

DTV Series Connector System

1. SCOPE

1.1. Content

This specification defines performance, tests and quality requirements for the DTV Series Connector System.

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 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 2005. The Qualification Test Report number for testing is 501-151040. 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 Documents

- **0425-015-0000:** General Performance and Application Characteristics for Solid and S&F Contacts
- **0425-205-0000:** Solid Contact Crimp Specifications
- **114-151000:** Application Specification for DEUTSCH Size 16 S&F Pin & Socket
- **408-151008:** Instruction Guide DEUTSCH Removal Tool DT-RT1
- **501-151040:** DTV Qualification Test Report

2.2. Industry Documents

- **DIN 72551-6:** Road Vehicles—Low-Tension Cables—Part 6: Single-Core, Unscreened with Thin Insulation Wall; Dimensions, Materials, Marking
- **MIL-STD-1344:** Test Methods for Electrical Connectors
- **EIA-364:** Electrical Connector/Socket Test Procedures Including Environmental Classifications
- **ISO 6722:** Road Vehicles—60 V and 600 V Single-Core Cables—Dimensions, Test Methods, and Requirements
- **SAE J1128:** Low Voltage Primary Cable

2.3. Reference Document

Product Drawings

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

DTV02-18PX-XXXX	18pin Receptacle, Flanged
DTV06-18SX-XXXX	18pin Plug

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

WV-18P-XXXX	18pin Rcpt Wedge Lock
WV-18S-XXXX	18pin Plug Wedge Lock

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 (A): See Figure 1
- Temperature: -55°C to +125°C

Connector Loading	Wire Size AWG [mm ²]			
	14 [2.00]	16 [1.00]	18 [0.80]	20 [0.50]
All Circuits Energized	13.0	13.0	10.0	7.5

Figure 1

3.3. Test Requirements and Procedures Summary

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

Test Description	Requirement	Procedure
Visual Inspection	The connectors shall be correctly constructed, marked and shall show good quality and workmanship	Examine samples for detects or damages (i.e. torn seals, cracked plastic, missing parts, arcing, charring, identification, finish, interchangeability, workmanship, etc.)
ELECTRICAL		
Low Level Contact Resistance	Resistance less than 6 mΩ for 16AWG	MIL-STD-1344, Method 3002.1 Test with applied voltage not to exceed 20 mV open circuit and the test current shall be limited to 100 mA.
Contact Resistance	Voltage drop shall not exceed 100 mV when measured 30 seconds after the voltage is applied.	Measure the voltage drop using 10A test current. The voltage drop shall be 4.50±0.25 VDC open circuit. The voltage drop shall be measured 76.2mm (3 inches) from each end of the mated connector. Measurements can be taken further from the connector if the voltage drop in the extra wire length is subtracted.
Insulation Resistance	The minimum insulation resistance shall be 10 MΩ. The maximum leakage current shall be 100 μA.	Check insulation resistance at 1000 VDC between adjacent contacts.
MECHANICAL		
Crimp Tensile	The minimum tensile strength is 156 N (35 lbs.).	Each wired contact shall be placed in an appropriate test fixture of a tensile tester. An axial force shall be applied to the wire and contact at 25.4±6 mm/min.

Test Description	Requirement	Procedure																																		
Vibration	No discontinuities allowed during vibration testing. There shall be no evidence of contact wear which may be detrimental to reliable performance of the connector.	<p>The vibration profile consisted of two (2) parts. Monitor for discontinuities.</p> <table border="1" data-bbox="992 289 1474 905"> <thead> <tr> <th colspan="3">PROFILE 1</th> </tr> <tr> <th></th> <th>FREQ (Hz)</th> <th>ACCEL (g)</th> </tr> </thead> <tbody> <tr> <td rowspan="5">15.3 GRMS for 20 hours</td> <td>24</td> <td>0.04</td> </tr> <tr> <td>60</td> <td>0.50</td> </tr> <tr> <td>100</td> <td>0.50</td> </tr> <tr> <td>240</td> <td>0.10</td> </tr> <tr> <td>2000</td> <td>0.10</td> </tr> <tr> <th colspan="3">PROFILE 2</th> </tr> <tr> <th></th> <th>FREQ (Hz)</th> <th>ACCEL (g)</th> </tr> <tr> <td rowspan="5">7.7 GRMS for 100 hours</td> <td>24</td> <td>0.010</td> </tr> <tr> <td>60</td> <td>0.125</td> </tr> <tr> <td>100</td> <td>0.125</td> </tr> <tr> <td>240</td> <td>0.025</td> </tr> <tr> <td>2000</td> <td>0.025</td> </tr> </tbody> </table>	PROFILE 1				FREQ (Hz)	ACCEL (g)	15.3 GRMS for 20 hours	24	0.04	60	0.50	100	0.50	240	0.10	2000	0.10	PROFILE 2				FREQ (Hz)	ACCEL (g)	7.7 GRMS for 100 hours	24	0.010	60	0.125	100	0.125	240	0.025	2000	0.025
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Contact Retention	Contact displacement shall not exceed 0.8mm (0.031 inch).	Axially load the contact by gradually applying a force of 111 N (25 lbs.).																																		
Maintenance Aging	There shall be no visible change or damage to the contact cavities.	Remove and then reinsert 20% of the connector contacts eight (8) times. The terminal position assurance device must also be removed. Repeat two (2) times at 0°±3°C. Remove and replace contacts using the approved tool(s).																																		
Durability and Mating/Unmating Force	There shall be no evidence of contact wear which may be detrimental to reliable performance of the connector	Assembled connectors shall be subjected to 50 cycles of mating and unmating. No mismatching, moving back or bending of contacts is allowed. Also, during this test the mating and unmating forces are to be measured and recorded.																																		
5 psi Sealing	Observe the water vessel for 5 minutes. No bubbles allowed.	The mated connector test samples shall be placed inside a sealed pressure chamber with a vent tube attached and the other end exiting the chamber and immersed in 21°C±5°C water. Apply a 35±5 kPa dry compressed air source to the pressure chamber. Allow the pressure to stabilize for one (1) minute before observing any bubbles.																																		
Audible Confirmation	Record and compare to DT control samples	Position unmated plug and receptacle within 12.0±1.0 inches from the dB meter microphone. Push the connector together until there is an audible snap.																																		

