	Pass
C	N			>10G	Pass
D	E			>10G	Pass
D	M			>10G	Pass
D	N			>10G	Pass
E	F			>10G	Pass
E	N			>10G	Pass
E	P			>10G	Pass
F	G			>10G	Pass
F	N			>10G	Pass
F	P			>10G	Pass
G	H			>10G	Pass
G	P			>10G	Pass
G	R	>10G	Pass		
H	J	>10G	Pass		
H	P	>10G	Pass		
H	R	>10G	Pass		
J	K	>10G	Pass		
J	L	>10G	Pass		
J	R	>10G	Pass		

Sample 1-5P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
K	L	500 V	120 s	>10G	Pass
K	R			>10G	Pass
L	M			>10G	Pass
L	N			>10G	Pass
L	P			>10G	Pass
L	R			>10G	Pass
M	N			>10G	Pass
M	P			>10G	Pass
M	R			>10G	Pass
N	P			>10G	Pass
N	R			>10G	Pass
P	R			>10G	Pass
A	Shell			>10G	Pass
B	Shell			>10G	Pass
C	Shell			>10G	Pass
D	Shell			>10G	Pass
E	Shell			>10G	Pass
F	Shell			>10G	Pass
G	Shell			>10G	Pass
H	Shell			>10G	Pass
J	Shell	>10G	Pass		
K	Shell	>10G	Pass		
L	Shell	>10G	Pass		
M	Shell	>10G	Pass		
N	Shell	>10G	Pass		
P	Shell	>10G	Pass		
R	Shell	>10G	Pass		

Test Results

Test Name	Insulation Resistance Post Altitude Immersion
Specification	EIA-364-21F
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM032
Date	9/9/21-9/13/21

Sample 1-6P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120s	6667M	Pass
A	E			8739M	Pass
B	C			7028M	Pass
C	D			3982M	Pass
D	E			5331M	Pass
A	Shell			6073M	Pass
B	Shell			5909M	Pass
C	Shell			3084M	Pass
D	Shell			4565M	Pass
E	Shell			7053M	Pass

Sample 1-7P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120s	20813M	Pass
A	E			21038M	Pass
B	C			11956M	Pass
C	D			18340M	Pass
D	E			14115M	Pass
A	Shell			28915M	Pass
B	Shell			17838M	Pass
C	Shell			12983M	Pass
D	Shell			12652M	Pass
E	Shell			7878M	Pass

Test Results

Test Name	Dielectric Withstanding Voltage Post Altitude Immersion
Specification	EIA-364-20F Method A
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM012, EM032
Date	9/8/2021

Sample 1-1P/S					
Pin to Pin		Test Level	Duration	Leakage Current (mA)	Pass/Fail
A	B	2kVAC	60 s	0.311	Pass
A	D			0.070	Pass
B	C			0.072	Pass
B	D			0.092	Pass
C	D			0.075	Pass
A	Shell			0.146	Pass
B	Shell			0.189	Pass
C	Shell			0.145	Pass
D	Shell			0.197	Pass

Sample 1-2P/S					
Pin to Pin		Test Level	Duration	Leakage Current (mA)	Pass/Fail
A	B	2kVAC	60 s	0.071	Pass
A	C			0.078	Pass
A	D			0.093	Pass
A	E			0.104	Pass
A	F			0.067	Pass
A	G			0.066	Pass
C	B			0.062	Pass
C	D			0.070	Pass
E	D			0.106	Pass
E	F			0.070	Pass
G	F			0.048	Pass
A	Shell			0.219	Pass
C	Shell			0.016	Pass
E	Shell			0.234	Pass
G	Shell			0.134	Pass

Test Results

Test Name	Dielectric Withstanding Voltage Post Altitude Immersion
Specification	EIA-364-20F Method A
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM012, EM032
Date	9/8/2021

Sample 1-3P/S					
Pin to Pin		Test Level	Duration	Leakage Current (mA)	Pass/Fail
A	B	2kVAC	60 s	0.142	Pass
A	C			0.133	Pass
A	D			0.125	Pass
B	C			0.135	Pass
B	D			0.123	Pass
C	D			0.126	Pass
A	Shell			0.277	Pass
B	Shell			0.273	Pass
C	Shell			0.256	Pass
D	Shell			0.288	Pass

Sample 1-4P/S					
Pin to Pin		Test Level	Duration	Leakage Current (mA)	Pass/Fail
A	B	2kVAC	60 s	0.138	Pass
A	C			0.127	Pass
A	D			0.140	Pass
B	C			0.134	Pass
B	D			0.139	Pass
C	D			0.138	Pass
A	Shell			0.299	Pass
B	Shell			0.293	Pass
C	Shell			0.284	Pass
D	Shell			0.311	Pass

Test Name	Dielectric Withstanding Voltage Post Altitude Immersion
Specification	EIA-364-20F Method A
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM012, EM032
Date	9/9/2021

Sample 1-5P/S					
Pin to Pin		Test Level	Duration	Leakage Current (mA)	Pass/Fail
A	B	2kVAC	60 s	0.093	Pass
A	K			0.065	Pass
A	L			0.069	Pass
C	D			0.110	Pass
C	M			0.063	Pass
C	N			0.067	Pass
E	F			0.078	Pass
E	N			0.081	Pass
E	P			0.069	Pass
G	H			0.071	Pass
G	P			0.068	Pass
G	R			0.063	Pass
J	K			0.069	Pass
J	L			0.063	Pass
J	R			0.095	Pass
L	M	0.069	Pass		

Sample 1-5P/S					
Pin to Pin		Test Level	Duration	Leakage Current (mA)	Pass/Fail
L	N	2kVAC	60 s	0.070	Pass
L	P			0.063	Pass
L	R			0.066	Pass
N	P			0.073	Pass
N	R			0.068	Pass
P	R			0.067	Pass
A	Shell			0.230	Pass
C	Shell			0.217	Pass
E	Shell			0.220	Pass
G	Shell			0.211	Pass
J	Shell			0.200	Pass
L	Shell			0.204	Pass
N	Shell			0.210	Pass
P	Shell			0.211	Pass
R	Shell			0.201	Pass

Test Name	Dielectric Withstanding Voltage Post Altitude Immersion
Specification	EIA-364-20F Method A
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM012, EM032
Date	9/9/21-9/13/21

Sample 1-6P/S					
Pin to Pin		Test Level	Duration	Leakage Current (mA)	Pass/Fail
A	B	2kVAC	60 s	0.036	Pass
A	E			0.346	Pass
C	D			0.543	Pass
C	B			0.443	Pass
E	D			0.335	Pass
A	Shell			0.746	Pass
C	Shell			0.696	Pass
E	Shell			0.717	Pass

Sample 1-7P/S					
Pin to Pin		Test Level	Duration	Leakage Current (mA)	Pass/Fail
A	B	2kVAC	60 s	0.343	Pass
A	E			0.338	Pass
C	D			0.331	Pass
C	B			0.334	Pass
E	D			0.327	Pass
A	Shell			0.763	Pass
C	Shell			0.724	Pass
E	Shell			0.727	Pass

Test Name	Durability
Specification	EIA-364-09D
Environmental Conditions	Ambient Lab Conditions
Test Equipment	-
Date	9/10/21-9/15/21

Sample	Number of Cycles	Notes
1-1P/S	500	Plating on thread and internal connector body of receptacle showed excessive wear. Contacts showed wear. Metal debris was cleaned between contacts to account for excess durability cycles. Little to no increase in force was observed.
1-2P/S	500	Plating on thread and internal connector body of receptacle showed excessive wear. Contacts showed wear. Metal debris was cleaned between contacts to account for excess durability cycles. Tightening of connector was observed beginning at ~200 cycles. Wear of body at contacts was observed at ~181 cycles.
1-3P/S	360	Plating on thread and internal connector body of receptacle showed excessive wear. Contacts showed wear. Metal debris was cleaned between contacts to account for excess durability cycles.
1-4P/S	500	Plating on thread and internal connector body of receptacle showed excessive wear. Contacts showed wear. Metal debris was cleaned between contacts to account for excess durability cycles.
1-5P/S	500	Plating on thread and internal connector body of receptacle showed some wear. Debris was cleaned between contacts to account for excess durability cycles.
1-6P/S	100	Plating on thread and internal connector body of receptacle showed some wear. Debris was cleaned between contacts to account for excess durability cycles.
1-7P/S	141	Plating on thread and internal connector body of receptacle showed excessive wear. Contacts showed wear. Metal debris was cleaned between contacts to account for excess durability cycles.

Test Name	Mechanical Shock
Specification	EIA-364-27C
Environmental Conditions	Ambient Lab Conditions
Test Equipment	CE039, EM016, EM008, SK05, TQ002, TQ026, AC034
Date	9/16/21-9/21/21

Sample	Axis	Pass/Fail
1-1P/S	±X	Pass
1-2P/S	±X	Pass
1-3P/S	±X	Pass
1-4P/S	±X	Pass
1-5P/S	±X	Pass
1-6P/S	±X	Pass
1-7P/S	±X	Pass

Sample	Axis	Pass/Fail
1-1P/S	±Z	Pass
1-2P/S	±Z	Pass
1-3P/S	±Z	Pass
1-4P/S	±Z	Pass
1-5P/S	±Z	Pass
1-6P/S	±Z	Pass
1-7P/S	±Z	Pass

Sample	Axis	Pass/Fail
1-1P/S	±Y	Pass
1-2P/S	±Y	Pass
1-3P/S	±Y	Pass
1-4P/S	±Y	Pass
1-5P/S	±Y	Pass
1-6P/S	±Y	Pass
1-7P/S	±Y	Pass

Test Name	Insulation Resistance Post Pre Condition Moisture Resistance
Specification	EIA-364-21F
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM017
Date	9/24/2021

Sample 1-1P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>10G	Pass
A	D			>10G	Pass
B	C			>10G	Pass
B	D			>10G	Pass
C	D			>10G	Pass
A	Shell			>10G	Pass
B	Shell			>10G	Pass
C	Shell			>10G	Pass
D	Shell			>10G	Pass

Sample 1-2P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>10G	Pass
A	C			>10G	Pass
A	D			>10G	Pass
A	E			>10G	Pass
A	F			>10G	Pass
A	G			>10G	Pass
B	C			>10G	Pass
B	D			>10G	Pass
C	D			>10G	Pass
D	E			>10G	Pass
E	F			>10G	Pass
E	G			>10G	Pass
F	G			>10G	Pass
A	Shell			>10G	Pass
B	Shell			>10G	Pass
C	Shell			>10G	Pass
D	Shell			>10G	Pass
E	Shell			>10G	Pass
F	Shell			>10G	Pass
G	Shell			>10G	Pass

Test Results

Test Name	Insulation Resistance Post Pre Condition Moisture Resistance
Specification	EIA-364-21F
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM032
Date	9/24/2021

Sample 1-3P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>50G	Pass
A	C			>50G	Pass
A	D			>50G	Pass
B	C			>50G	Pass
B	D			>50G	Pass
C	D			>50G	Pass
A	Shell			>50G	Pass
B	Shell			>50G	Pass
C	Shell			>50G	Pass
D	Shell			>50G	Pass

Sample 1-4P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>50G	Pass
A	C			>50G	Pass
A	D			>50G	Pass
B	C			>50G	Pass
B	D			>50G	Pass
C	D			>50G	Pass
A	Shell			>50G	Pass
B	Shell			>50G	Pass
C	Shell			>50G	Pass
D	Shell			>50G	Pass

Test Results

Test Name	Insulation Resistance Post Pre Condition Moisture Resistance
Specification	EIA-364-21F
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM017
Date	9/24/2021

Sample 1-5P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>10G	Pass
A	K			>10G	Pass
A	L			>10G	Pass
B	C			>10G	Pass
B	L			>10G	Pass
B	M			>10G	Pass
C	D			>10G	Pass
C	M			>10G	Pass
C	N			>10G	Pass
D	E			>10G	Pass
D	M			>10G	Pass
D	N			>10G	Pass
E	F			>10G	Pass
E	N			>10G	Pass
E	P			>10G	Pass
F	G			>10G	Pass
F	N			>10G	Pass
F	P			>10G	Pass
G	H			>10G	Pass
G	P			>10G	Pass
G	R	>10G	Pass		
H	J	>10G	Pass		
H	P	>10G	Pass		
H	R	>10G	Pass		
J	K	>10G	Pass		
J	L	>10G	Pass		
J	R	>10G	Pass		

Sample 1-5P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
K	L	500 V	120 s	>10G	Pass
K	R			>10G	Pass
L	M			>10G	Pass
L	N			>10G	Pass
L	P			>10G	Pass
L	R			>10G	Pass
M	N			>10G	Pass
M	P			>10G	Pass
M	R			>10G	Pass
N	P			>10G	Pass
N	R			>10G	Pass
P	R			>10G	Pass
A	Shell			>10G	Pass
B	Shell			>10G	Pass
C	Shell			>10G	Pass
D	Shell			>10G	Pass
E	Shell			>10G	Pass
F	Shell			>10G	Pass
G	Shell			>10G	Pass
H	Shell			>10G	Pass
J	Shell	>10G	Pass		
K	Shell	>10G	Pass		
L	Shell	>10G	Pass		
M	Shell	>10G	Pass		
N	Shell	>10G	Pass		
P	Shell	>10G	Pass		
R	Shell	>10G	Pass		

Test Results

Test Name	Insulation Resistance Post Pre Condition Moisture Resistance
Specification	EIA-364-21F
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM032
Date	9/24/2021

Sample 1-6P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120s	>50G	Pass
A	E			>50G	Pass
B	C			>50G	Pass
C	D			>50G	Pass
D	E			>50G	Pass
A	Shell			>50G	Pass
B	Shell			>50G	Pass
C	Shell			>50G	Pass
D	Shell			>50G	Pass
E	Shell			>50G	Pass

Sample 1-7P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120s	>50G	Pass
A	E			>50G	Pass
B	C			>50G	Pass
C	D			>50G	Pass
D	E			>50G	Pass
A	Shell			>50G	Pass
B	Shell			>50G	Pass
C	Shell			>50G	Pass
D	Shell			>50G	Pass
E	Shell			>50G	Pass

Test Results

Test Name	Moisture Resistance: Insulation Resistance at Elevated Relative Humidity
Specification	EIA-364-21F
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM032
Date	10/8/2021

Sample 1-1P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>50G	Pass
A	D			>50G	Pass
B	C			31692M	Pass
B	D			>50G	Pass
C	D			22620M	Pass
A	Shell			>50G	Pass
B	Shell			>50G	Pass
C	Shell			3056M	Pass
D	Shell			26148M	Pass

Sample 1-2P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>50G	Pass
A	C			>50G	Pass
A	D			>50G	Pass
A	E			>50G	Pass
A	F			>50G	Pass
A	G			>50G	Pass
B	C			>50G	Pass
B	D			>50G	Pass
C	D			>50G	Pass
D	E			414.8M	Pass
E	F			>50G	Pass
E	G			>50G	Pass
F	G			>50G	Pass
A	Shell			>50G	Pass
B	Shell			>50G	Pass
C	Shell			>50G	Pass
D	Shell			956.6M	Pass
E	Shell			3265M	Pass
F	Shell			>50G	Pass
G	Shell			>50G	Pass

Test Results

Test Name	Moisture Resistance: Insulation Resistance at Elevated Relative Humidity
Specification	EIA-364-21F
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM032
Date	10/5/2021

Sample 1-3P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>50G	Pass
A	C			>50G	Pass
A	D			>50G	Pass
B	C			>50G	Pass
B	D			>50G	Pass
C	D			>50G	Pass
A	Shell			>50G	Pass
B	Shell			>50G	Pass
C	Shell			>50G	Pass
D	Shell			>50G	Pass

Sample 1-4P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>50G	Pass
A	C			45135M	Pass
A	D			18598M	Pass
B	C			17906M	Pass
B	D			10786M	Pass
C	D			869.3M	Pass
A	Shell			7587M	Pass
B	Shell			1749M	Pass
C	Shell			321.9M	Pass
D	Shell			1484M	Pass

Test Results

Test Name	Moisture Resistance: Insulation Resistance at Elevated Relative Humidity
Specification	EIA-364-21F
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM017, EM032
Date	10/8/2021

Sample 1-5P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>10G	Pass
A	K			>10G	Pass
A	L			>10G	Pass
B	C			>10G	Pass
B	L			>10G	Pass
B	M			>10G	Pass
C	D			>10G	Pass
C	M			>10G	Pass
C	N			>10G	Pass
D	E			1329M	Pass
D	M			>10G	Pass
D	N			>10G	Pass
E	F			>10G	Pass
E	N			>10G	Pass
E	P			>10G	Pass
F	G			>10G	Pass
F	N			>10G	Pass
F	P			>10G	Pass
G	H			>10G	Pass
G	P			>10G	Pass
G	R	>10G	Pass		
H	J	>10G	Pass		
H	P	>10G	Pass		
H	R	>10G	Pass		
J	K	>10G	Pass		
J	L	>10G	Pass		
J	R	>10G	Pass		

