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

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

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

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

| Indicates Change

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 milliampers.	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 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 2004.1 10 cycles of ½ sine pluses, 50g±15%, 11±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 MΩ 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. - 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 MΩ 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	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.
Contact Resistance	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.
	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. 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 ± 3°C to +125 ±3°C at a rate of 3°C ± 1°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 ±3°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 ±3°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