

DT Series Connector System

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for the TE Connectivity (TE) DT Series Connector System.

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 2 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

1.3. Qualification Test Results

Successful qualification testing on the subject product line was completed in 1987. The Qualification Test Report number for this testing is 501-151032. This documentation is on file at and available from Engineering Practices and Standards (EPS).

2. APPLICABLE DOCUMENTS AND FORMS

The following documents and forms constitute a part of this specification to the extent specified herein. Unless otherwise indicated, the latest edition of the document applies.

2.1. TE Connectivity (TE) Documents

- [0425-017-0000](#): DT Series Performance and Application Characteristics
- [109-1](#): General Requirements for Testing
- [114-151000](#): Application Specification for DEUTSCH Size 16 S&F Pin & Socket
- [408-151008](#): Instruction Guide DEUTSCH Removal Tool DT-RT1
- [501-151032](#): DT Qualification Test Report
- Product Drawings

X refers to A,B,C,D keys. XXXX refers to product modification.

| | |
|----------------|------------------|
| DT04-2P-XXXX | 2pin Receptacle |
| DT04-3P-XXXX | 3pin Receptacle |
| DT04-4P-XXXX | 4pin Receptacle |
| DT04-6P-XXXX | 6pin Receptacle |
| DT04-08PX-XXXX | 8pin Receptacle |
| DT04-12PX-XXXX | 12pin Receptacle |

| | |
|----------------|------------------------------|
| DT13-2P-XXXX | 2pin Receptacle, 90° Header |
| DT13-4P-XXXX | 4pin Receptacle, 90° Header |
| DT13-6P-XXXX | 6pin Receptacle, 90° Header |
| DT13-08PX-XXXX | 8pin Receptacle, 90° Header |
| DT13-12PX-XXXX | 12pin Receptacle, 90° Header |

| | |
|----------------|------------|
| DT06-2S-XXXX | 2pin Plug |
| DT06-3S-XXXX | 3pin Plug |
| DT06-4S-XXXX | 4pin Plug |
| DT06-6S-XXXX | 6pin Plug |
| DT06-08SX-XXXX | 8pin Plug |
| DT06-12SX-XXXX | 12pin Plug |

| | |
|----------------|-------------------------------|
| DT15-2P-XXXX | 2pin Receptacle, 180° Header |
| DT15-3P-XXXX | 3pin Receptacle, 180° Header |
| DT15-4P-XXXX | 4pin Receptacle, 180° Header |
| DT15-6P-XXXX | 6pin Receptacle, 180° Header |
| DT15-08PX-XXXX | 8pin Receptacle, 180° Header |
| DT15-12PX-XXXX | 12pin Receptacle, 180° Header |

| | |
|----------------|------------|
| DT16-6SX-XXXX | 6pin Plug |
| DT16-15SX-XXXX | 15pin Plug |
| DT16-18SX-XXXX | 18pin Plug |

Wedge Lock PN's sold separately but are required for DT functionality

| | | | | |
|-----------|-----------------------|--|-----------|-----------------------|
| W2P-XXXX | 2pin Rcpt Wedge Lock | | W2SX-XXXX | 2pin Plug Wedge Lock |
| W3P-XXXX | 3pin Rcpt Wedge Lock | | W3S-XXXX | 3pin Plug Wedge Lock |
| W4P-XXXX | 4pin Rcpt Wedge Lock | | W4SX-XXXX | 4pin Plug Wedge Lock |
| W6P-XXXX | 6pin Rcpt Wedge Lock | | W6S-XXXX | 6pin Plug Wedge Lock |
| W8P-XXXX | 8pin Rcpt Wedge Lock | | W8S-XXXX | 8pin Plug Wedge Lock |
| W12P-XXXX | 12pin Rcpt Wedge Lock | | W12S-XXXX | 12pin Plug Wedge Lock |

2.2. Industry Documents

- DIN 40050-9: Road vehicles Degrees of Protection (I P Code)
- DIN 72551-6: Road Vehicles—Low-Tension Cables—Part 6: Single-Core, Unscreened with Thin Insulation Wall; Dimensions, Materials, Marking
- EIA-364: Electrical Connector/Socket Test Procedures Including Environmental Classifications
- IEC-60512: Electronic Equipment - Tests and Measurements
- IEC-60529: Degrees of Protection Provided by Enclosures (IP Code)
- ISO 6722: Road Vehicles—60 V and 600 V Single-Core Cables—Dimensions, Test Methods, and Requirements
- SAE J1128: Low Voltage Primary Cable

3. REQUIREMENTS

3.1. Design and Construction

Product shall be of the design, construction, materials and physical dimensions specified on the applicable product drawing.

