







Glenair, Inc. 1211 Air Way, Glendale, California, 91201  
Tel: (818) 247-6000 Fax: (818) 247-7240

# TEST REPORT GT-23-185

## Power Play Connectors

### APPROVALS

 _____ (Prepared By) <b>David Donner</b> Test Engineer, Glenair, Inc.	10/26/2023 _____ Date
 _____ <b>Dan Mitchell</b> Senior Technical Staff, Glenair, Inc.	10/26/2023 _____ Date
 _____ <b>Raul Galvan</b> Product Manager, Glenair, Inc.	10/27/2023 _____ Date
 _____ <b>Mike Ghara</b> Director of Engineering, Glenair, Inc.	10/30/23 _____ Date

TEST REPORT  
GT-23-185  
Revision B



**Glenair, Inc. 1211 Air Way, Glendale, California, 91201**  
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## REVISION PAGE

REVISION LETTER	DESCRIPTION OF REVISION	PAGE	DATE	APPROVAL
A	Initial Release	All	9/19/2023	-
B	Added section callouts for DWV Corrected Post-Durability photo for 1-P2	5 29	10/26/2023	DD



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## Applicable Documents

MIL-DTL-38999	General Specification For Connectors, Electrical, Circular, Miniature, High Density, Quick Disconnect (Bayonet, Threaded, and Breech Coupling), Environment Resistant, Removable Crimp and Hermetic Solder Contacts.
EIA-364	Electrical Connector / Socket Test Procedures Including Environmental Classifications
QTP-1317 Rev A	Glenair Test Plan Document



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## Scope

This report summarizes electrical, mechanical, and environmental performance testing of Glenair Power Play circular connectors (973 series). The information in this report was obtained from tests conducted by Vertical Laboratories in Glendale. Data and photos are included in the appendix.

## Test Items

Serial Number	Test Group	Part Number	Date Code
1-P1	1	973-001-G6ME17-2BN	2241
1-R1		973-001-00ME17-2AN	2249
1-P2		973-001-G6ME17-2BN	2241
1-R2		973-001-00ME17-2AN	2249
3-P1	3	973-001-G6ME17-2BN	2241
3-R1		973-001-00ME17-2AN	2249
3-P2		973-001BG6ME21-4BN	2238
3-R2		973-001-07ME21-4AN	2250

## Procedure

Tests performed are listed below, with applicable dates:

Test	Group(s)	Start Date	Completion Date
Visual and Mechanical Examination	1, 3	4/26/2023	4/26/2023
Insulation Resistance	1	4/27/2023	4/27/2023
Temperature Cycling	1	5/1/2023	5/2/2023
Insulation Resistance	1	5/2/2023	5/3/2023
DWV	1	5/3/2023	5/3/23
DWV at Altitude	1	5/3/2023	5/3/2023
Contact Resistance	1, 3	5/11/2023	5/15/2023
Durability - 150 Cycles	1	5/25/2023	5/26/2023
Durability - 500 Cycles	3	5/25/2023	5/25/2023
Contact Resistance	1, 3	5/26/2023	5/26/2023
Random Vibration at 200°C	1	6/7/2023	6/13/2023
Temperature Rise (Connectors)	3	8/2/2023	8/7/2023



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## Results

All samples passed per requirements.

## Testing Requirements

### Insulation Resistance

Shall be performed at ambient temperature. When tested as specified in 4.5.10.1 of MIL-DTL-38999M, the insulation resistance between any pair of contacts and between any contact and the shell shall be greater than 5,000 megohms. Test samples shall be unmated during all testing.

### Temp Cycling

Mated connectors shall be tested in accordance with test procedure EIA-364-32, test method A (air-to-air). The duration of steps 2 and 4 shall be 2 minutes maximum. Test samples shall be exposed to -65°C to 200°C. 60 minutes at each temperature extreme, for a duration of 5 cycles.

### DWV

Ambient: Wired, unmated connectors shall be tested in accordance with MIL-DTL-38999M, section 4.5.11.1. Testing performed at 5000 VAC. Test voltage shall be maintained for a 2 second minimum with a 2mA leakage current.

At Altitude: Mated connectors shall be tested in accordance with MIL-DTL-38999M, section 4.5.11.2. Testing performed at 3000 VAC. Test voltage shall be maintained for a 2 second minimum with a 2mA leakage current. All testing to be performed at the specified altitude of 15,000ft, 429torr equivalent pressure.

### Contact Resistance

Mated connectors shall be tested in accordance with the contact resistance requirements of EIA-364-06C and SAE-AS39029 Rev. D at ambient temperature. Voltage probes for crimp contacts shall be placed on the conductors a distance of 152.4 millimeters  $\pm$  3.0 millimeters (6.00 inch  $\pm$  0.12 inch) from each other, with the mated contacts in the center of that distance recorded. Max values listed on table 6 of SAEAS39029 Rev. D, 25°C values.



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**Durability - 150 Cycles (Group 1)**

Testing shall be in accordance with MIL-DTL-38999M, section 4.5.8.1. Mating and unmating shall be accomplished so that the plug and receptacle are completely separated during each cycle for a total of 150 cycles.

**Durability - 500 Cycles (Group 3)**

Testing shall be in accordance with MIL-DTL-38999M, section 4.5.8.1. Mating and unmating shall be accomplished so that the plug and receptacle are completely separated during each cycle for a total of 500 cycles.

**Random Vibration at 200°C**

EIA-364-28F Test condition VI, letter "J" (43.92 overall Grms.) Duration shall be 8 hours in the longitudinal direction and 8 hours in a perpendicular direction for a total of 16 hours. All contacts shall carry a test current of 100 milliamperes and be detected for discontinuities in excess of 1 microsecond. Testing shall be performed at 200°C.

**Temperature Rise (Connectors)**

Measure and record specimen temperature, ambient temperature and test current. Consecutively increase current levels as shown in table below. Maximum internal temperature of the connectors may not exceed 230°C.

Test Current Values	
Arrangement 17-2	Arrangement 21-4
55	45
80	60
95	75
110	90
120	95



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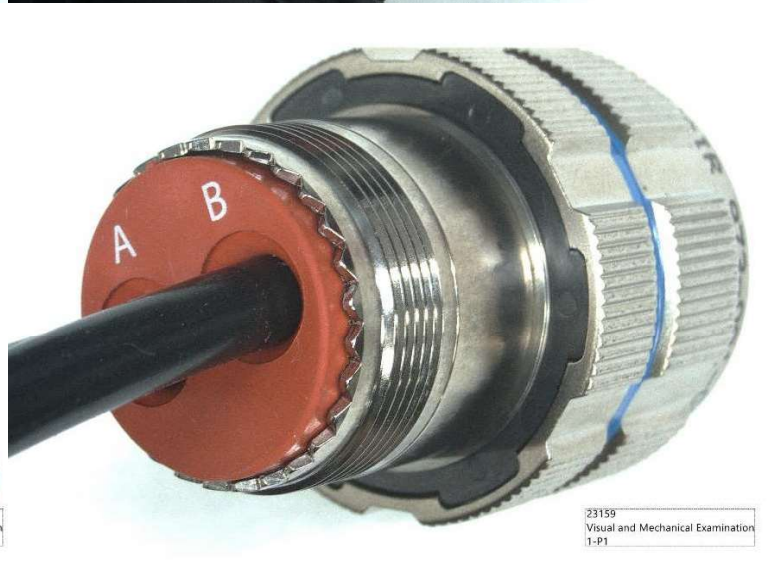
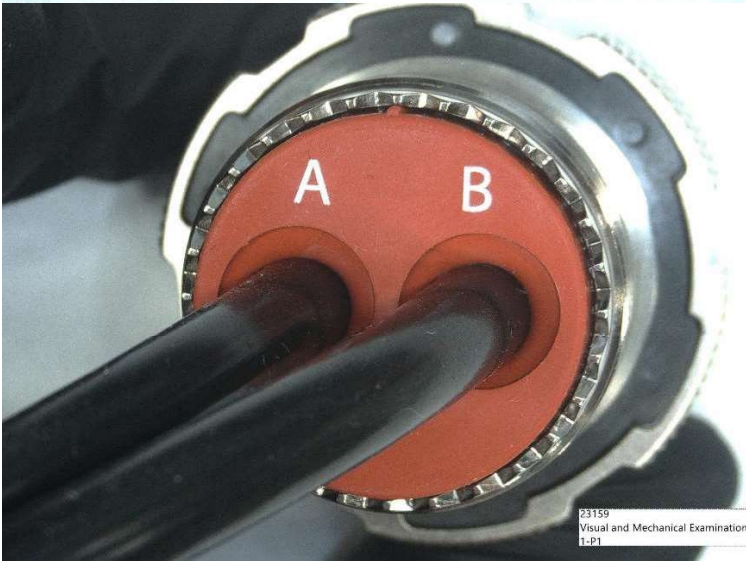
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# **APPENDIX A**

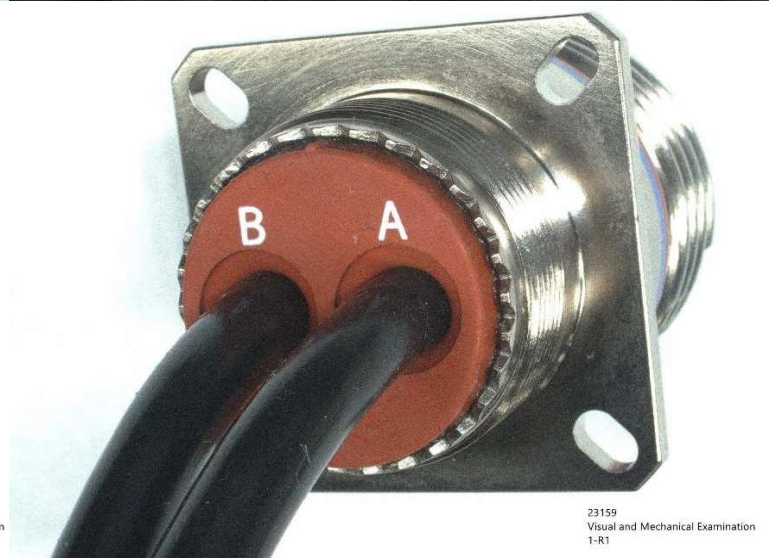
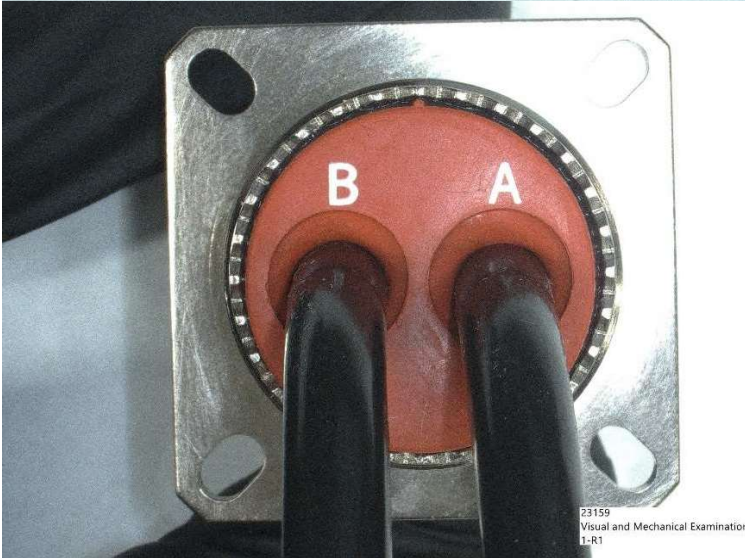
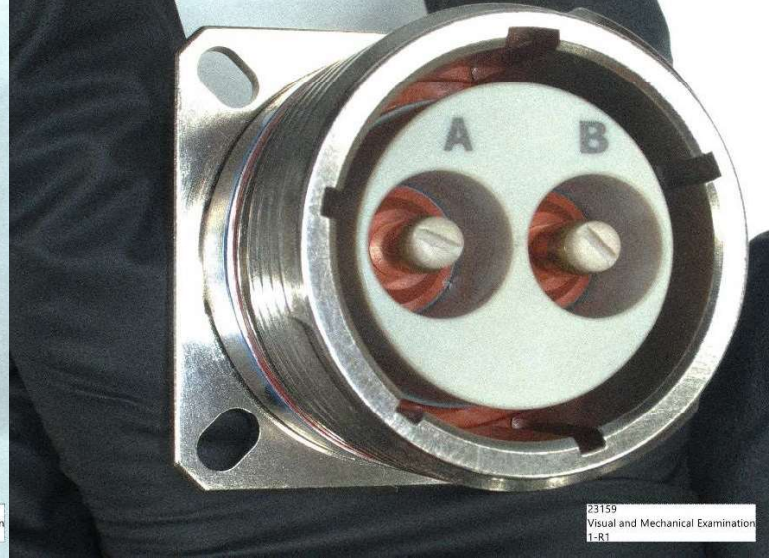
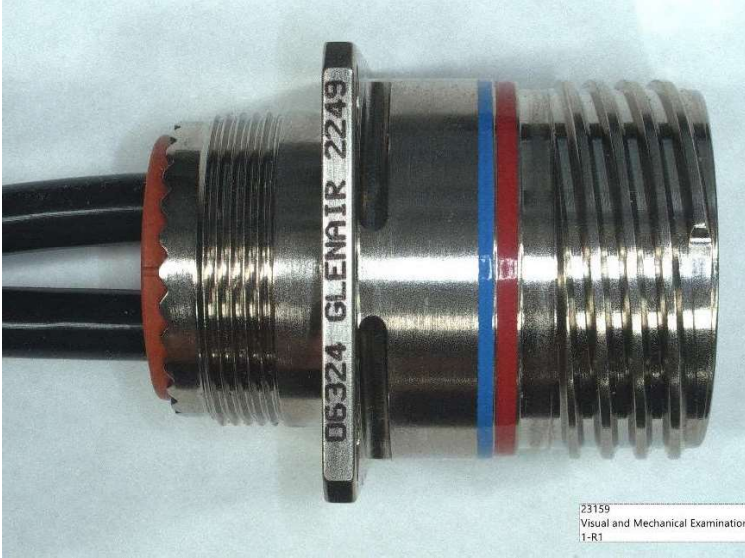
## **TEST DATA AND PHOTOS**

