

**TEST REPORT COVERING THE
IN-HOUSE QUALIFICATION TESTING OF
094202101 RECEPTACLE HOUSING
DRC26-38S** PLUG**



SIGNATURE PAGE

This document has been reviewed and found to be acceptable by the undersigned:

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ABSTRACT

This report summarizes the results of in-house qualification testing of the 094202101 receptacle housing and the DRC26-38S01, DRC26-38S02 plug. This test, which was derived from the SAE J2030, Deutsch DITS 7-030-01 & Eaton TES-124 test spec, simulates extreme environmental, vibration, and electrical conditions.

The following part numbers were subjected to testing in accordance with Deutsch Test Procedures as described herein. 094202101 (receptacle housing) and DRC26-38S01, DRC26-38S02 (plug) were the only parts being qualified, all other parts used for the test have already been qualified.

<u>Deutsch Part Number</u>	<u>Description</u>
094202101	76 way receptacle connector
DRC26-38S01	38 way plug DRC series key position 1
DRC26-38S02	38 way plug DRC series key position 2
1062-20-0144	20 size gold stamped and formed socket contacts.
1062-12-0166	12 size tin/nickel stamped & formed socket contacts.

Test groups A, B, C, D,E & F passed all aspects of the testing described in this test report.



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1.0 QUALIFICATION TEST PLAN FOR EATON / MOTOROLA 76 PIN HEADER

2.0 SPECIFICATION REFERENCES

- 2.1 SAE J2030 Heavy Duty Electrical Connector Performance Standard.
- 2.2 DITS 7-303-01 Deutsch Industrial Test Procedure Qualification of Heavy Duty Connectors.
- 2.3 TES-124 EATON Engineering Specification.
- 2.4 DCPM 2000 Deutsch Calibration Procedures Manual

3.0 TEST CONDITIONS AND EQUIPMENT

3.1 Test Conditions

Unless otherwise specified all test and measurements were conducted within the following conditions.

Temperature	+18C to +35C (+65F to +95F)
Relative Humidity	5% to 95%
Barometric Pressure	650 to 800 mm Hg

3.2 Test Equipment

Instrument calibration was performed in accordance with Deutsch Calibration Procedure Manual DCPM 2000 prior to using the instrument for testing. Calibration records are maintained and are directly traceable to the National Bureau of Standards with no more than three levels of separation.

The following data concerning the test equipment was recorded on the data format for each test:

- a. Descriptive name.
- b. Laboratory identification.
- c. Date of last calibration prior to use.

4.0 DOCUMENTATION

4.1 Recorded Data

All measurements were recorded to as many significant digits as are meaningful under the accuracy limits of the equipment used. All data was recorded on 8 1/2" x 11" data forms.

The ambient test conditions (temperature and relative humidity) and the date were recorded on the data form.



If a test was conducted on more than one day, the ambient test conditions and dates were recorded for each testing day.

The data includes whenever applicable, any diagrams and sketches of the following:

- a. Electrical hookups that are peculiar to this test program or might prohibit duplication of the test method and results involved if not supplied.
- b. The orientation of samples to the direct force imparted during any physical shock or vibration testing.
- c. Any fixtures that would be used for mounting the test samples that were fabricated exclusively for this sequence.

5.0 SAMPLES AND TEST GROUPS

5.1 Sample Description

The following parts and their associated components for the specific part number were randomly selected from stock.

<u>Part Number</u>	<u>Description</u>	<u>Quantity</u>
094202101	Receptacle Header	21
DRC26-38S01	Plug connector	21
DRC26-38S02	Plug connector	21
1062-12-0166	12 size tin/nickel S&F socket contacts	168
1062-20-0144	20 size gold S&F socket contacts	1512



5.2 Group Selection

Five test groups were created to test the functionality of the DRC26-38S** connector system. The sample parts were divided into test groups. The sample parts were randomly selected to go into each test group. For identification purposes each sample part was numbered after being placed into a test group.

<u>Test Group</u>	<u>Sample Part Number</u>
Group A (ENVIR/MECH)	A1, A2, A3, A4, A5, A6
Group B (ELEC/SIGNAL)	B1, B2
Group C (ELEC/POWER)	C1, C2
Group D (ENVIR/FLUIDS)	D1, D2, D3, D4, D5
Group E (ELEC/VIB)	E1, E2, E3
Group F (VIB)	F1, F2, F3

5.3 Sample Assembly

Each sample part that required wiring were wired with a 12 and 20 AWG SXL chemically cross-linked polyethylene insulated wire supplied in lengths sufficient to accommodate testing. The wire was crimped to each contact with Deutsch DCT-20-02-00 and HDP-400 crimp tooling

The sample parts for each test group were assembled as follows:

5.3.1 Group A (Environmental / Mechanical)

Sample group to include: six header connectors, and twelve mating plugs. Plugs wired with 1200mm leads. Headers mounted to leak test fixtures.

5.3.2 Group B (Electrical / Signal)

Sample group to include: two header connectors, and mating plugs. Plugs wired with 100mm leads (includes reference wire). Header pins open to rear.

5.3.3 Group C (Electrical / Power)

Sample group to include: two header connector, and mated plugs. Headers soldered with jumper wires and looped plug wires.