Sample 1-5P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
K	L	500 V	120 s	>10G	Pass
K	R			>10G	Pass
L	M			>10G	Pass
L	N			>10G	Pass
L	P			>10G	Pass
L	R			>10G	Pass
M	N			>10G	Pass
M	P			>10G	Pass
M	R			>10G	Pass
N	P			>10G	Pass
N	R			>10G	Pass
P	R			>10G	Pass
A	Shell			>10G	Pass
B	Shell			>10G	Pass
C	Shell			>10G	Pass
D	Shell			4663M	Pass
E	Shell			4482M	Pass
F	Shell			>10G	Pass
G	Shell			>10G	Pass
H	Shell			6285M	Pass
J	Shell	>10G	Pass		
K	Shell	>10G	Pass		
L	Shell	>10G	Pass		
M	Shell	>10G	Pass		
N	Shell	>10G	Pass		
P	Shell	>10G	Pass		
R	Shell	>10G	Pass		

Test Results

Test Name	Moisture Resistance: Insulation Resistance at Elevated Relative Humidity
Specification	EIA-364-21F
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM032
Date	10/5/2021

Sample 1-6P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120s	33.69M	Fail
A	E			36.21M	Fail
B	C			235.5M	Pass
C	D			84.43M	Fail
D	E			88.50M	Fail
A	Shell			60.12M	Fail
B	Shell			265.0M	Pass
C	Shell			112.7M	Pass
D	Shell			118.8M	Pass
E	Shell			80.49M	Fail
A	C			84.72M	Fail
B	E			313.1M	Pass

Sample 1-7P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120s	>50G	Pass
A	E			>50G	Pass
B	C			>50G	Pass
C	D			>50G	Pass
D	E			>50G	Pass
A	Shell			>50G	Pass
B	Shell			33389M	Pass
C	Shell			>50G	Pass
D	Shell			21211M	Pass
E	Shell			27153M	Pass

Test Results

Test Name	Moisture Resistance: Insulation Resistance at Ambient (After 24 hour recovery period)
Specification	EIA-364-21F
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM032, CE027
Date	10/9/2021

Sample 1-1P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>50G	Pass
A	D			>50G	Pass
B	C			>50G	Pass
B	D			>50G	Pass
C	D			>50G	Pass
A	Shell			>50G	Pass
B	Shell			>50G	Pass
C	Shell			26044M	Pass
D	Shell			>50G	Pass

Sample 1-2P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>50G	Pass
A	C			>50G	Pass
A	D			>50G	Pass
A	E			>50G	Pass
A	F			>50G	Pass
A	G			>50G	Pass
B	C			>50G	Pass
B	D			>50G	Pass
C	D			>50G	Pass
D	E			4135M	Pass
E	F			>50G	Pass
E	G			>50G	Pass
F	G			>50G	Pass
A	Shell			>50G	Pass
B	Shell			>50G	Pass
C	Shell			>50G	Pass
D	Shell			10288M	Pass
E	Shell			>50G	Pass
F	Shell			>50G	Pass
G	Shell			>50G	Pass

Test Results

Test Name	Moisture Resistance: Insulation Resistance at Ambient (After 24 hour recovery period)
Specification	EIA-364-21F
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM032
Date	10/6/2021

Sample 1-3P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>50G	Pass
A	C			>50G	Pass
A	D			>50G	Pass
B	C			>50G	Pass
B	D			>50G	Pass
C	D			>50G	Pass
A	Shell			>50G	Pass
B	Shell			>50G	Pass
C	Shell			>50G	Pass
D	Shell			>50G	Pass

Sample 1-4P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	29544M	Pass
A	C			31507M	Pass
A	D			25152M	Pass
B	C			9882M	Pass
B	D			10713M	Pass
C	D			1919M	Pass
A	Shell			22667M	Pass
B	Shell			8403M	Pass
C	Shell			945.6M	Pass
D	Shell			1526M	Pass

Test Results

Test Name	Moisture Resistance: Insulation Resistance at Ambient (After 24 hour recovery period)
Specification	EIA-364-21F
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM032
Date	10/9/2021

Sample 1-5P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120 s	>10G	Pass
A	K			>10G	Pass
A	L			>10G	Pass
B	C			>10G	Pass
B	L			>10G	Pass
B	M			>10G	Pass
C	D			>10G	Pass
C	M			>10G	Pass
C	N			>10G	Pass
D	E			2001M	Pass
D	M			>10G	Pass
D	N			>10G	Pass
E	F			>10G	Pass
E	N			>10G	Pass
E	P			>10G	Pass
F	G			>10G	Pass
F	N			>10G	Pass
F	P			>10G	Pass
G	H			>10G	Pass
G	P			>10G	Pass
G	R	>10G	Pass		
H	J	>10G	Pass		
H	P	>10G	Pass		
H	R	>10G	Pass		
J	K	>10G	Pass		
J	L	>10G	Pass		
J	R	>10G	Pass		

Sample 1-5P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
K	L	500 V	120 s	>10G	Pass
K	R			>10G	Pass
L	M			>10G	Pass
L	N			>10G	Pass
L	P			>10G	Pass
L	R			>10G	Pass
M	N			>10G	Pass
M	P			>10G	Pass
M	R			>10G	Pass
N	P			>10G	Pass
N	R			>10G	Pass
P	R			>10G	Pass
A	Shell			>10G	Pass
B	Shell			>10G	Pass
C	Shell			>10G	Pass
D	Shell			3526M	Pass
E	Shell			4072M	Pass
F	Shell			>10G	Pass
G	Shell			>10G	Pass
H	Shell			>10G	Pass
J	Shell	>10G	Pass		
K	Shell	>10G	Pass		
L	Shell	>10G	Pass		
M	Shell	>10G	Pass		
N	Shell	>10G	Pass		
P	Shell	>10G	Pass		
R	Shell	>10G	Pass		

Test Results

Test Name	Moisture Resistance: Insulation Resistance at Ambient (After 24 hour recovery period)
Specification	EIA-364-21F
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM032
Date	10/6/2021

Sample 1-6P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120s	30893M	Pass
A	E			11721M	Pass
B	C			>50G	Pass
C	D			42348M	Pass
D	E			14509M	Pass
A	Shell			6135M	Pass
B	Shell			14617M	Pass
C	Shell			14414M	Pass
D	Shell			4661M	Pass
E	Shell			6304M	Pass
A	C			>50G	Pass
B	E			42591M	Pass

Sample 1-7P/S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120s	>50G	Pass
A	E			>50G	Pass
B	C			>50G	Pass
C	D			>50G	Pass
D	E			>50G	Pass
A	Shell			41687M	Pass
B	Shell			>50G	Pass
C	Shell			31618M	Pass
D	Shell			45496M	Pass
E	Shell			>50G	Pass

Test Name	Moisture Resistance: Insulation Resistance at Ambient (After 24 hour recovery period) Unmated
Specification	EIA-364-21F
Environmental Conditions	Ambient Lab Conditions
Test Equipment	EM032
Date	10/7/2021

Sample 1-6P					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120s	>50G	Pass
A	E			>50G	Pass
B	C			>50G	Pass
C	D			>50G	Pass
D	E			>50G	Pass
A	Shell			>50G	Pass
B	Shell			>50G	Pass
C	Shell			>50G	Pass
D	Shell			>50G	Pass
E	Shell			>50G	Pass

Sample 1-6S					
Pin to Pin		Test Level	Duration	Resistance (Ω)	Pass/Fail
A	B	500 V	120s	>50G	Pass
A	E			>50G	Pass
B	C			>50G	Pass
C	D			>50G	Pass
D	E			>50G	Pass
A	Shell			>50G	Pass
B	Shell			>50G	Pass
C	Shell			>50G	Pass
D	Shell			>50G	Pass
E	Shell			>50G	Pass

Test Name	Insert Retention
Specification	EIA-364-35C
Environmental Conditions	Ambient Lab Conditions
Test Equipment	WT005, CP029
Date	10/8/2021-10/10/21

Test Method for Insert Retention		
Application Direction	Rear	Face
Type of Engagement	Air	Disc
Area of Engagement (in ²)	N/A	2.18

Sample	Direction	Test Pressure (psi)	Pass/Fail
1-1P	Rear	99.179	Pass
1-1S	Rear	101.033	Pass
1-2P	Rear	74.971	Pass
1-2S	Rear	75.105	Pass
1-4P	Rear	60.700	Pass
1-4S	Rear	60.680	Pass
1-5P	Rear	60.714	Pass
1-5S	Rear	60.700	Pass
1-6P	Rear	46.409	Pass
1-6S	Rear	46.436	Pass
1-7P	Rear	46.429	Pass
1-7S	Rear	46.449	Pass

Sample	Direction	Test Pressure (psi)	Pass/Fail
1-1P	Face	104.148	Pass
1-1S	Face	100.968	Pass
1-2P	Face	75.189	Pass
1-2S	Face	79.459	Pass
1-4P	Face	65.152	Pass
1-4S	Face	60.688	Pass
1-5P	Face	61.195	Pass
1-5S	Face	61.065	Pass
1-6P	Face	45.539	Pass
1-6S	Face	45.729	Pass
1-7P	Face	45.118	Pass
1-7S	Face	45.464	Pass

Test Name	External Bending Moment
Specification	SAE AS 50151 Rev E
Environmental Conditions	Ambient Lab Conditions
Test Equipment	CE056, CP035, CP035A
Date	10/12/2021

Sample	Length of Lever Arm (in)	Peak Force Applied (lbf)	Calculated Bend Moment (in-lbs)	Required Bend Moment (in-lbs)	Notes	Pass/Fail
1-1P/S	3.651	117	427.167	420	Delfected and did not return to original state.	Pass
1-2P/S	3.666	124	454.584	450	Delfected and did not return to original state.	Pass
1-4P/S	3.912	165	645.48	630	Delfected about 0.02in and did not return to original state.	Pass
1-5P/S	3.912	168	657.216	630	Delfected and did not return to original state.	Pass
1-6P/S	4.316	205	884.78	870	Delfected about 0.04in and did not return to original state.	Pass
1-7P/S	4.316	209	902.044	870	Creaking noise from 15 to 100lbf of applied force. Delfected and did not return to original state. Damage to backshell at point of contact.	Pass

Test Name	Contact Insertion and Removal Forces
Specification	EIA-364-05C
Environmental Conditions	Ambient Lab Conditions
Test Equipment	CP028, DM025
Date	9/16/21-9/30/21

Sample 2-1P					
Contact	Cycle 1 Insertion (lbf)	Cycle 1 Removal (lbf)	Cycle 9 Insertion (lbf)	Cycle 9 Removal (lbf)	Notes
A	20.715	10	11.435	6.325	Hit retention clip during insertion
B	8.125	4.825	7.985	5.595	Hit retention clip during insertion
D	15.225	12.85	-	-	Hit retention clip during insertion
E	12.38	9.98	6.34	5.89	Hit retention clip during insertion
F	14.29	5.18	3.69	15.7	Hit retention clip during insertion
G	6.19	4.425	-	-	Tear at grommet cavity

Test Name	Contact Insertion and Removal Forces
Specification	EIA-364-05C
Environmental Conditions	Ambient Lab Conditions
Test Equipment	CP028, DM025
Date	9/16/21-9/30/21

Sample 2-2S					
Contact	Cycle 1 Insertion (lbf)	Cycle 1 Removal (lbf)	Cycle 9 Insertion (lbf)	Cycle 9 Removal (lbf)	Notes
A	28.930	19.830	16.585	9.505	Tear at grommet cavity
B	2.595	10.775	6.870	5.640	Tear at grommet cavity
C	19.745	18.405	-	-	-
D	15.350	11.705	-	-	Tear at grommet cavity
E	22.965	18.855	8.860	14.435	Tear at grommet cavity
F	6.605	7.540	7.140	4.420	Tear at grommet cavity

Sample 2-3P					
Contact	Cycle 1 Insertion (lbf)	Cycle 1 Removal (lbf)	Cycle 9 Insertion (lbf)	Cycle 9 Removal (lbf)	Notes
A	39.805	25.32	25.515	14.445	Tear at grommet cavity
B	29.025	13.035	14.295	22.665	Tear at grommet cavity

Test Name	Contact Resistance
Specification	EIA-364-06C
Environmental Conditions	Ambient Lab Conditions
Test Equipment	DM022, DM003, EM003, EM022, EM040, EM007, EM037
Date	10/1/2021-10/8/21

Sample 2-1			
Contact	Measured Voltage Drop (mV)	Actual Voltage Drop (mV)	Notes
B	90.17	55.725392	-
C	89.91	55.465392	-
F	90.28	55.835392	-
G	89.88	55.435392	-

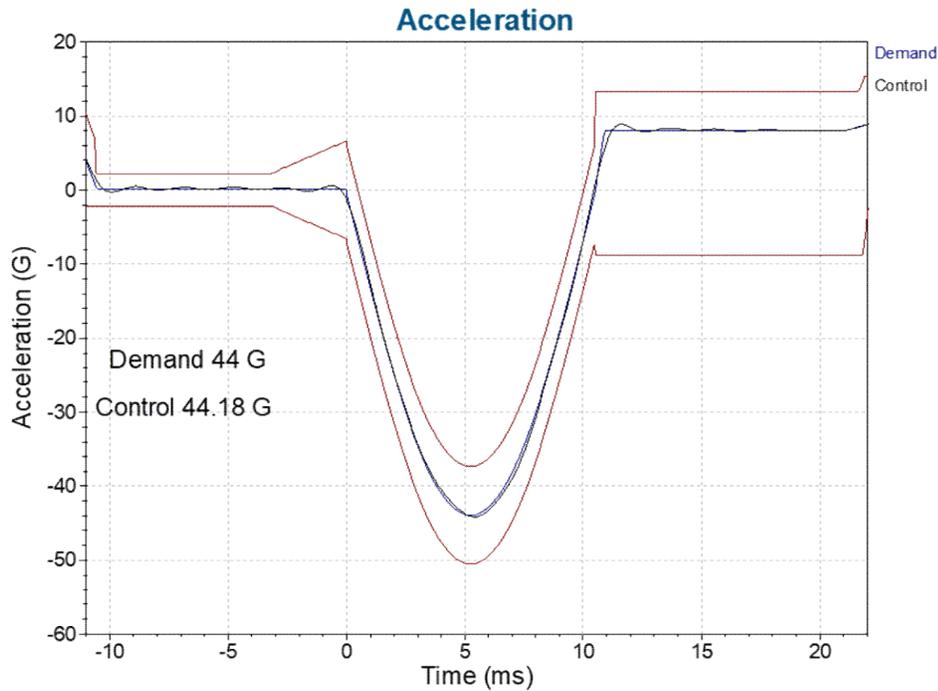
Sample 2-3			
Contact	Measured Voltage Drop (mV)	Actual Voltage Drop (mV)	Notes
A	37.841	31.9269907	-
B	36.561	30.6469907	-

Sample 2-2			
Contact	Measured Voltage Drop (mV)	Actual Voltage Drop (mV)	Notes
A	48.122	32.9890463	-
B	81.07	53.3533463	-
C	47.262	32.1290463	-
D	87.41	59.6933463	-
E	48.363	33.2300463	-
F	81.57	53.8533463	-

Sample 2-4			
Contact	Measured Voltage Drop (mV)	Actual Voltage Drop (mV)	Notes
A	55.49	41.9157137	-
E	53.797	40.2227137	-
K	56.31	42.7357137	-
W	56.52	42.9457137	-

6 inch Wire			
Wire Size	Length of Excess Wire (in)	Average Voltage Drop Per In (mV/in)	Voltage Drop to Subtract (mV)
16	9.306	3.701	34.444608
12	10.545	2.628	27.7166538
8	7.724	1.757	13.5742863
4	10.545	1.435	15.1329538
1	7.724	0.766	5.91400933