ID No.	Equipment Name	Manufacturer	Model No.	Cal. Date	Cal. Due
EM017	AC/DC/IR HIPOT TESTER	ASSOCIATED RESEARCH INC	3770	7/5/2023	7/31/2024
TC054	TEMPERATURE & HUMIDITY MONITOR	CONTROL COMPANY	4040	4/5/2022	4/30/2024
CE065	THERMAL SHOCK CHAMBER	ESPEC	TSE-12-A	6/23/2022	6/30/2023
VL35	BELL JAR	ABBESS INSTRUMENTS	-	-	-
VP19	DRY SCROLL PUMP	AGILENT	IDP-7	-	-
EM037	SYSTEM DC POWER SUPPLY	KEYSIGHT TECHNOLOGIES	N5741A	-	-
EM021	TRUE RMS MULTIMETER	FLUKE	87 SERIES V	1/9/2023	1/31/2024
EM007	TRUE RMS CLAMP ON AMMETER	FLUKE	376	5/10/2023	5/31/2024
TC028	TEMPERATURE DATALOGGER	EXTECH INSTRUMENTS	SD200	5/19/2023	5/31/2024
EM003	TRUE RMS MULTIMETER	FLUKE	287	12/28/2022	12/31/2023
EM038	TRUE RMS MULTIMETER	FLUKE	287	1/5/2023	1/31/2024
TC056	RH/TEMP DATA LOGGER (RESISTANCE)	LASCAR	EL-USB-2	4/26/2023	4/30/2024
VL20	NUMBER COUNTER	-	-	-	-
SK05	ELECTRODYNAMIC SHAKER	LDS	V8-440	-	-
AM02	AMPLIFIER	DYNAMIC SOLUTIONS	SA-30	-	-
TC058	RH/TEMP DATA LOGGER (SHAKER ROOM)	LASCAR	EL-USB-2	4/26/2023	4/30/2024
CE028	SHAKER TEMP CHAMBER	LR ENVIRONMENTAL	90760-3-3	8/9/2022	8/31/2023
AC082	CHARGE MODE ACCELEROMETER, HIGH TEMP	DYTRAN	3030C1	6/6/2023	6/30/2024

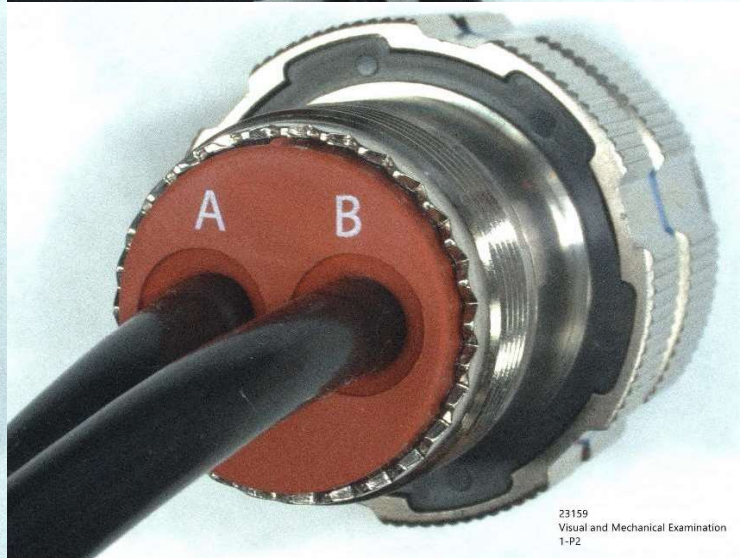
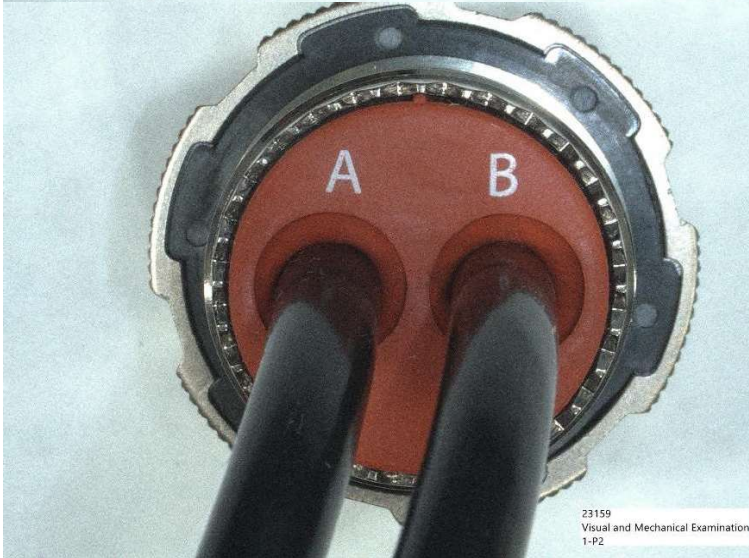
ID No.	Equipment Name	Manufacturer	Model No.	Cal. Date	Cal. Due
AC083	CHARGE MODE ACCELEROMETER, HIGH TEMP	DYTRAN	3030C1	5/1/2023	5/31/2024



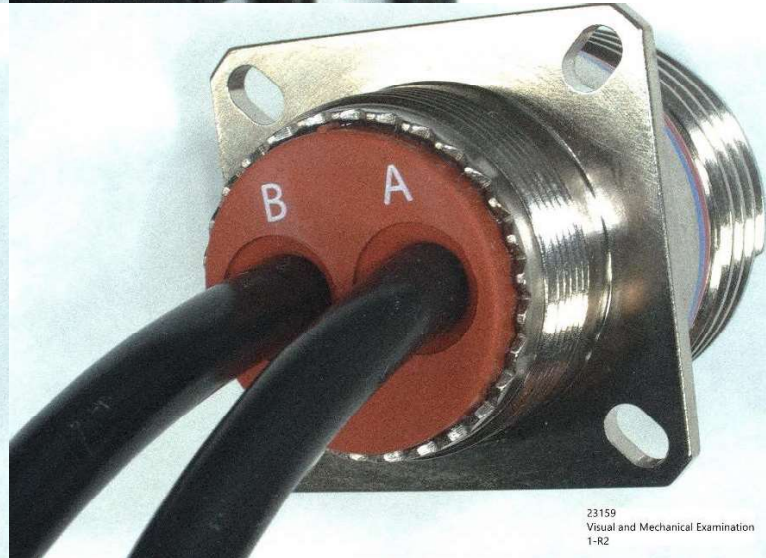
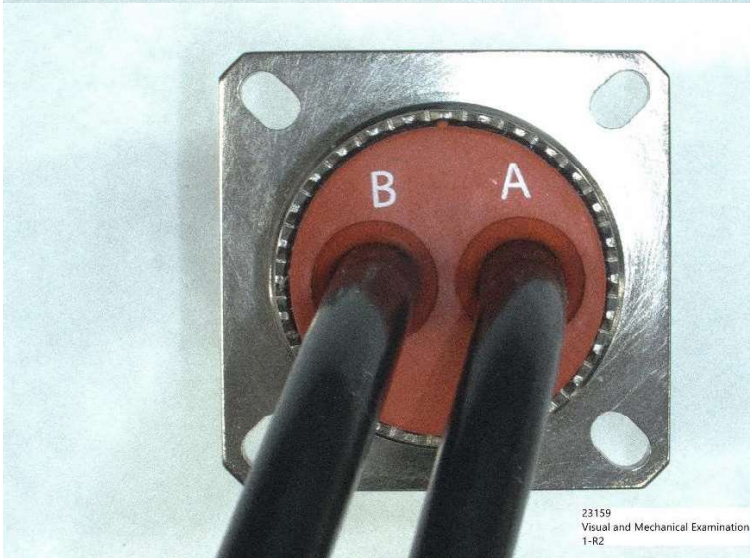
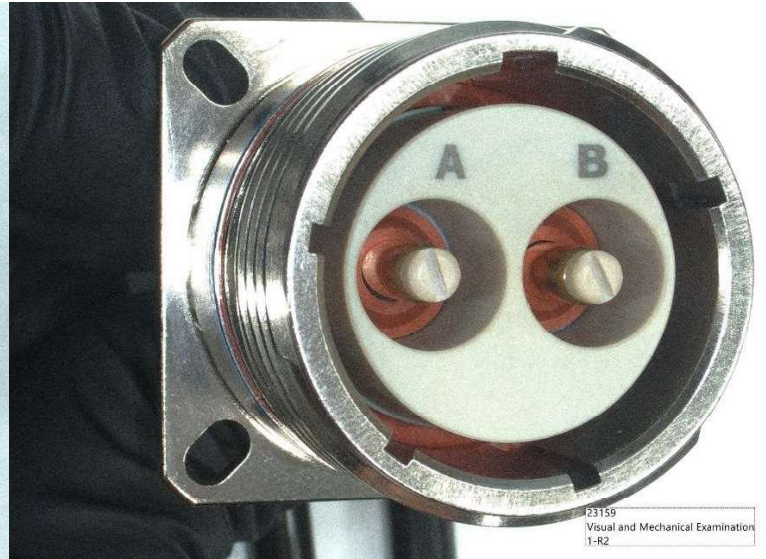
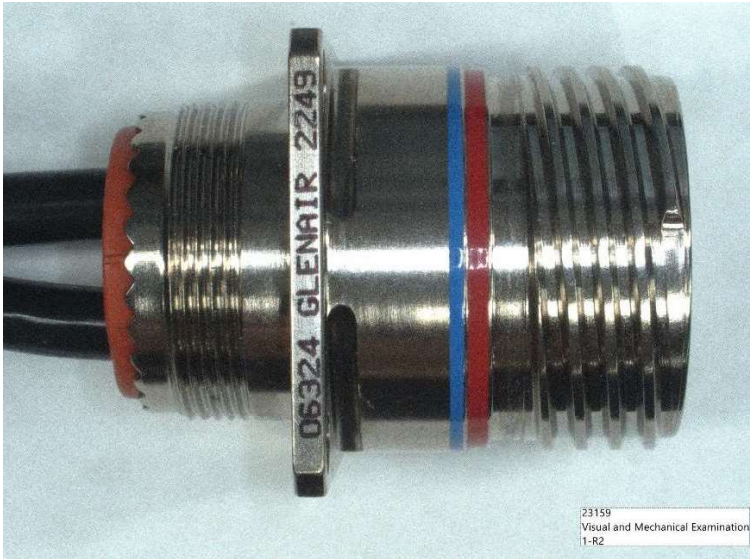
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<b>Test Name</b>	Visual and Mechanical Examination
<b>Part Name</b>	PowerPlay Connector
<b>Test Group</b>	1
<b>Part No.</b>	973-001-G6ME17-2BN
<b>Serial No.</b>	1-P1