5.3.4 Group D (Environmental / fluids)

Sample group to be: five header connectors and mated plugs. Plugs wired with looped leads. Headers mounted to leak test fixtures.

5.3.5 Group E (Electrical / Vibration)

Sample group to be: three header connectors and mated plugs. Plugs wired with 1200mm leads. Header pins soldered to test wires.

5.3.6 Group F (Vibration)

Sample Group to be: three header connectors and mated plugs. Plugs wired with 1200 mm leads. Header pins soldered to test wires.

6 TEST SEQUENCE

Each sample group was subjected to the following test methods as outlined below. The tests were conducted in the order shown.

<u>Group A (Environmental / Mechanical)</u>	<u>Para.</u>
1. Examination of Product	6.1.1
2. Water Immersion	6.1.2
3. Insulation Resistance	6.1.3
4. Thermal Cycle	6.1.4
5. Water Immersion	6.1.5
6. Insulation Resistance	6.1.6
7. Temperature Life	6.1.7
8. Water Immersion	6.1.8
9. Insulation Resistance	6.1.9
10. Pressure Wash	6.1.10
11. Insulation Resistance	6.1.11
12. Durability	6.1.12
13. Maintenance Aging	6.1.13
14. Mismatching	6.1.14
15. Connector Retention	6.1.15
16. Terminal Retention	6.1.16
17. Final Examination	6.1.17
<u>Group B (Environmental / Electrical-Signal)</u>	
1. Examination of Product	6.2.1
2. Low Voltage Resistance (Initial)	6.2.2
3. Connection Resistance (Initial)	6.2.3
4. Thermal Cycle	6.2.4
5. Temperature Life	6.2.5
6. Low Voltage Resistance (After Conditioning)	6.2.6
7. Connection Resistance (After Conditioning)	6.2.7
8. Final Examination	6.2.8



<u>Group C (Environmental / Electrical-Power)</u>		
1.	Examination of Product	6.3.1
2.	Thermal Cycle	6.3.2
3.	Current Test	6.3.3
4.	Final Examination	6.3.4
<u>Group D (Environmental / Fluids)</u>		
1.	Examination of Product	6.4.1
2.	Thermal Cycle	6.4.2
3.	Fluid Immersion	6.4.3
4.	Final Examination	6.4.4
<u>Group E (Electrical / Vibration)</u>		
1.	Examination of Product	6.5.1
2.	Temperature Life	6.5.2
3.	Thermal Shock	6.5.3
4.	Vibration	6.5.4
5.	Final Examination	6.5.5
<u>Group F (Vibration)</u>		
1.	Examination of Product	6.6.1
2.	Thermal Cycle	6.6.2
3.	Thermal Shock	6.6.3
4.	Vibration	6.6.4
5.	Final Examination	6.6.5

6 TEST METHOD AND RESULTS

The validation test and its results are summarized in the following pages. Refer to the Appendix for the detailed laboratory test forms and other related test documentation.

6.1 GROUP A (ENVIRONMENTAL/MECHANICAL)

6.1.1 EXAMINATION OF PRODUCTS

Reference: SAE J2030-6.1 (DITS 7-303-01-7.1)

Test Method:

1. The connectors were visually inspected for correct use of materials, proper construction, correct part number and insert markings and over-all quality of workmanship.
2. Poor molding fabrication, loose materials, damaged or improperly manufactured contacts, galling of metal parts, nicks and burrs of metal parts, torn seals or cracked plastic are considered adequate basis for rejection.

Requirements:

The connectors shall be correctly constructed, marked and shall show good quality and workmanship. Connector after conditioning shall not show signs of damage or any detectable loss of function.



Results:

The connectors were thoroughly inspected and showed no evidence of cracking, distortion or any defects detrimental to part function.

6.1.2 WATER IMMERSION

Reference: SAE J2030-6.19 (DITS 7-303-01-7.15)

Test Method:

The wired and mated connectors shall be placed in an oven at $125\pm 3^{\circ}\text{C}$ for 1h the immediately be placed in water with a 5% salt weight content and a 0.1g/L wetting agent, to a depth of 1m for 4h. Water temperature is to be $23\pm 3^{\circ}\text{C}$. The free wire ends must not enter the water.

Requirements:

Inspect samples for insulation resistance per para 6.3, visually inspect connector for moisture inside the connector.

Results:

Moisture was not detected upon visual inspection of all 6 parts.

6.1.3 INSULATION RESISTANCE

Reference: SAE J2030-6.3 (DITS 7-303-01-7.2)

Test Method:

1. Using a 1000 VDC Megometer check the insulation resistance between each contact to each adjacent contact.

Requirements:

The insulation resistance shall be greater than 20 megohms.

Results:

After 4 hours of water immersion the 6 samples were tested for insulation resistance, the results were all 6 samples passed this portion of the test.



6.1.4 THERMAL CYCLE

Reference: TES-124-5.30 (DITS 7-303-7.11)

Test Method:

The wired and mated connectors shall be thermal cycled from $-55\pm 3^{\circ}\text{C}$ to $125\pm 3^{\circ}\text{C}$ at a rate of 3° per minute. Connectors to remain at each temperature extreme for one (1) hour minimum. Connectors to be cycled for 30 complete cycles.

