



Report Title: MATE-Ax 4P Sealed
Report Number: WE-20201175
Revision: A
Date Issued: 27 January 2021

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Failure Notification(s): WE-20201175F-01, WE-20201175F-02, WE-20201175F-03, WE-20201175F-04, WE-20201175F-05

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List of Part Numbers: 2-2354440-1, 2291824-1, 2291825-1, 2298116-1, 2298120-1, 2298121-1, 2298123-1, 2298126-1, 2306601-1, 2354439-1

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Scope/Abstract and Conclusions

Purpose

Purpose of this testing is to determine if the product meets its desired requirements.

Summary

All testing was referenced and performed according to the WE-20201175 Test/Service Request/Test Plan, with a revised stamp date of October 08, 2020, the DIN EN 60512-1 and -3, dated 02/2002, the 109-18379, Rev. C, and the LV214 Test Specification, dated 03/2010. All testing was completed between 11/11/2020 and 11/24/2020.

All testing was performed by TE Connectivity's Winston-Salem Electrical Components Test Laboratory, 3800 Reidsville Rd., Winston-Salem, N. C. 270101, USA.

Test procedures included Visual Inspection, Resistance to Agents, Functional Test, Heat Age, Thermal Shock, Insulation Resistance, Immersion with Pressure Difference, Submersion, and High-Pressure Spray.

Following are a list of test failures:

- WE-20201175F-01 – PG23, Leg 1, **Failed** Insulation Resistance at Initial.
- WE-20201175F-02 – PG23, Leg 1, **Failed** Insulation Resistance after High Pressure Spray.
- WE-20201175F-03 – PG23, Leg 1, **Failed** Final Visual with water droplets inside connector.
- WE-20201175F-04 – PG22B, Leg 1, **Failed** Functional Check for not unmate or re-mate.
- WE-20201175F-05 - PG22B, Leg 2, **Failed** Functional Check for not unmate or re-mate.

All other testing met the requirements as stated in the Test Plan and Specifications.

1. RESULTS

| Test Sequence/Environment | Requirements | Results |
|--|--|------------|
| Test Group: Group PG22A - Chemical Resistance | | |
| Visual Examination | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. | Passed. |
| Chemical Exposure (5 chemicals) 1.) Cockpit Cleaning Agent/Spray/@ 50°C 2.) Penetrating Oil/Spray/@ 50°C 3.) Antifreeze, Undiluted Washer Fluid Dousing/@ 50°C 4.) Isopropanol/Dousing/Room Temp 5.) Grease/Rubbing in/@ 50°C | After completion of the test, there must be no functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible. | Performed. |
| Visual Examination | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. | Passed. |
| Functional Check | After completion of the test, there must be no functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible. | Passed. |
| Visual Examination | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. | Passed. |

| Test Sequence/Environment | Requirements | Results |
|--|--|--|
| Test Group: Group PG22B Leg 1 Samples – Chemical Resistance, e | | |
| Visual Examination | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. | Passed. |
| Chemical Exposure (10 chemicals) 1.) Brake Fluid/(Dousing) 50°C 2.) FAM test fuel/(Dousing)/Room Temp 3.) Diesel/(Dousing)/Room Temp 4.) Diesel Additive AdBlue/Dousing/Room Temp 5.) Engine Oil 5W-30/50°C 6.) Power Steering Fluid/Dousing/@ 50°C 7.) Automatic Transmission Fluid/Dousing//@ 50°C 8.) Radiator Antifreeze/Dousing//@ 50°C 9.) Battery Fluid/Dousing//@ 50°C 10.) Road Salt Solution/Dousing//@ 50°C | After completion of the test, there must be no functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible | Performed. |
| Visual Examination | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. | Passed. |
| Functional Check | After completion of the test, there must be no functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible. | Performed/ Failed . Reference Failure Notification WE-20201175F-04 for more information. |
| Visual Examination | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. | Performed/ Failed . Reference Failure Notification WE-20201175F-04 for more information |

| Test Sequence/Environment | Requirements | Results |
|--|--|--|
| Test Group: Group PG22B Leg 2 Samples – Chemical Resistance, extended test | | |
| Visual Examination | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. | Passed. |
| Chemical Exposure (10 chemicals) 1.) Brake Fluid/(Dousing) 50°C 2.) FAM test fuel/(Dousing)/Room Temp 3.) Diesel/(Dousing)/Room Temp 4.) Diesel Additive AdBlue/Dousing/Room Temp 5.) Engine Oil 5W-30/50°C 6.) Power Steering Fluid/Dousing/@ 50°C 7.) Automatic Transmission Fluid/Dousing//@ 50°C 8.) Radiator Antifreeze/Dousing//@ 50°C 9.) Battery Fluid/Dousing//@ 50°C 10.) Road Salt Solution/Dousing//@ 50°C | After completion of the test, there must be no functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible | Performed. |
| Visual Examination | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. | Passed. |
| Functional Check | After completion of the test, there must be no functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible. | Performed/ Failed . Reference Failure Notification WE-20201175F-05 for more information. |
| Visual Examination | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. | Performed/ Failed . Reference Failure Notification WE-20201175F-05 for more information. |

| Test Sequence/Environment | Requirements | Results |
|---|--|--|
| Test Group: Group PG23 Leg 1 Samples – Water leak tightness | | |
| Visual Examination | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. | Passed. |
| Dry Heat 120 hours @ 105°C | No function deviations must have occurred. | Performed. |
| Temperature Shock -40°C to 105°C 15 minute duration at each temp extreme 144 cycles | No functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible | Performed. |
| Visual Examination | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. | Passed. |
| Insulation Resistance Initial | R > 100MOhms | Performed/ Failed . Reference Failure Notification WE-20201175F-01 for more information. |
| Immersion -10kPa/ for 5 minutes -50kPa for 5 minutes | No medium may penetrate the connector (possible use of water finding paste) The function of the locking and releasing elements must remain fully intact. | Performed. |
| Insulation Resistance | 100mOhm MIN | Passed. R > 50GΩ |
| Line Movement with Immersion -10kPa/ for 5 minutes -50kPa for 5 minutes Blend cable 90° 100mm from back of Connector Perform in X and Y Plane Hold 10 seconds in each X and Y Plane. | No medium may penetrate the connector (possible use of water finding paste) The function of the locking and releasing elements must remain fully intact. | Performed. |

| Test Sequence/Environment | Requirements | Results |
|---|---|--|
| Insulation Resistance | R > 100MOhms | Passed. R > 50GΩ |
| Visual Examination | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking | Passed. |
| Thermal Shock 5 cycles Cycle Sequence: 105°C for 30 minutes Immersion in 0°C water for 15 minutes | No functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible. | Performed. |
| Insulation Resistance | R > 100MOhms | Passed. R > 50GΩ |
| Visual Examination | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking | Passed. |
| High Pressure Spray | No medium may penetrate the connector (possible use of water finding paste) The function of the locking and releasing elements must remain fully intact. | Performed. |
| Insulation Resistance | 100mOhm MIN | Performed/ Failed . Reference Failure Notification WE-20201175F-02 for more information. |
| Visual Examination | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. | Performed. |

| Test Sequence/Environment | Requirements | Results |
|---|--|--|
| Functional Check | After completion of the test, there must be no functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible. | Performed/ Failed . Reference Failure Notification WE-20201175F-03 for more information. |
| Visual Examination | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. | Performed/ Failed . Reference Failure Notification WE-20201175F-03 for more information. |
| Test Group: Group PG23 Leg 2 Samples Water Leak Tightness | | |
| Visual Examination | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. | Passed. |
| Dry Heat 105°C for 120 hours. | No function deviations must have occurred. | Performed. |
| Temperature Shock -40°C to 105°C 15 minute duration each temp extreme 144 cycles | No functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible | Performed. |
| Visual Examination | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. | Passed. |

| Test Sequence/Environment | Requirements | Results |
|---|--|------------|
| Immersion -10kPa for 5 minutes -50kPa for 5 minutes | No medium may penetrate the connector (possible use of water finding paste) The function of the locking and releasing elements must remain fully intact. | Performed. |
| Visual Examination | No ingress of water | Passed. |
| Thermal Shock 5 cycles Cycle Sequence: 105°C for 30 minutes Immersion in 0°C water for 15 minutes | No functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible. | Performed. |
| Visual Examination | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking | Passed. |
| High Pressure Spray | No medium may penetrate the connector (possible use of water finding paste) The function of the locking and releasing elements must remain fully intact. | Performed. |
| Visual Examination | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. | Passed. |
| Functional Check | After completion of the test, there must be no functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible. | Passed. |

| Test Sequence/Environment | Requirements | Results |
|---------------------------|--|---------|
| Visual Examination | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. | Passed. |

2. SAMPLE & WIRE DESCRIPTION

The Certification of Conformance (C of C), submitted with the test request, lacked the necessary information to verify the samples tested. Therefore, the Test Lab cannot verify that the samples have been produced, inspected, and accepted as conforming to product drawing requirements, and made using the same core manufacturing processes and technologies as production parts. **Note:** Part number 2306601-1 is not documented on the C of C.

2.1 Groups / Samples

| Group | Part Number | Rev. | Date Code | Sample Description | Quantity Tested |
|--------------------------------------|-------------|------|-----------|--|-----------------|
| Group PG22A - Chemical resistance | 2-2354440-1 | B1 | 259 20 | MATE-AX, PIN HSG ASSY, SLD,180D 4P | 10 |
| Group PG22A - Chemical resistance | 2354439-1 | B | * | MATE-AX, SOC HSG ASSY, SLD,180D 4P | 10 |
| Group PG22A - Chemical resistance | 2298126-1 | C1 | * | FERRULE 180 DEGREE, MATE-AX, RTK-031 | 80 |
| Group PG22A - Chemical resistance | 2298121-1 | B | * | CENTER CONTACT, SOCKET MATE-AX, 180 DEG, RTK-031 | 40 |
| Group PG22A - Chemical resistance | 2298116-1 | C9 | * | OUTER SOCKET CONTACT 180 DEGREE MATE-AX, RTK-031 | 40 |
| Group PG22A - Chemical resistance | 2298120-1 | B4 | * | DIELECTRIC, SOCKET, 180 DEGREE, MATE-AX, RTK-031 | 40 |
| Group PG22A - Chemical resistance | 2291825-1 | A | * | CENTER CONTACT, PIN MINI COAX, 180 DEG, RTK-031 | 40 |
| Group PG22A - Chemical resistance | 2298123-1 | A5 | * | OUTER PIN CONTACT 180DEG MATE-AX, RTK- 031 | 40 |