Test Plots



Sep 16, 2021 16:48:31 Level 1) 100 %

Output 0.9617 Volts peak

1-1P/1-1S

Demand: 44 G

X Negative Axis

Control: 44.18 G

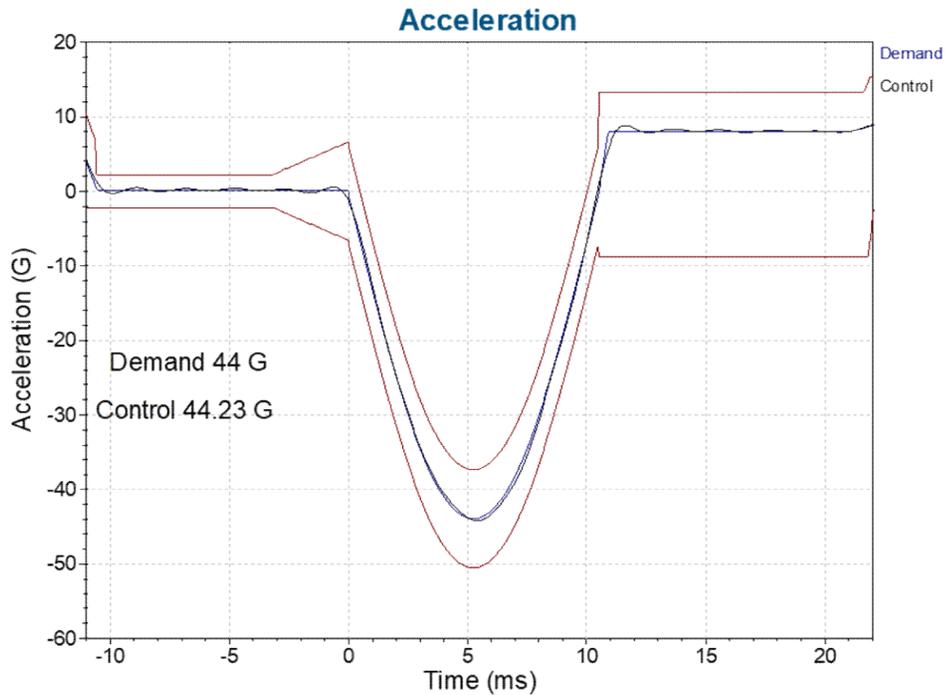
Pulse: 1 of 3

Running

Gain 100%

Description	Typical Negative Shock Peak (Sample 1-1P/S shown above)
Test Name	Shock
Part Name	18-4 Plug, 18-4 Receptacle, 20-7 Plug, 20-7 Receptacle, 28-4 Plug, 28-4 Receptacle, 28-15 Plug, 28-15 Receptacle, 40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001NF28-4S2-1, 970-003NF28-4P2N-1, 970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1, 970-001NF40-5S2-1, 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1
Serial No.	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S

Test Plots



Sep 16, 2021 16:48:47 Level 1) 100 %

Output: 0.9617 Volts peak

1-1P/1-1S

Demand: 44 G

X Negative Axis

Control: 44.23 G

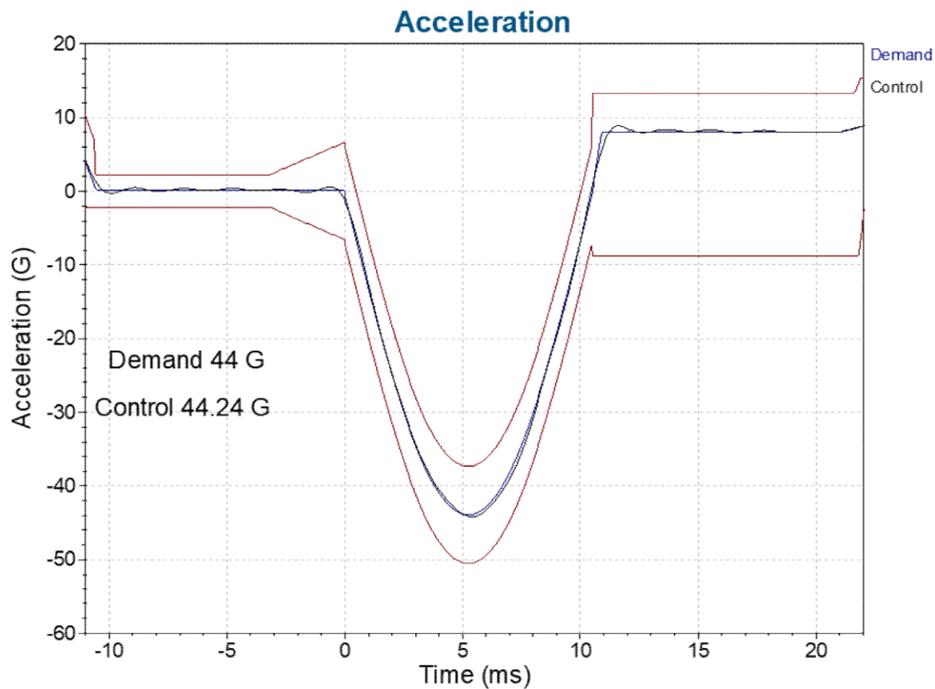
Pulse: 2 of 3

Running

Gain 100%

Description	Typical Negative Shock Peak (Sample 1-1P/S shown above)
Test Name	Shock
Part Name	18-4 Plug, 18-4 Receptacle, 20-7 Plug, 20-7 Receptacle, 28-4 Plug, 28-4 Receptacle, 28-15 Plug, 28-15 Receptacle, 40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001NF28-4S2-1, 970-003NF28-4P2N-1, 970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1, 970-001NF40-5S2-1, 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1
Serial No.	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S

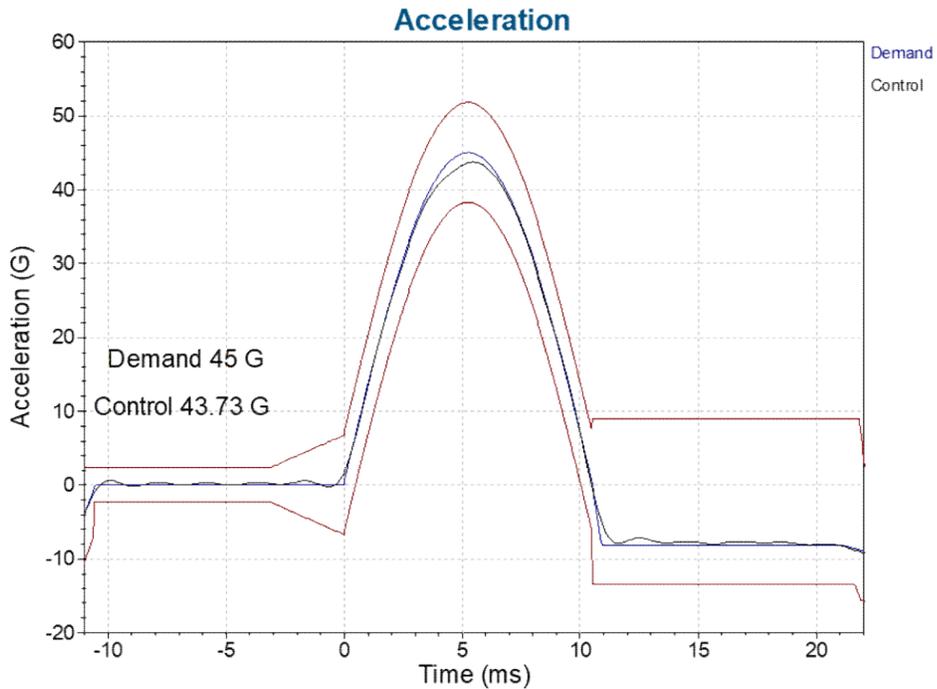
Test Plots



Sep 16, 2021 16:49:00 Level 1) 100 % Output: 0.9617 Volts peak 1-1P/1-1S
 Demand: 44 G X Negative Axis
 Control: 44.24 G Pulse: 3 of 3 End of Test Gain 100%

Description	Typical Negative Shock Peak (Sample 1-1P/S shown above)
Test Name	Shock
Part Name	18-4 Plug, 18-4 Receptacle, 20-7 Plug, 20-7 Receptacle, 28-4 Plug, 28-4 Receptacle, 28-15 Plug, 28-15 Receptacle, 40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001NF28-4S2-1, 970-003NF28-4P2N-1, 970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1, 970-001NF40-5S2-1, 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1
Serial No.	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S

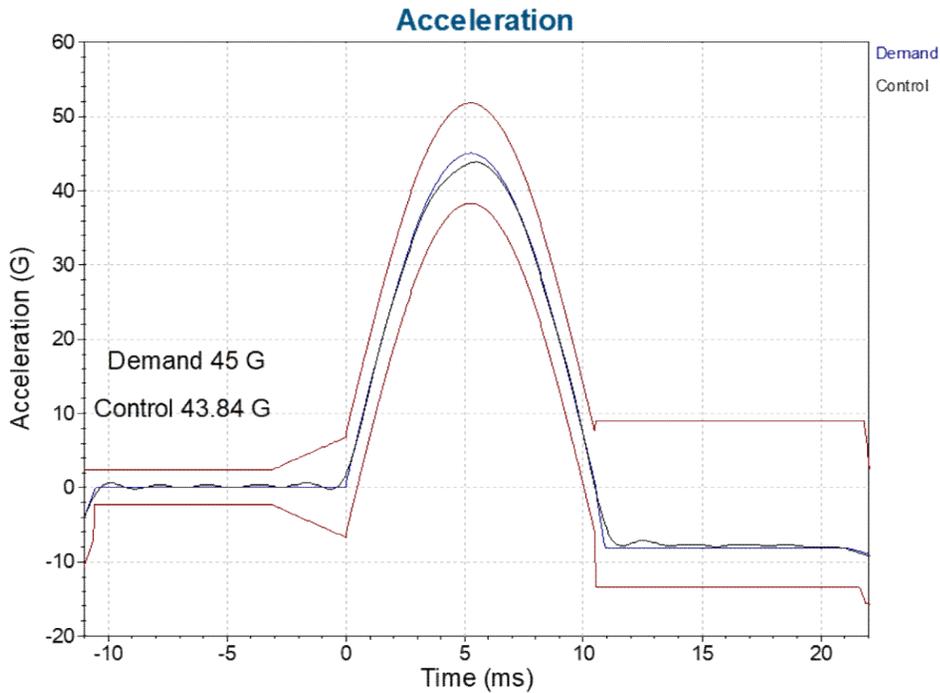
Test Plots



Sep 16, 2021 16:44:03 Level 1) 100 % Output: 1.007 Volts peak 1-1P/1-1S
 Demand: 45 G X Positive Axis
 Control: 43.73 G Pulse: 1 of 3 Running Gain 100%

Description	Typical Positive Shock Peak (Sample 1-1P/S shown above)
Test Name	Shock
Part Name	18-4 Plug, 18-4 Receptacle, 20-7 Plug, 20-7 Receptacle, 28-4 Plug, 28-4 Receptacle, 28-15 Plug, 28-15 Receptacle, 40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001NF28-4S2-1, 970-003NF28-4P2N-1, 970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1, 970-001NF40-5S2-1, 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1
Serial No.	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S

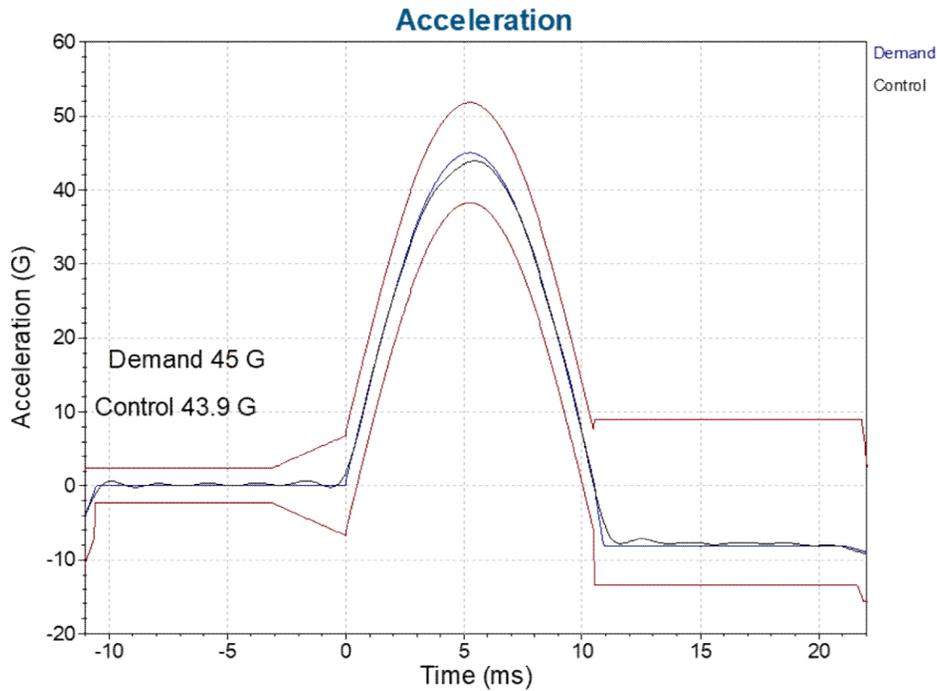
Test Plots



Sep 16, 2021 16:44:21 Level 1) 100 % Output: 1.007 Volts peak 1-1P/1-1S
 Demand: 45 G X Positive Axis
 Control: 43.84 G Pulse: 2 of 3 Running Gain 100%

Description	Typical Positive Shock Peak (Sample 1-1P/S shown above)
Test Name	Shock
Part Name	18-4 Plug, 18-4 Receptacle, 20-7 Plug, 20-7 Receptacle, 28-4 Plug, 28-4 Receptacle, 28-15 Plug, 28-15 Receptacle, 40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001NF28-4S2-1, 970-003NF28-4P2N-1, 970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1, 970-001NF40-5S2-1, 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1
Serial No.	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S