Requirements:

Inspect samples per Visual Inspection (para 6.1).

Results:

After 30 cycles the connectors showed no evidence of distortion, cracking or any physical defect detrimental to part function.

6.1.5 WATER IMMERSION

Reference: SAE J2030-6.19 (DITS 7-303-01-7.15)

Test Method:

The wired and mated connectors shall be placed in an oven at $125\pm 3^{\circ}\text{C}$ for 1h the immediately be placed in water with a 5% salt weight content and a 0.1g/L wetting agent, to a depth or 1m for 4h. Water temperature is to be $23\pm 3^{\circ}\text{C}$. The free wire ends must not enter the water.

Requirements:

Inspect samples for insulation resistance per para 6.3, visually inspect connector for moisture inside the connector.

Results:

Moisture was not detected upon visual inspection of all 6 parts.



6.1.6 INSULATION RESISTANCE

Reference: SAE J2030-6.3 (DITS 7-303-01-7.2)

Test Method:

1. Using a 1000 VDC Megometer check the insulation resistance between each contact to each adjacent contact.

Requirements:

The insulation resistance shall be greater than 20 megohms

Results:

After 4 hours of water immersion the 6 samples were tested for insulation resistance, the results were all 6 samples passed this portion of the test.

6.1.7 TEMPERATURE LIFE

Reference: SAE J2030-6.7 (DITS 7-303-01-7.5)

Test Method:

The wired and mated connectors shall be subject to 1000 h at 125°C ±3°C without the current flowing.

Requirements:

Inspect samples per Visual Inspection (para 6.1).

Results:

After 1000 hours of Temperature Life the connectors showed no evidence of distortion, cracking or physical defect detrimental to part function.



6.1.8 WATER IMMERSION

Reference: SAE J2030-6.19 (DITS 7-303-01-7.15)

Test Method:

The wired and mated connectors shall be placed in an oven at $125\pm 3^{\circ}\text{C}$ for 1h then immediately be placed in water with a 5% salt weight content and a 0.1g/L wetting agent, to a depth of 1m for 4h. Water temperature is to be $23\pm 3^{\circ}\text{C}$. The free wire ends must not enter the water.

Requirements:

Inspect samples for insulation resistance per para 6.3, visually inspect connector for moisture inside the connector.

Results:

Moisture was not detected upon visual inspection of all 6 parts after undergoing 1000 hours of temperature life.

6.1.9 INSULATION RESISTANCE

Reference: SAE J2030-6.3 (DITS 7-303-01-7.2)

Test Method:

1. Using a 1000 VDC Megometer check the insulation resistance between each contact to each adjacent contact.

Requirements:

The insulation resistance shall be greater than 20 megohms

Results:

After 4 hours of water immersion the 6 samples were tested for insulation resistance, the results were all 6 samples passed this portion of the test.



6.1.10 PRESSURE WASHING

Reference: TES-124-5.27 (SAE J2030-6.5 / SAE J1455)

Test Method:

The mated and cabled connectors under test shall be mounted in its normal operating position with drain holes, if used, open. The test should expose 100% of the test specimen and sprayed using a flat fan spray nozzle located 20 cm to 30 cm away. Perform test using the following conditions:

- 1) High Pressure Spray Wash with water/detergent.
40° C (104° F)
10,300 kPa (1500 lbf/in²)
9460 cm³/min
Spray for 3 seconds of a six seconds period.
375 cycles.
- 2) Steam Clean
1400 kPa (203 lbf/in²)
9460 cm³/min (150 gal/h)
93° C (200° F)
3 seconds of a 6 second period.
375 cycles.
- 3) Low pressure spray wash.
Using a typical hose and hot water flood sample for 20 minutes.

Requirements:

Inspect samples for Insulation Resistance (para. 6.3) and Visual inspection (para 6.1)

Results:

All samples were visually inspected after the insulation resistance test and passed this portion of the test.



6.1.11 INSULATION RESISTANCE

Reference: SAE J2030-6.3 (DITS 7-303-01-7.2)

Test Method:

1. Using a 1000 VDC Megometer check the insulation resistance between each contact to each adjacent contact.

Requirements:

The insulation resistance shall be greater than 20 megohms

Results:

After the pressure wash, the 6 samples were tested for insulation resistance, the results were all 6 samples passed this portion of the test.

6.1.12 DURABILITY

Reference: SAE J2030-6.11 (DITS 7-303-7.7)

Test Method:

The connector shall be mated and unmated for a total of 50 complete cycles.

Requirements:

Inspect samples per Visual Inspection (para 6.1).

Results:

After 50 cycles, the parts were visually inspected and passed the test.



6.1.13 MAINTENANCE AGEING

Reference: SAE J2030-6.6 (DITS 7-303-01)

Test Method:

Subject at least 10% of the cavities to ten cycles of inserting and removing of its respective contact.

Requirements:

Inspect samples per Visual Inspection (para 6.1).

Results:

After ten cycles of maintenance ageing the connectors were visually inspected and were found to be free of damage detrimental to part function.

