



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

1. INTRODUCTION

1.1. Purpose

This report summarizes the results of testing performed on DEUTSCH HD10-9-96P-B025 series connector system to determine conformance to the requirements of product specification 108-151071.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the DEUTSCH HD10-9-96P-B025 series connector system. Testing was performed at the DEUTSCH Industrial Products Division Laboratory in 2006. The test file numbers for this testing are listed in Figure 1. This documentation is on file at, and available from Product Engineering, Industrial Commercial Transportation (ICT) Laboratory.

Test Group	Test Report
1	IPD060112-01
2	IPD060112-02
3	IPD060112-03
4	IPD060112-04

Figure 1

1.3. Conclusion

The DEUTSCH HD10-9-96P-B025 series connector system products listed in Paragraph 1.4 conform to the electrical, mechanical, and environmental performance requirements given in product specification 108-151071.

1.4. Test Specimens

Test specimens were representative of normal production lots. Specimens identified with the part numbers given in Figure 2 were used for testing.

DEUTSCH PART NUMBER	DESCRIPTION	TEST GROUP
HD10-9-96P-B025	9pin Receptacle	1-4
HD16-9-96S	9pin Plug	
2414-002-1886	Size 18 Lock Washer	
2411-002-1805	Size 18 Panel Nut	
1060-16-0122	Size 16 S&F Pin, Nickel	
1062-16-0122	Size 16 S&F Socket, Nickel	

Figure 2

1.5. Environmental Conditions

Unless otherwise stated, the following environmental conditions prevailed during testing:

Temperature: 15° to 35°C

Relative humidity: 25 to 75%

1.6. Qualification 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			

- (a) Specimens were prepared in accordance production drawings and were selected at random from current production.
 - Groups 1-4 specimens consisted of 9-position connectors with DEUTSCH stamped and formed terminal system size 16 nickel sockets with 16 AWG wire.
- (b) Numbers indicate sequence that tests were performed.

Figure 3

2. TEST METHODS AND RESULTS

2.1. Visual Inspection (Groups 1-4)

- A. Procedure: Not Applicable
- B. Method: Examine samples for defects or damage (i.e. torn seals, cracked plastic, missing parts, arching, charring, identification, finish, interchangeability, workmanship, etc.)
- C. Requirement: Free of defects that could affect the electrical or mechanical performance of the part or degrade the long term performance of the part.
- D. Result: **PASSED.**

2.2. Thermal Cycle (Groups 1,3,4)

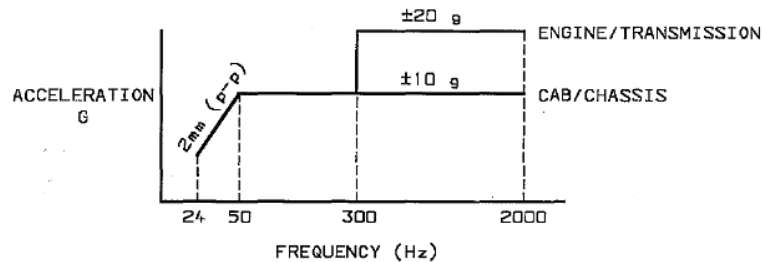
- A. Procedure: Not Applicable
- B. Method: The test samples shall be cycled between -40°C to 120°C temperature extremes.
 1. Cool the test samples to the lower operating temperature limit. The minimum dwell times at the temperature extremes are a function of the mass of the sample and are listed below.
 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.

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

- C. Requirement:
- D. Result: **PASSED.**

2.3. Vibration (Group 2)

- A. Procedure: Not Applicable
- B. Method: 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.



- C. Requirement: 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

- D. Result: **PASSED.**

2.4. Water Immersion (Group 1)

- A. Procedure: Not Applicable
- B. Method: Place the wired mated connectors in an oven at $50 \pm 5^\circ\text{C}$ for 2 hours. Immediately immerse samples in a container of $21 \pm 5^\circ\text{C}$ 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.
- C. Requirement: Inspect for leakage inside dried sample
- D. Result: **PASSED.**

2.5. Temperature Life (Group 2)

- A. Procedure: Not Applicable
- B. Method: Mated connectors shall be exposed to a temperature of $120 \pm 3^\circ\text{C}$ for 500 hours.
- C. Requirement: There shall be no evidence of cracking, distortion, or detrimental damage.
- D. Result: **PASSED.**

- 2.6. Insert Retention (Group 3)
 - A. Procedure: Not Applicable
 - B. Method: Equally distribute a 445 N pulling force to the wire bundle for 30 seconds.
 - C. Requirement: Inspect for loosening of the contact retainer.
 - D. Result: **PASSED.**
- 2.7. Fluid Resistance (Group 4)
 - A. Procedure: Not Applicable
 - B. Method: 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.

<u>FLUIDS</u>	<u>FLUID AND CHAMBER TEMPERATURE</u>
DIESEL FUEL	60±3°C
ENGINE OIL	100±3°C
ETHYLENE GLYCOL (50%)-WATER (50%)	100±3°C
BRAKE FLUID	25±3°C

- C. Requirement: Inspect for damage, such as cracked housing, seal displaced from housing, loose parts, inability to mate or unmate or couple housing, etc.
 - D. Result: **PASSED.**
- 2.8. Weld Tensile (Group 3)
 - A. Procedure: Not Applicable
 - B. Method: Apply a load to the rear weld ring of the connector in the opposite direction as welded until the weld fails.
 - C. Requirement: 100 lbf minimum.
 - D. Result: **PASSED.**
- 2.9. Panel Nut Torque (Group 2)
 - A. Procedure: Not Applicable
 - B. Method: 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.
 - C. Requirement: 40 in-lbf minimum after conditioning.
 - D. Result: **PASSED.**
- 2.10. Connector Retention (Group 1)
 - A. Procedure: SAE J2030
 - B. Method: 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.
 - C. Requirement: The plug and receptacle must remain together. No evidence of cracking, distortion or detrimental damage.
 - D. Result: **PASSED.**

3. REVISION HISTORY

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