Test Plots



Sep 16, 2021 16:44:50 Level 1) 100 %

Output: 1.007 Volts peak

1-1P/1-1S

Demand: 45 G

X Positive Axis

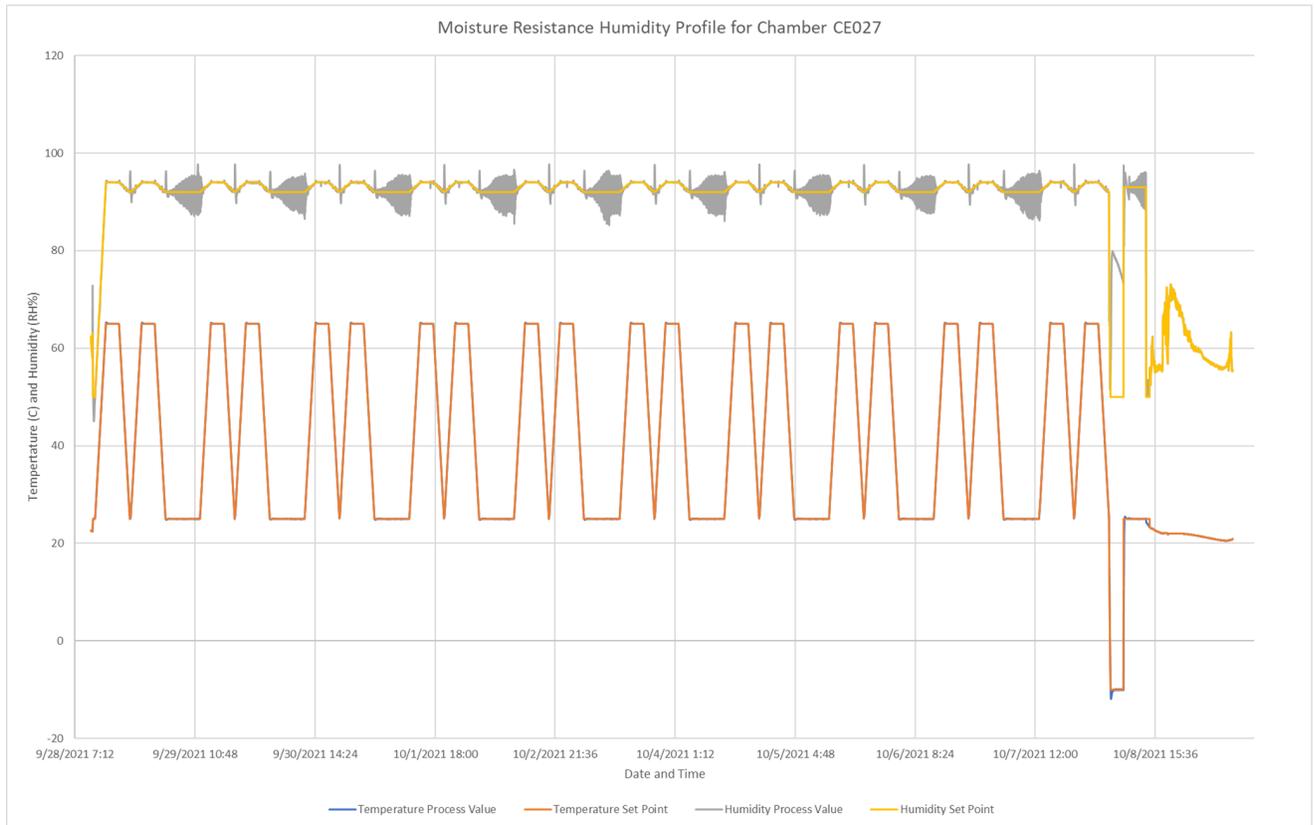
Control: 43.9 G

Pulse: 3 of 3

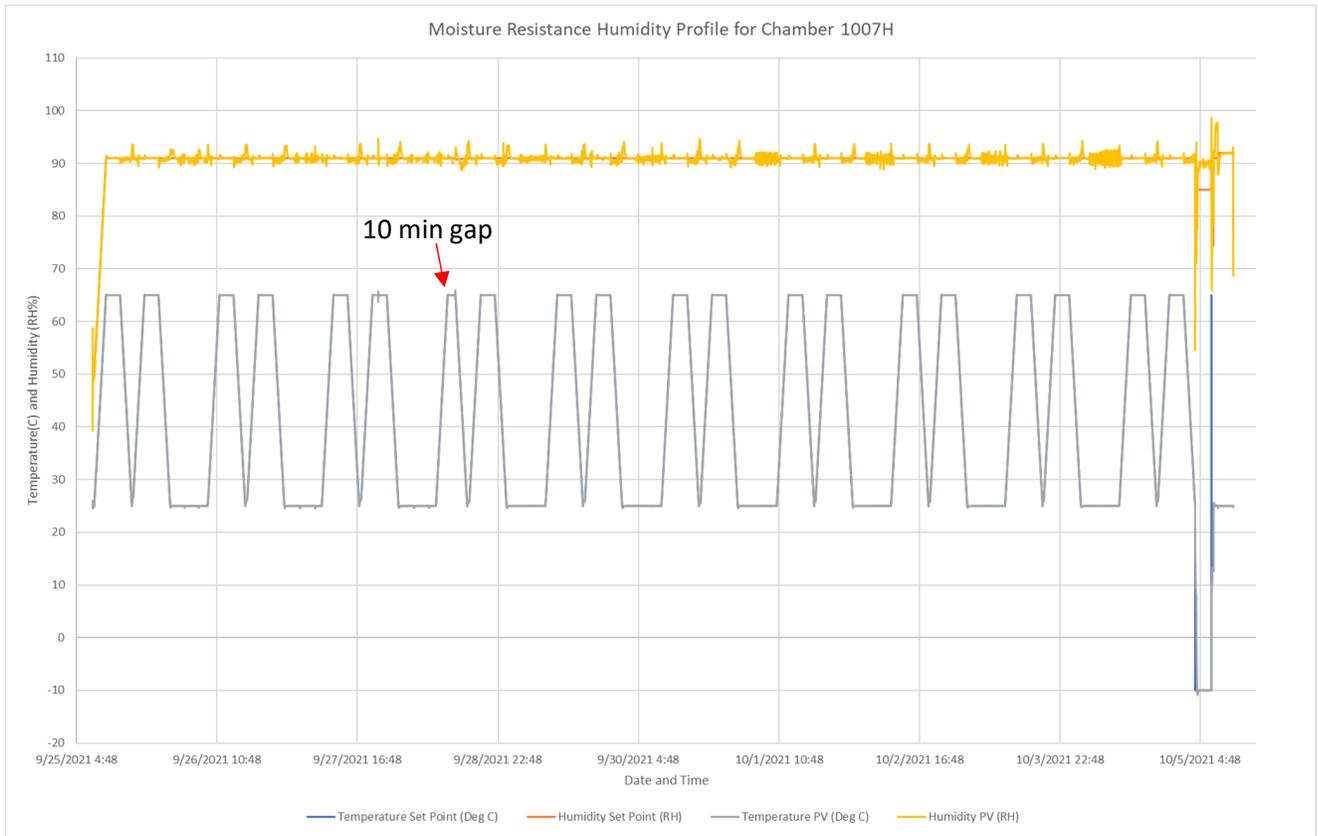
End of Test

Gain 100%

Description	Typical Positive Shock Peak (Sample 1-1P/S shown above)
Test Name	Shock
Part Name	18-4 Plug, 18-4 Receptacle, 20-7 Plug, 20-7 Receptacle, 28-4 Plug, 28-4 Receptacle, 28-15 Plug, 28-15 Receptacle, 40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001NF28-4S2-1, 970-003NF28-4P2N-1, 970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1, 970-001NF40-5S2-1, 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1
Serial No.	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S

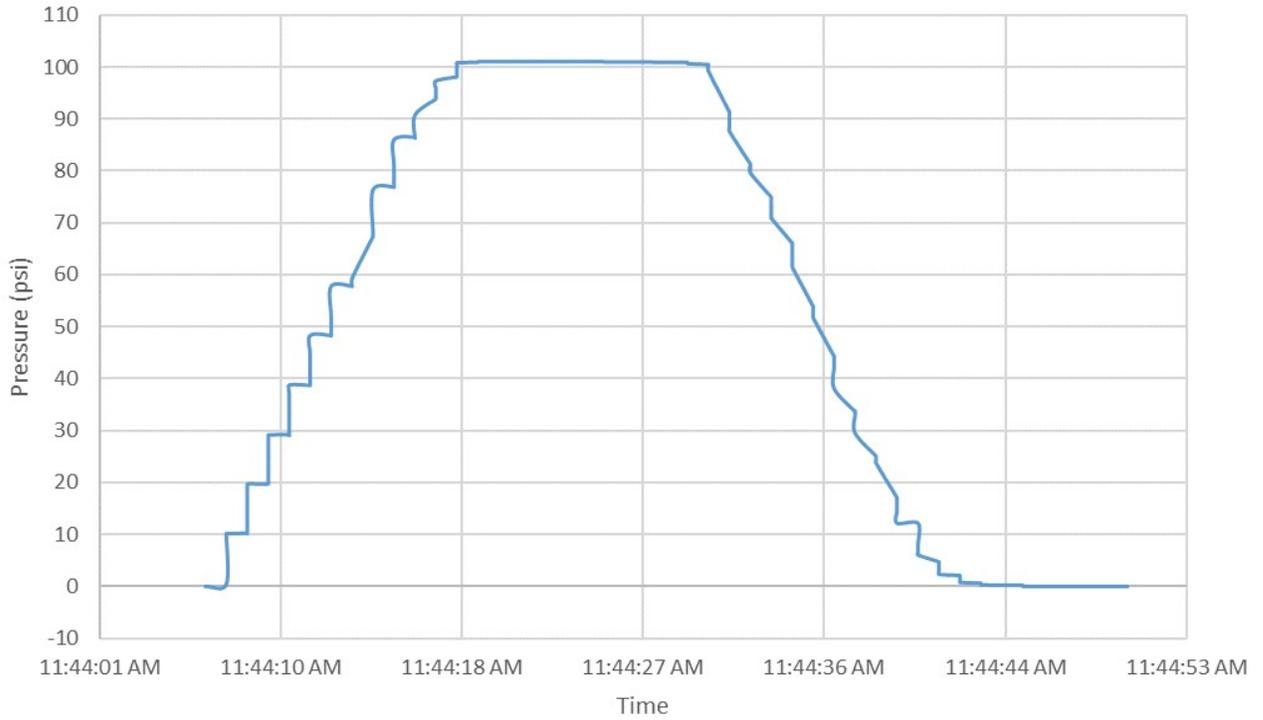


Description	Moisture Resistance Plot Chamber CE027 Note: Temperature Process Value is overlaid by the Temperature Set Point
Test Name	Moisture Resistance
Part Name	18-4 Plug, 18-4 Receptacle, 20-7 Plug, 20-7 Receptacle, 28-15 Plug, 28-15 Receptacle
Test Group	1
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1
Serial No.	1-1P, 1-1S, 1-2P, 1-2S, 1-5P, 1-5S

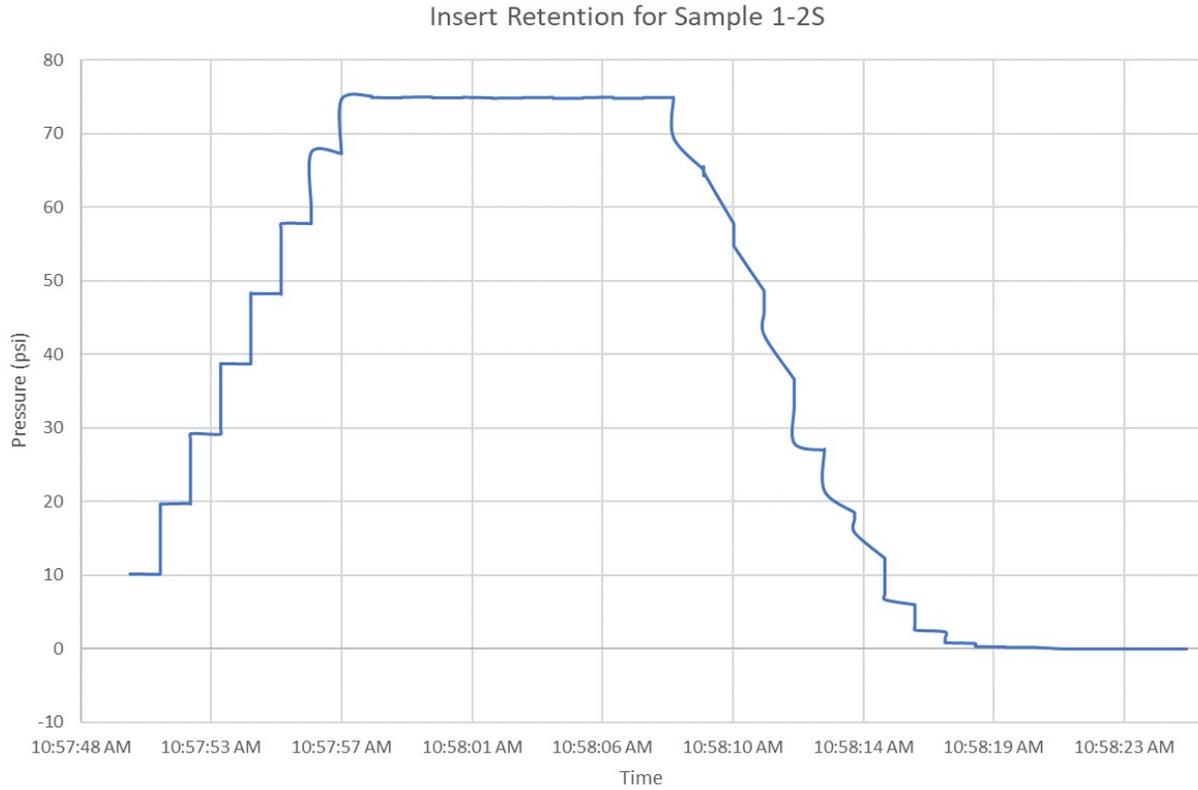


Description	Moisture Resistance Plot Chamber 1007H Cycle 3 shows a 10 minute gap due to a data logging error onto a local USB. Performance was confirmed during time lapse.
Test Name	Moisture Resistance
Part Name	28-4 Plug, 28-4 Receptacle, 40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF28-4S2-1, 970-003NF28-4P2N-1, 970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001NF40-5S2-1, 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1
Serial No.	1-3P, 1-3S, 1-4P, 1-4S, 1-6P, 1-6S, 1-7P, 1-7S

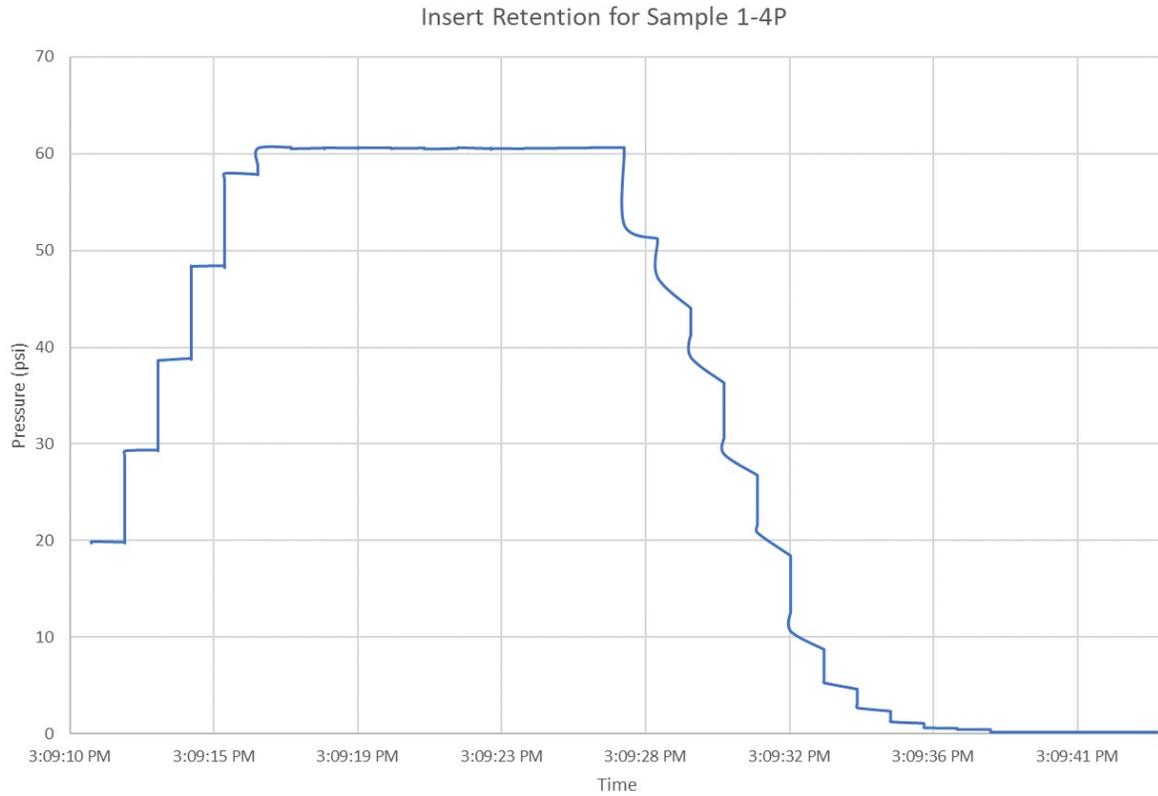
Insert Retention for Sample 1-1S



Description	Typical Insert Retention in Rear Direction Shell Size 18: Sample 1-1P/S
Test Name	Insert Retention
Part Name	18-4 Plug, 18-4 Receptacle
Test Group	1
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1
Serial No.	1-1P, 1-1S

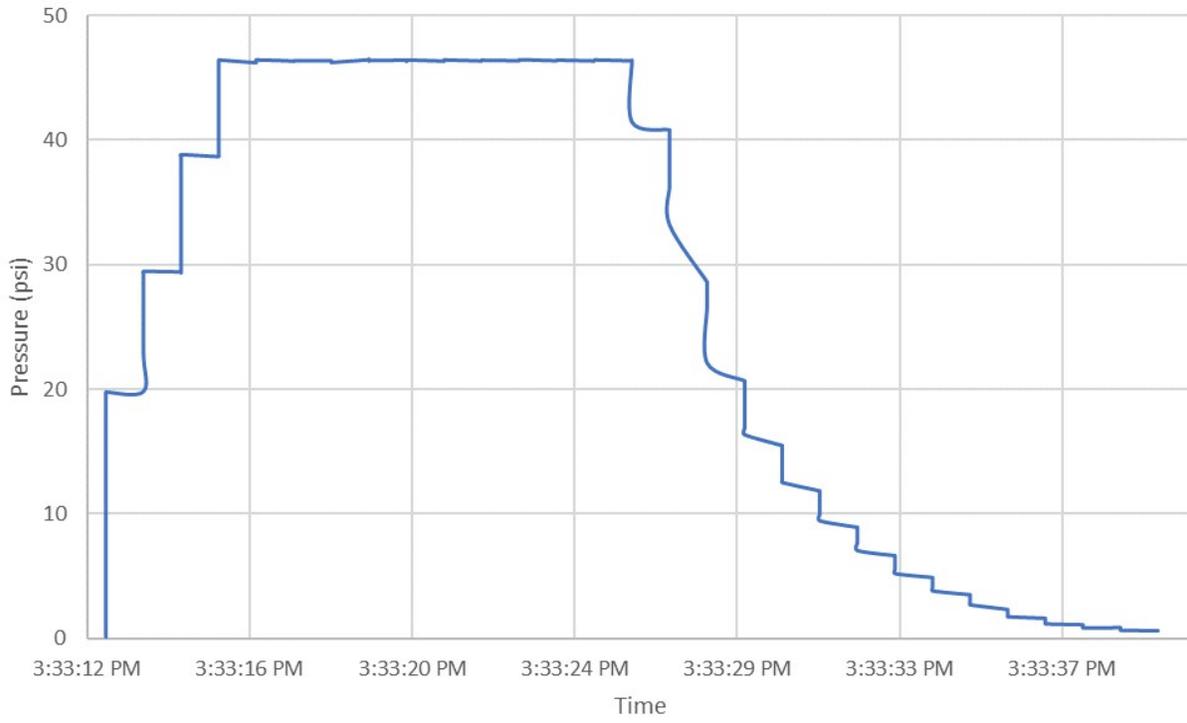


Description	Typical Insert Retention in Rear Direction Shell Size 20: Sample 1-2P/S
Test Name	Insert Retention
Part Name	20-7 Plug, 20-7 Receptacle
Test Group	1
Part No.	970-001ZR20-7S1-1, 970-003ZR20-7P1N-1
Serial No.	1-2P, 1-2S