6.1.14 MISMATING (Scoop-Proof)

Reference: SAE J2030-6.21

Test Method:

Apply an axial force of 178 N in such a way as to attempt to over-come polarization of keying features. Attempt to bend pins by intentional mismatching and misalignment of plug connector.

Requirements:

Inspect samples per Visual Inspection (para 6.1).

Results:

After attempting to mismatch the connector a visual inspection was conducted to inspect cracks to housing, keys or pins. None were found.



6.1.15 CONNECTOR RETENTION

Reference: SAE J2030-6.20 (DITS 7-303-01-7.14)

Test Method:

Apply a pulling force to the wire bundle of the mated connector with a pull force of 444 N. Apply the load for 30s.

Requirements:

Inspect samples per Visual inspection (para 6.1).

Results:

After applying an axial force of 444N for 30s no damage was apparent after a visual inspection of the part.

6.1.16 TERMINAL RETENTION

Reference: SAE J2030-6.18 (DITS 7-303-01-7.6)

Test Method:

Subject 10% of the contacts to a direct pull (the same cavities used for Maintenance Aging). The pull is to be exerted on the conductor such that sudden jerking is avoided. Pull each terminal with the respective pull values listed in table 5

Table 5 – Contact Retention Forces

Contact Size	Pull-Out Force (lb) [N]
20	20 [89]
12	30 [133]

Requirements:

The terminals shall maintain its original position in the connector throughout the test.

Results:

The terminals maintained their original position after applying the forces shown in table 5.



6.1.17 FINAL EXAMINATION OF PRODUCTS

Reference: SAE J2030-6.1 (DITS 7-303-01-7.1)

Test Method:

3. The connectors were visually inspected for correct use of materials, proper construction, correct part number and insert markings and over-all quality of workmanship.
4. Poor molding fabrication, loose materials, damaged or improperly manufactured contacts, galling of metal parts, nicks and burrs of metal parts, torn seals or cracked plastic are considered adequate basis for rejection.

Requirements:

The connectors shall be correctly constructed, marked and shall show good quality and workmanship. Connector after conditioning shall not show signs of damage or any detectable loss of function.

Results:

The connectors were thoroughly inspected and showed no evidence of cracking, distortion or any defects detrimental to part function.



6.2 GROUP B (ENVIRONMENTAL/ELECTRICAL-SIGNAL)

6.2.1 EXAMINATION OF PRODUCTS

Reference: SAE J2030-6.1 (DITS 7-303-01-7.1)

Test Method:

5. The connectors were visually inspected for correct use of materials, proper construction, correct part number and insert markings and over-all quality of workmanship.
6. Poor molding fabrication, loose materials, damaged or improperly manufactured contacts, galling of metal parts, nicks and burrs of metal parts, torn seals or cracked plastic are considered adequate basis for rejection.

Requirements:

The connectors shall be correctly constructed, marked and shall show good quality and workmanship. Connector after conditioning shall not show signs of damage or any detectable loss of function.

Results: All parts met the requirements of the visual inspection.

6.2.2 LOW-VOLTAGE RESISTANCE

Reference: SAE J2030-6.2 (DITS 7-303-01-7.16)

Test Method:

1. Test with applied voltage not to exceed 20mV open circuit and the test current shall be limited to 100mA. The resistance of an equal length of wire (reference wire) shall be subtracted from the actual readings to determine the added resistance of the terminal. The reference wire shall be from the same spool as used in the connector wiring.

Requirements:

The low level contact resistance of each terminal is defined as follows:

Wire Gauge AWG [mm ²]	Maximum Resistance (mΩ)
20 [.50]	11

Results:

All samples passed the low voltage resistance portion of this test.



6.2.3 CONTACT RESISTANCE

Reference: SAE J2030-6.4 (DITS 7-303-01-7.17)

Test Method:

- The measurement of connection resistance shall be per Figure 2. The resistance of a cable equal in length to that of the two measuring points shall be subtracted from the measured values. The cable used shall be from the same batch for all wires. Measurements shall be taken after thermal equilibrium. Test using current levels shown in table #3.

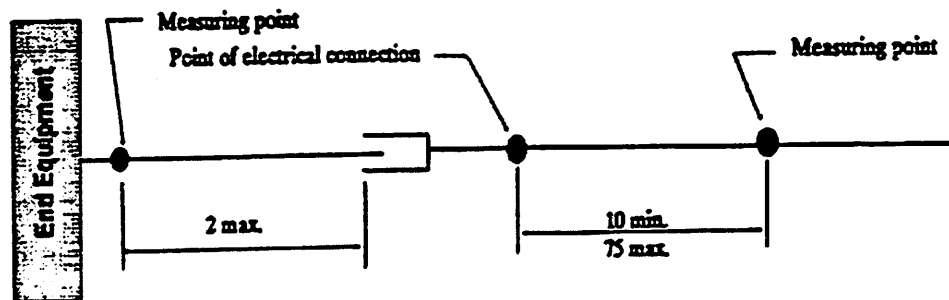


FIGURE 2—CONNECTION RESISTANCE, CABLE TO DEVICE

Note: — All dimensions are in millimeters. Wire lengths may be longer if required by other tests.
 Measuring points are on the wire.
 Points of electrical connection are typically the joint of the wire to the terminal.