| Group | Part Number | Rev. | Date Code | Sample Description | Quantity Tested |
|--|-------------|------|-----------|--|-----------------|
| Group PG22A - Chemical resistance | 2291824-1 | B4 | * | DIELETRIC, PIN, 180 DEGREE, MATE-AX, RTK-031 | 40 |
| Group PG22B Leg 1 Samples - Chemical resistance, e | 2-2354440-1 | B1 | 259 20 | MATE-AX, PIN HSG ASSY, SLD,180D 4P | 22 |
| Group PG22B Leg 1 Samples - Chemical resistance, e | 2354439-1 | B | * | MATE-AX, SOC HSG ASSY, SLD,180D 4P | 22 |
| Group PG22B Leg 1 Samples - Chemical resistance, e | 2298126-1 | C1 | * | FERRULE 180 DEGREE, MATE-AX, RTK-031 | 176 |
| Group PG22B Leg 1 Samples - Chemical resistance, e | 2298121-1 | B | * | CENTER CONTACT, SOCKET MATE-AX, 180 DEG, RTK-031 | 88 |
| Group PG22B Leg 1 Samples - Chemical resistance, e | 2298116-1 | C9 | * | OUTER SOCKET CONTACT 180 DEGREE MATE-AX, RTK-031 | 88 |
| Group PG22B Leg 1 Samples - Chemical resistance, e | 2298120-1 | B4 | * | DIELECTRIC, SOCKET, 180 DEGREE, MATE-AX, RTK-031 | 88 |
| Group PG22B Leg 1 Samples - Chemical resistance, e | 2291825-1 | A | * | CENTER CONTACT, PIN MINI COAX, 180 DEG, RTK-031 | 88 |
| Group PG22B Leg 1 Samples - Chemical resistance, e | 2298123-1 | A5 | * | OUTER PIN CONTACT 180DEG MATE-AX, RTK- 031 | 88 |
| Group PG22B Leg 1 Samples - Chemical resistance, e | 2291824-1 | B4 | * | DIELETRIC, PIN, 180 DEGREE, MATE-AX, RTK-031 | 88 |
| Group PG22B Leg 2 Samples - Chemical resistance, e | 2-2354440-1 | B1 | 259 20 | MATE-AX, PIN HSG ASSY, SLD,180D 4P | 11 |
| Group PG22B Leg 2 Samples - Chemical resistance, e | 2354439-1 | B | * | MATE-AX, SOC HSG ASSY, SLD,180D 4P | 11 |
| Group PG22B Leg 2 Samples - Chemical resistance, e | 2306601-1 | A1 | * | CAVITY PLUG, MATE- AX, CVTY DIA, 3.6, BLK | 44 |

| Group | Part Number | Rev. | Date Code | Sample Description | Quantity Tested |
|---|-------------|------|-----------|--|-----------------|
| Group PG23 Leg 1 Samples - Water leak tightness | 2-2354440-1 | B1 | 259 20 | MATE-AX, PIN HSG ASSY, SLD,180D 4P | 2 |
| Group PG23 Leg 1 Samples - Water leak tightness | 2354439-1 | B | * | MATE-AX, SOC HSG ASSY, SLD,180D 4P | 2 |
| Group PG23 Leg 1 Samples - Water leak tightness | 2298126-1 | C1 | * | FERRULE 180 DEGREE, MATE-AX, RTK-031 | 35 |
| Group PG23 Leg 1 Samples - Water leak tightness | 2298121-1 | B | * | CENTER CONTACT, SOCKET MATE-AX, 180 DEG, RTK-031 | 20 |
| Group PG23 Leg 1 Samples - Water leak tightness | 2298116-1 | C9 | * | OUTER SOCKET CONTACT 180 DEGREE MATE-AX, RTK-031 | 20 |
| Group PG23 Leg 1 Samples - Water leak tightness | 2298120-1 | B4 | * | DIELECTRIC, SOCKET, 180 DEGREE, MATE-AX, RTK-031 | 20 |
| Group PG23 Leg 1 Samples - Water leak tightness | 2291825-1 | A | * | CENTER CONTACT, PIN MINI COAX, 180 DEG, RTK-031 | 15 |
| Group PG23 Leg 1 Samples - Water leak tightness | 2298123-1 | A5 | * | OUTER PIN CONTACT 180DEG MATE-AX, RTK-031 | 15 |
| Group PG23 Leg 1 Samples - Water leak tightness | 2291824-1 | B4 | * | DIELECTRIC, PIN, 180 DEGREE, MATE-AX, RTK-031 | 15 |
| Group PG23 Leg 1 Samples - Water leak tightness | 2306601-1 | A1 | * | CAVITY PLUG, MATE-AX, CVTY DIA, 3.6, BLK | 5 |
| Group PG23 Leg 2 Samples Water leak tightness | 2-2354440-1 | B1 | 259 20 | MATE-AX, PIN HSG ASSY, SLD,180D 4P | 5 |
| Group PG23 Leg 2 Samples Water leak tightness | 2354439-1 | B | * | MATE-AX, SOC HSG ASSY, SLD,180D 4P | 5 |
| Group PG23 Leg 2 Samples Water leak tightness | 2306601-1 | A1 | * | CAVITY PLUG, MATE-AX, CVTY DIA, 3.6, BLK | 16 |

* Information either unavailable or not provided by requestor.

2.2 Wire Information

| Group Number | Wire Size | Overall Diameter | Strand Diameter | Number of Strands | Wire Length |
|--------------|-----------|------------------|-----------------|-------------------|--------------|
| RTK-031 | RTK-031 | 3.25mm | 0.25mm | 7 | 6 and 12 in. |

3. SAMPLE PREPARATION

3.1 Chemical Resistance

PG 22A: each connector was fully populated with terminals and each sample was labeled according to which fluid it would be tested in.

PG 22B Leg 1: each connector was fully populated with terminals and each sample was labeled according to which fluid it would be tested in.

PG 22B Leg 2: each connector was fully populated with cavity plugs and each sample was labeled according to which fluid it would be tested in.

PG 23 Leg 1: each female connector was fully populated with terminals. Each male connector was populated with three terminals and a single pressure tube to provide a way to perform immersion with pressure difference. On the female connector, the wire ends were stripped back $\frac{1}{2}$ inch and the shield was pulled back and taped down. The center conductor insulation was then stripped $\frac{1}{4}$ inch from the wire end. This provides a way to perform insulation resistance on each individual circuit between the center conductor and its respective shield.

PG 23 Leg 2: each connector was fully populated with cavity plugs, except for one cavity on the male connector, which was populated with a single pressure tube.

Images of sample preparation can be found in Figures 1-3.

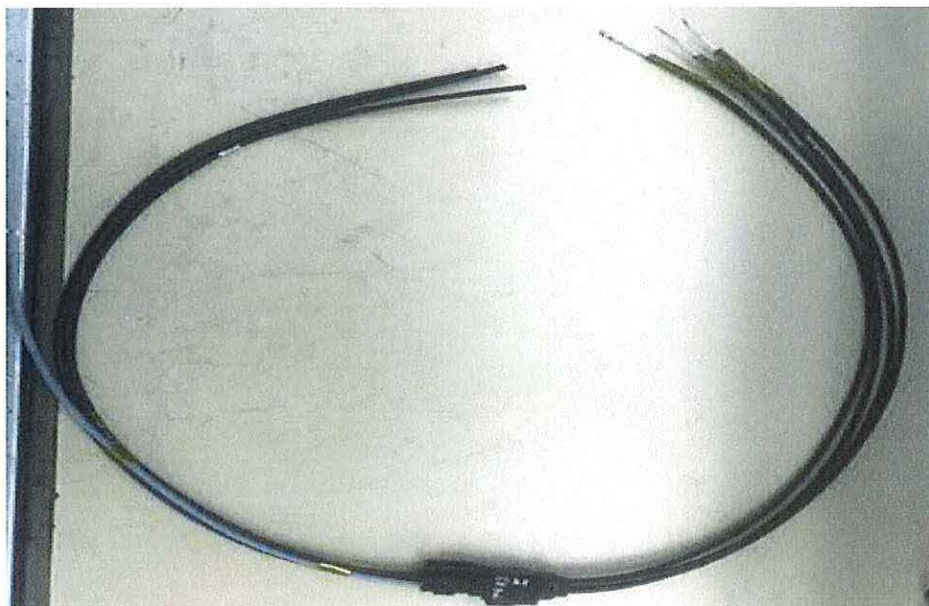


Figure 1: Sample Preparation

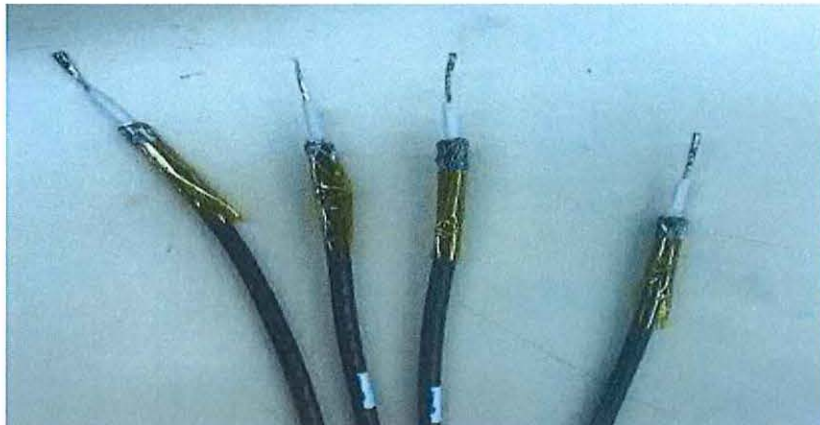


Figure 2: Wire End Preparation



Figure 3: Cavity Plugs Inserted

4. TEST PROCEDURE

4.1 Environmental Conditions

Unless otherwise noted the environmental conditions specified in the referenced test procedure were met.

4.2 Chemical Exposure

Reference the LV214 Test Specification, dated 03/2010, and the submitted WE-20201175 Test/Service Request/Test Plan, revised stamp date of October 09, 2020.

Each sample from Test Groups PG 22A, PG 22B Leg 1 and PG 22B Leg 2 experienced chemical exposure.

Each sample was exposed to its respective fluid by either dousing, rubbing in or spraying the chemical depending on the test specification requirements. Samples were then placed under a fume hood (room temperature) or in an oven (50°C) to age for 48 hours. After aging, samples were rinsed with water and carefully dried off before continuing to visual examination and functional checks. Images of this testing can be found in Figures 4-10.

NOTE: fluids not pictured include: Road Salt Solution, FAM Test Fuel, Diesel, Isopropanol, Brake Fluid, and Engine Oil 5W-30,



Figure 4: Fluids used in Testing



Figure 5: Fluids used in Testing



Figure 6: Fluids used in Testing

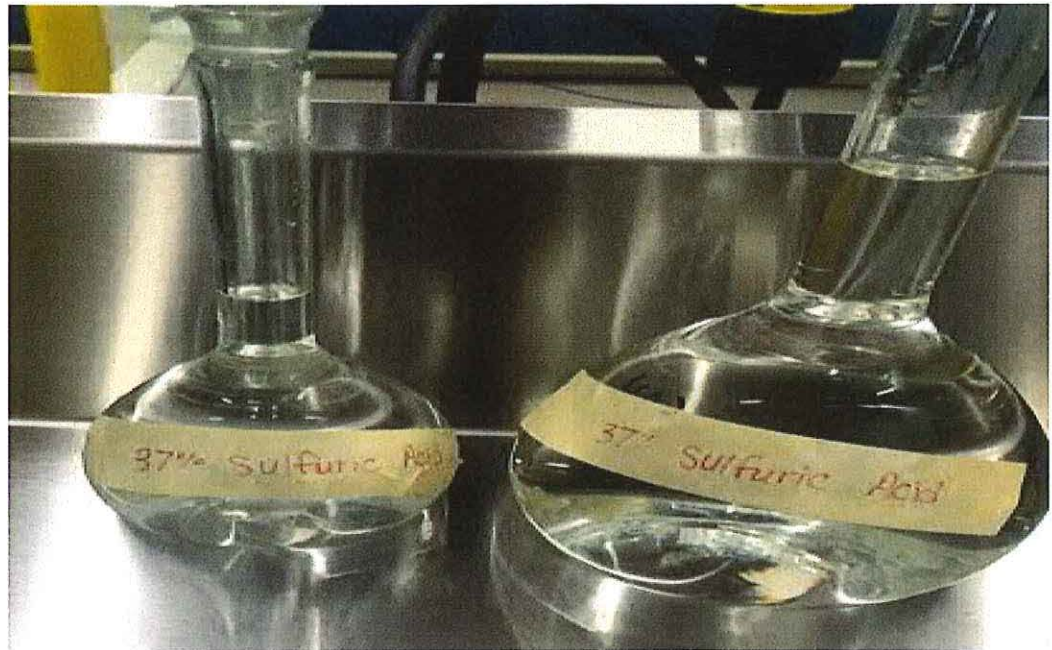


Figure 7: Fluids used in Testing



Figure 8: 50°C Aging Samples



Figure 9: Room Temperature Aging Samples

4.3 Dry Heat

Reference the LV214 Test Specification, dated 03/2010, and the submitted WE-20201175 Test/Service Request/Test Plan, revised stamp date of October 09, 2020.