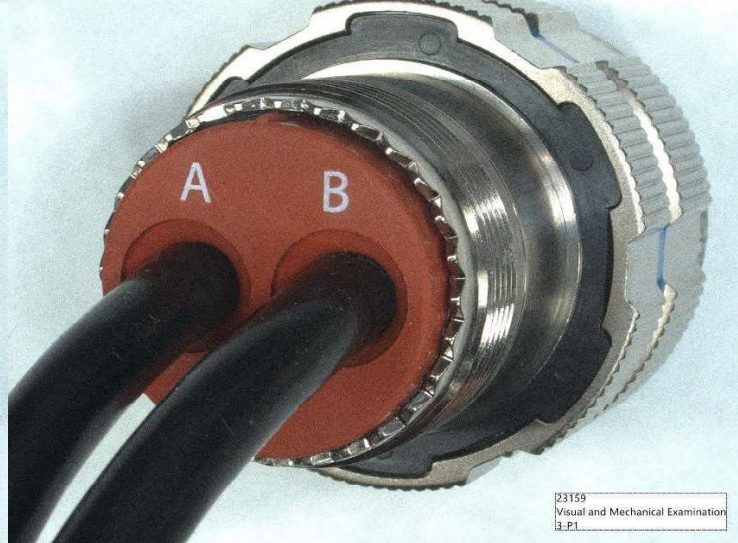
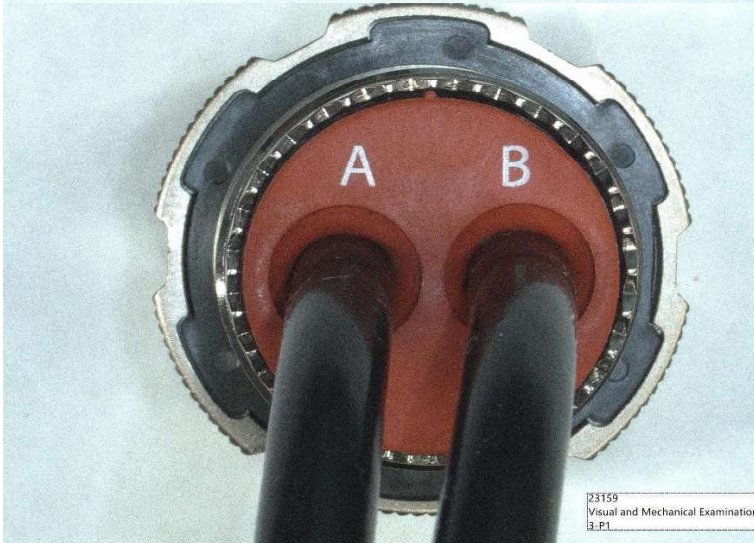
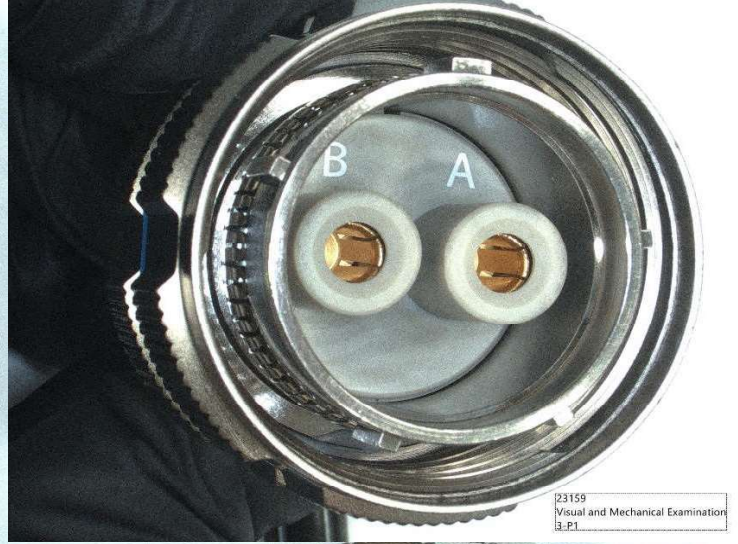
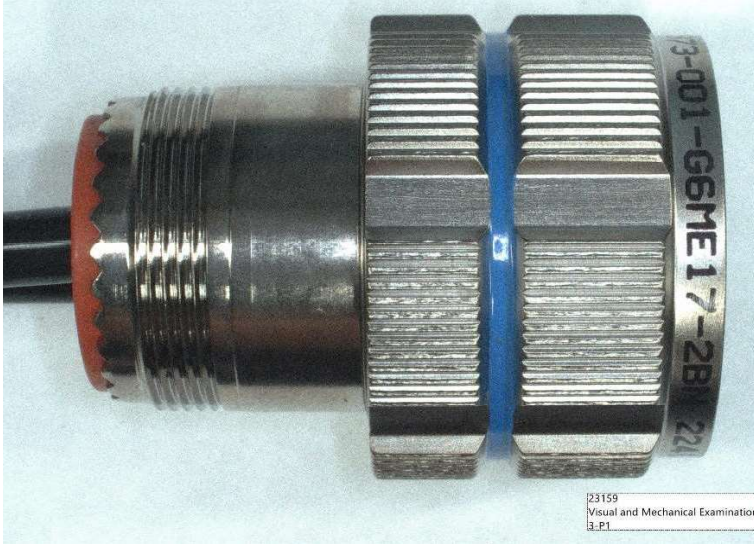
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Test Name	Visual and Mechanical Examination
Part Name	PowerPlay Connector
Test Group	1
Part No.	973-001-00ME17-2AN
Serial No.	1-R1



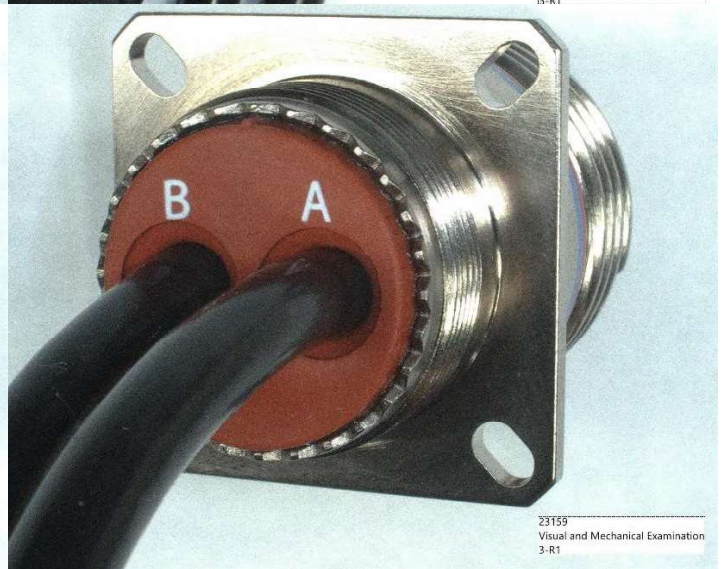
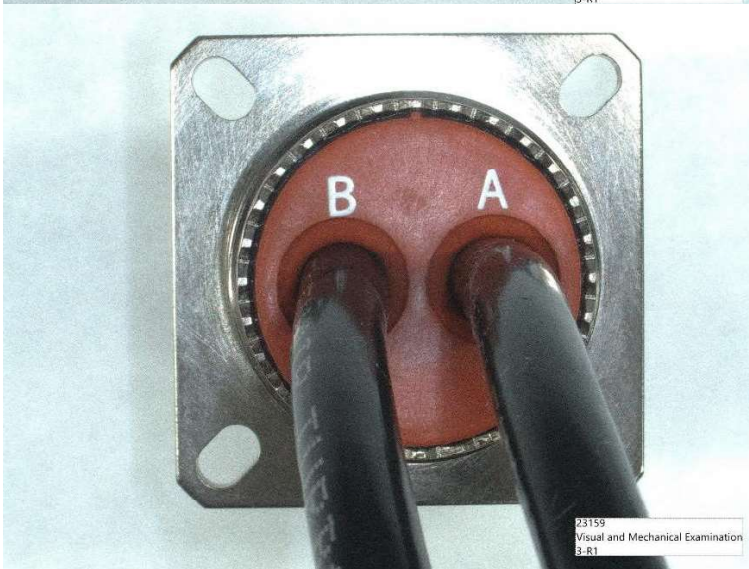
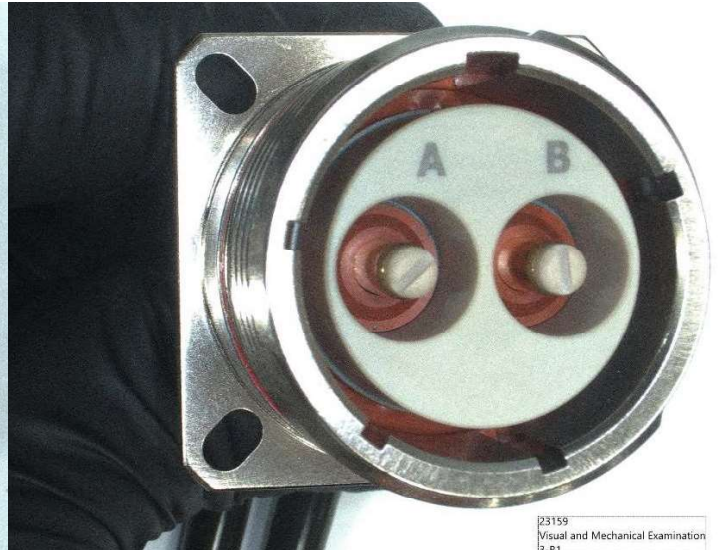
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<b>Test Name</b>	Visual and Mechanical Examination
<b>Part Name</b>	PowerPlay Connector
<b>Test Group</b>	1
<b>Part No.</b>	973-001-G6ME17-2BN
<b>Serial No.</b>	1-P2



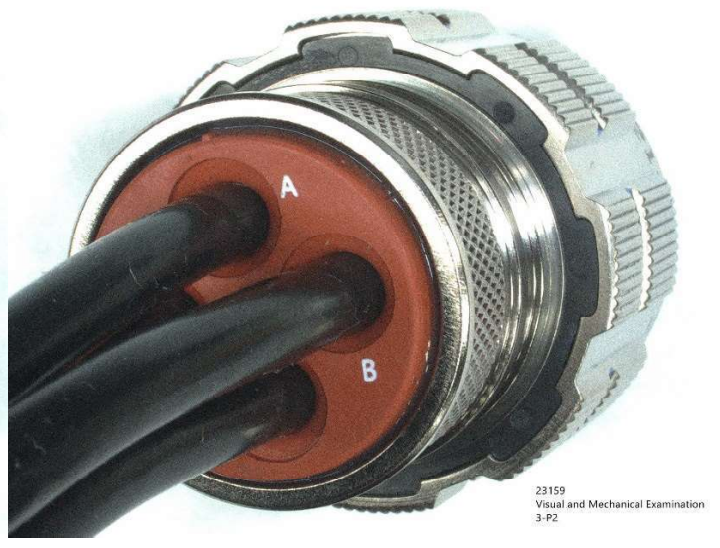
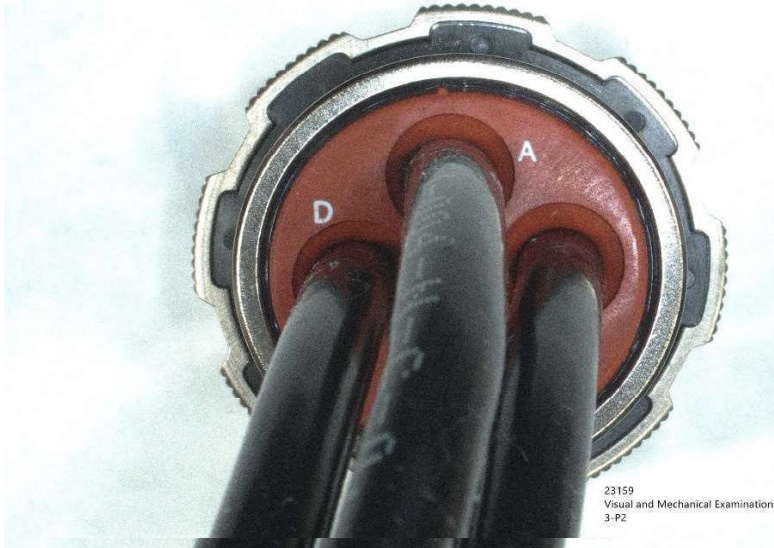
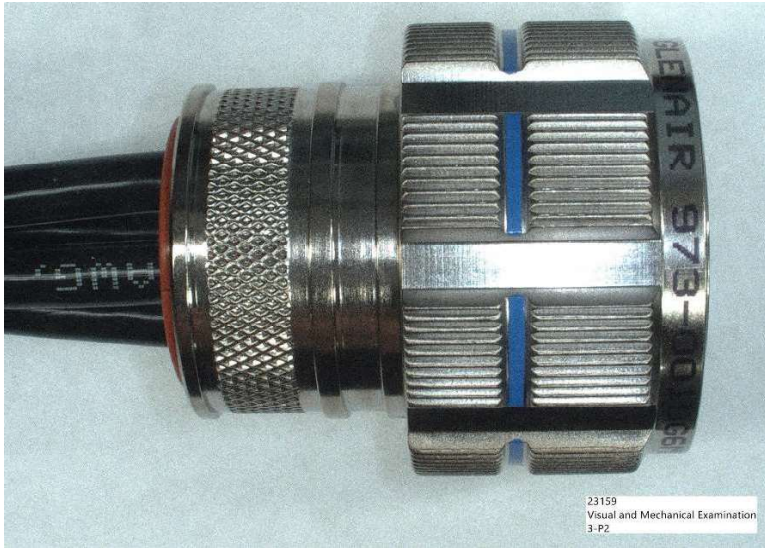
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<b>Test Name</b>	Visual and Mechanical Examination
<b>Part Name</b>	PowerPlay Connector
<b>Test Group</b>	1
<b>Part No.</b>	973-001-00ME17-2AN
<b>Serial No.</b>	1-R2