Requirements:

Voltage drops shall not exceed the levels of table #3

TABLE 3 – CONTACT RESISTANCE

Contact Size	Wire Gauge AWG [mm ²]	Test Current (Amps)	Resistance (mV) Solids	Resistance (mV) Stamped and Formed
20	20 [.50]	7.5	60	100
12	12 [3.0]	25	60	100



Results:

All samples met or exceeded the requirements of contact resistance.

6.2.4 THERMAL CYCLE

Reference: TES-124-5.30 (DITS 7-303-7.11)

Test Method:

The wired and mated connectors shall be thermal cycled from $-55\pm 3^{\circ}\text{C}$ to $125\pm 3^{\circ}\text{C}$ at a rate of 3° per minute. Connectors to remain at each temperature extreme for one (1) hour minimum. Connectors to be cycled for 30 complete cycles.

Requirements:

Inspect samples per Visual Inspection (para 6.1).

Results:

The samples were inspected and were found to have no cracks, warpage or damage detrimental to part function.

6.2.5 TEMPERATURE LIFE

Reference: SAE J2030-6.7 (DITS 7-303-01-7.5)

Test Method:

The wired and mated connectors shall be subject to 1000 h at $125^{\circ}\text{C} \pm 3^{\circ}\text{C}$ without the current flowing.

Requirements:

Inspect samples per Visual Inspection (para 6.1).

Results:

The samples were inspected after 1000 hours of temperature life and were found to have no cracks, warpage or damage detrimental to part function.



6.2.6 LOW-VOLTAGE RESISTANCE

Reference: SAE J2030-6.2 (DITS 7-303-01-7.16)

Test Method:

2. Test with applied voltage not to exceed 20Mv open circuit and the test current shall be limited to 100Ma. The resistance of an equal length of wire (reference wire) shall be subtracted from the actual readings to determine the added resistance of the terminal. The reference wire shall be from the same spool as used in the connector wiring.

Requirements:

The low level contact resistance of each terminal is defined as follows:

Wire Gauge AWG [mm ²]	Maximum Resistance (M ω)
20 [.50]	11

Results:

All samples passed the low voltage resistance portion of this test.

6.2.7 CONTACT RESISTANCE

Reference: SAE J2030-6.4 (DITS 7-303-01-7.17)

Test Method:

2. The measurement of connection resistance shall be per Figure 2. The resistance of a cable equal in length to that of the two measuring points shall be subtracted from the measured values. The cable used shall be from the same batch for all wires. Measurements shall be taken after thermal equilibrium. Test using current levels shown in table #3.



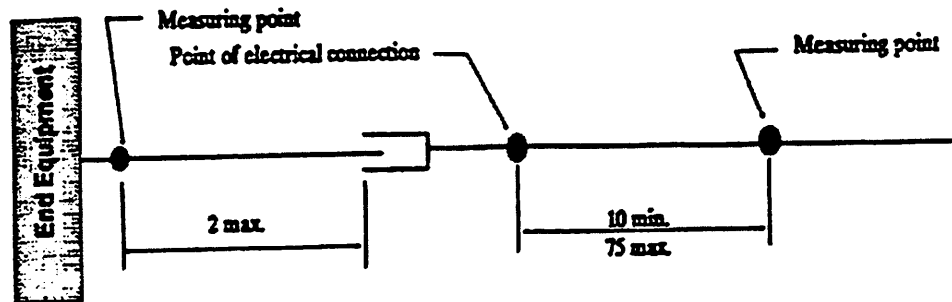


FIGURE 2—CONNECTION RESISTANCE, CABLE TO DEVICE

Note: — All dimensions are in millimeters. Wire lengths may be longer if required by other tests.
 Measuring points are on the wire.
 Points of electrical connection are typically the joint of the wire to the terminal.

Requirements:

Voltage drops shall not exceed the levels of table #3

TABLE 3 – CONTACT RESISTANCE

Contact Size	Wire Gauge AWG [mm ²]	Test Current (Amps)	Resistance (mV) Solids	Resistance (mV) Stamped and Formed
20	20 [.50]	7.5	60	100
12	12 [3.0]	25	60	100

Results:

All samples met or exceeded the requirements of contact resistance.



6.2.8 FINAL EXAMINATION OF PRODUCTS

Reference: SAE J2030-6.1 (DITS 7-303-01-7.1)

Test Method:

3. The connectors were visually inspected for correct use of materials, proper construction, correct part number and insert markings and overall quality of workmanship.
4. Poor molding fabrication, loose materials, damaged or improperly manufactured contacts, galling of metal parts, nicks and burrs of metal parts, torn seals or cracked plastic are considered adequate basis for rejection.

Requirements:

The connectors shall be correctly constructed, marked and shall show good quality and workmanship. Connector after conditioning shall not show signs of damage or any detectable loss of function.

Results:

The connectors were thoroughly inspected and showed no evidence of cracking, distortion or any defects detrimental to part function.