Each sample from Test Groups PG 23 Leg 1 and PG 23 Leg 2 experienced 120 hours at 105°C.

4.4 Functional Check

Reference the LV214 Test Specification, dated 03/2010, and the submitted WE-20201175 Test/Service Request/Test Plan, revised stamp date of October 09, 2020.

Each sample from all Test Groups had a functional test performed prior to the final visual examination. Samples were unmated and mated 5 times to verify functionality of samples.

4.5 High Pressure Spray

Reference the 109-18379 Rev. C Test Specification, and the submitted WE-20201175 Test/Service Request/Test Plan, revised stamp date of October 09, 2020.

Each sample from Test Groups PG 23 Leg 1 and PG 23 Leg 2 experienced the same high-pressure spray testing. Samples were mounted to a rotating mount inside the water test chamber. The water nozzle was positioned in the same horizontal plane and 100-150mm away from the sample. The water pressure was set to 8MPa and the water temperature was set to 80°C. The rotating mount was set to rotate at a speed of 5rpm. The water test machine was set to spray for 60 seconds. Thus, each side of the connector would experience 15 seconds of spray time. This was repeated 3 times for each sample. Images of how samples were mounted can be found in Figures 10 and 11.

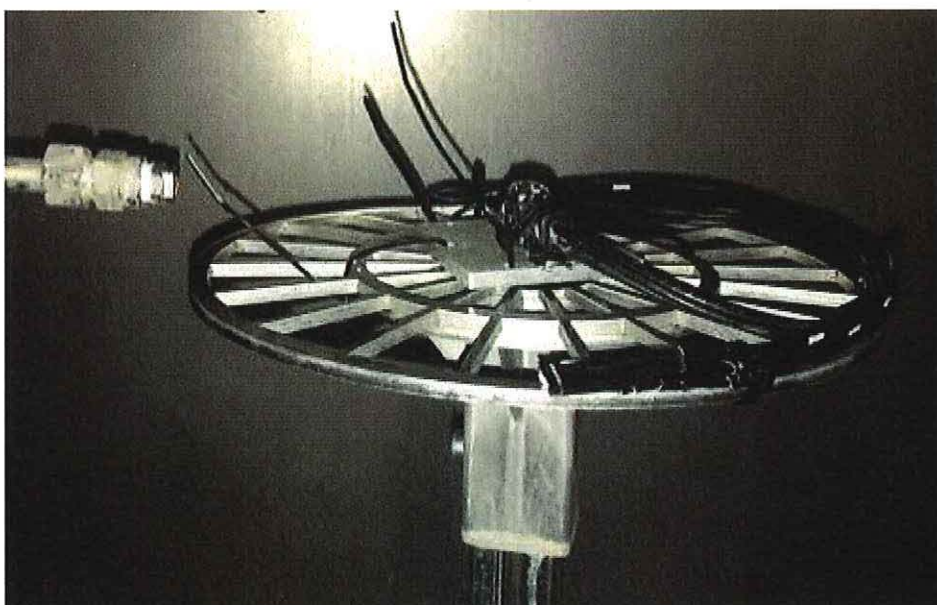


Figure 10: PG 23 Leg 1 High-Pressure Spray Setup



Figure 11: PG 23 Leg 2 High-Pressure Spray Setup

4.6 Immersion

Reference the LV214 Test Specification, dated 03/2010, and the submitted WE-20201175 Test/Service Request/Test Plan, revised stamp date of October 09, 2020.

Each sample from Test Groups PG 23 Leg 1 and Leg 2 experienced the same immersion with pressure difference testing.

Each sample was connected to a vacuum and submerged under a tap water solution with 15g/L of salt and 10mL/L of dish soap. Vacuum of -10kPa was pulled for 5 minutes. The vacuum was then increased to -50kPa and was pulled for another 5 minutes. An image of this testing can be found in Figure 12.

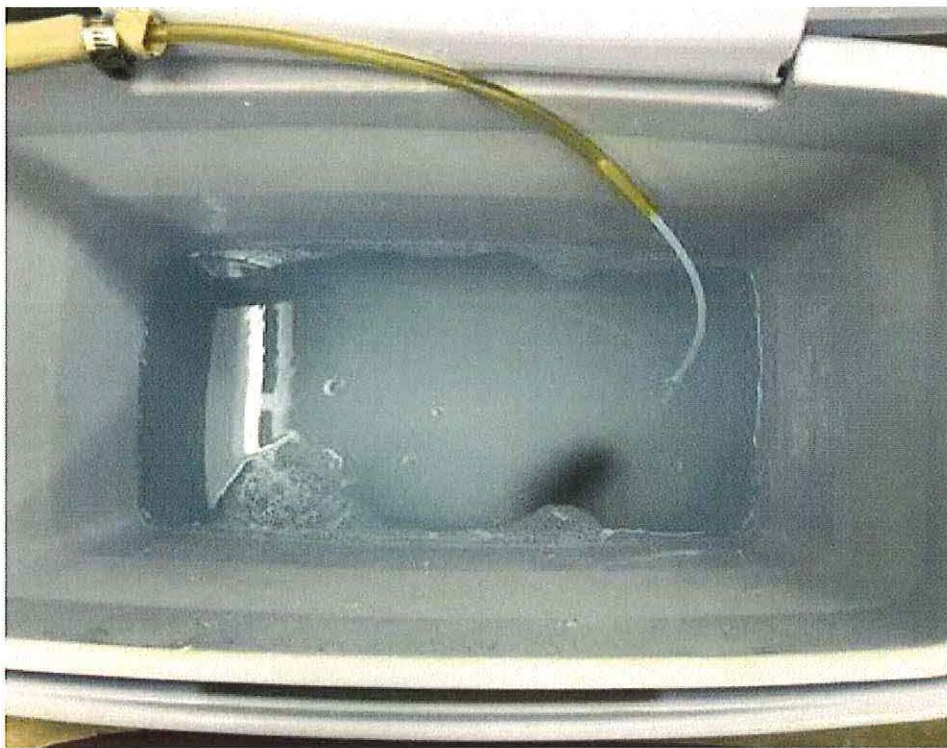


Figure 12: PG 23 Leg 2 Immersion with Pressure Difference

4.7 Insulation Resistance

Reference the DIN EN 60512 Test Specification, dated 02/2002, and the submitted WE-20201175 Test/Service Request/Test Plan, revised stamp date of October 09, 2020.

Each sample from Test Group PG 23 Leg 1 had insulation resistance measurements taken multiple times throughout testing. Prior to any Insulation Resistance being performed, a system check was performed to validate the data acquisition system. Once the system check was complete, isolation resistance measurements were taken on each circuit by applying 500 VDC for 60 seconds between adjacent circuits.

4.8 Line Movement with Immersion

Reference the LV214 Test Specification, dated 03/2010, and the submitted WE-20201175 Test/Service Request/Test Plan, revised stamp date of October 09, 2020.

Each sample from Test Group PG 23 Leg 1 experienced this testing.

This test was performed in the same manner as immersion with pressure difference, except the cable bundle was bent 90° with respect to the housings in the x and y planes 100mm from the back of the connector. This was performed for 10 seconds at each of the pressure settings described in immersion with pressure difference (-10kPa and -50kPa). An image of how cable bundles were bent can be found in Figure 13.

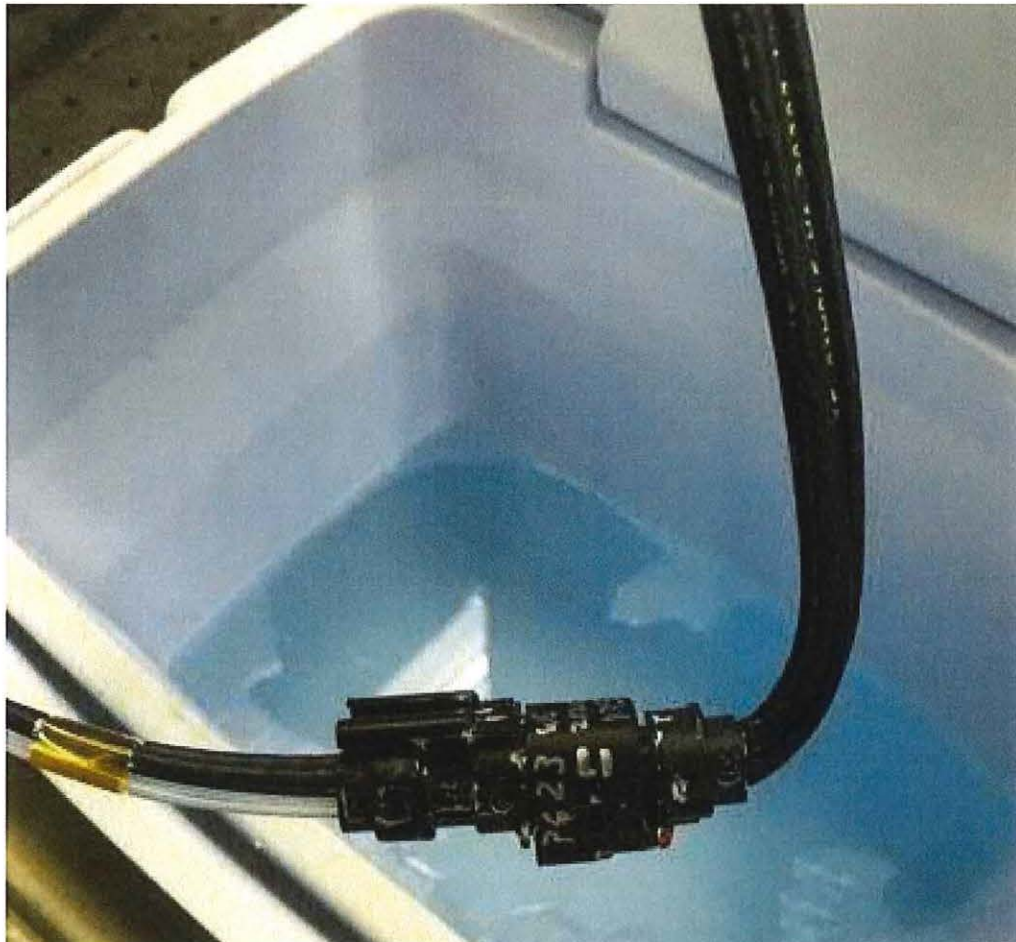


Figure 13: Line Movement During Immersion with Pressure Difference

4.9 Temperature Shock (Chamber)

Reference the LV214 Test Specification, dated 03/2010, and the submitted WE-20201175 Test/Service Request/Test Plan, revised stamp date of October 09, 2020.

Each sample from Test Groups PG 23 Leg 1 and PG 23 Leg 2 experienced the same temperature shock profile. Samples were placed in a chamber and cycled from -40°C to 105°C , with 15 minute duration at each temperature extreme for 144 cycles.

4.10 Thermal Shock (Water)

Reference the LV214 Test Specification, dated 03/2010, and the submitted WE-20201175 Test/Service Request/Test Plan, revised stamp date of October 09, 2020.

Each sample from Test Groups PG 23 Leg 1 and PG 23 Leg 2 experienced the same thermal shock testing. Samples were placed in an oven at 105°C for 30 minutes. Samples were then immediately transferred into a 0°C salt water solution with 5% salt and 10mL/L of dish soap for 15 minutes.

This was repeated for 5 cycles. An image of this testing can be found in Figure 14.



Figure 14: Thermal Shock Image

4.11 Visual Examination

Reference the DIN EN 60512 Test Specification, dated 02/2002, and the submitted WE-20201175 Test/Service Request/Test Plan, revised stamp date of October 09, 2020.