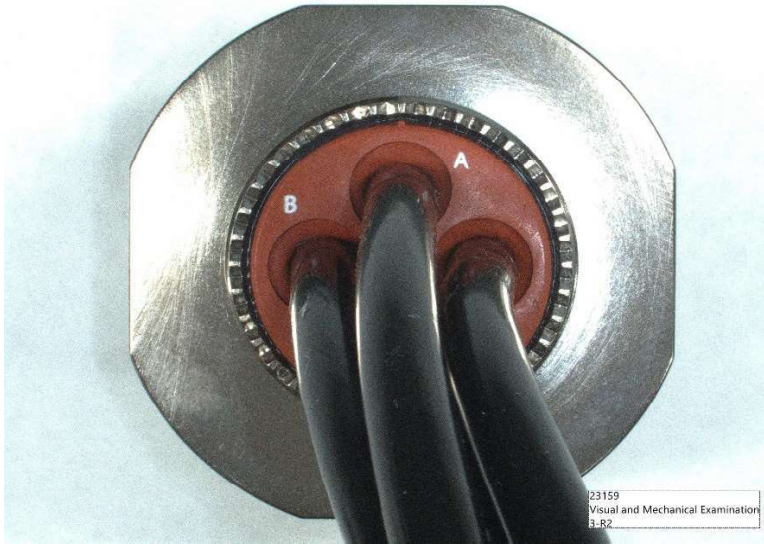
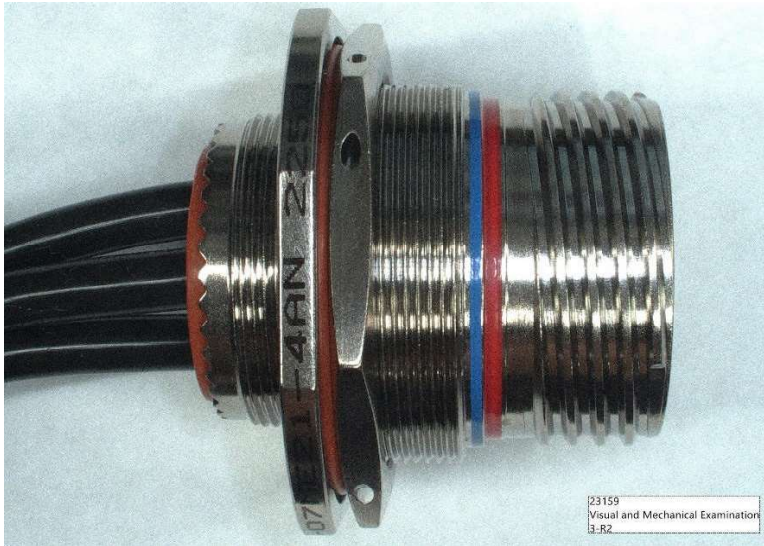
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Test Name	Visual and Mechanical Examination
Part Name	PowerPlay Connector
Test Group	3
Part No.	973-001-G6ME17-2BN
Serial No.	3-P1



<b>Description</b>	Typical Test Setup
<b>Test Name</b>	Visual and Mechanical Examination
<b>Part Name</b>	PowerPlay Connector
<b>Test Group</b>	3
<b>Part No.</b>	973-001-00ME17-2AN
<b>Serial No.</b>	3-R1



<b>Description</b>	Typical Test Setup
<b>Test Name</b>	Visual and Mechanical Examination
<b>Part Name</b>	PowerPlay Connector
<b>Test Group</b>	3
<b>Part No.</b>	973-001BG6ME21-4BN
<b>Serial No.</b>	3-P2



<b>Description</b>	Typical Test Setup
<b>Test Name</b>	Visual and Mechanical Examination
<b>Part Name</b>	PowerPlay Connector
<b>Test Group</b>	3
<b>Part No.</b>	973-001-07ME21-4AN
<b>Serial No.</b>	3-R2

## Insulation Resistance Data

Before Temperature Cycling

Test Type		IR at Ambient				
Sample Configuration		Unmated				
Serial Number	Pass/Fail	Active Pin	Ground Pin	Duration	Test Level	Test Value
1-P1	Pass	A	B	10.0s	500V	>10G
	Pass	A	Shell	10.0s	500V	>10G
	Pass	B	Shell	10.0s	500V	>10G
1-R1	Pass	A	B	10.0s	500V	>10G
	Pass	A	Shell	10.0s	500V	>10G
	Pass	B	Shell	10.0s	500V	>10G
1-P2	Pass	A	B	10.0s	500V	>10G
	Pass	A	Shell	10.0s	500V	>10G
	Pass	B	Shell	10.0s	500V	>10G
1-R2	Pass	A	B	10.0s	500V	>10G
	Pass	A	Shell	10.0s	500V	>10G
	Pass	B	Shell	10.0s	500V	>10G

After Temperature Cycling

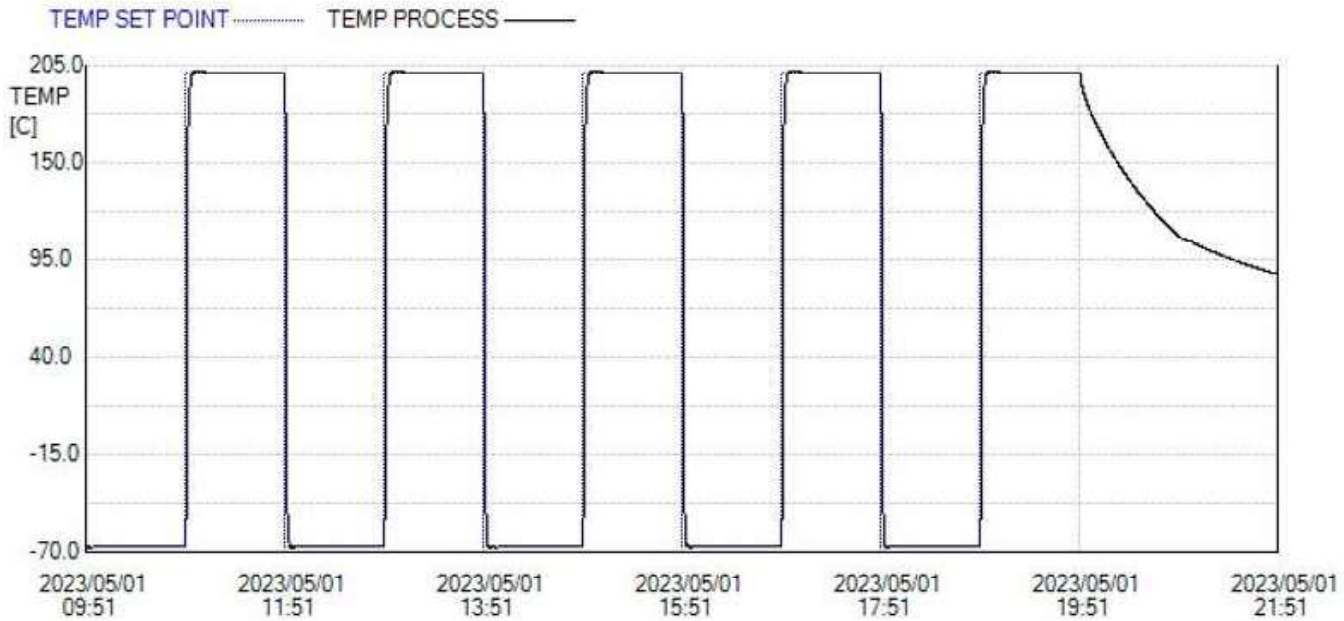
Test Type		IR at Ambient				
Sample Configuration		Unmated				
Serial Number	Pass/Fail	Active Pin	Ground Pin	Duration	Test Level	Test Value
1-P1	Pass	A	B	10.0s	500V	>10G
	Pass	A	Shell	10.0s	500V	>10G
	Pass	B	Shell	10.0s	500V	>10G
1-R1	Pass	A	B	10.0s	500V	>10G
	Pass	A	Shell	10.0s	500V	>10G
	Pass	B	Shell	10.0s	500V	>10G
1-P2	Pass	A	B	10.0s	500V	>10G
	Pass	A	Shell	10.0s	500V	>10G
	Pass	B	Shell	10.0s	500V	>10G
1-R2	Pass	A	B	10.0s	500V	>10G
	Pass	A	Shell	10.0s	500V	>10G
	Pass	B	Shell	10.0s	500V	>10G



<b>Description</b>	Typical Test Setup
<b>Test Name</b>	IR at Ambient
<b>Part Name</b>	PowerPlay Connector
<b>Test Group</b>	1

P-Viewer [Especc Log Data Viewer]

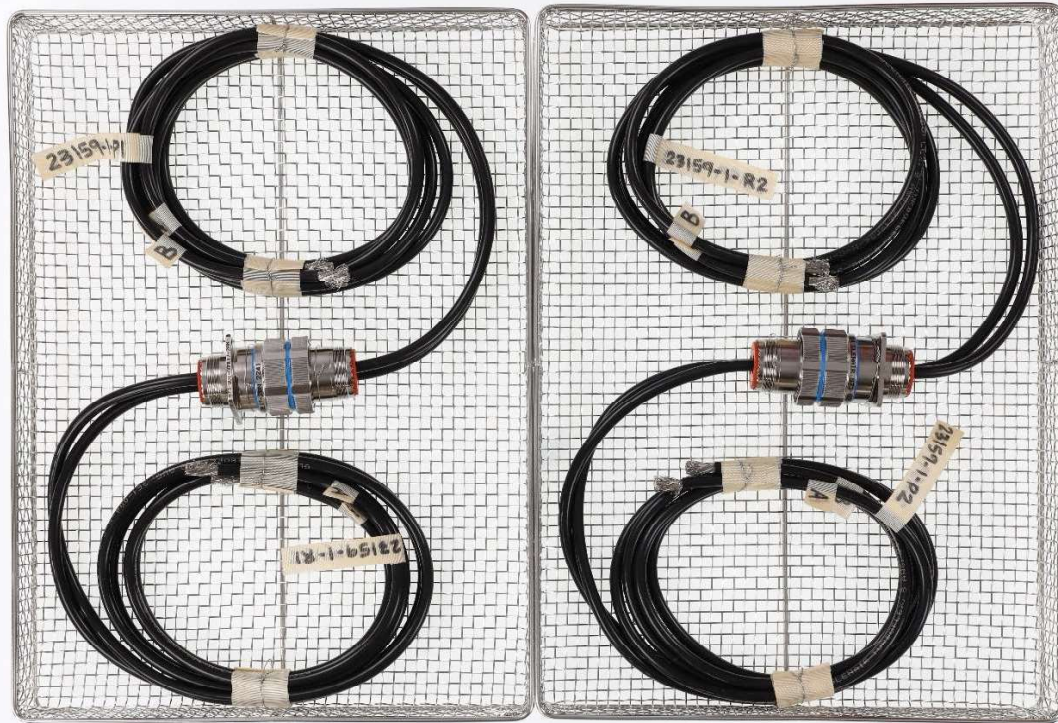
2023/05/02



<b>Description</b>	Typical Test Plot
<b>Test Name</b>	Temperature Cycling
<b>Part Name</b>	PowerPlay Connectors
<b>Test Group</b>	1
<b>Serial No.</b>	1-1P, 1-1R, 1-2P, 1-2R



Description	Typical Test Setup - PRE
Test Name	Temperature Cycling
Part Name	PowerPlay Connectors
Test Group	1
Serial No.	1-1P, 1-1R, 1-2P, 1-2R



Job Code: 23159  
 Part Number:  
 Serial Number: 1-P1, 1-R1, 1-P2, 1-R2  
 Test Name: TEMPERATURE CYCLING  
 Notes: (POST) -65°C to 200°C

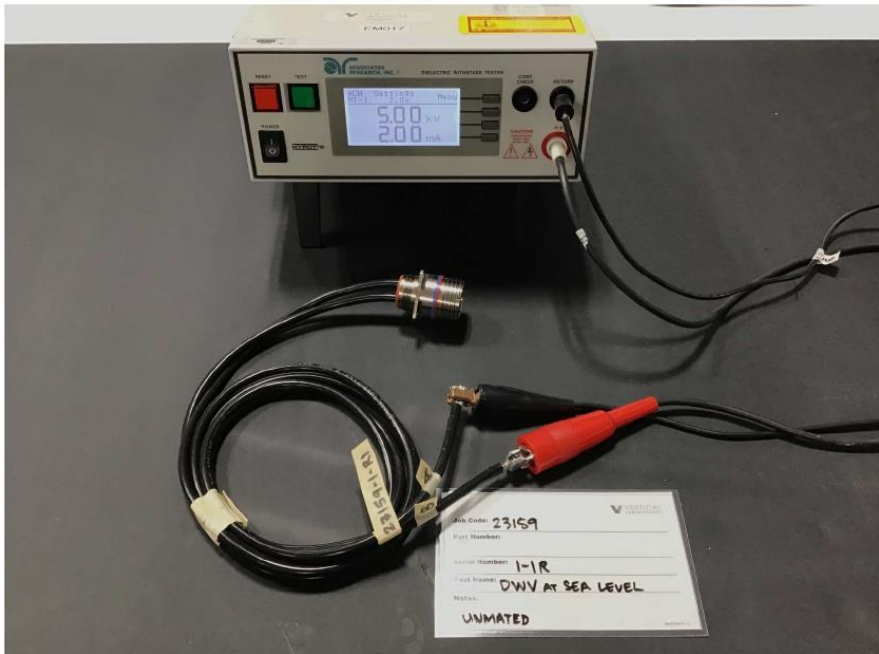
Description	Typical Test Setup - POST
Test Name	Temperature Cycling
Part Name	PowerPlay Connectors
Test Group	1
Serial No.	1-1P, 1-1R, 1-2P, 1-2R