6.3 GROUP C (ENVIRONMENTAL/ELECTRICAL-POWER)

6.3.1 EXAMINATION OF PRODUCTS – GROUP C (ENV./ELEC.)

Reference: SAE J2030-6.1 (DITS 7-303-01-7.1)

Test Method:

1. The connectors were visually inspected for correct use of materials, proper construction, correct part number and insert markings and over-all quality of workmanship.
2. Poor molding fabrication, loose materials, damaged or improperly manufactured contacts, galling of metal parts, nicks and burrs of metal parts, torn seals or cracked plastic are considered adequate basis for rejection.

Requirements:

The connectors shall be correctly constructed, marked and shall show good quality and workmanship. Connector after conditioning shall not show signs of damage or any detectable loss of function

Results: All connectors passed the visual inspection portion of the test.

6.3.2 THERMAL CYCLE

Reference: TES-124-5.30 (DITS 7-303-7.11)

Test Method:

The wired and mated connectors shall be thermal cycled from $-55\pm 3^{\circ}$ C to $125\pm 3^{\circ}$ C at a rate of 3° per minute. Connectors to remain at each temperature extreme for one (1) hour minimum. Connectors to be cycled for 30 complete cycles.

Requirements:

Inspect samples per Visual Inspection (para 6.1).

Results:

The samples were inspected and were found to have no cracks, warpage or damage detrimental to part function.



6.3.3 CURRENT TEST

Reference: SAE J2030-6.22

Test Method:

Apply maximum rated current (per Table 3) to all terminals. Ambient test temperature shall be $125\pm 3^{\circ}$ C for a 24 h period. Measure total circuit initial resistance.

Requirements:

Inspect total circuit resistance. Compare initial vs. Final resistance readings. Difference not to exceed $60\text{mV} \times \text{circuits}$.
Inspect samples per Visual Inspection (para 6.1).

Results:

All samples passed the current test.

6.3.4 FINAL EXAMINATION OF PRODUCTS

Reference: SAE J2030-6.1 (DITS 7-303-01-7.1)

Test Method:

1. The connectors were visually inspected for correct use of materials, proper construction, correct part number and insert markings and over-all quality of workmanship.
2. Poor molding fabrication, loose materials, damaged or improperly manufactured contacts, galling of metal parts, nicks and burrs of metal parts, torn seals or cracked plastic are considered adequate basis for rejection.

Requirements:

The connectors shall be correctly constructed, marked and shall show good quality and workmanship. Connector after conditioning shall not show signs of damage or any detectable loss of function.

Results:

The connectors were thoroughly inspected and showed no evidence of cracking, distortion or any defects detrimental to part function.



6.4 GROUP D (ENVIRONMENTAL/FLUIDS)

6.4.1 EXAMINATION OF PRODUCTS – GROUP D (ENV./FLUIDS)

Reference: SAE J2030-6.1 (DITS 7-303-01-7.1)

Test Method:

1. The connectors were visually inspected for correct use of materials, proper construction, correct part number and insert markings and over-all quality of workmanship.
2. Poor molding fabrication, loose materials, damaged or improperly manufactured contacts, galling of metal parts, nicks and burrs of metal parts, torn seals or cracked plastic are considered adequate basis for rejection.

Requirements:

The connectors shall be correctly constructed, marked and shall show good quality and workmanship. Connector after conditioning shall not show signs of damage or any detectable loss of function

Results: All connectors passed the visual inspection portion of the test.

6.4.2 THERMAL CYCLE

Reference: TES-124-5.30 (DITS 7-303-7.11)

Test Method:

The wired and mated connectors shall be thermal cycled from $-55\pm 3^{\circ}\text{C}$ to $125\pm 3^{\circ}\text{C}$ at a rate of 3° per minute. Connectors to remain at each temperature extreme for one (1) hour minimum. Connectors to be cycled for 30 complete cycles.

Requirements:

Inspect samples per Visual Inspection (para 6.1).

Results:

The samples were inspected and were found to have no cracks, warpage or damage detrimental to part function.



6.4.3 FLUID IMMERSION

Reference: SAE J2030-6.14

Test Method:

Subject each wired and mated connector to one fluid only for the fluid and listed temperatures shown in table 4. Submerge sample for 5 min, then remove and allow to air dry for 24h. This completes one cycle. Each connector is to be subjected to a total of five cycles.

Table 4— FLUIDS

Fluid	Concentration	Temperature	Classification
Motor oil 30 wt	100%	85°C	ASTM D471, IRM-902
Brake fluid (disc type 1)	100%	85°C	SAE RM66-04
Diesel fuel #2	90/10%	60°C	IRM-903/T-Xylene
50/50 antifreeze mixture	50/50	85°C	ASTM Service Fluid 104
Gear oil 90 wt	100%	85°C	ASTM STP 512, API GL-5

Requirements:

Inspect samples per Visual Inspection (para 6.1).

Results: All samples passed the fluid immersion portion of the test.

6.4.4 FINAL EXAMINATION OF PRODUCTS

Reference: SAE J2030-6.1 (DITS 7-303-01-7.1)

Test Method:

1. The connectors were visually inspected for correct use of materials, proper construction, correct part number and insert markings and over-all quality of workmanship.
2. Poor molding fabrication, loose materials, damaged or improperly manufactured contacts, galling of metal parts, nicks and burrs of metal parts, torn seals or cracked plastic are considered adequate basis for rejection.