Each sample was visually inspected under a microscope for any signs of deterioration, cracks or deformities that could affect the functionality of the samples.

5. TEST EQUIPMENT

All equipment containing a calibration number is calibrated and traceable to the International System of Units (SI), through National Metrology Institutes.

| Instrument Description | Manufacturer | Model Number | Calibration Number | Purpose |
|---------------------------------|-------------------------|---------------------------|--------------------|--|
| Chamber 076, T/S | ESPEC | TSA-302ES-W | E2997-1672 | Thermal Shock -40°C to 105°C |
| Oven 010, Heat Age | Blue M Electric Company | OV-490A-2 | E2997-0341 | Heat Age Exposure @ 105°C For 120 Hours |
| Oven 028, Heat Age | Blue M Electric Company | HS-3804-F | E2997-1681 | 48 hours at 50°C |
| Oven 012, Heat Age | Blue M Electric Company | OV-490A-2 | E2997-0334 | Immersion 30-minute Heat Soak at 105°C |
| Analyzer, Dielectric AC/DC (E1) | Quadtech | 1030S | E2997-1299 | Insulation Resistance, |
| Analyzer, Dielectric AC/DC (E2) | Quadtech | 1030S | E2997-1295 | Insulation Resistance, |
| Gage, Vacuum | Ashcroft | 45-1082- AS02L-30/oIMV | E2997-1390 | Verification of vacuum applied |
| Digital Calipers | Mitutoyo | CD-6" ASX | TE00138330 | Take Wire Measurements |
| Microscope | Nikon | 28.2-5MP Color | N/A | Visual Examination |
| Multi-Meter, Digital | Fluke | 179 | TE00138506 | Verify Water Temp |

6. APPROVALS

Approvals are secured electronically through the corporate document repository routing and approval system.

Testing/Service & Report By:

Klay Newsome, Product/Test Technician III

Reviewed & Approved By:

Patrick Sparks, Technical Associate/Lab Coordinator

Barbara Staley, Designated Reviewer

7. REVISION HISTORY

| Revision | Description |
|----------|----------------|
| A | Original Issue |
| | |

* END OF REPORT *

Failure Notification



WE-20201175F-01

Winston-Salem Electrical Components Test Laboratory
Reidsville Rd. Winston-Salem NC 27101

| | | | |
|---|-----------------------------|-------------------------------------|---|
| Date of Failure: 11/24/2020 | Test Number: WE-20201175 | Assembly Name: MATE-Ax 4P Sealed | Test Classification: Design Verification |
| Quality Assurance Rep: Christian Brandt | Division: AUT | Requestor: Christian Brandt | Cost Center: 18352 |
| Distribution: PAS Manager(s), WE Manager, WE Lab Coordinator, WFA Manager, Requestor's Manager | | | |

PURPOSE OF TEST

Purpose of this testing is to determine if the product meets its desired requirements.

DESCRIPTION OF FAILURE *(include cause if known)*

Originated By: Klay Newsome *HN* *11-25-20* Cost Center: 11245 Report Date: 11/24/2020

Test Group: Group PG23 Leg 1 Samples - Water leak tightness
Test Performed: Step 4: Insulation Resistance
Specification: LV 214
Revision: 2010
Requirement(s) Not Met: R > 100MOhms

Circuit 3 from sample 5 shorted during Insulation Resistance, but all other circuits from the same sample passed.

FAILED PARTS

| Part Number | Part Name | Revision | Num. Tested | Num. Failed |
|---------------------|--|----------|-------------|-------------|
| 2291824-1; Rev:B | DIELECTRIC, PIN, 180 DEGREE, MATE-AX, RTK-031 | B4 | 15 | 1 |
| 2291825-1; Rev:A | CENTER CONTACT, PIN MINI COAX, 180 DEG, RTK-031 | A | 15 | 1 |
| 2298116-1; Rev:C | OUTER SOCKET CONTACT 180 DEGREE MATE-AX, RTK-031 | C9 | 20 | 1 |
| 2298120-1; Rev:B | DIELECTRIC, SOCKET, 180 DEGREE, MATE-AX, RTK-031 | B4 | 20 | 1 |
| 2298121-1; Rev:B | CENTER CONTACT, SOCKET MATE-AX, 180 DEG, RTK-031 | B | 20 | 1 |
| 2298123-1; Rev:A | OUTER PIN CONTACT 180DEG MATE-AX, RTK-031 | A5 | 15 | 1 |

| Part Number | Part Name | Revision | Num. Tested | Num. Failed |
|---------------------|--------------------------------------|-----------------|--------------------|--------------------|
| 2298126-1; Rev:C | FERRULE 180 DEGREE, MATE-AX, RTK-031 | C1 | 35 | 1 |

ANALYSIS OF FAILURE (Test Requestor to complete ANALYSIS OF FAILURE section & return to PAS@te.com within 30 calendar days of Report Date)

- This IS considered a test failure.
- This is NOT considered a test failure. Record reason in ANALYSIS DETAIL section below.

ANALYSIS DETAILS

Failure Analyst: _____ Cost Center: _____ Date: _____

CORRECTIVE ACTION (to be completed by requestor)

Requestor Name: _____ Cost Center: _____ Date: _____

QUALITY ASSURANCE

Name: _____ Date: _____

After completion of CORRECTIVE ACTION section, Test Requestor to return to PAS@te.com

It is the responsibility of the Test Requestor to provide customer notification and/or containment (if applicable), analysis of failure/root cause investigation, corrective action, and test request(s) to validate corrective action.

USE THIS PAGE ONLY FOR AUTOMOTIVE / PRODUCT VALIDATION TEST FAILURES

For questions regarding this page, please send an email to APVM@te.com

APVM = Automotive Product Validation Metrics

| | |
|--|--|
| Is TE design responsible, or customer (i.e., build to print)? | <input type="radio"/> TE <input type="radio"/> Customer |
| For this PV test, was a prior DV test conducted on the area of non-conformance? If so, did DV test pass or fail? | <input type="radio"/> Pass <input type="radio"/> Fail <input type="radio"/> N/A <input type="radio"/> Not conducted |
| If DV test failed (related to the area of non-conformance), were there any changes made to correct the issue? | <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A |
| For this PV test, was testing correctly classified? | <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A |
| Was non-conformance related to incorrect parts or a problem with parts provided? | <input type="radio"/> Yes <input type="radio"/> No |
| Was non-conformance related to test setup or sample prep? | <input type="radio"/> Yes <input type="radio"/> No |
| Is test a special request by the customer? | <input type="radio"/> Yes <input type="radio"/> No |
| Was customer aware of/expecting non-conformance prior to testing? | <input type="radio"/> Yes <input type="radio"/> No |
| Is retest required? | <input type="radio"/> Yes <input type="radio"/> No |
| If retested, provide test number. | Test #: <input type="radio"/> N/A |
| Did non-conformance require changes to product / process / tool? <input type="radio"/> Product Change Resulting in Tool Change <input type="radio"/> Process Change Only <input type="radio"/> Tool Change Only <input type="radio"/> No Change | |
| Did non-conformance cause delay to PPAP? | <input type="radio"/> Yes <input type="radio"/> No |
| Was non-conformance accepted and deviation approved by the customer? | <input type="radio"/> Yes <input type="radio"/> No Customer: |
| Please add any lessons learned and suggestions on how to prevent this failure in the future. | |

TE Connectivity
Product Reliability Center, Automotive

::20201175ACL:MATE-Ax 4P :LV214 March 2010, PG23 L1 Samp 1-5 ::

I RESISTANCE in Ohms File: 20201175IR1.E2 Rdg: 1

GRP:23L1 :Sample 5 Circuits 1-4 :Initial Tech: KANewsome

Test date/time: 20201111/10:28:27 Amb.: 25.00°C 49.8% RH Min: 1.000E-37
V Set: 500 DC Low Limit: 100 M Ohms High Limit: OFF Hold Time: 60 s

| | | | |
|------|------|------|------|
| (1) | (2) | (3) | (4) |
| >50G | >50G | <1M* | >50G |

AM
11-25-20

* = FAIL
Data value reported beyond specification of meter

Failure Notification



SCANNED



WE-20201175F-02

Winston-Salem Electrical Components Test Laboratory

Reidsville Rd. Winston-Salem NC 27101

| | | | |
|---|-----------------------------|-------------------------------------|---|
| Date of Failure: 11/24/2020 | Test Number: WE-20201175 | Assembly Name: MATE-Ax 4P Sealed | Test Classification: Design Verification |
| Quality Assurance Rep: Christian Brandt | Division: AUT | Requestor: Christian Brandt | Cost Center: 18352 |
| Distribution: PAS Manager(s), WE Manager, WE Lab Coordinator, WFA Manager, Requestor's Manager | | | |

PURPOSE OF TEST

Purpose of this testing is to determine if the product meets its desired requirements.

DESCRIPTION OF FAILURE *(include cause if known)*

Originated By: Klay Newsome *HN 11-25-20* Cost Center: 11245 Report Date: 11/24/2020

Test Group: Group PG23 Leg 1 Samples - Water leak tightness
Test Performed: Step 14: Insulation Resistance
Specification: LV 214
Revision: 2010
Requirement(s) Not Met: R > 100MOhms

Circuit 2 from Sample 4 shorted while all other circuits from this sample passed.

FAILED PARTS

| Part Number | Part Name | Revision | Num. Tested | Num. Failed |
|---------------------|--|----------|-------------|-------------|
| 2-2354440-1; Rev | MATE-AX,PIN HSG ASSY,SLD,180D 4P | B1 | 5 | 1 |
| 2291824-1; Rev:B | DIELETRIC, PIN, 180 DEGREE, MATE-AX, RTK-031 | B4 | 15 | 1 |
| 2291825-1; Rev:A | CENTER CONTACT, PIN MINI COAX, 180 DEG, RTK-031 | A | 15 | 1 |
| 2298116-1; Rev:C | OUTER SOCKET CONTACT 180 DEGREE MATE-AX, RTK-031 | C9 | 20 | 1 |
| 2298120-1; Rev:B | DIELECTRIC, SOCKET, 180 DEGREE, MATE-AX, RTK-031 | B4 | 20 | 1 |
| 2298121-1; Rev:B | CENTER CONTACT, SOCKET MATE-AX, 180 DEG, RTK-031 | B | 20 | 1 |

| Part Number | Part Name | Revision | Num. Tested | Num. Failed |
|---------------------|---|-----------------|--------------------|--------------------|
| 2298123-1; Rev:A | OUTER PIN CONTACT 180DEG MATE-AX, RTK-031 | A5 | 15 | 1 |
| 2298126-1; Rev:C | FERRULE 180 DEGREE, MATE-AX, RTK-031 | C1 | 35 | 1 |
| 2306601-1; Rev:A | CAVITY PLUG, MATE-AX, CVTY DIA, 3.6, BLK | A1 | 5 | 1 |
| 2354439-1; Rev:B | MATE-AX,SOC HSG ASSY,SLD,180D 4P | B | 5 | 1 |

ANALYSIS OF FAILURE (Test Requestor to complete ANALYSIS OF FAILURE section & return to PAS@te.com within 30 calendar days of Report Date)

- This IS considered a test failure.
- This is NOT considered a test failure. Record reason in ANALYSIS DETAIL section below.

ANALYSIS DETAILS

Failure Analyst: _____ Cost Center: _____ Date: _____

CORRECTIVE ACTION (to be completed by requestor)

Requestor Name: _____ Cost Center: _____ Date: _____

QUALITY ASSURANCE

Name: _____ Date: _____

After completion of CORRECTIVE ACTION section, Test Requestor to return to PAS@te.com

It is the responsibility of the Test Requestor to provide customer notification and/or containment (if applicable), analysis of failure/root cause investigation, corrective action, and test request(s) to validate corrective action.