3.2. Ratings

- Voltage: 250 VDC
- Current (Amp): See Figure 1

| Connector Loading | Wire Size AWG [mm ²] | | | |
|------------------------|-------------------------------------|-------------|-------------|-------------|
| | 14 [2.0] | 16 [1.0] | 18 [.80] | 20 [.50] |
| All Circuits Energized | 13.0 | 13.0 | 10.0 | 7.5 |

Figure 1

- Temperature: -55°C to +125°C
- Ingress Protection (IP) Level: IP68 and IP6K9K (with rear protection, such as backshell)
- Flammability: UL Recognized. Parts have been successfully tested to the 20 mm Flame Test per Standard UL-94

3.3. Test Requirements and Procedures Summary

Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

See Appendix A for additional test requirements

See Appendix B for Procedure Comparison Chart with ISO standards

| Test Description | Requirement | Procedure |
|---------------------------------|--|---|
| Examination of Product | The connectors shall be correctly constructed, marked and shall show good quality and workmanship | EIA-364-18. Visually inspected for use of materials, proper construction, correct part number and insert markings and over-all quality of workmanship. 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 were considered adequate basis for rejection. |
| ELECTRICAL | | |
| Insulation Resistance | 1000 MΩ minimum at 25°C | MIL-STD-1344, Method 3003.1 Using a 500 VDC megohmmeter check each contact to all other contacts and the shell electrically connected together. |
| Dielectric Withstanding Voltage | No evidence of breakdown or flashover or current leakage in excess of 2.0 milliamperes. | MIL-STD-1344, Method 3001.1 Check each contact to all other contacts and the shell electrically connected together for breakdown / flashover when subjected to a 1500 VAC test potential for a period of 1 minute. |
| Contact Resistance | Maximum voltage drop across a 6 inch wire/contact assembly shall be 89mV max for 16AWG. | MIL-STD-1344, Method 3004.1 15A for 16AWG. |
| MECHANICAL | | |
| Maintenance Aging | There shall be no visible change or damage to the contact cavities. | MIL-STD-1344, Method 2002.1 Subject 10% of the cavities to 10 cycles of inserting and removing its respective contact. Insert by hand, remove using removal tool. |
| Contact Retention | The contact shall remain in place | MIL-STD-1344, Method 2007.1 Subject each wired contact to an applied load of 25 lbf for a period of 15 seconds in a direction tending to push the contact out of the rear of the connector. |
| Durability | No evidence of damage to the contacts, contact plating, connector housing or seals which may be detrimental to reliable connector performance. | MIL-STD-1344, Method 2016 The connector shall be mated and unmated for a total of 100 complete cycles at room temperature. |
| Vibration | No discontinuity in excess of 1.0 μs at 100 mA during the last hour of each axis. Shall meet visual requirements, show no physical damage and meet requirements of additional tests as needed. | MIL-STD-1344, Method 2005.1 Sine Sweep: 10 to 2000 Hz Sweep Cycle: 20 minutes Initial Displacement: .07 inch DA Maximum Acceleration: 20g Test Duration: 12 hours Time Per Axis X, Y, Z: 4 hours Test Current first 3 hours each axis: 16 AWG: 13A |

Figure 2 Cont.