Requirements:

The connectors shall be correctly constructed, marked and shall show good quality and workmanship. Connector after conditioning shall not show signs of damage or any detectable loss of function.



Results:

The connectors were thoroughly inspected and showed no evidence of cracking, distortion or any defects detrimental to part function.



6.5 GROUP E (ELECTRICAL/VIBRATION)

6.5.1 EXAMINATION OF PRODUCTS

Reference: SAE J2030-6.1 (DITS 7-303-01-7.1)

Test Method:

1. The connectors were visually inspected for correct use of materials, proper construction, correct part number and insert markings and over-all quality of workmanship.
2. Poor molding fabrication, loose materials, damaged or improperly manufactured contacts, galling of metal parts, nicks and burrs of metal parts, torn seals or cracked plastic are considered adequate basis for rejection.

Requirements:

The connectors shall be correctly constructed, marked and shall show good quality and workmanship. Connector after conditioning shall not show signs of damage or any detectable loss of function.

Results:

The connectors were thoroughly inspected and showed no evidence of cracking, distortion or any defects detrimental to part function.

6.5.2 TEMPERATURE LIFE

Reference: SAE J2030-6.7 (DITS 7-303-01-7.5)

Test Method:

The wired and mated connectors shall be subject to 1000 h at 125°C ±3°C without the current flowing.

Requirements:

Inspect samples per Visual Inspection (para 6.1).

Results:

The samples in this test group showed no damage detrimental to part function.



6.5.3 THERMAL SHOCK

Reference: SAE J2030-6.13

Test Method:

The cabled mated connector shall be subjected to 10 cycles of thermal shock with no evidence of cracking, chipping or other damage detrimental to part function. One cycle shall consist of a soak time at $-55\text{ }^{\circ}\text{C}$ for a period of 1 hour, then a transition of no longer than 2 minutes, to a temperature of $125\text{ }^{\circ}\text{C}$ for a period of 1 hour, then a transition back to $-55\text{ }^{\circ}\text{C}$ for a period of 1 hour.

Requirements:

Inspect samples per Visual Inspection (para. 6.1).

Results:

The samples in this test group showed no damage detrimental to part function.

6.5.4 VIBRATION

Reference: TES-124 para. 5.31

Test Method:

Connectors to be tested to the following conditions:

Maximum acceleration	17g
Test duration	20h/ axis 60h total
Jackscrew Torque	25-28 in-lb

Connectors under test are to be fixed to the vibrating plane with the wire harness fixed to non-vibrating objects no closer than 100mm and no farther away than 300 mm from the back of the connector.

Requirements:

Monitor each circuit for discontinuity greater than 10Ω in excess of $1\ \mu\text{s}$ at 100mA during the last hour of vibration in each axis.

Results:

The samples in this test group passed all aspects of the vibration test.



6.5.6 FINAL EXAMINATION OF PRODUCTS

Reference: SAE J2030-6.1 (DITS 7-303-01-7.1)

Test Method:

1. The connectors were visually inspected for correct use of materials, proper construction, correct part number and insert markings and over-all quality of workmanship.
2. Poor molding fabrication, loose materials, damaged or improperly manufactured contacts, galling of metal parts, nicks and burrs of metal parts, torn seals or cracked plastic are considered adequate basis for rejection.

Requirements:

The connectors shall be correctly constructed, marked and shall show good quality and workmanship. Connector after conditioning shall not show signs of damage or any detectable loss of function.

Results:

All parts in this group passed every aspect of the test.



6.6 GROUP F (ELECTRICAL/VIBRATION)

6.6.1 EXAMINATION OF PRODUCTS

Reference: SAE J2030-6.1 (DITS 7-303-01-7.1)

Test Method:

1. The connectors were visually inspected for correct use of materials, proper construction, correct part number and insert markings and over-all quality of workmanship.
2. Poor molding fabrication, loose materials, damaged or improperly manufactured contacts, galling of metal parts, nicks and burrs of metal parts, torn seals or cracked plastic are considered adequate basis for rejection.

Requirements:

The connectors shall be correctly constructed, marked and shall show good quality and workmanship. Connector after conditioning shall not show signs of damage or any detectable loss of function.

Results:

The connectors were thoroughly inspected and showed no evidence of cracking, distortion or any defects detrimental to part function.

6.6.2 THERMAL CYCLE

Reference: TES-124-5.30 (DITS 7-303-7.11)

Test Method:

The wired and mated connectors shall be thermal cycled from $-55\pm 3^{\circ}\text{C}$ to $125\pm 3^{\circ}\text{C}$ at a rate of 3° per minute. Connectors to remain at each temperature extreme for one (1) hour minimum. Connectors to be cycled for 30 complete cycles.

Requirements:

Inspect samples per Visual Inspection (para 6.1).

Results:

The samples were inspected and were found to have no cracks, warpage or damage detrimental to part function.



6.6.3 THERMAL SHOCK

Reference: SAE J2030-6.13

Test Method:

The cabled mated connector shall be subjected to 10 cycles of thermal shock with no evidence of cracking, chipping or other damage detrimental to part function. One cycle shall consist of a soak time at $-55\text{ }^{\circ}\text{C}$ for a period of 1 hour, then a transition of no longer than 2 minutes, to a temperature of $125\text{ }^{\circ}\text{C}$ for a period of 1 hour, then a transition back to $-55\text{ }^{\circ}\text{C}$ for a period of 1 hour.