USE THIS PAGE ONLY FOR AUTOMOTIVE / PRODUCT VALIDATION TEST FAILURESFor questions regarding this page, please send an email to APVM@te.com

APVM = Automotive Product Validation Metrics

| | |
|--|--|
| Is TE design responsible, or customer (i.e., build to print)? | <input type="radio"/> TE <input type="radio"/> Customer |
| For this PV test, was a prior DV test conducted on the area of non-conformance? If so, did DV test pass or fail? | <input type="radio"/> Pass <input type="radio"/> Fail <input type="radio"/> N/A <input type="radio"/> Not conducted |
| If DV test failed (related to the area of non-conformance), were there any changes made to correct the issue? | <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A |
| For this PV test, was testing correctly classified? | <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A |
| Was non-conformance related to incorrect parts or a problem with parts provided? | <input type="radio"/> Yes <input type="radio"/> No |
| Was non-conformance related to test setup or sample prep? | <input type="radio"/> Yes <input type="radio"/> No |
| Is test a special request by the customer? | <input type="radio"/> Yes <input type="radio"/> No |
| Was customer aware of/expecting non-conformance prior to testing? | <input type="radio"/> Yes <input type="radio"/> No |
| Is retest required? | <input type="radio"/> Yes <input type="radio"/> No |
| If retested, provide test number. | Test #: <input type="radio"/> N/A |
| Did non-conformance require changes to product / process / tool? <input type="radio"/> Product Change Resulting in Tool Change <input type="radio"/> Process Change Only <input type="radio"/> Tool Change Only <input type="radio"/> No Change | |
| Did non-conformance cause delay to PPAP? | <input type="radio"/> Yes <input type="radio"/> No |
| Was non-conformance accepted and deviation approved by the customer? | <input type="radio"/> Yes <input type="radio"/> No Customer: |
| Please add any lessons learned and suggestions on how to prevent this failure in the future. | |

TE Connectivity
Product Reliability Center, Automotive

::20201175ACL:MATE-Ax 4P :LV214 March 2010, PG23 L1 Samp 1-5 ::

I RESISTANCE in Ohms File: 20201175IR1.E2 Rdg: 5

GRP:Check:100MOhm 20090512 :Post HPS Tech: KANewsome

Test date/time: 20201124/12:44:45 Amb.: 23.50°C 25.4% RH Min: 99.00 M
V Set: 500 DC Low Limit: 100 M Ohms High Limit: OFF Hold Time: 60 s

(1)
99.0M

GRP:23L1 :Sample 1 Circuits 1-4 :Post HPS Tech: KANewsome

Test date/time: 20201124/12:52:48 Amb.: 23.50°C 26.0% RH Min: 133.0 M
V Set: 500 DC Low Limit: 100 M Ohms High Limit: OFF Hold Time: 60 s

| (1) | (2) | (3) | (4) |
|------|------|------|------|
| 224M | 201M | 200M | 133M |

GRP:23L1 :Sample 2 Circuits 1-4 :Post HPS Tech: KANewsome

Test date/time: 20201124/13:05:55 Amb.: 23.50°C 26.2% RH Min: 144.0 M
V Set: 500 DC Low Limit: 100 M Ohms High Limit: OFF Hold Time: 60 s

| (1) | (2) | (3) | (4) |
|-------|-------|------|-------|
| 2.19G | 22.4G | 144M | 2.50G |

GRP:23L1 :Sample 3 Circuits 1-4 :Post HPS Tech: KANewsome

Test date/time: 20201124/13:26:00 Amb.: 23.60°C 24.9% RH Min: 280.0 M
V Set: 500 DC Low Limit: 100 M Ohms High Limit: OFF Hold Time: 60 s

| (1) | (2) | (3) | (4) |
|-------|------|-------|------|
| 9.70G | 280M | 3.90G | >50G |

Data value reported beyond specification of meter

GRP:23L1 :Sample 4 Circuits 1-4 :Post HPS Tech: KANewsome

Test date/time: 20201124/14:26:14 Amb.: 24.40°C 29.3% RH Min: 1.000E-37
V Set: 500 DC Low Limit: 100 M Ohms High Limit: OFF Hold Time: 60 s

| (1) | (2) | (3) | (4) |
|-------|------|------|-------|
| 24.5G | <1M* | 128M | 1.98G |

AM
11-25-20

* = FAIL

Data value reported beyond specification of meter

Failure Notification



WE-20201175F-03

Winston-Salem Electrical Components Test Laboratory
Reidsville Rd. Winston-Salem NC 27101

| | | | |
|---|-----------------------------|-------------------------------------|---|
| Date of Failure: 11/24/2020 | Test Number: WE-20201175 | Assembly Name: MATE-Ax 4P Sealed | Test Classification: Design Verification |
| Quality Assurance Rep: Christian Brandt | Division: AUT | Requestor: Christian Brandt | Cost Center: 18352 |
| Distribution: PAS Manager(s), WE Manager, WE Lab Coordinator, WFA Manager, Requestor's Manager | | | |

PURPOSE OF TEST

Purpose of this testing is to determine if the product meets its desired requirements.

DESCRIPTION OF FAILURE *(include cause if known)*

Originated By: Klay Newsome *ANN 11-25-20* Cost Center: 11245 Report Date: 11/24/2020

Test Group: Group PG23 Leg 1 Samples - Water leak tightness
Test Performed: Step 15: Visual Examination
Specification: LV 214
Revision: 2010
Requirement(s) Not Met: No defects or ingress of water.

Water droplets were found inside the connector of sample 4 during Functional Testing, after high-pressure spray.

FAILED PARTS

| Part Number | Part Name | Revision | Num. Tested | Num. Failed |
|---------------------|--|----------|-------------|-------------|
| 2-2354440-1; Rev | MATE-AX,PIN HSG ASSY,SLD,180D 4P | B1 | 5 | 1 |
| 2291824-1; Rev:B | DIELETRIC, PIN, 180 DEGREE, MATE-AX, RTK-031 | B4 | 15 | 1 |
| 2291825-1; Rev:A | CENTER CONTACT, PIN MINI COAX, 180 DEG, RTK-031 | A | 15 | 1 |
| 2298116-1; Rev:C | OUTER SOCKET CONTACT 180 DEGREE MATE-AX, RTK-031 | C9 | 20 | 1 |
| 2298120-1; Rev:B | DIELECTRIC, SOCKET, 180 DEGREE, MATE-AX, RTK-031 | B4 | 20 | 1 |
| 2298121-1; Rev:B | CENTER CONTACT, SOCKET MATE-AX, 180 DEG, RTK-031 | B | 20 | 1 |

| Part Number | Part Name | Revision | Num. Tested | Num. Failed |
|---------------------|---|-----------------|--------------------|--------------------|
| 2298123-1; Rev:A | OUTER PIN CONTACT 180DEG MATE-AX, RTK-031 | A5 | 15 | 1 |
| 2298126-1; Rev:C | FERRULE 180 DEGREE, MATE-AX, RTK-031 | C1 | 35 | 1 |
| 2306601-1; Rev:A | CAVITY PLUG, MATE-AX, CVTY DIA, 3.6, BLK | A1 | 5 | 1 |
| 2354439-1; Rev:B | MATE-AX,SOC HSG ASSY,SLD,180D 4P | B | 5 | 1 |

ANALYSIS OF FAILURE (Test Requestor to complete ANALYSIS OF FAILURE section & return to PAS@te.com within 30 calendar days of Report Date)

- This IS considered a test failure.
- This is NOT considered a test failure. Record reason in ANALYSIS DETAIL section below.

ANALYSIS DETAILS

Failure Analyst: _____ Cost Center: _____ Date: _____

CORRECTIVE ACTION (to be completed by requestor)

Requestor Name: _____ Cost Center: _____ Date: _____

QUALITY ASSURANCE

Name: _____ Date: _____

After completion of CORRECTIVE ACTION section, Test Requestor to return to PAS@te.com

It is the responsibility of the Test Requestor to provide customer notification and/or containment (if applicable), analysis of failure/root cause investigation, corrective action, and test request(s) to validate corrective action.

USE THIS PAGE ONLY FOR AUTOMOTIVE / PRODUCT VALIDATION TEST FAILURES

For questions regarding this page, please send an email to APVM@te.com

APVM = Automotive Product Validation Metrics

| | |
|--|--|
| Is TE design responsible, or customer (i.e., build to print)? | <input type="radio"/> TE <input type="radio"/> Customer |
| For this PV test, was a prior DV test conducted on the area of non-conformance? If so, did DV test pass or fail? | <input type="radio"/> Pass <input type="radio"/> Fail <input type="radio"/> N/A <input type="radio"/> Not conducted |
| If DV test failed (related to the area of non-conformance), were there any changes made to correct the issue? | <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A |
| For this PV test, was testing correctly classified? | <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A |
| Was non-conformance related to incorrect parts or a problem with parts provided? | <input type="radio"/> Yes <input type="radio"/> No |
| Was non-conformance related to test setup or sample prep? | <input type="radio"/> Yes <input type="radio"/> No |
| Is test a special request by the customer? | <input type="radio"/> Yes <input type="radio"/> No |
| Was customer aware of/expecting non-conformance prior to testing? | <input type="radio"/> Yes <input type="radio"/> No |
| Is retest required? | <input type="radio"/> Yes <input type="radio"/> No |
| If retested, provide test number. | Test #: <input type="radio"/> N/A |
| Did non-conformance require changes to product / process / tool? <input type="radio"/> Product Change Resulting in Tool Change <input type="radio"/> Process Change Only <input type="radio"/> Tool Change Only <input type="radio"/> No Change | |
| Did non-conformance cause delay to PPAP? | <input type="radio"/> Yes <input type="radio"/> No |
| Was non-conformance accepted and deviation approved by the customer? | <input type="radio"/> Yes <input type="radio"/> No Customer: |
| Please add any lessons learned and suggestions on how to prevent this failure in the future. | |

Failure Notification



WE-20201175F-04

Winston-Salem Electrical Components Test Laboratory

Reidsville Rd. Winston-Salem NC 27101

| | | | |
|---|-----------------------------|-------------------------------------|---|
| Date of Failure: 11/24/2020 | Test Number: WE-20201175 | Assembly Name: MATE-Ax 4P Sealed | Test Classification: Design Verification |
| Quality Assurance Rep: Christian Brandt | Division: AUT | Requestor: Christian Brandt | Cost Center: 18352 |
| Distribution: PAS Manager(s), WE Manager, WE Lab Coordinator, WFA Manager, Requestor's Manager | | | |

PURPOSE OF TEST

Purpose of this testing is to determine if the product meets its desired requirements.

DESCRIPTION OF FAILURE *(include cause if known)*

Originated By: Klay Newsome *HN* *11-25-20* Cost Center: 11245 Report Date: 11/24/2020

Test Group: Group PG22B Leg 1 Samples - Chemical resistance, e
Test Performed: Step 4: Functional Check
Specification: LV 214
Revision: 2010
Requirement(s) Not Met: There must be no functional impairments detected on the housings.

Diesel samples were able to unmate, but would not latch when trying to remate samples.
Battery Fluid samples could not be unmated. Latch was "stuck" in place.

FAILED PARTS

| Part Number | Part Name | Revision | Num. Tested | Num. Failed |
|---------------------|----------------------------------|----------|-------------|-------------|
| 2-2354440-1; Rev | MATE-AX,PIN HSG ASSY,SLD,180D 4P | B1 | 20 | 4 |
| 2354439-1; Rev:B | MATE-AX,SOC HSG ASSY,SLD,180D 4P | B | 20 | 4 |

ANALYSIS OF FAILURE (Test Requestor to complete ANALYSIS OF FAILURE section & return to PAS@te.com within 30 calendar days of Report Date)

- This IS considered a test failure.
- This is NOT considered a test failure. Record reason in ANALYSIS DETAIL section below.