| Test Description | Requirement | Procedure |
|------------------|---|---|
| Shock | No discontinuity in excess of 1.0 μ s at 100 mA during the last hour of each axis. Shall meet visual requirements, show no physical damage and meet requirements of additional tests as needed. | MIL-STD-1344, Method 2004.1 10 cycles of ½ sine pluses, 50g \pm 15%, 11 \pm 1 ms duration X and Z axis are to be tested. |
| ENVIRONMENTAL | | |
| Temperature Life | There shall be no evidence of cracking, distortion or detrimental damage to the connector following the test. Meet 500 M Ω minimum | MIL-STD-1344, Method 1005.1 The wired mated connectors shall be subjected to 100 hours at 125°C. Insulation resistance shall be measured immediately after removing sample from the oven. |
| Salt Spray | There should be no evidence of corrosion on the connector or terminals after the connector is removed from the test and cleaned with tap water. | MIL-STD-1344, Method 1001.1 Connector shall be fully mated, then submerged in a fine mist of 5% by weight of salt solution for 96 hour. |
| Fluid Immersion | There shall be no evidence of cracking, distortion or detrimental damage to the connector following the test. | MIL-STD-1344, Method 1016 Subject each connector to one fluid only. The wired mated connectors shall be submerged in the fluids below at ambient temperature. Each connector shall be submerged for 5 minutes, then removed from the fluid to air dry for 24 hours. This cycle is to be completed a total of 5 cycles. <ul style="list-style-type: none"> - Motor Oil 30 weight - Brake Fluid (disc type 1) - Gasoline - Diesel Fuel #2 - Antifreeze Solution (Max Protection) - Transmission Oil 90 weight |
| Thermal Shock | There shall be no evidence of cracking, distortion or detrimental damage to the connector following the test. Meet 500 M Ω minimum | MIL-STD-1344, Method 1003.1 Cycle mated connectors for 30 minutes at –55°C followed by 30 minutes at +125°C with 2 minute max transfer time. Repeat for 5 cycles. Insulation resistance measured during last heat cycle. |
| Moisture | Connectors shall show no sign of moisture inside the cavities or connector interior. | The wired mated connectors shall be immersed in 3 feet of water for 24 hours. |

Figure 2 end

3.4. Product Qualification and Requalification Test Sequence

| Test | Test Group (a) | | | | | |
|---------------------------------|-------------------|----|----|----|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| | Test Sequence (b) | | | | | |
| Examination of Product | 1 | 1 | 1 | 1 | 1 | 1 |
| Insulation Resistance | 2 | 2 | 2 | 2 | 2 | 2 |
| Dielectric Withstanding Voltage | 3 | 3 | 3 | 3 | 3 | 3 |
| Maintenance Aging | 4 | | 4 | | | |
| Temperature Life | | 4 | | 4 | | 4 |
| Contact Retention | 5 | | 5 | | | |
| Durability | | 5 | 6 | | 4 | |
| Salt Spray | | 6 | 7 | | | 5 |
| Moisture | 6 | | | 5 | 5 | |
| Fluid Immersion | 7 | 7 | 8 | 6 | 6 | 6 |
| Thermal Shock | 8 | 8 | | | | 7 |
| Vibration | 9 | | 9 | 7 | | |
| Shock | 10 | | 10 | 8 | | |
| Contact Resistance | 11 | 9 | 11 | 9 | 7 | 8 |
| Final Examination | 12 | 10 | 12 | 10 | 8 | 9 |



NOTE

- a) *Specimens shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production. Specimens shall consist of 3 position connectors with DEUTSCH Solid Terminal System size 16 nickel plated pin and socket contacts 16 AWG GXL wire.*
- b) *Numbers indicate sequence in which tests are performed.*