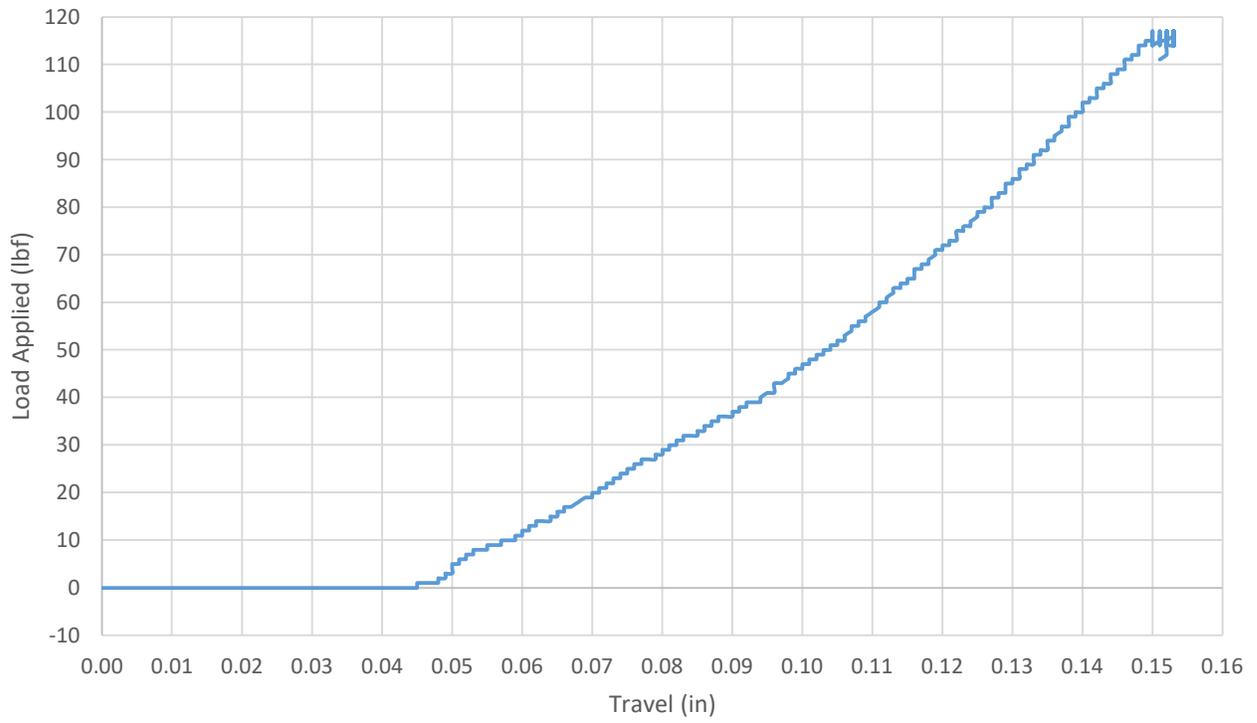
Description	Typical Insert Retention in Rear Direction Shell Size 28: Samples 1-4P/S and 1-5P/S
Test Name	Insert Retention
Part Name	28-4 Plug, 28-4 Receptacle, 28-15 Plug, 28-15 Receptacle
Test Group	1
Part No.	970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1
Serial No.	1-4P, 1-4S, 1-5P, 1-5S

Insert Retention for Sample 1-7S



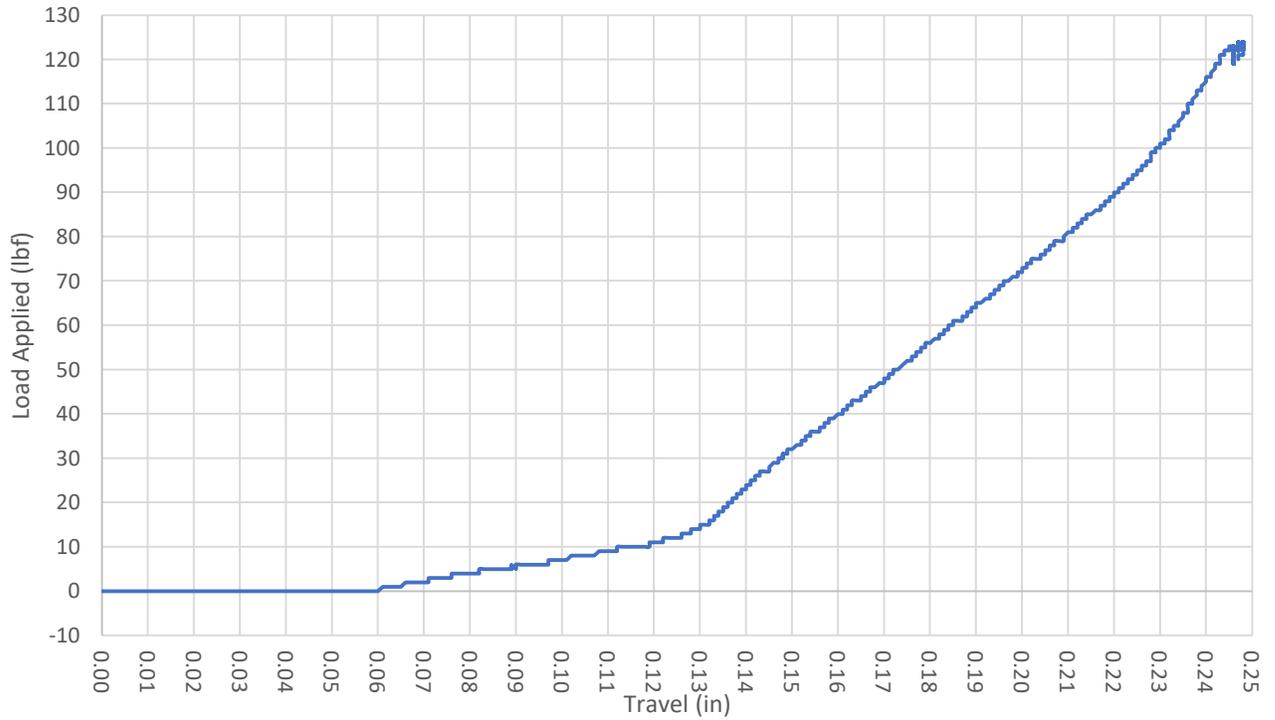
Description	Typical Insert Retention in Rear Direction Shell Size 40: Samples 1-6P/S and 1-7P/S
Test Name	Insert Retention
Part Name	40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF40-5S2-1 , 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1
Serial No.	1-6P, 1-6S, 1-7P, 1-7S

Force vs Deflection of Sample 1-1P/S



Description	External Bending Moment Sample 1-1P/S
Test Name	External Bending Moment
Part Name	18-4 Plug, 18-4 Receptacle
Test Group	1
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1
Serial No.	1-1P, 1-1S

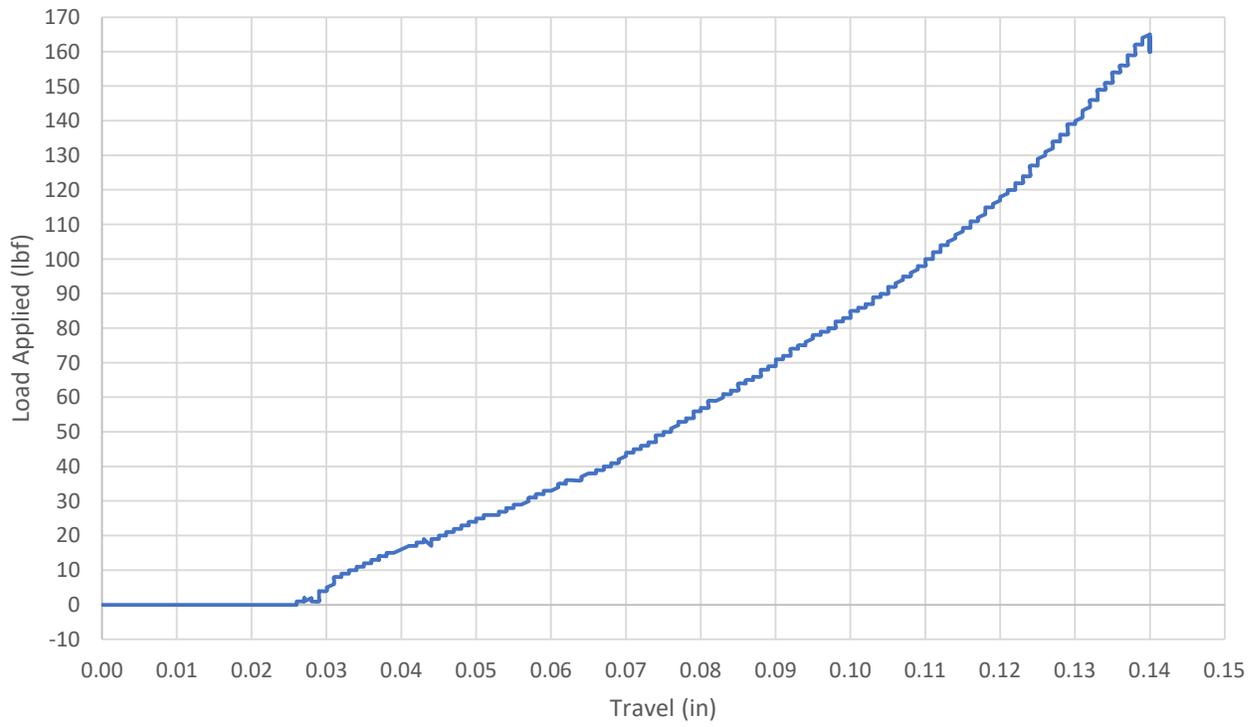
Force vs Deflection of Sample 1-2P/S



Description	External Bending Moment Sample 1-2P/S
Test Name	External Bending Moment
Part Name	20-7 Plug, 20-7 Receptacle
Test Group	1
Part No.	970-001ZR20-7S1-1, 970-003ZR20-7P1N-1
Serial No.	1-2P, 1-2S

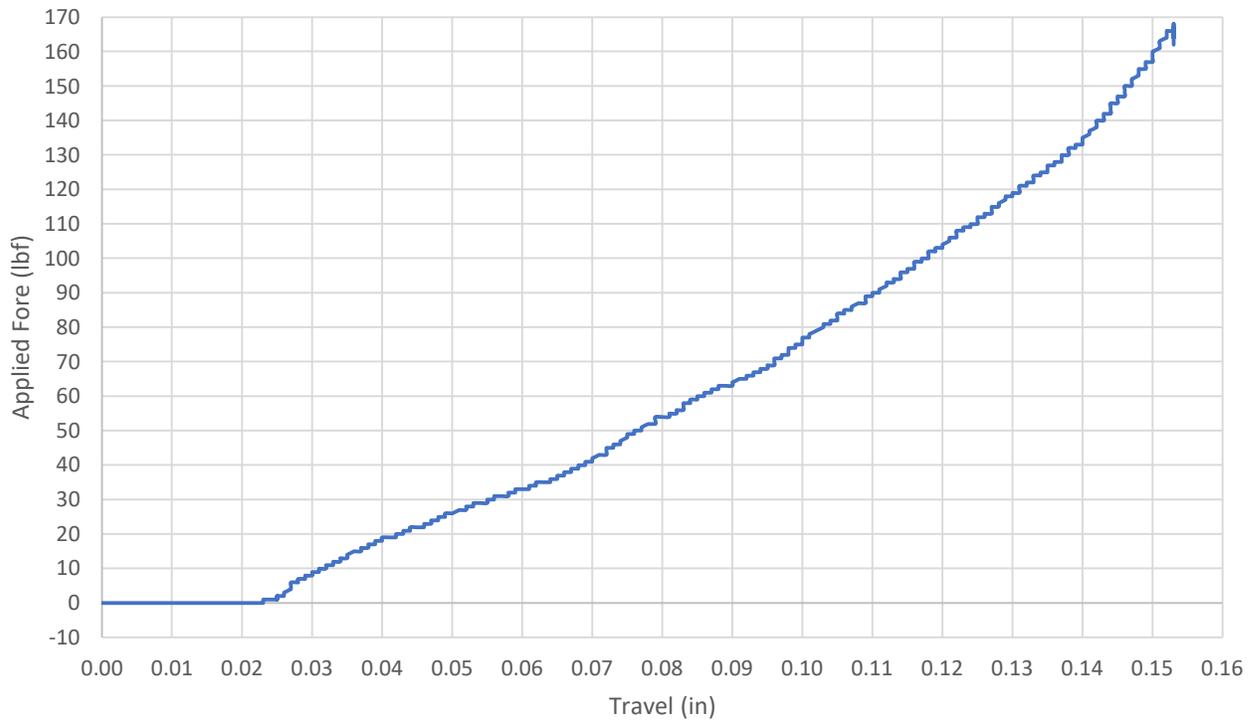
Test Plots

Force vs Deflection of Sample 1-4



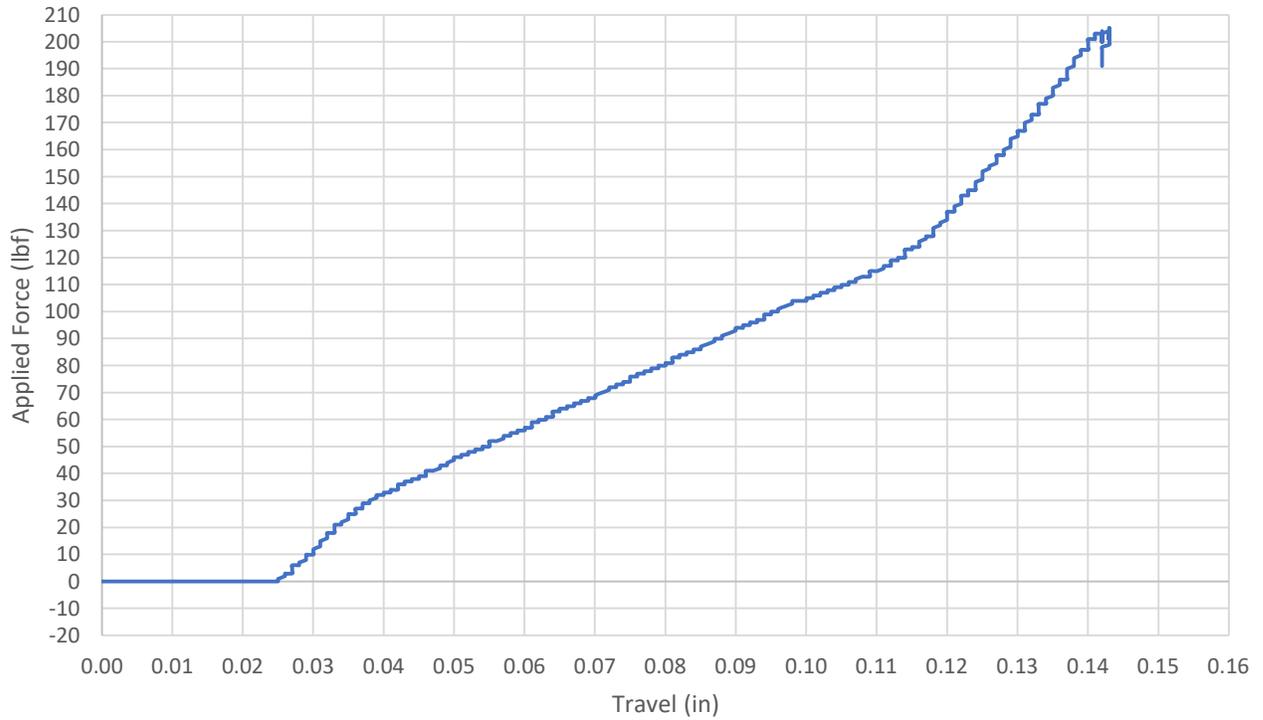
Description	External Bending Moment Sample 1-4P/S
Test Name	External Bending Moment
Part Name	28-4 Plug, 28-4 Receptacle
Test Group	1
Part No.	970-001NF28-4S1-1, 970-003NF28-4P1N-1
Serial No.	1-4P, 1-4S