ANALYSIS DETAILS

Failure Analyst: _____ Cost Center: _____ Date: _____

CORRECTIVE ACTION (to be completed by requestor)

Requestor Name: _____ Cost Center: _____ Date: _____

QUALITY ASSURANCE

Name: _____ Date: _____

After completion of CORRECTIVE ACTION section, Test Requestor to return to PAS@te.com

It is the responsibility of the Test Requestor to provide customer notification and/or containment (if applicable), analysis of failure/root cause investigation, corrective action, and test request(s) to validate corrective action.

USE THIS PAGE ONLY FOR AUTOMOTIVE / PRODUCT VALIDATION TEST FAILURESFor questions regarding this page, please send an email to APVM@te.com

APVM = Automotive Product Validation Metrics

| | |
|--|--|
| Is TE design responsible, or customer (i.e., build to print)? | <input type="radio"/> TE <input type="radio"/> Customer |
| For this PV test, was a prior DV test conducted on the area of non-conformance? If so, did DV test pass or fail? | <input type="radio"/> Pass <input type="radio"/> Fail <input type="radio"/> N/A <input type="radio"/> Not conducted |
| If DV test failed (related to the area of non-conformance), were there any changes made to correct the issue? | <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A |
| For this PV test, was testing correctly classified? | <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A |
| Was non-conformance related to incorrect parts or a problem with parts provided? | <input type="radio"/> Yes <input type="radio"/> No |
| Was non-conformance related to test setup or sample prep? | <input type="radio"/> Yes <input type="radio"/> No |
| Is test a special request by the customer? | <input type="radio"/> Yes <input type="radio"/> No |
| Was customer aware of/expecting non-conformance prior to testing? | <input type="radio"/> Yes <input type="radio"/> No |
| Is retest required? | <input type="radio"/> Yes <input type="radio"/> No |
| If retested, provide test number. | Test #: <input type="radio"/> N/A |
| Did non-conformance require changes to product / process / tool? <input type="radio"/> Product Change Resulting in Tool Change <input type="radio"/> Process Change Only <input type="radio"/> Tool Change Only <input type="radio"/> No Change | |
| Did non-conformance cause delay to PPAP? | <input type="radio"/> Yes <input type="radio"/> No |
| Was non-conformance accepted and deviation approved by the customer? | <input type="radio"/> Yes <input type="radio"/> No Customer: |
| Please add any lessons learned and suggestions on how to prevent this failure in the future. | |

WE-202D1175F-04



Failure Notification



WE-20201175F-05

Winston-Salem Electrical Components Test Laboratory
Reidsville Rd. Winston-Salem NC 27101

| | | | |
|---|-----------------------------|-------------------------------------|---|
| Date of Failure: 11/24/2020 | Test Number: WE-20201175 | Assembly Name: MATE-Ax 4P Sealed | Test Classification: Design Verification |
| Quality Assurance Rep: Christian Brandt | Division: AUT | Requestor: Christian Brandt | Cost Center: 18352 |
| Distribution: PAS Manager(s), WE Manager, WE Lab Coordinator, WFA Manager, Requestor's Manager | | | |

PURPOSE OF TEST

Purpose of this testing is to determine if the product meets its desired requirements.

DESCRIPTION OF FAILURE *(include cause if known)*

Originated By: Klay Newsome *AM 11-25-20* Cost Center: 11245 Report Date: 11/24/2020

Test Group: Group PG22B Leg 2 Samples - Chemical resistance, e
Test Performed: Step 4: Functional Check
Specification: LV 214
Revision: 2010
Requirement(s) Not Met: There must be no functional impairments detected on the housings.

Diesel sample was able to be unmated, but would not latch when trying to remate the sample.
Battery Fluid sample could not be unmated. Latch was "stuck" in place.

FAILED PARTS

| Part Number | Part Name | Revision | Num. Tested | Num. Failed |
|---------------------|----------------------------------|----------|-------------|-------------|
| 2-2354440-1; Rev | MATE-AX,PIN HSG ASSY,SLD,180D 4P | B1 | 10 | 2 |
| 2354439-1; Rev:B | MATE-AX,SOC HSG ASSY,SLD,180D 4P | B | 10 | 2 |

ANALYSIS OF FAILURE (Test Requestor to complete ANALYSIS OF FAILURE section & return to PAS@te.com within 30 calendar days of Report Date)

- This IS considered a test failure.
- This is NOT considered a test failure. Record reason in ANALYSIS DETAIL section below.

ANALYSIS DETAILS

Failure Analyst: _____ Cost Center: _____ Date: _____

CORRECTIVE ACTION (to be completed by requestor)

Requestor Name: _____ Cost Center: _____ Date: _____

QUALITY ASSURANCE

Name: _____ Date: _____

After completion of CORRECTIVE ACTION section, Test Requestor to return to PAS@te.com

It is the responsibility of the Test Requestor to provide customer notification and/or containment (if applicable), analysis of failure/root cause investigation, corrective action, and test request(s) to validate corrective action.

USE THIS PAGE ONLY FOR AUTOMOTIVE / PRODUCT VALIDATION TEST FAILURESFor questions regarding this page, please send an email to APVM@te.com

APVM = Automotive Product Validation Metrics

| | |
|--|--|
| Is TE design responsible, or customer (i.e., build to print)? | <input type="radio"/> TE <input type="radio"/> Customer |
| For this PV test, was a prior DV test conducted on the area of non-conformance? If so, did DV test pass or fail? | <input type="radio"/> Pass <input type="radio"/> Fail <input type="radio"/> N/A <input type="radio"/> Not conducted |
| If DV test failed (related to the area of non-conformance), were there any changes made to correct the issue? | <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A |
| For this PV test, was testing correctly classified? | <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A |
| Was non-conformance related to incorrect parts or a problem with parts provided? | <input type="radio"/> Yes <input type="radio"/> No |
| Was non-conformance related to test setup or sample prep? | <input type="radio"/> Yes <input type="radio"/> No |
| Is test a special request by the customer? | <input type="radio"/> Yes <input type="radio"/> No |
| Was customer aware of/expecting non-conformance prior to testing? | <input type="radio"/> Yes <input type="radio"/> No |
| Is retest required? | <input type="radio"/> Yes <input type="radio"/> No |
| If retested, provide test number. | Test #: <input type="radio"/> N/A |
| Did non-conformance require changes to product / process / tool? <input type="radio"/> Product Change Resulting in Tool Change <input type="radio"/> Process Change Only <input type="radio"/> Tool Change Only <input type="radio"/> No Change | |
| Did non-conformance cause delay to PPAP? | <input type="radio"/> Yes <input type="radio"/> No |
| Was non-conformance accepted and deviation approved by the customer? | <input type="radio"/> Yes <input type="radio"/> No Customer: |
| Please add any lessons learned and suggestions on how to prevent this failure in the future. | |

WE-20201175F-05

~~WE-20201175F-~~

AMS
11-27-21



| | | | | | |
|--|-----------------------|--|--------------------------------|---|------------------------------------|
| 419-11 Rev G (08/2020) | | ASSIGNED TO: <i>Klay Newsome</i> | | DATE ASSIGNED: <i>9-22-20</i> | TEST NUMBER: WE-20201175 |
| TEST/SERVICE REQUEST Reidsville Road | | LAB USE ONLY | | CONTACT: <i>Hunter Mitchell</i> | |
| REQUESTOR: Christian Brandt | BLDG.-BOX: 140-066 | PHONE: 717-758-7935 | NETWORK ID: TE224914 | SCHEDULING INFORMATION (CHOOSE ONE): <input checked="" type="radio"/> NORMAL <input type="radio"/> PRIORITY | |
| PROJECT MANAGER: Guillermo Smith | BLDG.-BOX: 079-001 | PHONE: 336-727-7781 | NETWORK ID: TE350569 | Asterisk (*) indicates a required field * REQUESTED COMPLETION DATE (required for PRIORITY scheduling): | |
| PRODUCT NAME: MATE-Ax 4P Sealed | | QUALITY REPRESENTATIVE (If Applicable): | | * OVERTIME AUTHORIZED BY A MGR? <input type="radio"/> Yes <input checked="" type="radio"/> No (required for PRIORITY scheduling) | |
| PROJECT NUMBER: PRJ-19-000903055 | DV/PV NUMBER: DV03 | COST CENTER: 18352 | DATE SUBMITTED: 18-Sep-2020 | * PARTS IN LAB BY (DATE): 30-Sep-2020 | |
| PREVIOUS TEST # or FAILURE RETEST (If Applicable): N/A | | FIXTURE or PCB NUMBER or DATE EXPECTED TO COMPLETE DESIGN: | | | |
| CLASSIFICATION: | | | | | |
| <input checked="" type="radio"/> Design Verification (INITIAL) <input type="radio"/> Design Verification (RETEST) <input type="radio"/> Product Validation (INITIAL) <input type="radio"/> Product Validation (RETEST) <input type="radio"/> Evaluation <input type="radio"/> Customer Driven <input type="radio"/> Qualification <input type="radio"/> Continuing Conformance Re-Test (ref 102-8) <input type="radio"/> Request for Quote <input type="radio"/> Fixture/PCB/Equipment <input type="radio"/> Other: <input type="text"/> | | | | | |
| ADDITIONAL DATA REQUESTED: | | | | | |
| <input checked="" type="checkbox"/> Data Summary (PDF) <input type="checkbox"/> Raw Data (Excel) <input checked="" type="checkbox"/> Charts/Graphs <input type="checkbox"/> Video(s) <input type="checkbox"/> Other <input type="text"/> | | | | | |
| PURPOSE OF TEST OR SERVICE, INCLUDE BUSINESS REASON: | | | | | |
| Purpose of this testing is to determine if the product meets its desired requirements. Revised 07Oct2020 | | | | | |
| SPECIFICATION AND REVISION: | | | | | |
| Motor Vehicle Connectors Test Specification LV-214: 2010-03 Test Specification for components and assembled contacts for cable connector MATE-AX109-18379: Rev C Connectors for electronic equipment tests and measurements - Part 1-1 DIN EN 60512-1-1: 2002-02 Connectors for electronic equipment tests and measurements - Part 3-1 DIN EN 60512-3-1: 2002-02 | | | | | |
| DESCRIPTION OF TEST OR SERVICE / CUSTOMER REQUIREMENTS: | | | | | |
| Group PG22A - Chemical resistance Group PG22B - Chemical resistance, extended test - (2 test legs) Group PG23 - Water leak tightness - (2 test legs) | | | | | |
| REVISED OCT 08 2020 WECTL | | | | | |
| Submit request to WE Test Request mailbox: WETestRequest@te.com | | | | | |
| TEST SETUP APPROVALS (If Required): | | Technician / Date: | | Requestor / Date: | |
| Vibration (Fixture / Setup): | | <input type="text"/> | | <input type="text"/> | |

| | | | | | |
|---|-----------------------|---|--------------------------------|---|------------------------------------|
| 419-11 Rev G (08/2020) | | ASSIGNED TO: <i>Klay Newsome</i> | | DATE ASSIGNED: <i>9-22-20</i> | TEST NUMBER: WE-20201175 |
| TEST/SERVICE REQUEST Reidsville Road | | CONTACT: <i>Hunter Mitchell</i> | | | |
| REQUESTOR: Christian Brandt | BLDG.-BOX: 140-066 | PHONE: 717-758-7935 | NETWORK ID: TE224914 | SCHEDULING INFORMATION (CHOOSE ONE): <input checked="" type="radio"/> NORMAL <input type="radio"/> PRIORITY | |
| PROJECT MANAGER: Guillermo Smith | BLDG.-BOX: 079-001 | PHONE: 336-727-7781 | NETWORK ID: TE350569 | * REQUESTED COMPLETION DATE (required for PRIORITY scheduling): | |
| PRODUCT NAME: MATE-Ax 4P Sealed | | QUALITY REPRESENTATIVE (If Applicable): | | * OVERTIME AUTHORIZED BY A MGR? (required for PRIORITY scheduling) <input type="radio"/> Yes <input checked="" type="radio"/> No | |
| PROJECT NUMBER: PRJ-19-000903055 | DV/PV NUMBER: DV03 | COST CENTER: 18352 | DATE SUBMITTED: 18-Sep-2020 | * PARTS IN LAB BY (DATE): 30-Sep-2020 | |
| Other Setup: | | | | | |
| Other Setup: | | | | | |

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| Test Plan | Test Group ID: Group PG22A - Chemical resistance | 18-Dec-2020 |
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Remarks:
 10 samples of each gender (Male and Female Housings Assemblies populated with Terminals).