Requirements:

Inspect samples per Visual Inspection (para. 6.1).

Results: All samples passed the thermal shock portion of the test.

6.6.4 VIBRATION

Reference: TES-124 para. 5.31

Test Method:

Connectors to be tested to the following conditions:

Maximum acceleration	17g
Test duration	20h/ axis 60h total
Jackscrew Torque	25-28 in-lb

Connectors under test are to be fixed to the vibrating plane with the wire harness fixed to non-vibrating objects no closer than 100mm and no farther away than 300 mm from the back of the connector.

Requirements:

Monitor each circuit for discontinuity greater than 10Ω in excess of $1\ \mu\text{s}$ at 100mA during the 20 hours in each axis.

Results:

All samples passed the test with no damage detrimental to part function. Discontinuities were not detected during the course of the test.



6.6.5 FINAL EXAMINATION OF PRODUCTS

Reference: SAE J2030-6.1 (DITS 7-303-01-7.1)

Test Method:

1. The connectors were visually inspected for correct use of materials, proper construction, correct part number and insert markings and over-all quality of workmanship.
2. Poor molding fabrication, loose materials, damaged or improperly manufactured contacts, galling of metal parts, nicks and burrs of metal parts, torn seals or cracked plastic are considered adequate basis for rejection.

Requirements:

The connectors shall be correctly constructed, marked and shall show good quality and workmanship. Connector after conditioning shall not show signs of damage or any detectable loss of function.

Results:

The connectors were thoroughly inspected and showed no evidence of cracking, distortion or any defects detrimental to part function.



7.0 CONCLUSION

Group A:

Group A contained six samples that were tested under extreme environmental and mechanical conditions. These parts were tested per EatonTES-124, SAE J2030 and Deutsch DITS 7-303-01. The following is the sequence and test that was followed for this group.

Examination of Product	6.1.1
Water Immersion	6.1.2
Insulation Resistance	6.1.3
Thermal Cycle	6.1.4
Water Immersion	6.1.5
Insulation Resistance	6.1.6
Temperature Life	6.1.7
Water Immersion	6.1.8
Insulation Resistance	6.1.9
Pressure Wash	6.1.10
Insulation Resistance	6.1.11
Durability	6.1.12
Maintenance Aging	6.1.13
Mismatching	6.1.14
Connector Retention	6.1.15
Terminal Retention	6.1.16
Final Examination	6.1.17

The six samples in Group A passed all aspects of the test described above with no damage detrimental to part form, fit or function.

Group B:

Group B contained two samples that were tested under extreme environmental and electrical testing. These parts were tested per EatonTES-124, SAE J2030 and Deutsch DITS 7-303-01. The following is the sequence and test that was followed for this group.

Examination of Product		6.2.1
Low Voltage Resistance	(Initial)	6.2.2
Connection Resistance	(Initial)	6.2.3
Thermal Cycle		6.2.4
Temperature Life		6.2.5
Low Voltage Resistance	(After Conditioning)	6.2.6
Connection Resistance	(After Conditioning)	6.2.7
Final Examination		6.2.8

The two samples in Group B passed all aspects of the test described above with no damage detrimental to part form, fit or function.



Group C

Group C contained two samples that were tested under extreme environmental and electrical testing. These parts were tested per EatonTES-124, SAE J2030 and Deutsch DITS 7-303-01. The following is the sequence and test that was followed for this group.

Examination of Product	6.3.1
Thermal Cycle	6.3.2
Current Test	6.3.3
Final Examination	6.3.4

The two samples in Group C passed all aspects of the test described above with no damage detrimental to part form, fit or function.

GROUP D

Group D contained five samples that were tested under extreme environmental conditions. These parts were tested per EatonTES-124, SAE J2030 and Deutsch DITS 7-303-01. The following is the sequence and test that was followed for this group.

Examination of Product	6.4.1
Thermal Cycle	6.4.2
Fluid Immersion	6.4.3
Final Examination	6.4.4

The five samples in Group D passed all aspects of the test described above with no damage detrimental to part form, fit or function.

GROUP E

Group E contained three samples that were tested under extreme environmental and vibration conditions. These parts were tested per EatonTES-124, SAE J2030 and Deutsch DITS 7-303-01. The following is the sequence and test that was followed for this group.

Examination of Product	6.5.1
Temperature Life	6.5.2
Thermal Shock	6.5.3
Vibration	6.5.4
Final Examination	6.5.5

The three samples in Group E passed all aspects of the test described above with no damage detrimental to part form, fit or function.



GROUP F

Group E contained three samples that were tested under extreme environmental and vibration conditions. These parts were tested per Eaton TES-124, SAE J2030 and Deutsch DITS 7-303-01. The following is the sequence and test that was followed for this group.

Examination of Product	6.6.1
Thermal Cycle	6.6.2
Thermal Shock	6.6.3
Vibration	6.6.4
Final Examination	6.6.5

The three samples in Group F passed all aspects of the test described above with no damage detrimental to part form, fit or function.