Force vs Deflection of Sample 1-5



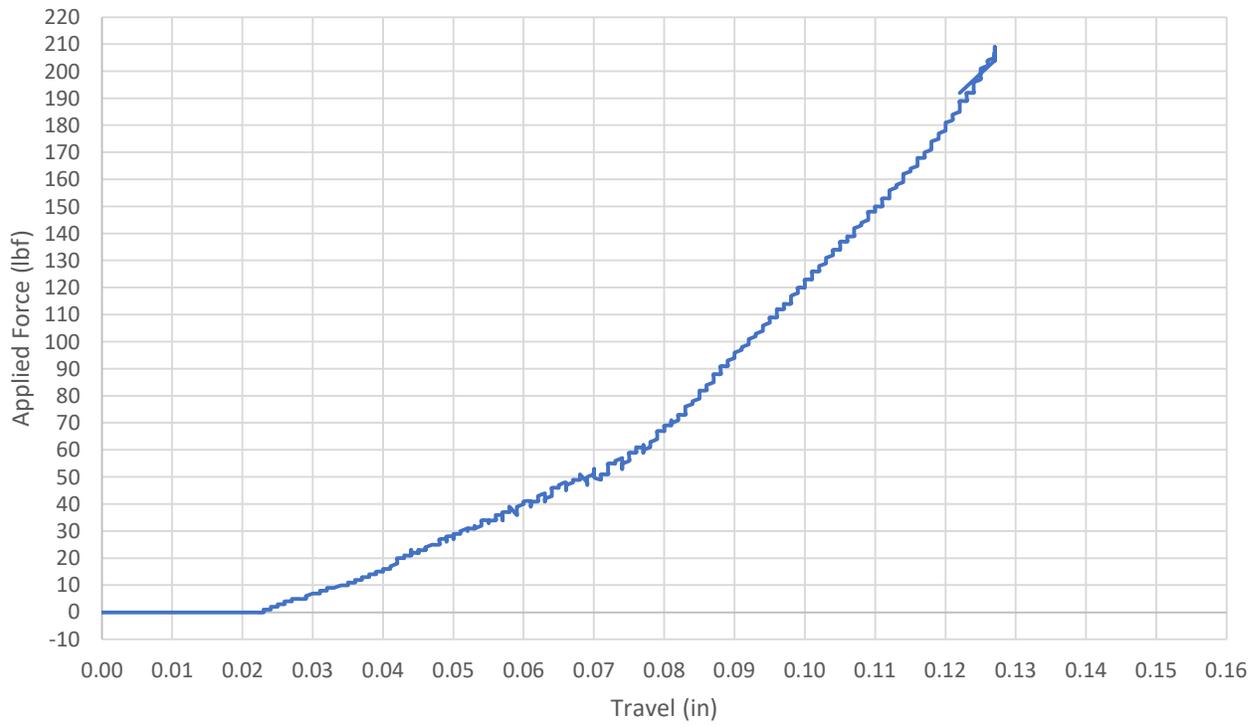
Description	External Bending Moment Sample 1-5P/S
Test Name	External Bending Moment
Part Name	28-15 Plug, 28-15 Receptacle
Test Group	1
Part No.	970-001ZR28-15S2-1, 970-003ZR28-15P2N-1
Serial No.	1-5P, 1-5S

Force vs Deflection of Sample 1-6



Description	External Bending Moment Sample 1-6P/S
Test Name	External Bending Moment
Part Name	40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF40-5S2-1 , 970-003NF40-5P2N-1
Serial No.	1-6P, 1-6S

Force vs Deflection of Sample 1-7



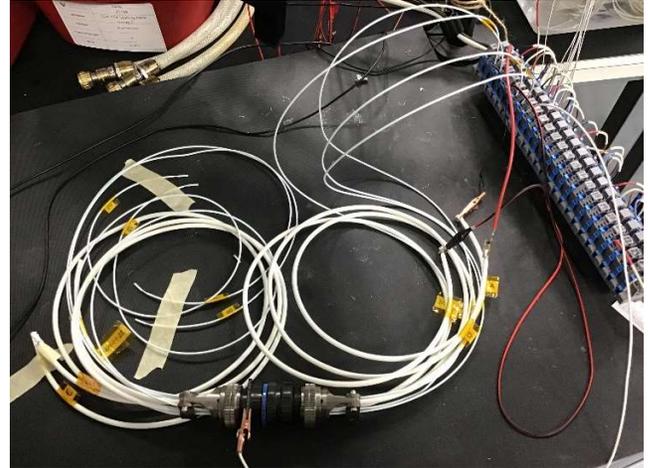
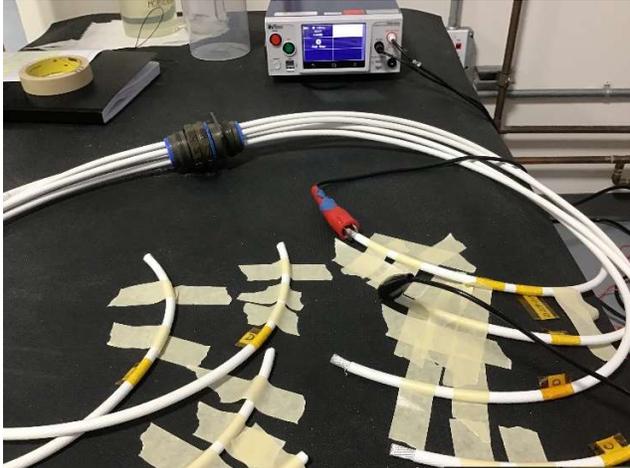
Description	External Bending Moment Sample 1-7P/S
Test Name	External Bending Moment
Part Name	40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF40-5S1-1, 970-003NF40-5P1N-1
Serial No.	1-7P, 1-7S

Test Photos



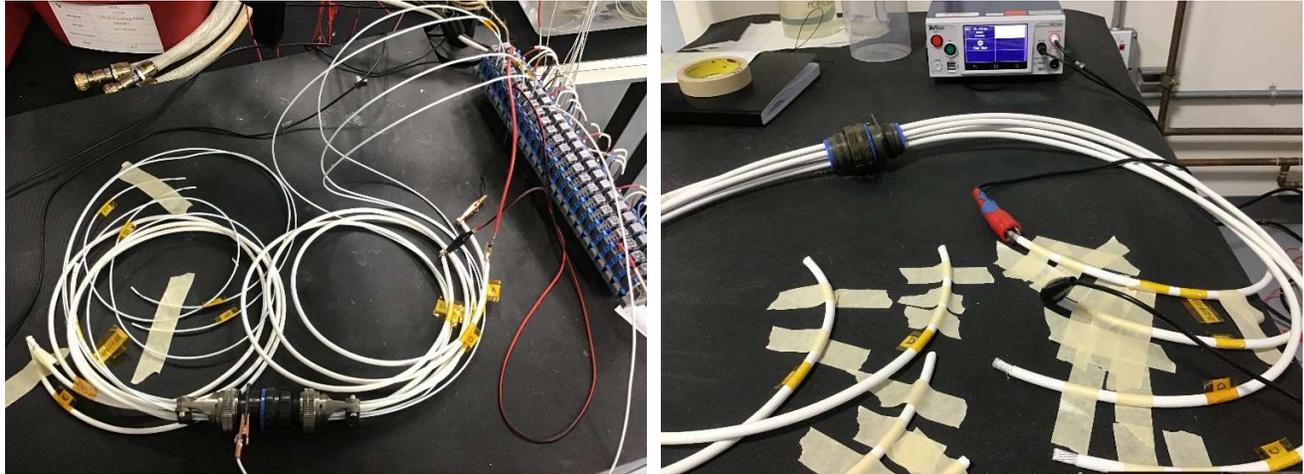
Description	Contact Retention Typical Setup
Test Name	Contact Retention
Part Name	18-4 Plug, 18-4 Receptacle, 20-7 Plug, 20-7 Receptacle, 28-4 Plug, 28-4 Receptacle, 28-15 Plug, 28-15 Receptacle, 40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001NF28-4S2-1, 970-003NF28-4P2N-1, 970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1, 970-001NF40-5S2-1, 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1
Serial No.	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S

Test Photos



Description	Insulation Resistance Typical Setup
Test Name	Insulation Resistance
Part Name	18-4 Plug, 18-4 Receptacle, 20-7 Plug, 20-7 Receptacle, 28-4 Plug, 28-4 Receptacle, 28-15 Plug, 28-15 Receptacle, 40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001NF28-4S2-1, 970-003NF28-4P2N-1, 970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1, 970-001NF40-5S2-1, 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1
Serial No.	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S

Test Photos



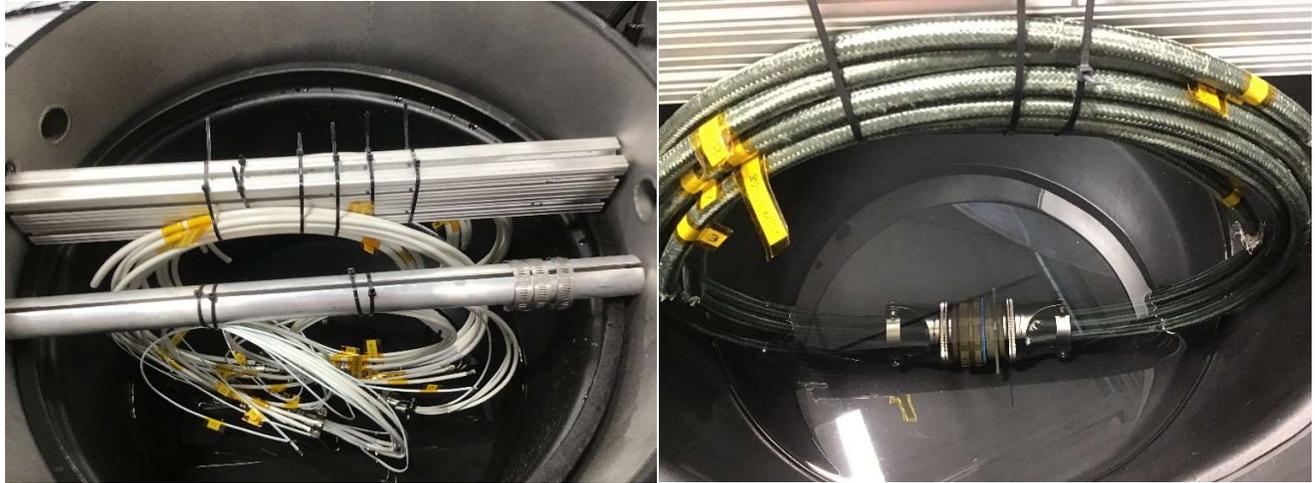
Description	Dielectric Withstanding Voltage Typical Setup
Test Name	Dielectric Withstanding Voltage
Part Name	18-4 Plug, 18-4 Receptacle, 20-7 Plug, 20-7 Receptacle, 28-4 Plug, 28-4 Receptacle, 28-15 Plug, 28-15 Receptacle, 40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001NF28-4S2-1, 970-003NF28-4P2N-1, 970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1, 970-001NF40-5S2-1, 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1
Serial No.	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S

Test Photos



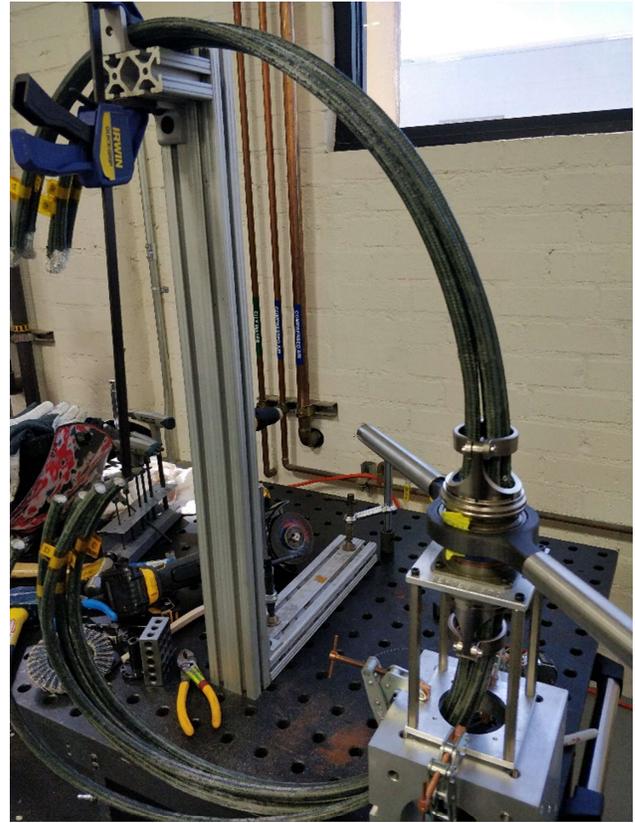
Description	Sample 1-6S Noted Damage to Grommet at Cavities B, D, and E
Test Name	Post Initial Insulation Resistance
Part Name	40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF40-5S2-1 , 970-003NF40-5P2N-1
Serial No.	1-6P, 1-6S

Test Photos



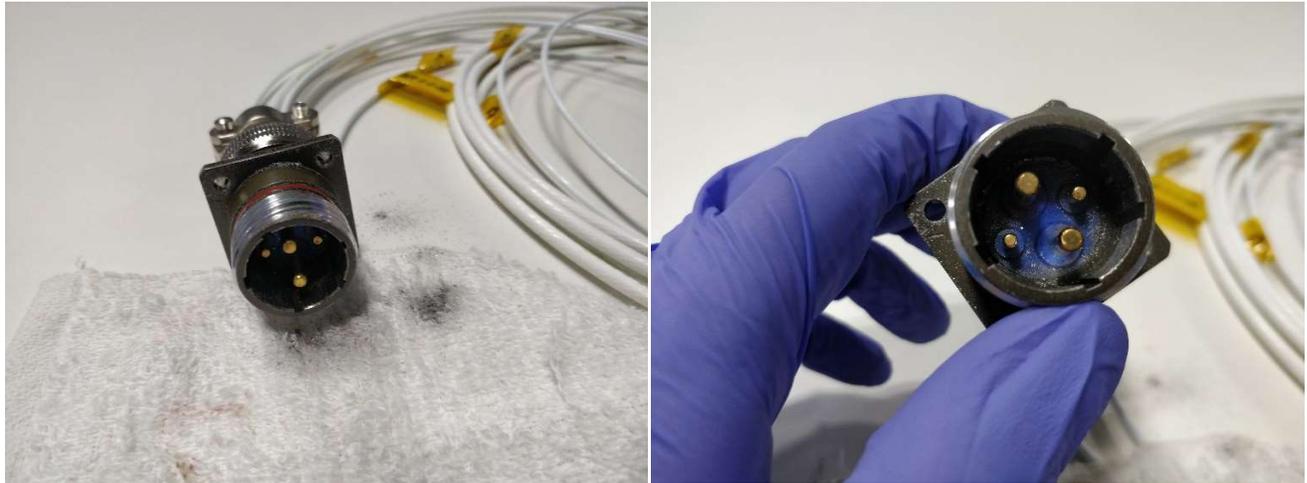
Description	Altitude Immersion Typical Setup
Test Name	Altitude Immersion
Part Name	18-4 Plug, 18-4 Receptacle, 20-7 Plug, 20-7 Receptacle, 28-4 Plug, 28-4 Receptacle, 28-15 Plug, 28-15 Receptacle, 40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001NF28-4S2-1, 970-003NF28-4P2N-1, 970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1, 970-001NF40-5S2-1, 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1
Serial No.	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S

Test Photos



Description	Durability Typical Setup
Test Name	Durability
Part Name	18-4 Plug, 18-4 Receptacle, 20-7 Plug, 20-7 Receptacle, 28-4 Plug, 28-4 Receptacle, 28-15 Plug, 28-15 Receptacle, 40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001NF28-4S2-1, 970-003NF28-4P2N-1, 970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1, 970-001NF40-5S2-1, 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1
Serial No.	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S

Test Photos



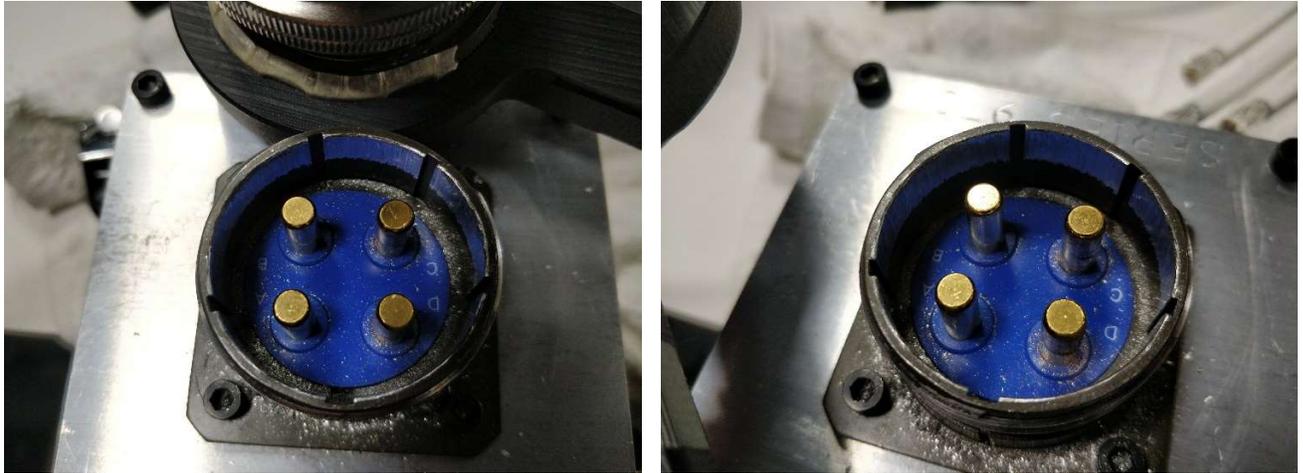
Description	Durability Excessive Wear 500 Cycles Sample 1-1S
Test Name	Durability
Part Name	18-4 Plug, 18-4 Receptacle
Test Group	1
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1
Serial No.	1-1P, 1-1S