Parts (list all components separately)

| QTY | PART NUMBER | REV | PART DESCRIPTION | LIST ATTRIBUTES APPLICABLE TO CONDUCTOR TYPE/SIZE, TOOLING |
|-----|-------------|-----|--|--|
| 10 | 2-2354440-1 | B1 | MATE-AX,PIN HSG ASSY,SLD,180D 4P | |
| 10 | 2354439-1 | B | MATE-AX,SOC HSG ASSY,SLD,180D 4P | |
| 80 | 2298126-1 | C1 | FERRULE 180 DEGREE, MATE-AX, RTK-031 | |
| 40 | 2298121-1 | B | CENTER CONTACT, SOCKET MATE-AX, 180 DEG, RTK-031 | |
| 40 | 2298116-1 | C9 | OUTER SOCKET CONTACT 180 DEGREE MATE-AX, RTK-031 | |
| 40 | 2298120-1 | B4 | DIELECTRIC, SOCKET, 180 DEGREE, MATE-AX, RTK-031 | |
| 40 | 2291825-1 | A | CENTER CONTACT, PIN MINI COAX, 180 DEG, RTK-031 | |
| 40 | 2298123-1 | A5 | OUTER PIN CONTACT 180DEG MATE-AX, RTK-031 | |
| 40 | 2291824-1 | B4 | DIELETRIC, PIN, 180 DEGREE, MATE-AX, RTK-031 | |

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To add an additional row in the Parts section, 'Copy' an existing row, then 'Insert Copied Cells'. Do not use the single word 'Insert' command, you will not be able to merge cells. Do not insert copied cells into existing cells with no entry allowed. Row height may be increased. Rows may be deleted.

Test Sequence / Customer Requirements

| SEQUENCE | TEST OR SERVICE | PRODUCT SPECIFIC / TEST PARAMETERS / RELEVANT INFORMATION | ACCEPTANCE CRITERIA |
|----------|---|---|---|
| 22A-1 | Visual Inspection | Utilize 10X magnification. | No evidence of deterioration cracks, deformities, etc., that could affect their functional or distort their appearance. Connector locking mechanism must function without breaking. |
| 22A-2 | Resistance to Agents (general requirements) | CUTs (2 per fluid type) must be exposed to the fluids (5 different fluids) and then aged for 48 hours at temperatures listed Appendix E. After the test is complete, the DUTs must be rinsed thoroughly with water and dried. <i>Chemicals at RT or at temp for</i> | After completion of the test there must be no functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible |

Test Plan

Test Group ID: Group PG22A - Chemical resistance

18-Dec-2020

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|-------|-------------------|--|-----------------------------|---|
| 22A-3 | Visual Inspection | | Utilize 10X magnification. | No evidence of deterioration cracks, deformities, etc., that could affect their functional or distort their appearance. Connector locking mechanism must function without breaking. |
| 22A-4 | Functional Test | | Mate and Unmate Connectors. | After completion of the test there must be no functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible. |
| 22A-5 | Visual Inspection | | Utilize 10X magnification. | No evidence of deterioration cracks, deformities, etc., that could affect their functional or distort their appearance. Connector locking mechanism must function without breaking. |
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To add an additional row in the **Test Sequence** section, use the single word 'Insert' command or 'Copy' an existing row, then 'Insert Copied Cells'. **Do not insert a row or insert copied cells immediately after the h**
 Row height may be increased. Rows may be deleted. Additional copies of the blank Group Attachment worksheet may be made as needed using the worksheet 'Move or Copy'

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| Test Plan | Test Group ID: Group PG22B Leg 1 Samples - Chemical resistance, extended test | 18-Dec-2020 |
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Remarks:

22 samples of each gender (Male and Female Housing Assemblies populated with Terminals).

Omit Biodiesel fuel from the list of required fluids.

Parts (list all components separately)

| QTY | PART NUMBER | REV | PART DESCRIPTION | LIST ATTRIBUTES APPLICABLE CONDUCTOR TYPE/SIZE, TOOLING |
|-----|-------------|-----|--|--|
| 22 | 2-2354440-1 | B1 | MATE-AX,PIN HSG ASSY,SLD,180D 4P | |
| 22 | 2354439-1 | B | MATE-AX,SOC HSG ASSY,SLD,180D 4P | |
| 176 | 2298126-1 | C1 | FERRULE 180 DEGREE, MATE-AX, RTK-031 | |
| 88 | 2298121-1 | B | CENTER CONTACT, SOCKET MATE-AX, 180 DEG, RTK-031 | |
| 88 | 2298116-1 | C9 | OUTER SOCKET CONTACT 180 DEGREE MATE-AX, RTK-031 | |
| 88 | 2298120-1 | B4 | DIELECTRIC, SOCKET, 180 DEGREE, MATE-AX, RTK-031 | |
| 88 | 2291825-1 | A | CENTER CONTACT, PIN MINI COAX, 180 DEG, RTK-031 | |
| 88 | 2298123-1 | A5 | OUTER PIN CONTACT 180DEG MATE-AX, RTK-031 | |
| 88 | 2291824-1 | B4 | DIELETRIC, PIN, 180 DEGREE, MATE-AX, RTK-031 | |
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To add an additional row in the Parts section, 'Copy' an existing row, then 'Insert Copied Cells'. Do not use the single word 'Insert' command, you will not be able to merge cells. Do not insert copied cells into empty cells with no entry allowed. Row height may be increased. Rows may be deleted.

Test Sequence / Customer Requirements

| SEQUENCE | TEST OR SERVICE | PRODUCT SPECIFIC / TEST PARAMETERS / RELEVANT INFORMATION | ACCEPTANCE CRITERIA |
|----------|-------------------|---|--|
| 22B L1-1 | Visual Inspection | Utilize 10X magnification. | No evidence of deterioration, cracks, deformities, etc., that could affect their functional performance or distort their appearance. Connector locking mechanism must function without breaking. |

Test Plan

Test Group ID: Group PG22B Leg 1 Samples - Chemical resistance, extended test

18-Dec-2020

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|----------|--|--|---|--|
| 22B L1-2 | Resistance to Agents (general requirements) | | <p>CUTs must be exposed to the fluids (10 different fluids) and then aged for 48 hours at temperatures listed Appendix E. After the test is complete, the DUTs must be thoroughly dried. 2 samples per fluid type. Omit the use of Biodiesel fuel from testing.</p> | <p>After completion of the test there must be no functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible.</p> |
| 22B L1-3 | Visual Inspection | | Utilize 10X magnification. | <p>No evidence of deterioration, cracks, deformities, etc., that could affect their functional or distort their appearance. Connector locking mechanism must function without breaking.</p> |
| 22B L1-4 | Functional Test | | Mate and Unmate Connectors. | <p>After completion of the test there must be no functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible.</p> |
| 22B L1-5 | Visual Inspection | | Utilize 10X magnification. | <p>No evidence of deterioration, cracks, deformities, etc., that could affect their functional or distort their appearance. Connector locking mechanism must function without breaking.</p> |
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To add an additional row in the Test Sequence section, use the single word 'Insert' command or 'Copy' an existing row, then 'Insert Copied Cells'. Do not insert a row or insert copied cells immediately after the h
 Row height may be increased. Rows may be deleted. Additional copies of the blank Group Attachment worksheet may be made as needed using the worksheet 'Move or Copy

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| Test Plan | Test Group ID: Group PG22B Leg 2 Samples - Chemical resistance, extended test | 18-Dec-2020 |
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Remarks:
 11 samples of each gender (Male and Female Housing Assemblies populated with Cavity Plugs).
Omit Biodiesel fuel from the list of required fluids.

Parts (list all components separately)

| QTY | PART NUMBER | REV | PART DESCRIPTION | LIST ATTRIBUTES APPLICABLE TO CONDUCTOR TYPE/SIZE, TOOLING |
|-----|-------------|-----|--|--|
| 11 | 2-2354440-1 | B1 | MATE-AX,PIN HSG ASSY,SLD,180D 4P | RE |
| 11 | 2354439-1 | B | MATE-AX,SOC HSG ASSY,SLD,180D 4P | RE |
| 88 | 2306601-1 | A1 | CAVITY PLUG, MATE-AX, CVTY DIA, 3.6, BLK | W |

To add an additional row in the **Parts** section, 'Copy' an existing row, then 'Insert Copied Cells'. Do not use the single word 'Insert' command, you will not be able to merge cells. Do not insert copied cells into empty cells with no entry allowed. Row height may be increased. Rows may be deleted.

Test Sequence / Customer Requirements

| SEQUENCE | TEST OR SERVICE | PRODUCT SPECIFIC / TEST PARAMETERS / RELEVANT INFORMATION | ACCEPTANCE CRITERIA |
|----------|---|---|---|
| 22B L2-1 | Visual Inspection | Utilize 10X magnification. | No evidence of deterioration cracks, deformities, etc., that could affect their functional or distort their appearance. Connector locking mechanism must function without breaking. |
| 22B L2-2 | Resistance to Agents (general requirements) | CUTs must be exposed to the fluids (10 different fluids) and then aged for 48 hours at temperatures listed Appendix E. After the test is complete, the DUTs must be thoroughly dried. 2 samples per fluid type. Omit the use of Biodiesel fuel from testing. | After completion of the test there must be no functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible. |
| 22B L2-3 | Visual Inspection | 10-30-20 Utilize 10X magnification. | No evidence of deterioration cracks, deformities, etc., that could affect their functional or distort their appearance. Connector locking mechanism must function without breaking. |

Test Plan **Test Group ID:** Group PG22B Leg 2 Samples - Chemical resistance, extended test

18-Dec-2020

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|----------|-------------------|--|-----------------------------|---|
| 22B L2-4 | Functional Test | | Mate and Unmate Connectors. | After completion of the test, there must be no functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible. |
| 22B L2-5 | Visual Inspection | | Utilize 10X magnification. | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. |
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To add an additional row in the Test Sequence section, use the single word 'insert' command or 'Copy' an existing row, then 'insert Copied Cells'. Do not insert a row or insert copied cells immediately after the header. Row height may be increased. Rows may be deleted. Additional copies of the blank Group Attachment worksheet may be made as needed using the worksheet 'Move or Copy.'

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| Test Plan | Test Group ID: Group PG23 Leg 1 Samples - Water leak tightness | 18-Dec-2020 |
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Remarks:

5 samples of each gender (Male and Female Housing Assemblies populated as listed directly below).
 - Male Connectors to be populated with 3 Terminals each. Remaining cavity to be fitted with tubing to facilitate vacuum.
 - Female Connectors to be populated with Terminals.

Insert loose Cavity Plugs into Male samples after pressure testing is complete (after step 23 L1-8).