### DWV at Ambient Conditions

Test Type	DWV
Sample Configuration	Unmated

Serial Number	Pass/Fail	Active Pin	Active Pin	Duration	Test Level (kV)	Test Value (mA)
1-P1	Pass	A	B	2.0s	4.99	0.183
	Pass	A	Shell		5.00	0.079
	Pass	B	Shell		5.00	0.085
1-R1	Pass	A	B	2.0s	5.00	0.194
	Pass	A	Shell		4.99	0.070
	Pass	B	Shell		5.00	0.066
1-P2	Pass	A	B	2.0s	5.00	0.179
	Pass	A	Shell		4.99	0.087
	Pass	B	Shell		4.99	0.083
1-R2	Pass	A	B	2.0s	5.00	0.174
	Pass	A	Shell		5.00	0.075
	Pass	B	Shell		5.00	0.078

### Setup Photo:



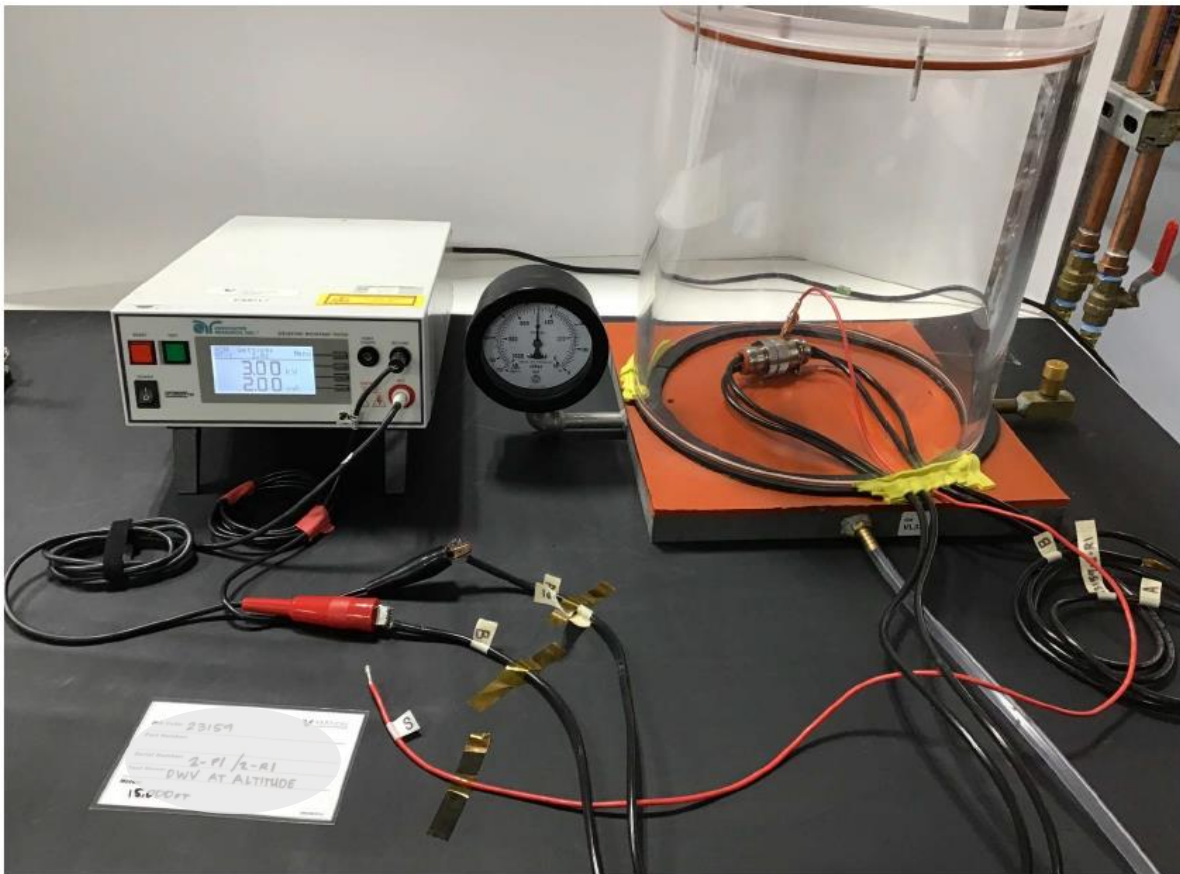
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Test Name	DWV
Part Name	PowerPlay Connector
Test Group	1

### DWV at Altitude

Test Type	DWV at Altitude
Sample Configuration	Mated

Serial Number	Pass/Fail	Active Pin	Active Pin	Duration	Test Level (kV)	Test Value (mA)
1-P1 / 1-R1	Pass	A	B	2.0s	3.00	0.105
	Pass	A	Shell		2.99	0.068
	Pass	B	Shell		3.00	0.056
1-P2 / 1-R2	Pass	A	B	2.0s	3.00	0.114
	Pass	A	Shell		3.00	0.036
	Pass	B	Shell		3.00	0.034

### Setup Photo:



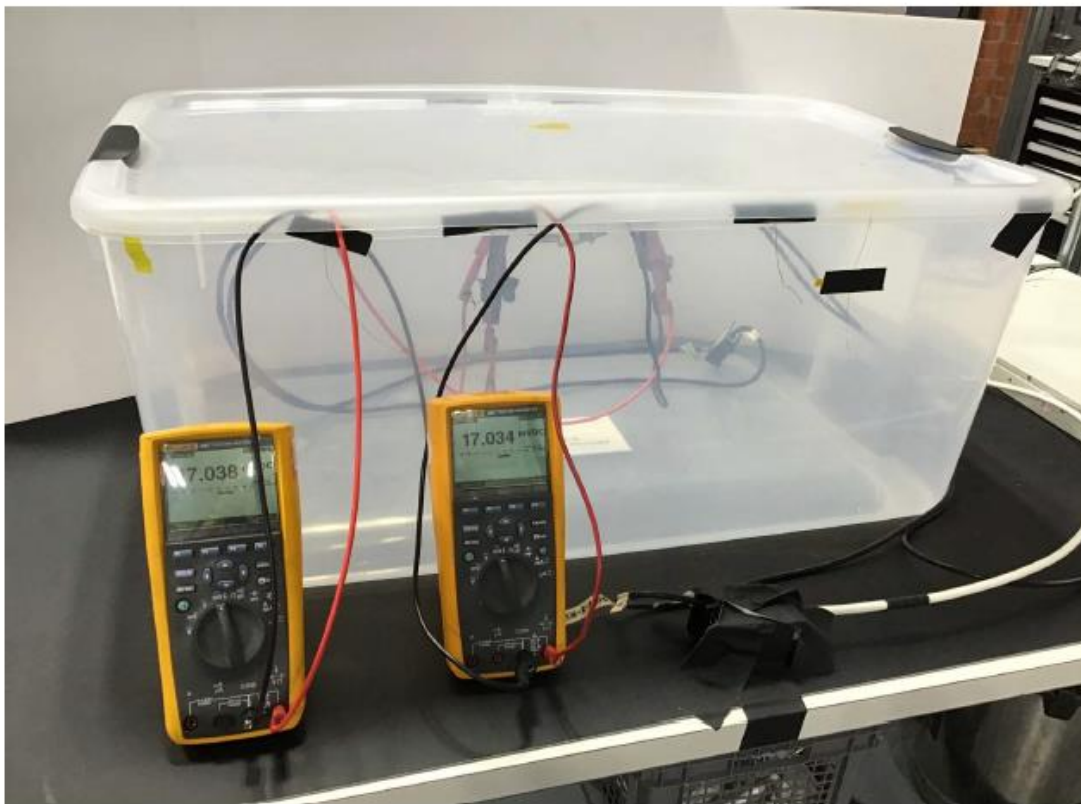
Description	Typical Test Setup
Test Name	DWV at Altitude (15,000ft)
Part Name	PowerPlay Connector
Test Group	1

**Contact Resistance Data**

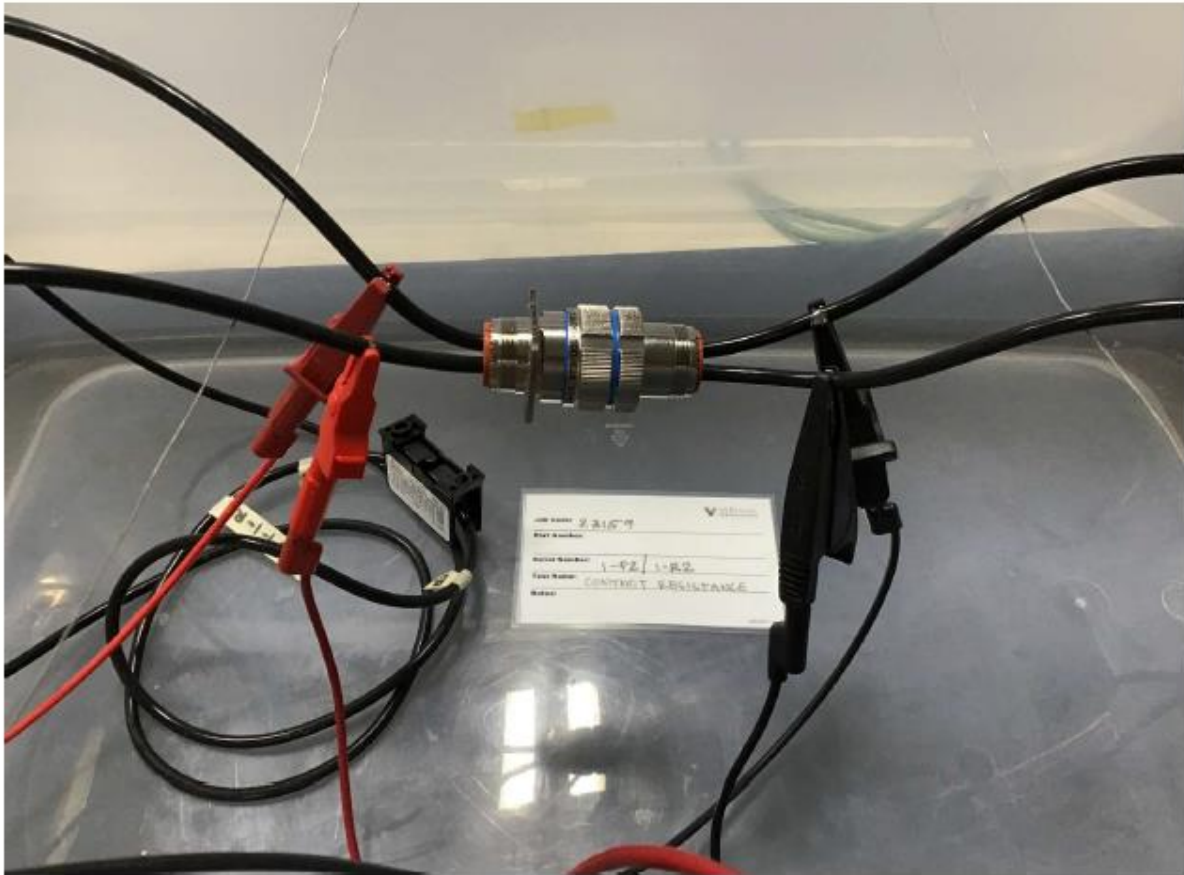
Temp: 25°C, Wire Size 8 – Max Pre-Conditioned Voltage Drop: 65mV, Max Average Voltage Drop: 60mV

Serial Numbers	Test current	Pin	Voltage Drop (mV)
1-P1 / 1-R1	46	A	16.916
		B	16.581
1-P2 / 1-R2	46	A	15.657
		B	16.620
3-P1 / 3-R1	46	A	16.198
		B	16.507
3-P2 / 3-R2	46	A	16.550
		B	16.787
		C	17.378
		D	17.121

Setup Photos:

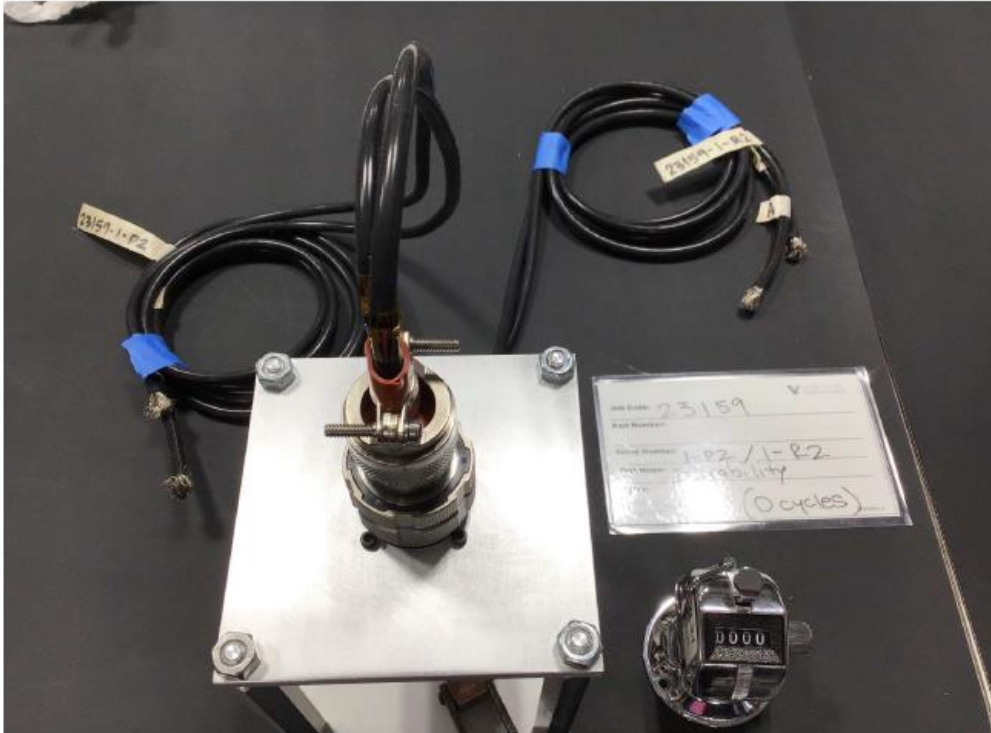


<b>Description</b>	Typical Test Setup
<b>Test Name</b>	Contact Resistance
<b>Part Name</b>	Powerplay Conectors
<b>Test Group</b>	1

