DEUTSCH* HD10-9-96P-B025/BE09 Series Connector System

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for the TE Connectivity (TE) HD10-9-96P-B025 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 Successful qualification testing on the subject product line was completed in 2006. The Qualification Test Report number for this testing is 501-151071. These documents are on file at and available from Product Engineering, Industrial Commercial Transportation (ICT).

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

- 109-1 General Requirements for Testing
- 108-151016 HD10 Product Specification
- 408-151007 Instruction Guide DEUTSCH Extraction Tools
- 501-151071 HD10-9-96P-B025 Qualification Test Report
- 502-151016 HD10 Ingress Protection Engineering Test Report
- Product Drawings

  X refers to E-Seal (E)

HD10-9-96PX-B025	9pin Receptacle, Black
HD10-9-96PX-BE09	9pin Receptacle, Gray

2.2 Industry Documents

- DIN 72551-6: Road Vehicles—Low-Tension Cables—Part 6: Single-Core, Unscreened with Thin Insulation Wall; Dimensions, Materials, Marking
- ISO 6722: Road Vehicles—60 V and 600 V Single-Core Cables—Dimensions, Test Methods, and Requirements
- SAE J1128: Low Voltage Primary Cable
- SAE J2030: Heavy-Duty Electrical Connector Performance Standard

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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 VAC/VDC
- Current (Amp): See Figure 1

Contact Size	Wire Size AWG [mm²]	All Circuits Energized (A)
16	12 [2.5]	13
	14 [2.0]	
	16 [1.5-1.0]	
	18 [0.8-0.75]	10
	20 [0.5]	7.5

Figure 1

- Temperature: -55°C to +125°C
- Ingress Protection (IP): IP6K9K (with rear protection, such as backshell)
- Flammability: Not tested. Housing material is UL94 V-0

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	Free of defects that could affect the electrical or mechanical performance of the part or degrade the long term performance of the part.	Examine samples for defects or damage (i.e. torn seals, cracked plastic, missing parts, arching, charring, identification, finish, interchangeability, workmanship, etc.)
ENVIRONMENTAL		
Temperature Life	There shall be no evidence of cracking, distortion, or detrimental damage.	Mated connectors shall be exposed to a temperature of 120 ± 3 °C for 500 hours.
Thermal Cycle	There shall be no evidence of cracking, distortion or detrimental damage to the connector following the test.	The test samples shall be cycled between -40°C to 120°C temperature extremes. 1. Cool the test samples to the lower operating temperature limit. The minimum dwell times at the temperature extremes are a function of the mass of the sample and are listed below. 2. Bring the environmental chamber to the opposite temperature limit at a rate of 2°C to 5°C per minute. Dwell at the limit temperature for at least the minimum time per below table. 3. Repeat step 2 39 times for a total of 20 cycles. For ease of testing, 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.
Water Immersion	Inspect for leakage inside dried sample	Place the wired mated connectors in an oven at 50±5°C for 2 hours. Immediately immerse samples in a container of 21±5°C tap water (electrically conductive) to a depth of 90 cm for 120 minutes. The container shall be large enough, so the sample does not increase the water temperature more than 1°C. The wire leads shall be long enough to extend outside the container with sealed ends.

WEIGHT OF SPECIMEN (GRAMS)	MINIMUM TIME (HOURS)
<136	0.5
136 TO 1.36 K	1.0
1.36 K TO 13.6 K	2.0
13.6 K TO 136 K	4.0
>136	8.0