Parts (list all components separately)

| QTY | PART NUMBER | REV | PART DESCRIPTION | LIST ATTRIBUTES APPLICABLE TO CONDUCTOR TYPE/SIZE, TOOLING |
|-----|-------------|-----|--|--|
| 5 | 2-2354440-1 | B1 | MATE-AX,PIN HSG ASSY,SLD,180D 4P | |
| 5 | 2354439-1 | B | MATE-AX,SOC HSG ASSY,SLD,180D 4P | |
| 35 | 2298126-1 | C1 | FERRULE 180 DEGREE, MATE-AX, RTK-031 | |
| 20 | 2298121-1 | B | CENTER CONTACT, SOCKET MATE-AX, 180 DEG, RTK-031 | |
| 20 | 2298116-1 | C9 | OUTER SOCKET CONTACT 180 DEGREE MATE-AX, RTK-031 | |
| 20 | 2298120-1 | B4 | DIELECTRIC, SOCKET, 180 DEGREE, MATE-AX, RTK-031 | |
| 15 | 2291825-1 | A | CENTER CONTACT, PIN MINI COAX, 180 DEG, RTK-031 | |
| 15 | 2298123-1 | A5 | OUTER PIN CONTACT 180DEG MATE-AX, RTK-031 | |
| 15 | 2291824-1 | B4 | DIELECTRIC, PIN, 180 DEGREE, MATE-AX, RTK-031 | |
| 5 | 2306601-1 | A1 | CAVITY PLUG, MATE-AX, CVTY DIA, 3.6, BLK | |
| | | | | |

To add an additional row in the **Parts** section, 'Copy' an existing row, then 'Insert Copied Cells'. Do not use the single word 'insert' command, you will not be able to merge cells. Do not insert copied cells into existing rows with no entry allowed. Row height may be increased. Rows may be deleted.

Test Sequence / Customer Requirements

| SEQUENCE | TEST OR SERVICE | PRODUCT SPECIFIC / TEST PARAMETERS / RELEVANT INFORMATION | ACCEPTANCE CRITERIA |
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Test Plan

Test Group ID: Group PG23 Leg 1 Samples - Water leak tightness

18-Dec-2020

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| 23 L1-10 | Visual Inspection | Utilize 10X magnification. | No evidence of deterioration cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking |
| 23 L1-11 | Thermal Shock | 5 cycles. Cycle sequence: 1. Air Temp: 105°C for 30 minutes. 2. Water Temp: 0°C for 15 minutes. | No functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible. |
| 23 L1-12 | Insulation Resistance | Measure between Center and Outer Contact of the cable assemblies. Apply the test voltage U = 500 V DC continuously for at least t ≥ 60 s. | 100mΩ MIN |
| 23 L1-13 | Visual Inspection | Utilize 10X magnification. | No evidence of deterioration cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking |
| 23 L1-14 | Degree of Protection Test / Pressure Washer Test (IPx9K) | Test duration per side: 15 seconds Distance, nozzle to CUT: 100 mm - 150 mm Pressure: 8 MPa Temperature: 80 ° C The test is to be performed 3 times. | No medium may penetrate the connector (possible use of water finding paste) The function of the locking and releasing elements must remain fully intact. |
| 23 L1-15 | Insulation Resistance | Measure between Center and Outer Contact of the cable assemblies. Apply the test voltage U = 500 V DC continuously for at least t ≥ 60 s. | 100mΩ MIN |
| 23 L1-16 | Visual Inspection | Utilize 10X magnification. | No evidence of deterioration cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. |

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| Test Plan | Test Group ID: Group PG23 Leg 1 Samples - Water leak tightness | | 18-Dec-2020 |
|-----------|--|--|---|
| 23 L1-1 | Visual Inspection | Utilize 10X magnification. | No evidence of deterioration cracks, deformities, etc., that could affect their functional or distort their appearance. Connector locking mechanism must function without breaking. |
| 23 L1-2 | Aging in Dry Heat | 120 hours at 105°C. | No function deviations must have occurred. |
| 23 L1-3 | Temperature Shock | 144 cycles -40° to 105°C for 15 minutes at each setting. | No functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible. |
| 23 L1-4 | Visual Inspection | Utilize 10X magnification. | No evidence of deterioration cracks, deformities, etc., that could affect their functional or distort their appearance. Connector locking mechanism must function without breaking. |
| 23 L1-5 | Insulation Resistance | Measure between Center and Outer Contact of the cable assemblies. Apply the test voltage U = 500 V DC continuously for at least t ≥ 60 s. | 100mΩ MIN |
| 23 L1-6 | Immersion with Pressure Difference | Pressure setting sequence: 1. Atmosphere. 2. -10kPa for 5 minutes <i>3" of Hg</i> 3. -50kPa for another 5 minutes. <i>14" of Hg</i> 4. Back to atmosphere. Do not adjust the pressure setting any faster than a rate of 10kPa per minute. | No medium may penetrate the connector (possible use of water finding paste) The function of the locking and releasing elements must remain fully intact. |
| 23 L1-7 | Insulation Resistance | Measure between Center and Outer Contact of the cable assemblies. Apply the test voltage U = 500 V DC continuously for at least t ≥ 60 s. | 100mΩ MIN |
| 23 L1-8 | Line Movement During Immersion with Pressure Difference - Vacuum | Grab cable bundle 100mm away from back of Connectors and bend 90° WRT the Housings in both X and Y planes and hold in each orientation for 10 seconds at each pressure setting defined in step 23-5. <i>Some VDC OS</i> | No medium may penetrate the connector (possible use of water finding paste) The function of the locking and releasing elements must remain fully intact. |
| 23 L1-9 | Insulation Resistance | Measure between Center and Outer Contact of the cable assemblies. Apply the test voltage U = 500 V DC continuously for at least t ≥ 60 s. | 100mΩ MIN |

Test Plan

Test Group ID: Group PG23 Leg 1 Samples - Water leak tightness

18-Dec-2020

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|----------|-------------------|--|-----------------------------|---|
| 23 L1-17 | Functional Test | | Mate and Unmate Connectors. | After completion of the test, there must be no functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible. |
| 23 L1-18 | Visual Inspection | | Utilize 10X magnification. | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. |
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 Row height may be increased. Rows may be deleted. Additional copies of the blank Group Attachment worksheet may be made as needed using the worksheet 'Move or Copy'.

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| Test Plan | Test Group ID: Group PG23 - Leg 2 Samples Water leak tightness | 18-Dec-2020 | |
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Remarks:

2 samples of each gender (Male and Female Housing Assemblies populated as listed directly below).
 - Male Connectors to be populated with 3 Cavity Plugs each. Remaining cavity to be fitted with tubing to facilitate vacuum.
 - Female Connectors to be populated with Cavity Plugs.

Insert loose Cavity Plugs into Male samples after pressure testing is complete (after step 23 L2-6).

Parts (list all components separately)

| QTY | PART NUMBER | REV | PART DESCRIPTION | LIST ATTRIBUTES APPLICABLE TO PURPOSE OF TEST (PL CONDUCTOR TYPE/SIZE, TOOLING, HOUSING/INSULATION) |
|-----|-------------|-----|--|---|
| 2 | 2-2354440-1 | B1 | MATE-AX,PIN HSG ASSY,SLD,180D 4P | |
| 2 | 2354439-1 | B | MATE-AX,SOC HSG ASSY,SLD,180D 4P | |
| 16 | 2306601-1 | A1 | CAVITY PLUG, MATE-AX, CVTY DIA, 3.6, BLK | |

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Test Sequence / Customer Requirements

| SEQUENCE | TEST OR SERVICE | PRODUCT SPECIFIC / TEST PARAMETERS / RELEVANT INFORMATION | ACCEPTANCE CRITERIA | SPECIFICATION |
|----------|-------------------|---|---|-------------------------|
| 23 L2-1 | Visual Inspection | Utilize 10X magnification. | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. | DIN EN 60512-1-1 Sect.4 |
| 23 L2-2 | Aging in Dry Heat | 120 hours at 105°C. | No function deviations must have occurred. | LV-214, Pg 39 |
| 23 L2-3 | Temperature Shock | 144 cycles -40° to 105°C for 15 minutes at each setting. | No functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible. | LV-214, Pg 43 |
| 23 L2-4 | Visual Inspection | Utilize 10X magnification. | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. | DIN EN 60512-1-1 Sect.4 |

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OCT 08 2020

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| Test Plan | Test Group ID: Group PG23 - Leg 2 Samples Water leak tightness | | 18-Dec-2020 |
|-----------|--|---|---|
| 23 L2-5 | Immersion with Pressure Difference | Pressure setting sequence: 1. Atmosphere. 2. -10kPa for 5 minutes 3. -50kPa for another 5 minutes. 4. Back to atmosphere. Do not adjust the pressure setting any faster than a rate of 10kPa per minute. | No medium may penetrate the connector (possible use of water finding paste) The function of the locking and releasing elements must remain fully intact. |
| 23 L2-6 | Visual Inspection | Separate Housings and inspect using 10X magnification for presence of fluid and any damage. | No medium may penetrate the connector (possible use of water finding paste) The function of the locking and releasing elements must remain fully intact. No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. |
| 23 L2-7 | Thermal Shock | 5 cycles. Cycle sequence: 1. Air Temp: 105°C for 30 minutes. 2. Water Temp: 0°C for 15 minutes. | No functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible. |

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| Test Plan | Test Group ID: Group PG23 - Leg 2 Samples Water leak tightness | | 18-Dec-2020 |
|-----------|--|---|---|
| 23 L2-8 | Visual Inspection | Separate Housings and inspect using 10X magnification for presence of fluid and any damage. <p style="text-align: center; color: red; font-weight: bold; font-size: 2em;">REVISED</p> <p style="text-align: center; color: red; font-weight: bold; font-size: 1.5em;">NOV 19 2020</p> <p style="text-align: center; color: red; font-weight: bold; font-size: 2em;">WECTL</p> | No medium may penetrate the connector (possible use of water finding paste) The function of the locking and releasing elements must remain fully intact. No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. |
| 23 L2-9 | Degree of Protection Test / Pressure Washer Test (IPx9K) | Test duration per side: 15 seconds Distance, nozzle to CUT: 100 mm - 150 mm Pressure: 8 MPa Temperature: 80 ° C The test is to be performed 3 times. | No medium may penetrate the connector (possible use of water finding paste) The function of the locking and releasing elements must remain fully intact. |
| 23 L2-10 | Visual Inspection | Separate Housings and inspect using 10X magnification for presence of fluid and any damage. | No medium may penetrate the connector (possible use of water finding paste) The function of the locking and releasing elements must remain fully intact. No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. |

| Test Plan | Test Group ID: Group PG23 - Leg 2 Samples Water leak tightness | | | 18-Dec-2020 |
|-----------|--|--|-----------------------------|---|
| 23 L2-11 | Functional Test | | Mate and Unmate Connectors. | After completion of the test, there must be no functional impairments detected on the housings. Cracking or delamination that affect the function are not permissible. |
| 23 L2-12 | Visual Inspection | | Utilize 10X magnification. | No evidence of deterioration, cracks, deformities, etc., that could affect their functionality or distort their appearance. Connector locking mechanism must function without breaking. |
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WE-20201175

1154-5 (07/11)
REF.: 102-8

CERTIFICATION OF CONFORMANCE
TEST PACKAGE

| PRODUCT NAME MATE Ax SEALED CONNECTOR: RTK031 Group PG8 Retest | | PROJECT NO. PRJ-15-000903055 | |
|---|-----|---------------------------------|-----|
| PART NO. | REV | DATE CODE | QTY |
| 2-2354440-1 | B1 | 259 20 | 6 |
| 2354439-1 | B | Not provided | 12 |
| 2298126-1 | C1 | XX XX (Cable Assembly) | 48 |
| 2298121-1 | B | | 48 |
| 2298116-1 | C9 | | 48 |
| 2298120-1 | B4 | | 48 |
| 2298126-1 | C1 | XX XX (Cable Assembly) | 24 |
| 2291825-1 | A | | 24 |
| 2298123-1 | A5 | | 24 |
| 2291824-1 | B4 | | 24 |

This certifies that the samples in this test package have been produced, inspected and accepted as conforming to product drawing requirements, and made using the same core manufacturing processes and technologies as production parts.

Winston-Salem Electrical Components Test Laboratory
Winston-Salem, NC

TE Connectivity

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