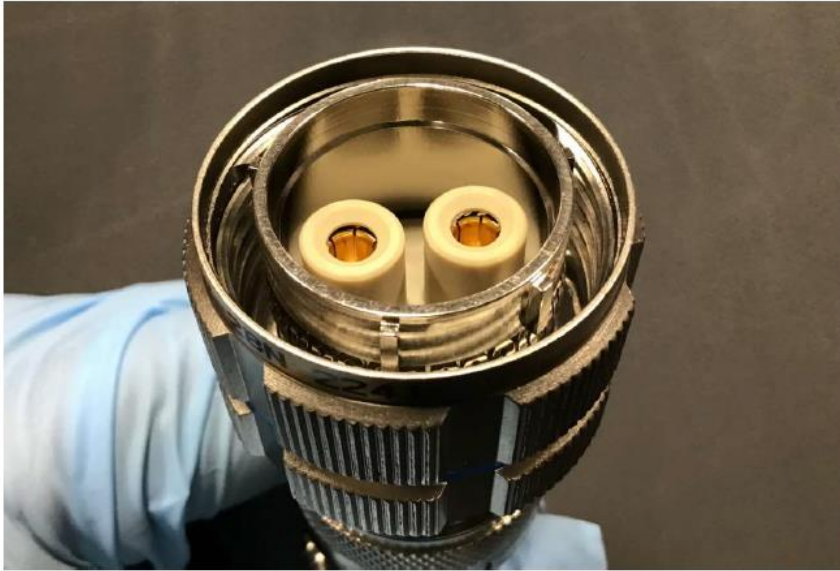


Description	Typical Test Setup
Test Name	Contact Resistance
Part Name	Powerplay Connectors
Test Group	1

**Durability, 150 Cycles, Photos**



Description	Typical Test Setup
Test Name	Durability
Test Group	1



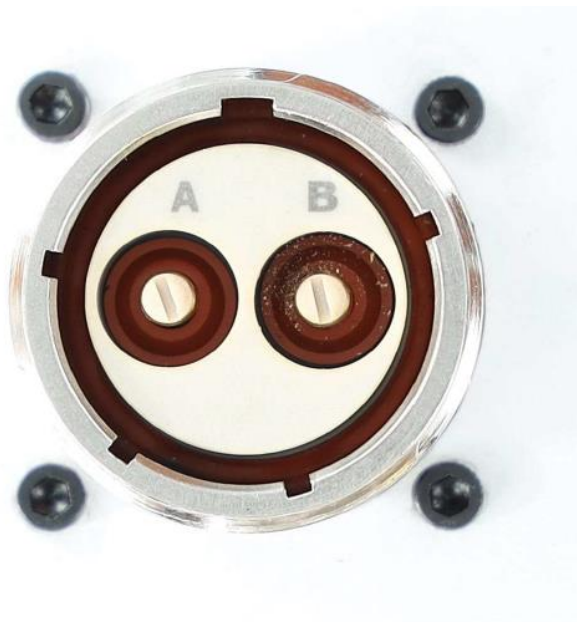
Description	Post 150 Durability Cycles
Test Name	Durability
Test Group	1
Serial No.	1-P1



Description	Post 150 Durability Cycles
Test Name	Durability
Test Group	1
Serial No.	1-R1



Description	Post 150 Durability Cycles
Test Name	Durability
Test Group	1
Serial No.	1-P2



Description	Post 150 Durability Cycles
Test Name	Durability
Test Group	1
Serial No.	1-R2

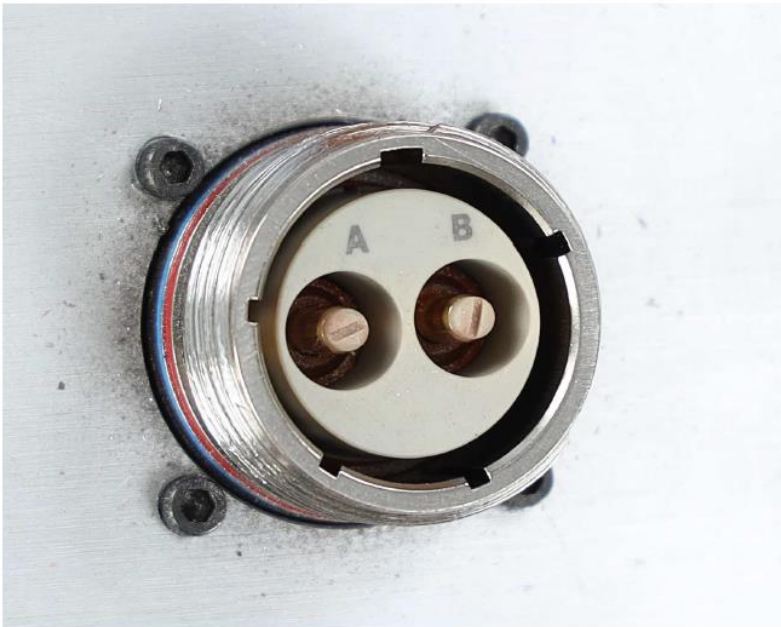
**Durability, 500 Cycles, Photos**



Description	Typical Test Setup
Test Name	Durability
Test Group	3
Serial No.	3-P1/3-R1



Description	Post 500 Durability Cycles
Test Name	Durability
Test Group	3
Serial No.	3-P1



Description	Post 500 Durability Cycles
Test Name	Durability
Test Group	3
Serial No.	3-R1



Description	Post 500 Durability Cycles
Test Name	Durability
Test Group	3
Serial No.	3-P2



Description	Post 500 Durability Cycles
Test Name	Durability
Test Group	3
Serial No.	3-R2

### Contact Resistance Data (Post Durability)

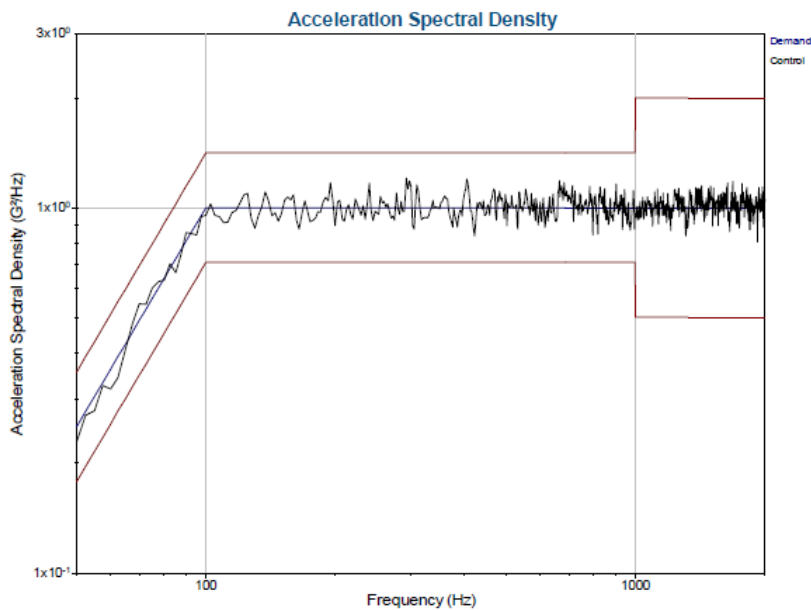
Temp: 25°C,

Wire Size 8 – After Conditioning Values. Voltage Drop: 80mV, Max Average Voltage Drop: 70mV

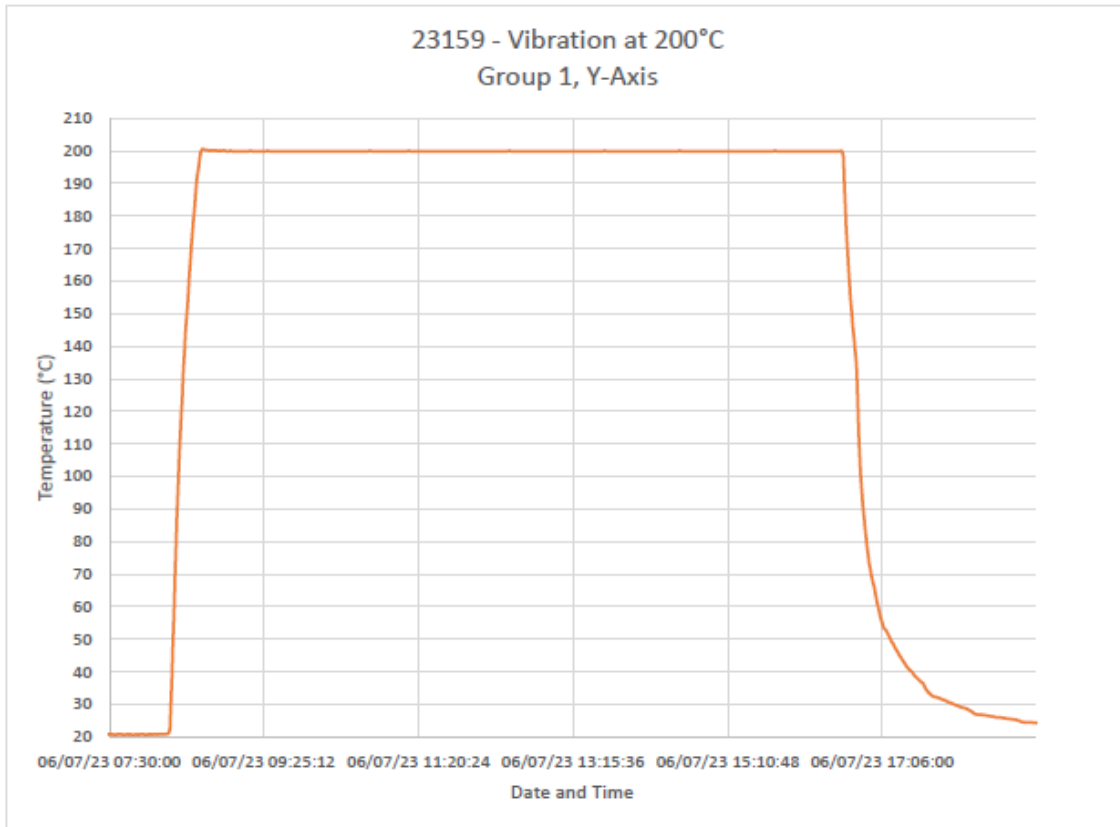
Serial Numbers	Test current	Pin	Voltage Drop (mV)
1-P1 / 1-R1	46	A	16.151
		B	16.181
1-P2 / 1-R2	46	A	16.134
		B	16.178
3-P1 / 3-R1	46	A	16.983
		B	16.489
3-P2 / 3-R2	46	A	16.378
		B	16.032
		C	16.883
		D	16.814