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Terminal Retention Assurance	Measure and record force. The applied force should not exceed 30 lbs.	Using a plug or receptacle loaded with contacts, use a force gage to measure the force required to fully seat the wedge lock. Remove the wedge lock and back out one (1) contact so the retention finger associated with the contact is in the full open position. Use a force gage to measure the force required to fully seat the wedge lock with the contact finger backed out. Remove the wedge lock and inspect for broken retention fingers. Repeat step of backing out one (1) contact and measuring the force to seat the wedge lock six (6) times.										
ENVIRONMENTAL												
Temperature Life	There shall be evidence of cracking, distortion or detrimental damage.	The wired mated connectors shall be subject for 500 hours of 140±3°C without current flowing.										
Thermal Cycle	There shall be evidence of cracking, distortion or detrimental damage.	Cycle mated connectors from -40°C to +140°C at a rate of 5°C per minute. The minimum dwell times at the temperature extremes are a function of mass of the samples. Weight of specimen greater than 136g is 8 hours. Repeat for a total of 20 cycles. Samples may be held at the temperature extremes for extended time, such as overnight. On the last cycle, thoroughly soak the test samples to -50°C for 8 hours.										
Fluid Resistance	There shall be no evidence of cracking, distortion or detrimental damage to the connector following the test.	<p>Test samples to be tested in a temperature chamber with the fluid stabilized to the chamber temperature per table. The test shall begin with properly assembled and mated connectors. One connector per fluid. On day one, the connector shall be dipped in fluid for five (5) seconds. Remove and allow to drip-dry for one (1) hour per table. Repeat six (6) times and allow samples to drip-dry overnight at temperature per table. Fluid shall not be drained from recesses. Repeat the seven (7) immersions for four (4) more days.</p> <table border="1" data-bbox="987 1541 1507 1810"> <thead> <tr> <th data-bbox="987 1541 1269 1612">Fluid</th> <th data-bbox="1269 1541 1507 1612">Fluid & Chamber Temperature</th> </tr> </thead> <tbody> <tr> <td data-bbox="987 1612 1269 1650">Motor Oil (30 wt)</td> <td data-bbox="1269 1612 1507 1650">100°C</td> </tr> <tr> <td data-bbox="987 1650 1269 1711">50/50 Ethylene Glycol</td> <td data-bbox="1269 1650 1507 1711">100°C</td> </tr> <tr> <td data-bbox="987 1711 1269 1749">Diesel Fluid #2</td> <td data-bbox="1269 1711 1507 1749">60°C</td> </tr> <tr> <td data-bbox="987 1749 1269 1810">Brake Fluid (Disk Type 1)</td> <td data-bbox="1269 1749 1507 1810">25°C</td> </tr> </tbody> </table>	Fluid	Fluid & Chamber Temperature	Motor Oil (30 wt)	100°C	50/50 Ethylene Glycol	100°C	Diesel Fluid #2	60°C	Brake Fluid (Disk Type 1)	25°C
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Figure 2 end

3.4. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group (a)					
	1	2	3	4	5	6
	Test Sequence (b)					
Visual inspection	1,8	1,6	1,11	1,15	1,3	1,3
Insulation Resistance	3,7	2,5	2,7	2,6,9,12		
Contact Resistance			3,8	3,7,13		
Low Level Contact Resistance			5			
Contact Retention				4		
Thermal Cycle	5		4			
Maintenance Aging			9			
Durability and Mating/Unmating Force			10			
Vibration	4			10		
5 psi Sealing	2,6	3	6	8,11		
Temperature Life				5		
Fluid Resistance		4				
Crimp Tensile				14		
Terminal Retention Assurance					2	
Audible Confirmation						2



NOTE

- (a) Specimens were prepared in accordance production drawings and were selected at random from current production.
 - Group 1 through 4 specimens consisted of connectors with DEUTSCH S&F terminal system size 16 palladium/nickel/gold pin and socket contacts with sizes 16 AWG Raychem Spec 44 non-wicking wire (PN 44A9605-16) with insulation OD $\varnothing.093\text{-}\varnothing.101$.
 - Group 5 specimens consisted of connectors with DEUTSCH S&F terminal system size 16 palladium/nickel/gold pin and socket contacts with sizes 16 GXL.
 - Group 6 specimens consisted of connectors with DEUTSCH S&F terminal system size 16 palladium/nickel/gold pin and socket contacts with sizes 16 AWG Raychem Spec 44 non-wicking wire (PN 44A9605-16) with insulation OD $\varnothing.093\text{-}\varnothing.101$.
- (b) Numbers indicate sequence in which tests are performed.