3.5. Appendix A Additional test requirements

| Test Description | Requirement | Procedure | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------|--|---|----------------------|-------------------------------|---------------------|-----------|---------------------------|-----------|----------|---|----------------|-----------|--------------------------------|-----------|----------------------------|-----------|-----|----------|----|----|-----|----------|-----|----|-----|---|
| ELECTRICAL | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Low Level Contact Resistance | <table border="1"> <thead> <tr> <th>Wire Size AWG [mm2]</th> <th>Resistance mΩ max</th> </tr> </thead> <tbody> <tr> <td>16 [1.0]</td> <td>6.0</td> </tr> <tr> <td>18 [.80]</td> <td>7.5</td> </tr> <tr> <td>20 [.50]</td> <td>11.0</td> </tr> </tbody> </table> | Wire Size AWG [mm2] | Resistance mΩ max | 16 [1.0] | 6.0 | 18 [.80] | 7.5 | 20 [.50] | 11.0 | EIA-364-23 Test with applied voltage not to exceed 20 mV open circuit and the test current shall be limited to 100 mA. The resistance of an equal length of wire (reference wire) shall be subtracted from the same reel as used for the connector wiring. | | | | | | | | | | | | | | | | |
| Wire Size AWG [mm2] | Resistance mΩ max | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 [1.0] | 6.0 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 [.80] | 7.5 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 [.50] | 11.0 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Contact Resistance | <table border="1"> <thead> <tr> <th>Wire Size AWG [mm2]</th> <th>Test Current (A)</th> <th colspan="2">Voltage Drop (mV max)</th> </tr> <tr> <th></th> <th></th> <th>Solid</th> <th>S&F</th> </tr> </thead> <tbody> <tr> <td>14 [2.0]</td> <td>13</td> <td>60</td> <td>100</td> </tr> <tr> <td>16 [1.0]</td> <td>13</td> <td>60</td> <td>100</td> </tr> <tr> <td>18 [.80]</td> <td>10</td> <td>60</td> <td>100</td> </tr> <tr> <td>20 [.50]</td> <td>7.5</td> <td>60</td> <td>100</td> </tr> </tbody> </table> | Wire Size AWG [mm2] | Test Current (A) | Voltage Drop (mV max) | | | | Solid | S&F | 14 [2.0] | 13 | 60 | 100 | 16 [1.0] | 13 | 60 | 100 | 18 [.80] | 10 | 60 | 100 | 20 [.50] | 7.5 | 60 | 100 | EIA-364-6 Using test currents as defined. The resistance of an equal length 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 reel as used for the connector wiring. |
| Wire Size AWG [mm2] | Test Current (A) | Voltage Drop (mV max) | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Solid | S&F | | | | | | | | | | | | | | | | | | | | | | | |
| 14 [2.0] | 13 | 60 | 100 | | | | | | | | | | | | | | | | | | | | | | | |
| 16 [1.0] | 13 | 60 | 100 | | | | | | | | | | | | | | | | | | | | | | | |
| 18 [.80] | 10 | 60 | 100 | | | | | | | | | | | | | | | | | | | | | | | |
| 20 [.50] | 7.5 | 60 | 100 | | | | | | | | | | | | | | | | | | | | | | | |
| MECHANICAL | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Vibration | There shall be no discontinuity in excess of one (1) μs at 20mV and 100 mA during the last hour of each axis. Shall meet visual requirements, show no physical damage and meet requirements of additional tests as needed. | Sine Sweep: 10 to 2000 Hz Initial Displacement: 1.78 mm DA Maximum Acceleration: 20 G's Test Duration: 12 hours Time Per Axis X, Y, Z Test Current first 3 hours each axis: 14-16 AWG[2.0-1.0]: 10A 18 AWG [.80]: 8A 20 AWG [.50]: 5A | | | | | | | | | | | | | | | | | | | | | | | | |
| Impact | There shall be no evidence of cracking, distortion or detrimental damage to the connector following the test. Small chips and dents that do not adversely affect the connector shall be disregarded. | Wired mated connector shall be dropped from a height of 1.2m on a cement floor. This action is to be completed a total of five (5) times. | | | | | | | | | | | | | | | | | | | | | | | | |
| Connector Retention | There shall be no evidence of cracking, distortion or detrimental damage to the connector following the test | Apply a pulling force to the wire bundles that exit the rear of the connector for a period of one (1) minute. The amount of load is to be 111N, times the number of cavities, up to a maximum of 445N. | | | | | | | | | | | | | | | | | | | | | | | | |
| ENVIRONMENTAL | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Temperature Life | There shall be no evidence of cracking, distortion or detrimental damage to the connector following the test. | The wired mated connectors shall be subjected to 1000 hours at +125 ±3°C without current flowing as per MIL-STD-202, Method 108, Test Condition D. | | | | | | | | | | | | | | | | | | | | | | | | |
| Fluid Immersion | There shall be no evidence of cracking, distortion or detrimental damage to the connector following the test. | Subject each sample group to one fluid only. The wired mated connectors shall be submerged in the fluids below at the temperatures listed. Each connector shall be submerged for five (5) minutes, then removed from the fluid to air dry for 24 hours. This cycle is to be completed a total of five (5) cycles. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Fluid</th> <th>Temperature ± 3 °C (±5 °F)</th> </tr> </thead> <tbody> <tr> <td>Motor Oil 30 weight</td> <td>+60 [140]</td> </tr> <tr> <td>Brake Fluid (disc type 1)</td> <td>+60 [140]</td> </tr> <tr> <td>Gasoline</td> <td>+25 [77]</td> </tr> <tr> <td>Diesel Fuel #2</td> <td>+60 [140]</td> </tr> <tr> <td>50/50 Antifreeze/Water mixture</td> <td>+60 [140]</td> </tr> <tr> <td>Transmission Oil 90 weight</td> <td>+60 [140]</td> </tr> </tbody> </table> | Fluid | Temperature ± 3 °C (±5 °F) | Motor Oil 30 weight | +60 [140] | Brake Fluid (disc type 1) | +60 [140] | Gasoline | +25 [77] | Diesel Fuel #2 | +60 [140] | 50/50 Antifreeze/Water mixture | +60 [140] | Transmission Oil 90 weight | +60 [140] | | | | | | | | | | |
| Fluid | Temperature ± 3 °C (±5 °F) | | | | | | | | | | | | | | | | | | | | | | | | | |
| Motor Oil 30 weight | +60 [140] | | | | | | | | | | | | | | | | | | | | | | | | | |
| Brake Fluid (disc type 1) | +60 [140] | | | | | | | | | | | | | | | | | | | | | | | | | |
| Gasoline | +25 [77] | | | | | | | | | | | | | | | | | | | | | | | | | |
| Diesel Fuel #2 | +60 [140] | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50/50 Antifreeze/Water mixture | +60 [140] | | | | | | | | | | | | | | | | | | | | | | | | | |
| Transmission Oil 90 weight | +60 [140] | | | | | | | | | | | | | | | | | | | | | | | | | |