### Vibration at 200 °C

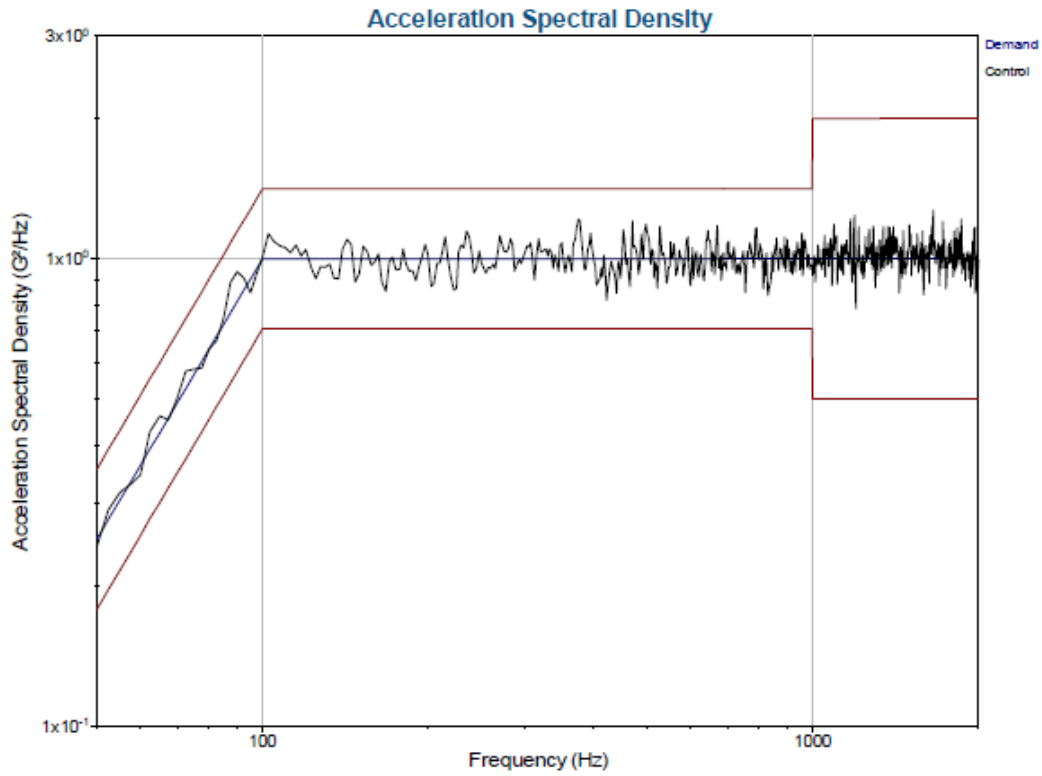
Plots:



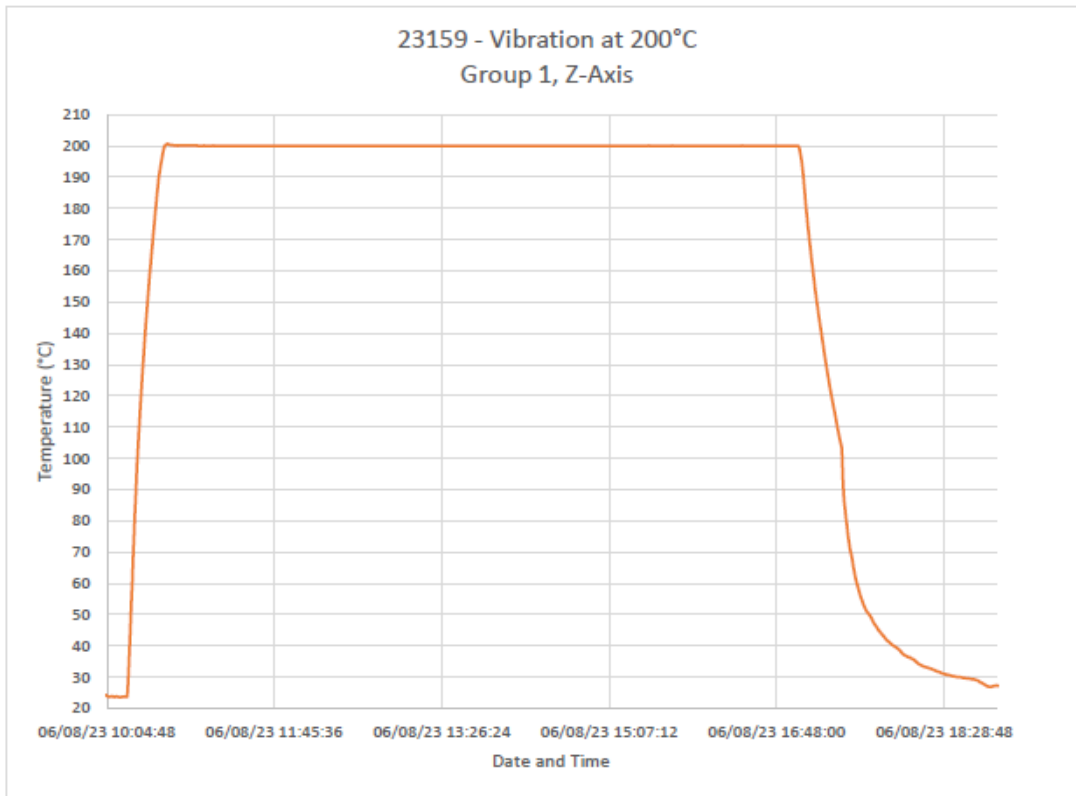
Description	Typical Test Plot
Test Name	Random Vibration at 200°C
Part Name	Powerplay Connector
Test Group	1
Serial No.	1-P1/1-R1, 1-P2/1-R2
Duration	8:00:00
Axis	Y



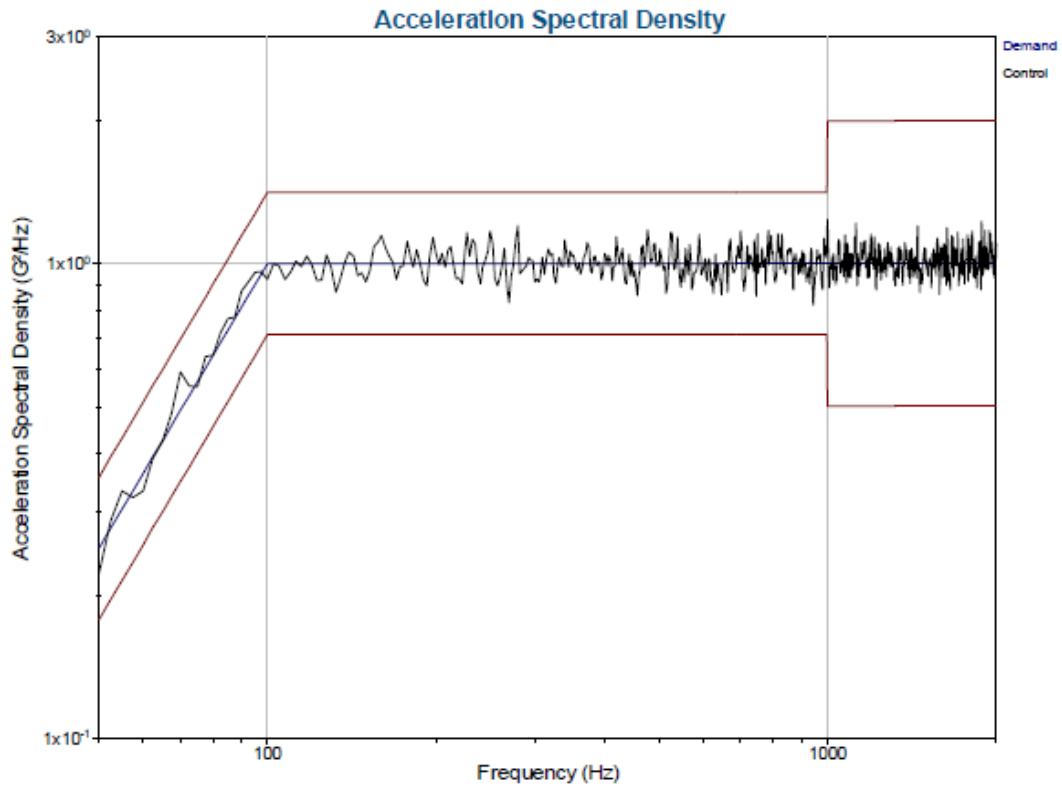
<b>Description</b>	Typical Test Plot - Chamber Temperature
<b>Test Name</b>	Random Vibration at 200°C
<b>Part Name</b>	Powerplay Connector
<b>Test Group</b>	1
<b>Serial No.</b>	1-P1/1-R1, 1-P2/1-R2
<b>Duration</b>	8:00:00
<b>Axis</b>	Y



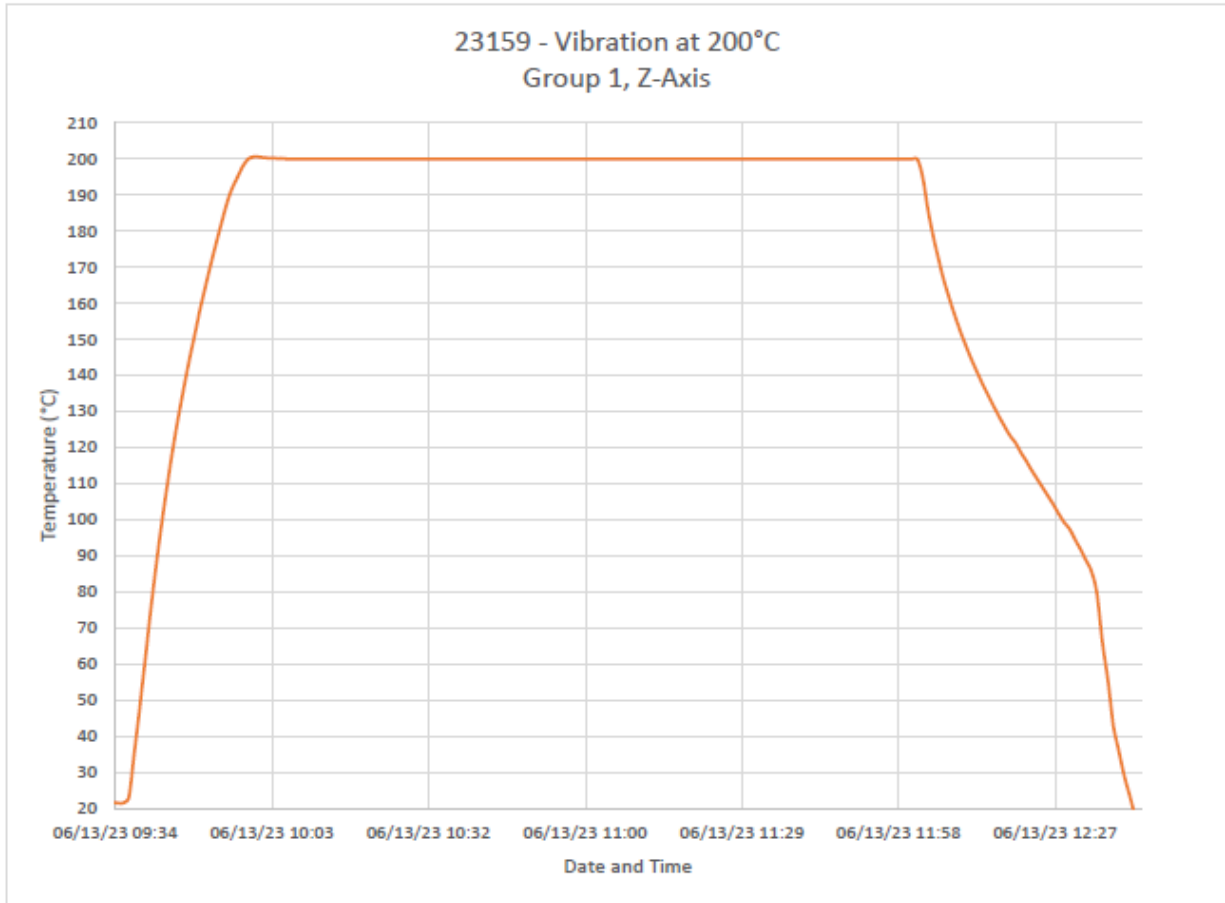
<b>Description</b>	Typical Test Plot
<b>Test Name</b>	Random Vibration at 200°C
<b>Part Name</b>	Powerplay Connector
<b>Test Group</b>	1
<b>Serial No.</b>	1-P1/1-R1, 1-P2/1-R2
<b>Duration</b>	6:10:00
<b>Axis</b>	Z



<b>Description</b>	Typical Test Plot - Chamber Temperature
<b>Test Name</b>	Random Vibration at 200°C
<b>Part Name</b>	Powerplay Connector
<b>Test Group</b>	1
<b>Serial No.</b>	1-P1/1-R1, 1-P2/1-R2
<b>Duration</b>	6:10:00
<b>Axis</b>	Z

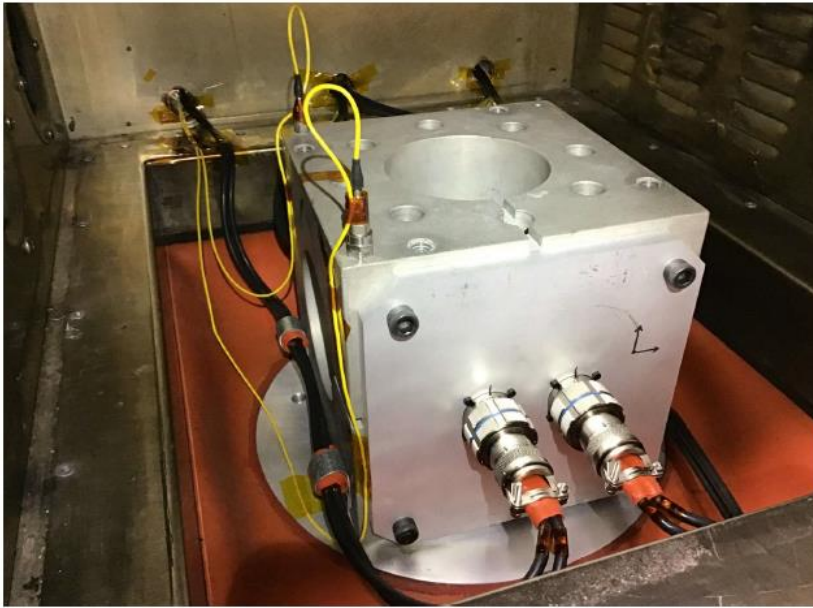


<b>Description</b>	Typical Test Plot
<b>Test Name</b>	Random Vibration at 200°C
<b>Part Name</b>	Powerplay Connector
<b>Test Group</b>	1
<b>Serial No.</b>	1-P1/1-R1, 1-P2/1-R2
<b>Duration</b>	1:50:00
<b>Axis</b>	Z