Test Photos



Description	Durability Excessive Wear ~200 Cycles (Left) 500 Cycles (Right) Sample 1-2S
Test Name	Durability
Part Name	20-7 Plug, 20-7 Receptacle
Test Group	1
Part No.	970-001ZR20-7S1-1, 970-003ZR20-7P1N-1
Serial No.	1-2P, 1-2S

Test Photos



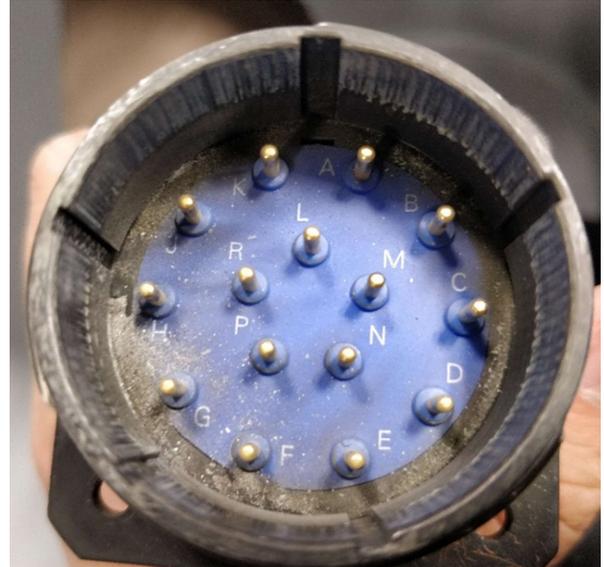
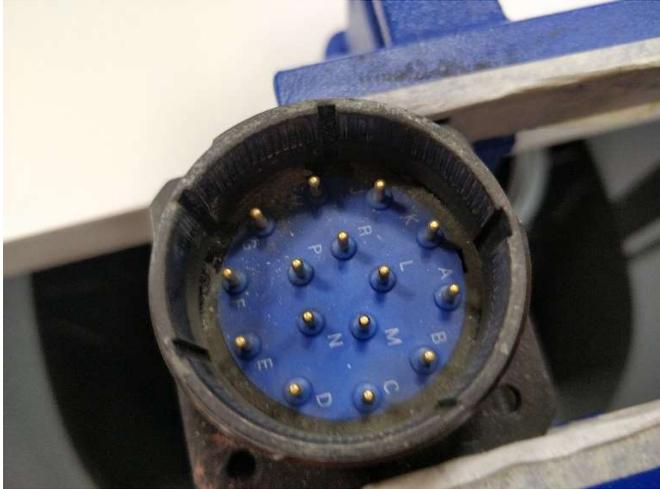
Description	Durability Excessive Wear 250 Cycles (Left) 360 Cycles (Right) Sample 1-3S
Test Name	Durability
Part Name	28-4 Plug, 28-4 Receptacle
Test Group	1
Part No.	970-001NF28-4S2-1, 970-003NF28-4P2N-1
Serial No.	1-3P, 1-3S

Test Photos



Description	Durability Excessive Wear 500 Cycles Sample 1-4P/S
Test Name	Durability
Part Name	28-4 Plug, 28-4 Receptacle
Test Group	1
Part No.	970-001NF28-4S1-1, 970-003NF28-4P1N-1
Serial No.	1-4P, 1-4S

Test Photos



Description	Durability Excessive Wear 150 Cycles (Left) 500 Cycles (Right) Sample 1-5S
Test Name	Durability
Part Name	28-15 Plug, 28-15 Receptacle
Test Group	1
Part No.	970-001ZR28-15S2-1, 970-003ZR28-15P2N-1
Serial No.	1-5P, 1-5S

Test Photos



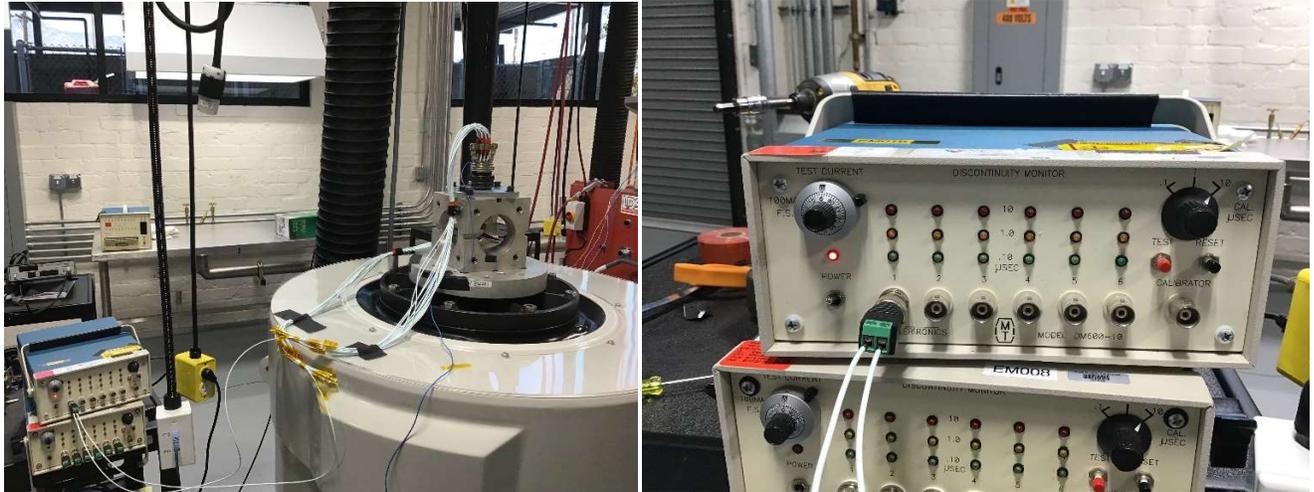
Description	Durability Wear 100 Cycles Sample 1-6P/S
Test Name	Durability
Part Name	40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF40-5S2-1 , 970-003NF40-5P2N-1
Serial No.	1-6P, 1-6S

Test Photos



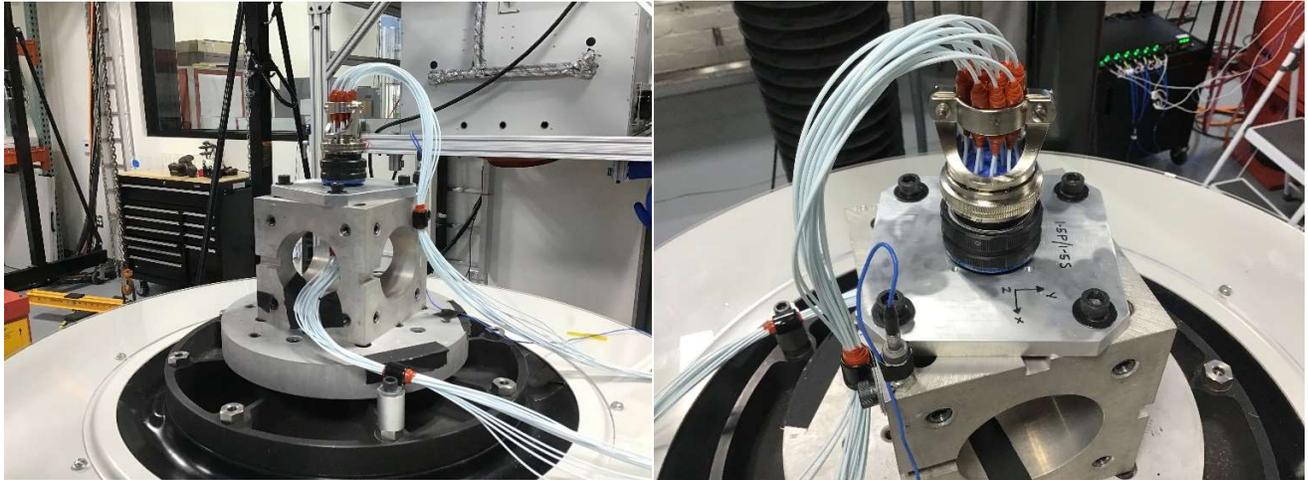
Description	Durability Excessive Wear 100 Cycles (Left) 141 Cycles (Right) Sample 1-7
Test Name	Durability
Part Name	40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF40-5S1-1, 970-003NF40-5P1N-1
Serial No.	1-7P, 1-7S

Test Photos



Description	Shock Typical Setup (Sample 1-5 Shown above)
Test Name	Shock
Part Name	18-4 Plug, 18-4 Receptacle, 20-7 Plug, 20-7 Receptacle, 28-4 Plug, 28-4 Receptacle, 28-15 Plug, 28-15 Receptacle, 40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001NF28-4S2-1, 970-003NF28-4P2N-1, 970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1, 970-001NF40-5S2-1, 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1
Serial No.	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S

Test Photos



Description	Shock Typical Setup (Sample 1-5 Shown above)
Test Name	Shock
Part Name	18-4 Plug, 18-4 Receptacle, 20-7 Plug, 20-7 Receptacle, 28-4 Plug, 28-4 Receptacle, 28-15 Plug, 28-15 Receptacle, 40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001NF28-4S2-1, 970-003NF28-4P2N-1, 970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1, 970-001NF40-5S2-1, 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1
Serial No.	1-1P, 1-1S, 1-2P, 1-2S, 1-3P, 1-3S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S

Test Photos



Description	Moisture Resistance Test Setup Chamber CE027
Test Name	Moisture Resistance
Part Name	18-4 Plug, 18-4 Receptacle, 20-7 Plug, 20-7 Receptacle, 28-15 Plug, 28-15 Receptacle
Test Group	1
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1
Serial No.	1-1P, 1-1S, 1-2P, 1-2S, 1-5P, 1-5S

Test Photos



Description	Moisture Resistance Test Setup Chamber 1007H
Test Name	Moisture Resistance
Part Name	28-4 Plug, 28-4 Receptacle, 40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF28-4S2-1, 970-003NF28-4P2N-1, 970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001NF40-5S2-1, 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1
Serial No.	1-3P, 1-3S, 1-4P, 1-4S, 1-6P, 1-6S, 1-7P, 1-7S

Test Photos



Description	Insert Retention on Face of Connectors
Test Name	Insert Retention
Part Name	18-4 Plug, 18-4 Receptacle, 20-7 Plug, 20-7 Receptacle, 28-4 Plug, 28-4 Receptacle, 28-15 Plug, 28-15 Receptacle, 40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1, 970-001NF40-5S2-1, 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1
Serial No.	1-1P, 1-1S, 1-2P, 1-2S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S

Test Photos



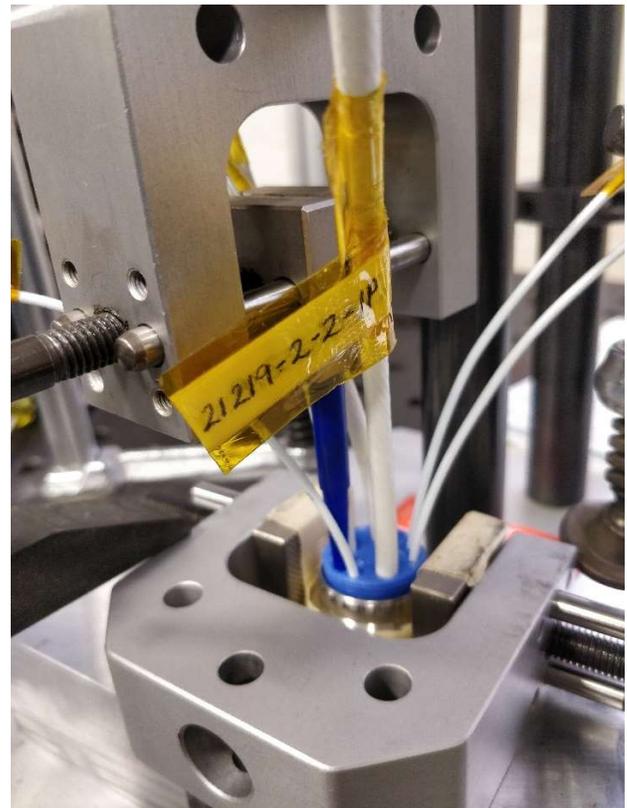
Description	Insert Retention in Rear Direction
Test Name	Insert Retention
Part Name	18-4 Plug, 18-4 Receptacle, 20-7 Plug, 20-7 Receptacle, 28-4 Plug, 28-4 Receptacle, 28-15 Plug, 28-15 Receptacle, 40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1, 970-001NF40-5S2-1, 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1
Serial No.	1-1P, 1-1S, 1-2P, 1-2S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S

Test Photos



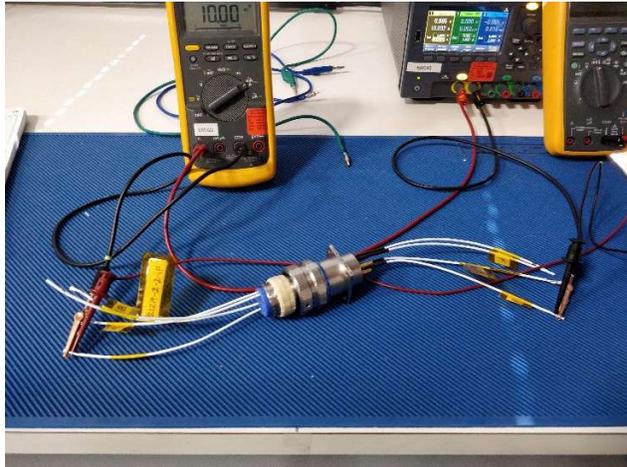
Description	External Bending Moment Typical Test setup
Test Name	External Bending Moment
Part Name	18-4 Plug, 18-4 Receptacle, 20-7 Plug, 20-7 Receptacle, 28-4 Plug, 28-4 Receptacle, 28-15 Plug, 28-15 Receptacle, 40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1, 970-001NF40-5S2-1, 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1
Serial No.	1-1P, 1-1S, 1-2P, 1-2S, 1-4P, 1-4S, 1-5P, 1-5S, 1-6P, 1-6S, 1-7P, 1-7S

Test Photos



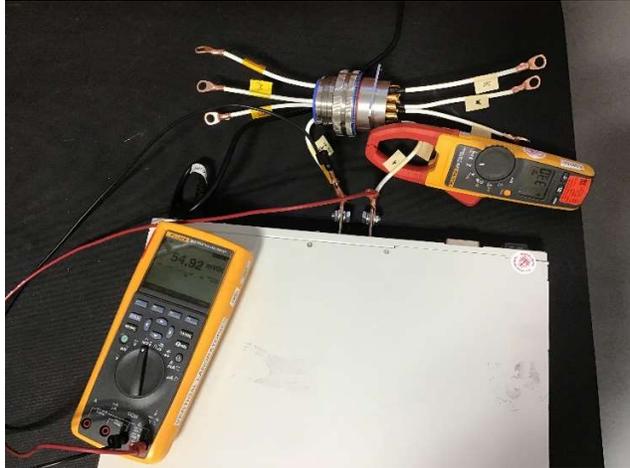
Description	Insertion and Removal Forces Typical Test setup
Test Name	Insertion and Removal Forces
Part Name	20-7 Plug, 20-7 Receptacle, 24-6 Plug, 24-6 Receptacle, 32-2 Plug, 32-2 Receptacle
Test Group	2
Part No.	970-001Z120-7P2-1, 970-001Z120-7SN-1, 970-001Z124-A6S2-1, 970-001Z124-A6P2N-1, 970-001Z132-2P2-1, 970-001Z132-2S2N-1
Serial No.	2-1P, 2-1S, 2-2P, 2-2S, 2-3P, 2-3S

Test Photos



Description	Contact Resistance Typical Test setup
Test Name	Contact Resistance
Part Name	20-7 Plug, 20-7 Receptacle
Test Group	2
Part No.	970-001Z120-7P2-1, 970-001Z120-7SN-1
Serial No.	2-1P, 2-1S

Test Photos



Description	Insertion and Removal Forces Typical Test setup
Test Name	Insertion and Removal Forces
Part Name	24-6 Plug, 24-6 Receptacle, 32-2 Plug, 32-2 Receptacle, 40-21 Plug, 40-21 Receptacle
Test Group	2
Part No.	970-001Z124-A6S2-1, 970-001Z124-A6P2N-1, 970-001Z132-2P2-1, 970-001Z132-2S2N-1, 970-001Z140-21S2-1, 970-012Z140-21PSN-1
Serial No.	2-2P, 2-2S, 2-3P, 2-3S, 2-4P, 2-4S

Test Photos



Description	Post Test Examination Sample 1-1P/S
Test Name	Post Test Examination
Part Name	18-4 Plug, 18-4 Receptacle
Test Group	1
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1
Serial No.	1-1P, 1-1S