Figure 3 Cont.

| Test Description | Requirement | Procedure |
|------------------|---|--|
| Thermal Cycle | There shall be no evidence of cracking, distortion or detrimental damage to the connector following the test. | Cycle mated connectors from $-55 \pm 3^{\circ}\text{C}$ to $+125 \pm 3^{\circ}\text{C}$ at a rate of $3^{\circ}\text{C} \pm 1^{\circ}\text{C}$ per minute. Connectors to remain at each temperature extreme for one (1) hour minimum. Mated connectors are to be cycled a total of 20 complete cycles. |
| Water Immersion | Test samples must meet insulation resistance. | The wired mated connectors shall be placed in an oven at $+125 \pm 3^{\circ}\text{C}$ for two (2) hours minimum then immediately be placed in water with a 5% salt by weight content and 0.1 g/L wetting solution to a depth of 914mm for four (4) hours minimum. The free ends of the mated connectors must remain out of the water to prevent wicking of the water through the open wires. Water temperature to be $+23 \pm 3^{\circ}\text{C}$. |

Figure 3 end

3.6. Appendix B Test Procedure Comparison Chart

| Test | MIL-STD-1344 Method | EIA-364 Dash No. | Similar to SAE J2030 Paragraph | Similar to ISO 8092-2 Paragraph |
|---------------------------------|---------------------|------------------|--------------------------------|---------------------------------|
| Examination of product | - | 18 | 6.1 | 4.2 |
| Insulation Resistance | 3003.1 | 21 | 6.3 | 4.12 |
| Dielectric Withstanding Voltage | 3001.1 | 20 | - | 4.13 |
| Low Level Contact Resistance | 3002.1 | 23 | 6.2 | 4.8 |
| Contact Resistance | 3004.1 | 06 | 6.4 | 4.8 |
| Maintenance Aging | 2002.1 | 24 | 6.6 | - |
| Contact Retention | 2007.1 | 29 | 6.18 | 4.7 |
| Durability | 2016 | 09 | 6.11 | 4.3 |
| Vibration | 2005.1 | 28 | 6.15 | - |
| Shock | 2004.1 | 27 | 6.16 | - |
| Impact | - | 42 | 6.17 | 4.20 |
| Connector Retention | - | - | 6.20 | - |
| Temperature Life | 1005.1 | 17 | 6.7 | 4.18 |
| Salt Spray | 1001.1 | 26 | 6.12 | 4.16 |
| Fluid Immersion | 1016 | 10 | 6.14 | 4.23 |
| Thermal Cycle | - | - | - | - |
| Thermal Shock | 1003.1 | 32 | 6.13 | 4.22 |
| Moisture | - | - | - | - |
| Water Immersion | - | - | 6.19 | 4.9 |