<b>Description</b>	Typical Test Plot - Chamber Temperature
<b>Test Name</b>	Random Vibration at 200°C
<b>Part Name</b>	Powerplay Connector
<b>Test Group</b>	1
<b>Serial No.</b>	1-P1/1-R1, 1-P2/1-R2
<b>Duration</b>	1:50:00
<b>Axis</b>	Z

Setup Photos:



Description	Typical Test Setup
Test Name	Random Vibration at 200°C
Part Name	Powerplay Connector
Test Group	1
Serial No.	1-P1/1-R1, 1-P2/1-R2
Axis	Y



Description	Typical Test Setup
Test Name	Random Vibration at 200°C
Part Name	Powerplay Connector
Test Group	1
Serial No.	1-P1/1-R1, 1-P2/1-R2
Axis	Z

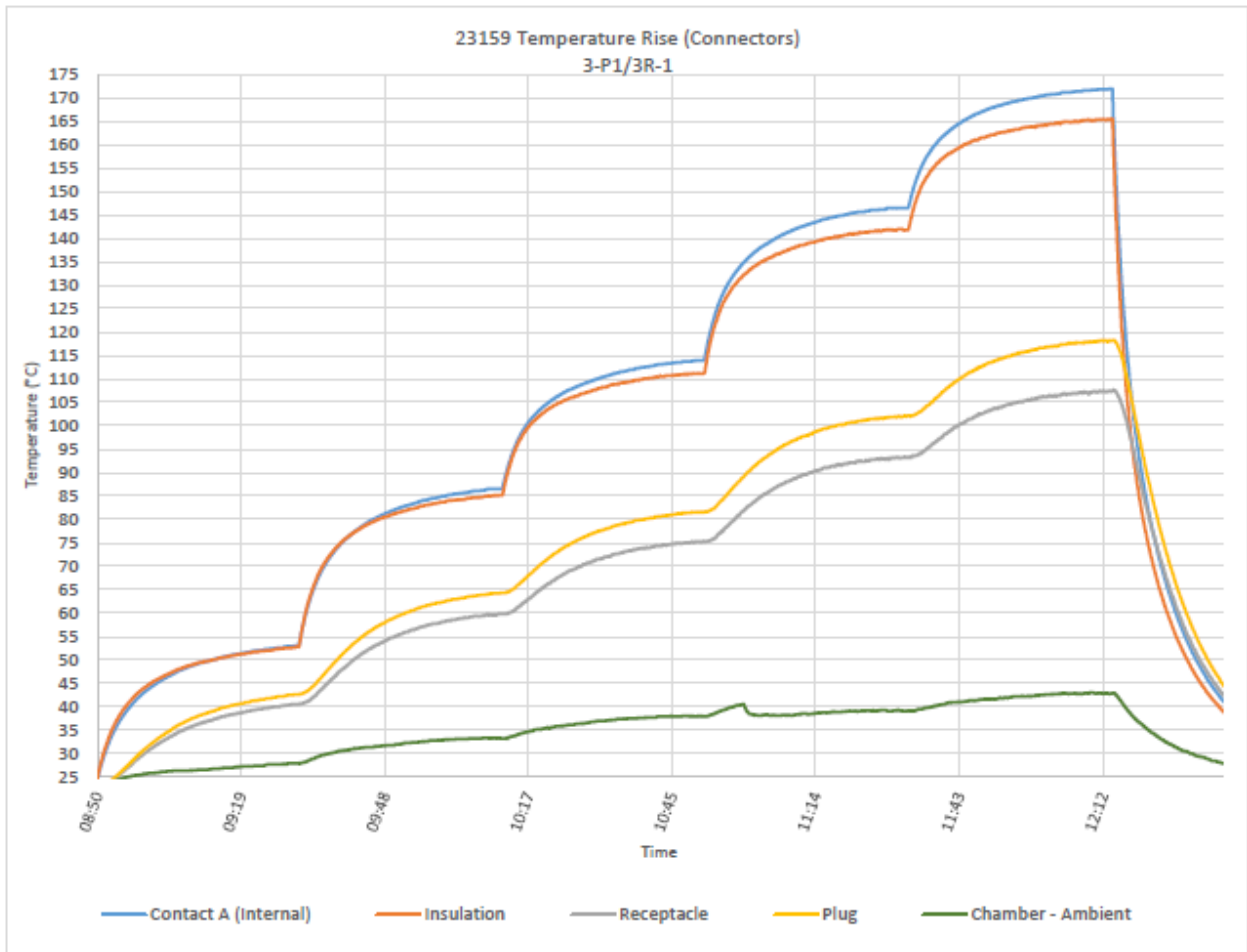
### Temperature Rise (Connectors)

DATA:

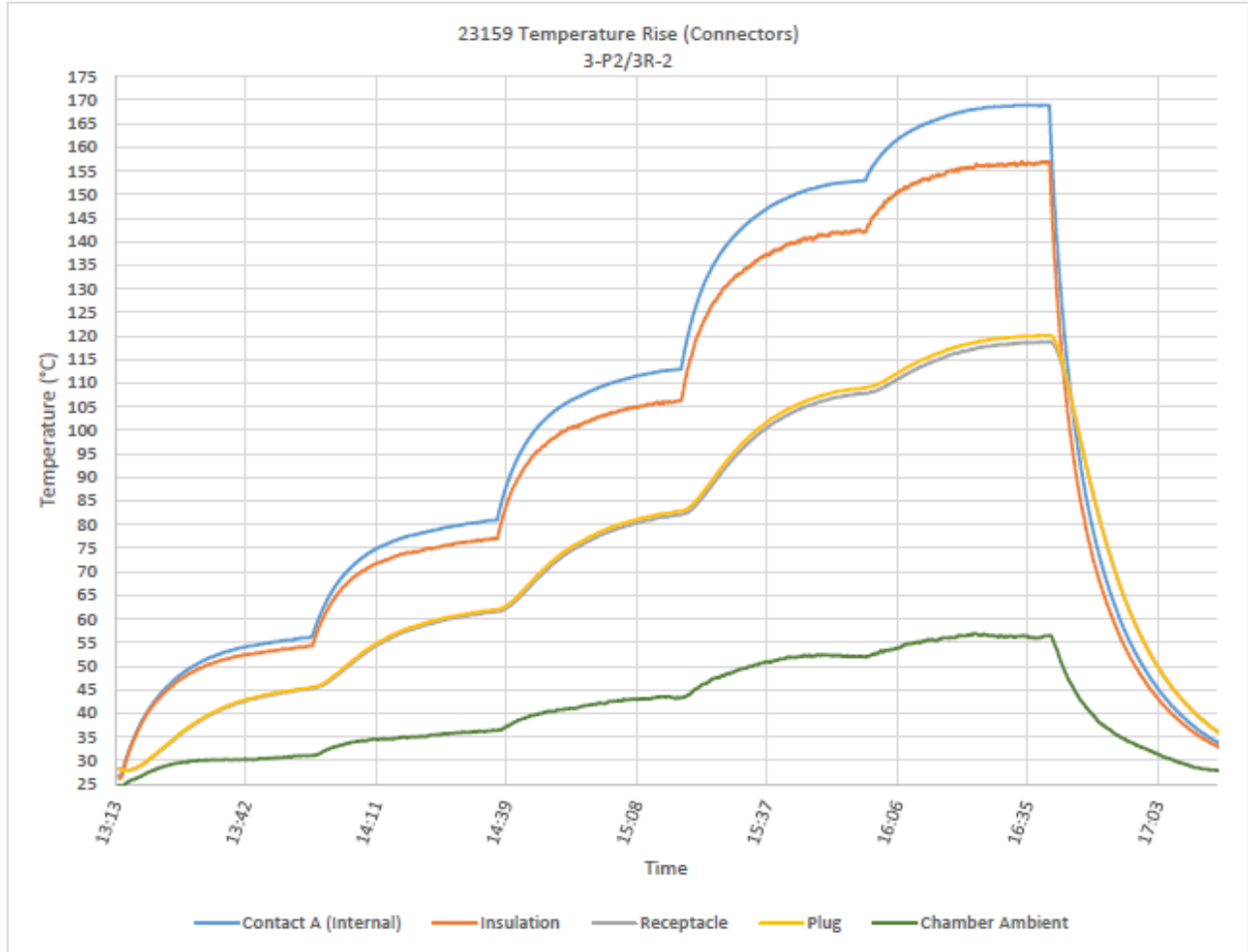
3-P1/3-R1									
<i>Temperatures averaged using the concluding 00:02:00 of each current dwell.</i>									
Amps	Internal Contact A (°C)	Insulation (°C)	Receptacle (°C)	Plug (°C)	Ambient (°C)	Internal Contact A Delta (°C)	Insulation Delta (°C)	Receptacle Delta (°C)	Plug Delta (°C)
55	53.0	52.7	40.6	42.7	28.0	25.0	24.7	12.6	14.7
80	86.6	85.1	59.7	64.3	33.4	53.2	51.8	26.3	30.9
95	113.9	111.2	75.2	81.6	38.0	75.8	73.1	37.2	43.6
110	146.5	141.9	93.2	102.1	39.2	107.3	102.7	54.0	62.9
120	171.8	165.3	107.4	118.2	42.9	128.9	122.4	64.5	75.3

3-P2/3-R2									
<i>Temperatures averaged using the concluding 00:02:00 of each current dwell.</i>									
Amps	Internal Contact A (°C)	Insulation (°C)	Receptacle (°C)	Plug (°C)	Ambient (°C)	Internal Contact A Delta (°C)	Insulation Delta (°C)	Receptacle Delta (°C)	Plug Delta (°C)
45	56.0	54.2	45.1	45.3	31.0	25.0	23.1	14.1	14.3
60	80.9	77.0	61.5	61.9	36.4	44.5	40.6	25.1	25.5
75	112.9	106.2	82.1	82.8	43.3	69.6	62.9	38.7	39.5
90	152.9	142.3	107.8	108.9	52.1	100.8	90.2	55.7	56.9
95	168.9	156.8	118.7	120.1	56.2	112.7	100.6	62.5	63.9

PLOTS:



Description	Typical Test Plot
Test Name	Temperature Rise
Part Name	PowerPlay Connectors
Test Group	3
Serial No.	3-P1/3-R1

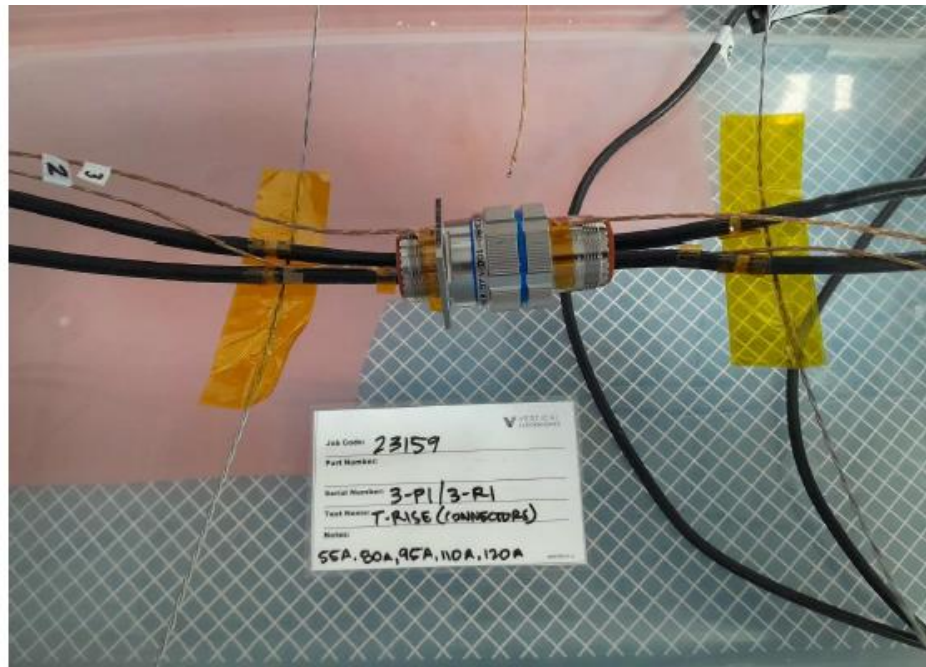


<b>Description</b>	Typical Test Plot
<b>Test Name</b>	Temperature Rise
<b>Part Name</b>	PowerPlay Connectors
<b>Test Group</b>	3
<b>Serial No.</b>	3-P2/3-R2

PHOTOS:



Description	Typical Test Setup
Test Name	Temperature Rise
Part Name	PowerPlay Connectors
Test Group	3



Description	Typical Test Setup
Test Name	Temperature Rise
Part Name	PowerPlay Connectors
Test Group	3