Test Photos



Description	Damage to Finish and Mating Stripe Sample 1-2S (Right) and Sample 1-2P (Left)
Test Name	Post Test Examination
Part Name	20-7 Plug, 20-7 Receptacle
Test Group	1
Part No.	970-001ZR20-7S1-1, 970-003ZR20-7P1N-1
Serial No.	1-2P, 1-2S

Test Photos



Description	Post Test Examination Sample 1-3P/S
Test Name	Post Test Examination
Part Name	28-4 Plug, 28-4 Receptacle
Test Group	1
Part No.	970-001NF28-4S2-1, 970-003NF28-4P2N-1
Serial No.	1-3P, 1-3S

Test Photos



Description	Post Test Examination Sample 1-4P/S
Test Name	Post Test Examination
Part Name	28-4 Plug, 28-4 Receptacle
Test Group	1
Part No.	970-001NF28-4S1-1, 970-003NF28-4P1N-1
Serial No.	1-4P, 1-4S

Test Photos



Description	Post Test Examination Sample 1-5P/S
Test Name	Post Test Examination
Part Name	28-15 Plug, 28-15 Receptacle
Test Group	1
Part No.	970-001ZR28-15S2-1, 970-003ZR28-15P2N-1
Serial No.	1-1P, 1-1S

Test Photos



Description	Post Test Examination Sample 1-6P/S
Test Name	Post Test Examination
Part Name	40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF40-5S2-1 , 970-003NF40-5P2N-1
Serial No.	1-6P, 1-6S

Test Photos



Description	Post Test Examination Sample 1-7P/S
Test Name	Post Test Examination
Part Name	40-5 Plug, 40-5 Receptacle
Test Group	1
Part No.	970-001NF40-5S1-1, 970-003NF40-5P1N-1
Serial No.	1-7P, 1-7S

Test Photos



Description	Post Test Examination Sample 2-1P/S
Test Name	Post Test Examination
Part Name	20-7 Plug, 20-7 Receptacle
Test Group	2
Part No.	970-001Z120-7P2-1, 970-012Z120-7S2N-1
Serial No.	2-1P, 2-1S

Test Photos



Description	Post Test Examination Sample 2-2P/S
Test Name	Post Test Examination
Part Name	24-6 Plug, 24-6 Receptacle
Test Group	2
Part No.	970-001Z124-A6S2-1, 970-012Z124-A6P2N-1
Serial No.	2-2P, 2-2S

Test Photos



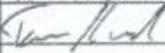
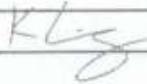
Description	Post Test Examination Sample 2-3P/S
Test Name	Post Test Examination
Part Name	32-2 Plug, 32-2 Receptacle
Test Group	2
Part No.	970-001Z132-2P2-1 , 970-012Z132-2S2N-1
Serial No.	2-3P, 2-3S

Test Photos



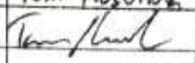
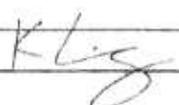
Description	Post Test Examination Sample 2-4P/S
Test Name	Post Test Examination
Part Name	40-21 Plug, 40-21 Receptacle
Test Group	2
Part No.	970-001Z140-21S2-1, 970-012Z140-21P2N-1
Serial No.	2-4P, 2-4S

Appendix

VERTICAL LABORATORIES		Test Deviation Form	
	Doc. No.	21219DV1DTV1	Version
			1
	Test Type	Insulation Resistance and Dielectric Withstanding Voltage	
Test Name	Insulation Resistance and Dielectric Withstanding Voltage		
Part Name	40-5		
Part No.	970-001NF40-5S2N-1, 970-003NF40-5P2N-1		
Serial No.	1-6P, 1-6S		
Test Requirements			
<p>Insulation Resistance: 500V, 500V/s Ramp Rate, Minimum 5000MΩ. All connections shall be tested including to shell.</p> <p>Dielectric Withstanding Voltage: 2kVAC, 500V/s Ramp Rate, Maximum 4mA Leakage Current. 50% of contacts shall be tested, but no less than 6 measurements shall be recorded.</p>			
Specification	EIA-364-20F, EIA-364-21F		
Method / Procedure	EIA-364-20F Method A		
Test Deviation Description			
<p>Sample 1-6P/S failed initial Insulation Resistance at sea level. Connector was unamted to investigate; moisture was discovered at the contact interface. IR test was performed before altitude immersion testing.</p>			
Test Operator	Danny Tan	Deviation Date	9/10/2021
Reported To	Tom Kusunoki	Date	9/10/2021
Resolution			
<p>After moisture was found in the contact interface, customer met and instructed to bake the unmated connectors and retest the samples. The unmated connector pairs were placed into an oven to bakeout at 50C for 3 hours. Connector passed insulation resistance retest.</p> <p style="color: red;">EWIS EAR concurs with RTP deviation to remove moisture from connector prior altitude immersion. NM. 09/16/21 AR-E-1208</p>			
Approval			
Client Name	Tom Kusunoki		
Client Signature		Date	9/14/21
Quality Manager		Date	9/14/2021

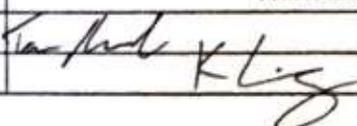
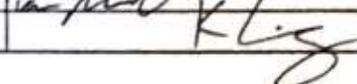
QMS708-F4 v3.1

Appendix

VERTICAL LABORATORIES		Test Deviation Form			
		Doc. No.	21219DV2DTV1	Version	1
		Test Type	Durability		
Test Name	Durability				
Part Name	18-4, 20-7, 28-4, 28-15, 40-5				
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001NF28-4S2-1, 970-003NF28-4P2N-1, 970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1, 970-001NF40-5S2N-1, 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1				
Serial No.	1-1P/S, 1-2P/S, 1-3P/S, 1-4P/S, 1-5P/S, 1-6P/S, 1-7P/S				
Test Requirements					
The wired, assembled plug and receptacle connectors shall be mated and unmated 500 times at a rate that shall not be greater than 300 cycles per hour in accordance with EIA-364-09D.					
Specification	EIA-364-09D				
Method / Procedure	EIA-364-09D				
Test Deviation Description					
<p>The original QTP requirements were to perform 500 cycles. After observing excessive wear on the connector shell and contacts, Glenair was notified and advised to complete only 100 cycles. Another approval to proceed to 500 cycles was received to reverse the previous instruction. Upon completion of some durability, further instruction was received to perform only 100 cycles. Connector samples went through various amounts of durability with signs of excessive wear on the contacts and the connector shell. Durability cycles are listed for each sample as follows: 1-1, 1-2, 1-4, and 1-5 underwent 500 cycles, 1-3 underwent 360 cycles, 1-6 underwent 100 cycles, 1-7 underwent 141 cycles.</p>					
Test Operator	Danny Tan		Deviation Date	9/15/2021	
Reported To	Tom Kusunoki		Date	9/15/2021	
Resolution					
<p>After inspecting the connector samples and a discussion with the customers, a review of the controlling document was performed. Customers agreed to change the durability requirement from 500 cycles to 100 cycles of mating and unmating in accordance with AS50151E Section 3.16. For the samples that underwent over 100 cycles of durability, dry nitrogen and isopropyl alcohol shall be used to remove some of the debris between the contacts from the connector face. The intent is to eliminate an additional creep path that may have been introduced due to the excessive wear.</p> <p style="color: red;">09/16/21 HM EWS AR concurs with deviation in accordance with AS50151E & QTP intent.</p>					
Approval					
Client Name	Tom Kusunoki				
Client Signature			Date	9/16/21	
Quality Manager			Date	9/16/2021	

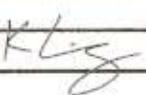
QMS708-F4 v3.1

Appendix

VERTICAL LABORATORIES		Test Deviation Form	
		Doc. No.	21219DV3DTV1
		Version	1
		Test Type	Moisture Resistance
Test Name	Moisture Resistance		
Part Name	18-4, 20-7, 28-4, 28-15, 40-5		
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001NF28-4S2-1, 970-003NF28-4P2N-1, 970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1, 970-001NF40-5S2N-1, 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1		
Serial No.	1-1P/S, 1-2P/S, 1-3P/S, 1-4P/S, 1-5P/S, 1-6P/S, 1-7P/S		
Test Requirements			
Perform initial insulation resistance measurement prior to any precondition. Precondition samples at 50C for 24 hours. Measure IR after 24 hour recovery period at ambient conditions. Cycle temperature and humidity per EIA-364-31F Method IV. Measure IR at elevated humidity a minimum of 3 hours after the start of step 7a (EIA-364-31F 5.5.3). Final IR measurement shall be taken after connectors have been brought back to ambient conditions.			
Specification	EIA-364-31F		
Method / Procedure	Method IV		
Test Deviation Description			
According to test requirements, initial insulation resistance were to be taken before connector samples were placed in the chamber. During the course of testing, initial IR measurement prior to preconditioning was omitted. The samples underwent preconditioning without the initial IR measurement.			
Test Operator	Danny Tan	Deviation Date	9/22/2021
Reported To	Tom Kusunoki, Neftali Magallanes	Date	9/23/2021
Resolution			
Customers were notified and agreed to continue testing. Insulation resistance measurement after preconditioning will be compared to last IR measurement for any discrepancies. If any failures are detected the root cause will be investigated.			
EWS EAR concurs with QTP deviation noted above, since IR measurement was recorded prior this test step. NM 10/13/21 AR-E-1208			
Approval			
Client Name	Tom Kusunoki, Neftali Magallanes		
Client Signature		Date	9/27/21
Quality Manager		Date	9/24/2021

QMS708-F4 v3.1

Appendix

VERTICAL LABORATORIES		Test Deviation Form			
		Doc. No.	21219DV4DTV1	Version	1
		Test Type	Moisture Resistance		
Test Name	Moisture Resistance				
Part Name	8-4 Plug, 18-4 Receptacle, 20-7 Plug, 20-7 Receptacle, 28-15 Plug, 28-15 Receptacle				
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001ZR28-1SS2-1, 970-003ZR28-1SP2N-1				
Serial No.	1-1P, 1-1S, 1-2P, 1-2S, 1-5P, 1-5S				
Test Requirements					
<p>Samples are to be exposed to the temperature and humidity conditions in accordance to EIA-364-31F Method IV with the inclusion of step 7a. Temperatures is cycled between 25C to 65C. Relative humidity (RH) is set between 90-98% during ramp up and soak steps and 80-98% for ramp down steps.</p>					
Specification	EIA-364-31F				
Method / Procedure	Method IV				
Test Deviation Description					
<p>During the first ramp up step from 25C to 65C and 50% humidity to 94% humidity, the humidity chamber held the temperature at 38.9C and experienced a drop in humidity at 63% RH. The parts in the chamber were exposed to 38.9C and humidity around 33%RH for approximately 48 hours.</p>					
Test Operator	Danny Tan		Deviation Date	9/25/2021	
Reported To	Tom Kusunoki, Neftali Magallanes		Date	9/27/2021	
Resolution					
<p>The samples were removed from the humidity chamber. Repairs were made to the humidity chamber. An overnight test run confirmed the performance of the chamber. Because the samples were exposed to 38.9C and 33%RH, the precondition will not be performed again. Moisture resistance testing was restarted.</p> <p><i>Ewis EAR concurs with the ATP deviation noted above to continue with the moisture resistance testing after chamber repair in order to meet the test intent and requirements. NM 10/13/21 AR-E-1208</i></p>					
Approval					
Client Name	Tom Kusunoki, Neftali Magallanes				
Client Signature			Date	9/29/21	
Quality Manager			Date	10/13/21	

QMS708-F4 v3.1

Appendix

		Test Deviation Form			
		Doc. No.	21219DV5DTV1	Version	1
		Test Type	Moisture Resistance		
Test Name	Moisture Resistance				
Part Name	18-4 Plug, 18-4 Receptacle, 20-7 Plug, 20-7 Receptacle, 28-15 Plug, 28-15 Receptacle				
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1				
Serial No.	1-1P, 1-1S, 1-2P, 1-2S, 1-5P, 1-5S				
Test Requirements					
<p>Samples are to be exposed to the temperature and humidity conditions in accordance to EIA-364-31F Method IV with the inclusion of step 7a. Temperatures is cycled between 25C to 65C. Relative humidity (RH) is set between 90-98% during ramp up and soak steps and 80-98% for ramp down steps.</p>					
Specification	EIA-364-31F				
Method / Procedure	Method IV				
Test Deviation Description					
<p>During step 7 in the 24 hour cycle of EIA-364-31F Method IV, the relative humidity (RH) of the chamber fluctuated and fell below the required RH of 90%RH. The lowest humidity are listed as follows for each cycle at the 25C 90-98% humidity dwell step (1-10): 87.1, 86.6, 86.6, 87.1, 85.5, 85.3, 86.1, 87.6, 86.2, and 88.5.</p>					
Test Operator	Danny Tan	Deviation Date	9/28/2021-10/8/2021		
Reported To	Tom Kusunoki, Neftali Magallanes	Date	9/29/2021		
Resolution					
<p>Customer was alerted of the decreased RH and agreed to accept the lower humidity value for this step.</p> <p style="color: red;"><i>EWIS EAR concurs with the QTP deviation noted above which still meets the test intent. NM 10/13/21 AR-E-1208</i></p>					
Approval					
Client Name	Tom Kusunoki, Neftali Magallanes				
Client Signature	<i>Tom Kusunoki</i>	Date	10/13/21		
Quality Manager	<i>[Signature]</i>	Date	10/13/21		

QMS708-F4 v3.1

Appendix

		Test Deviation Form			
		Doc. No.	21219DV6DTV1	Version	1
		Test Type	External Bending Moment		
Test Name	External Bending Moment				
Part Name	18-4, 20-7, 28-4, 28-15, 40-5				
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001NF28-4S2-1, 970-003NF28-4P2N-1, 970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001ZR28-15S2-1, 970-003ZR28-15P2N-1, 970-001NF40-5S2N-1, 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1				
Serial No.	1-1P/S, 1-2P/S, 1-3P/S, 1-4P/S, 1-5P/S, 1-6P/S, 1-7P/S				
Test Requirements					
<p>Samples are to be subjected to the listed bending moment in Table 6 section 7.12 in GT-19-342 Rev8. Mated connectors shall have a load applied at 10 pounds/second until the required load is applied. The load shall then be held for 1 minute.</p>					
Specification	SAE AS50151 Rev E				
Method / Procedure	N/A				
Test Deviation Description					
<p>The rate of load application was changed to adapt to the settings of the equipment in use. Testing was done to obtain a rate of in/min that would fall below the 10 pounds/second application listed in the test plan</p>					
Test Operator	Danny Tan	Deviation Date	10/12/2021		
Reported To	Tom Kusunoki, Robert Cowell	Date	10/12/2021		
Resolution					
<p>After testing and discussions with customer, a rate of 0.180 in/minute was agreed upon.</p>					
Approval					
Client Name	Tom Kusunoki, Robert Cowell				
Client Signature	<i>Tom Kusunoki</i>	Date	10/13/21		
Quality Manager	<i>K. Lig</i>	Date	10/13/21		

QMS708-F4 v3.1

Appendix

		Test Deviation Form	
		Doc. No.	21219DV6DTV1
		Version	1
		Test Type	External Bending Moment
Test Name	External Bending Moment		
Part Name	18-4, 20-7, 28-4, 28-15, 40-5		
Part No.	970-001NF18-4S2-1, 970-003NF18-4P2N-1, 970-001ZR20-7S1-1, 970-003ZR20-7P1N-1, 970-001NF28-4S2-1, 970-003NF28-4P2N-1, 970-001NF28-4S1-1, 970-003NF28-4P1N-1, 970-001ZR28-1SS2-1, 970-003ZR28-1SP2N-1, 970-001NF40-5S2N-1, 970-003NF40-5P2N-1, 970-001NF40-5S1-1, 970-003NF40-5P1N-1		
Serial No.	1-1P/S, 1-2P/S, 1-3P/S, 1-4P/S, 1-5P/S, 1-6P/S, 1-7P/S		
Test Requirements			
Samples are to be subjected to the listed bending moment in Table 6 section 7.12 in GT-19-342 Rev8. Mated connectors shall have a load applied at 10 pounds/second until the required load is applied. The load shall then be held for 1 minute.			
Specification	SAE AS50151 Rev E		
Method / Procedure	N/A		
Test Deviation Description			
The rate of load application was changed to adapt to the settings of the equipment in use. Testing was done to obtain a rate of in/min that would fall below the 10 pounds/second application listed in the test plan			
Test Operator	Danny Tan	Deviation Date	10/12/2021
Reported To	Tom Kusunoki, Robert Cowell	Date	10/12/2021
Resolution			
After testing and discussions with customer, a rate of 0.180 in/minute was agreed upon.			
Approval			
Client Name	Tom Kusunoki, Robert Cowell		
Client Signature		Date	10-13-2021
Quality Manager		Date	10/13/21

QMS708-F4 v3.1

End of Report