Figure 2

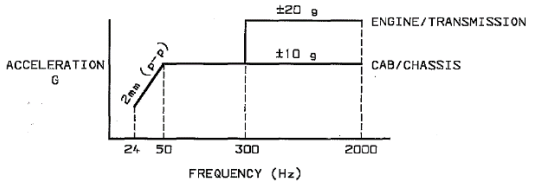
Test Description	Requirement	Procedure
Fluid Resistance	Inspect for damage, such as cracked housing, seal displaced from housing, loose parts, inability to mate or unmate or couple housing, etc.	Test sample are to be tested in a temperature chamber with the fluid stabilized to the chamber temperature listed below. Test sample shall be properly assembled and mated connectors. One sample is required for each fluid. On day 1 the sample shall be dipped for 5 seconds, removed and allowed to drip dry for 1 hour at the chamber temperature. Repeat test 6 times and allow sample to drip dry overnight at the chamber temperature. Fluid shall not be drained from recesses on sample. Repeat the 7 immersions for 4 more days. FLUIDS — FLUID AND CHAMBER TEMPERATURE DIESEL FUEL — 60±3°C ENGINE OIL — 100±3°C ETHYLENE GLYCOL (50%)-WATER (50%) — 100±3°C BRAKE FLUID — 25±3°C
MECHANICAL		
Vibration	No current discontinuity greater than 1 µ seconds with a 100 mA load applied. There shall be no physical damage or loosening of connector components	Mount sample close to actual service configuration to a rigid metal fixture. The fixture must not resonate, and each sample can be vibrated in each of 3 mutually perpendicular axis. Secure the mounting fixture to the vibration table. Place the accelerometer on the fixture as close as possible to the test sample. 1) Resonance Search: Determine resonant frequencies while sweeping the frequency range. The resonance search shall not exceed 1 hour and shall be conducted at 50% of peak vibration level. Resonance frequencies can be determined by a) visual observation of samples, b) sound emitted from sample, c) disturbance on the vibration table accelerometer output waveform. 2) Resonance Dwell: at each critical resonant frequency noted in step 1 above, dwell for 1 million cycles. If a change in resonant frequency occurs, then adjust the frequency to maintain peak resonance condition. Record final resonant frequency. 3) Vibration Cycle: see below for sinusoidal vibration profile. Vibrate each axis for 6 hours. Sweep rate shall be 0.50 octaves per minute. 

Figure 2 Cont.

Test Description	Requirement	Procedure
Insert Retention	Inspect for loosening of the contact retainer.	Equally distribute a 445 N pulling force to the wire bundle for 30 seconds.
Weld Tensile	100 lbf minimum.	Apply a load to the rear weld ring of the connector in the opposite direction as welded until the weld fails.
Panel Nut Torque	40 in-lbf minimum after conditioning.	Using the lock washer and panel nut, mount the connector in a fixture to simulate panel mounting. Tighten the panel nut to 55 in-lbf torque. Next, condition sample with temperature life and vibration.
Connector Retention	The plug and receptacle must remain together. No evidence of cracking, distortion or detrimental damage.	SAE J2030 Apply a pulling force to the wire bundle of the mated connector at 111 N times the number of contacts or a maximum of 444 N. The load shall be applied for 30 seconds. If the connector is designed to uncouple under tension, the maximum force required shall be 222 N.

Figure 2 End

NOTE

a) *All cavities wired with the minimum approved wire gauge per SAE J1128 suitable for the terminal size and with enough length to accommodate testing. Wire insulation shall be minimum diameter per SAE J1128 and shall be verified to be within the connector wire sealing range. Crimp characteristics (i.e. height, width, etc.) shall be checked prior to testing.*

All unsealed cavities shall be secured with sealing plugs. To prevent capillary action on the sealed connector, all free wire ends and test points (i.e. millivolt test connection) shall be sealed with alcohol-based RTV silicone or equivalent and covered with heat shrink tubing.

b) *Specimens shall be prepared in accordance with applicable production drawings and shall be selected at random from current production.*

3.4 Product Qualification and Requalification Test Sequence

TEST OR EXAMINATION	TEST GROUP (a)			
	1	2	3	4
	TEST SEQUENCE (b)			
Visual Inspection	1,5	1,5	1,5	1,4
Thermal Cycle	2		2	2
Vibration		4		
Water Immersion	4			
Temperature Life		3		
Insert Retention			3	
Fluid Resistance				3
Weld Tensile			4	
Panel Nut Torque		2		
Connector Retention	3			

NOTE

(a) Specimens shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random form current production.

- *Groups 1-4, Specimens shall consist of 9 position connectors with DEUTSCH Stamped and Formed Terminal System size 16 nickel sockets with 16 AWG wire.*

(b) Numbers indicate sequence in which tests are performed.

3.5 Revision History

Rev Ltr	Brief Description of Change	Date	Dwn	Apvd
A	Initial Release	15-Oct-2019	DM	DM