



**DEUTSCH\* HDP Series Connector System**

**1. INTRODUCTION**

1.1. Purpose

This report summarizes the results of testing performed on DEUTSCH HDP series connector system to determine conformance to the requirements of product specification 108-151015

1.2. Scope

This report covers the electrical, environmental and mechanical performance of the DEUTSCH HDP series connector system. Testing was performed at the DEUTSCH Industrial Products Division Laboratory in 1992. The original test report and documentation is on file in Product Engineering, Industrial Commercial Transportation (ICT) Laboratory.

1.3. Conclusion

The DEUTSCH HDP series connector system products listed in Paragraph 1.4 conform to the electrical, mechanical, and environmental performance requirements given in product specification 108-151015.

1.4. Test Specimens

Test specimens were representative of normal production lots. Specimens identified with the part numbers given in Figure 1 were used for testing.

DEUTSCH PART NUMBER	DESCRIPTION	TEST GROUP
HDP24-24-23PN	23pin Receptacle, N-seal	1-6
HDP26-24-23SN	23pin Plug, N-seal	
0460-203-16141	Size 16 Solid Pin, Nickel	
0462-201-16141	Size 16 Solid Socket, Nickel	
1060-16-0122	Size 16 S&F Pin, Nickel	
1062-16-0122	Size 16 S&F Socket, Nickel	

**Figure 1**

1.5. Environmental Conditions

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

Temperature: +18° to +35°C

Relative humidity: 5% to 95%

Barometric Pressure: 650 to 800 mm Mercury

1.6. Test Equipment

Instruments used for testing were calibrated per DEUTSCH Calibration Procedure DCPM 2000. Each piece of equipment has a calibration sticker attached indicating it is within calibration at the time of test. The calibration date is noted on each data sheet.

1.7. Qualification Test Sequence

TEST OR EXAMINATION	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	
Tool Abuse				5	5	
Salt Spray		6	7			5
Fluid Immersion	6	7	8	6	6	6
Thermal Cycle	7	8				7
Vibration	8			7	7	
Impact Test	9			8	8	
Insert Retention	10		9		9	
Water Immersion	11	9	10	9	10	8
Low Voltage Resistance		10	11			
Contact Resistance	12	11	12	10	11	9
Final Examination	13	12	13	11	12	10

- (a) Specimens were prepared in accordance production drawings and were selected at random from current production.
- Groups 1-6 specimens consisted of 12 mated pairs (2 per group) 23-position connectors with DEUTSCH terminal system.
    - One set used size 16 solid nickel pins and sockets with 18 AWG wire crimped using HDP-400.
    - One set used size 16 S&F nickel pins and socket with 18 AWG wire crimped using DCT16-01-00.
- (b) Numbers indicate sequence that tests were performed.

**Figure 2**

## 2. TEST METHODS AND RESULTS

- 2.1. Examination of Product (Groups 1-6)
- A. Procedure: DEUTSCH Test Procedure, rev 1/92
  - B. Method: Conduct a visual examination for identification or product, torn seals, cracked plastic, etc.
  - C. Requirement: The part shall also show no evidence of torn seal or part cracks
  - D. Result: **PASSED.**
- 2.2. Insulation Resistance (Groups 1-6)
- A. Procedure: DEUTSCH Test Procedure, rev 1/92
  - B. Method: Check each contact to all other contacts and the shell, if shell is conductive. Test to be performed using a 500 VDC  $\pm 10\%$  megohmmeter.
  - C. Requirement: 1000 M $\Omega$  minimum
  - D. Result: **PASSED.**
- 2.3. Dielectric Withstanding Voltage (Groups 1-6)
- A. Procedure: DEUTSCH Test Procedure, rev 1/92
  - B. Method: Check each contact to all other contacts and the shell, if the shell is conductive, for one minute minimum. Test to be performed at 1500 VAC.
  - C. Requirement: Current leakage not to exceed 2.0 mA for mated connectors.
  - D. Result: **PASSED.**
- 2.4. Maintenance Aging (Groups 1,3)
- A. Procedure: DEUTSCH Test Procedure, rev 1/92
  - B. Method: Subject 10% of the cavities to 10 complete cycles of inserting and removing its respective contact. This process to include any secondary locks and the recommended tools. 0411-204-1605 extraction tool was used.
  - C. Requirement: Parts must be capable of inserting and removing a terminal 10 cycles. Failure would consist of an inability to complete 10 cycles or breakage of any of the contact retention mechanism.
  - D. Result: **PASSED.**
- 2.5. Temperature Life (Groups 2,4,6)
- A. Procedure: DEUTSCH Test Procedure, rev 1/92
  - B. Method: The wired mated connectors shall be subjected to 1000 hours at 125°C. Visual inspect for any damage after test.
  - C. Requirement: Parts shall show no evidence of torn seals, cracked plastic, etc.
  - D. Result: **PASSED.**
- 2.6. Contact Retention (Groups 1,3)
- A. Procedure: DEUTSCH Test Procedure, rev 1/92
  - B. Method: Subject same cavities used for Maintenance Aging to a 25 lbf load for 15 seconds in a direction tending to pull the terminal from the rear of the connector.
  - C. Requirement: All terminals tested will remain in place while the load is applied for 15 seconds in a tensile manner to remove the terminal.
  - D. Result: **PASSED.**

- 2.7. Durability (Groups 2,3,5)
  - A. Procedure: DEUTSCH Test Procedure, rev 1/92
  - B. Method: The connector shall be mated and unmated for a total of 100 complete cycles. No mechanical damage to occur.
  - C. Requirement: Parts shall show no mechanical defects or breakage as a result of 100 mating cycles. Coupling torque must not increase as a result of cycling past the point where it can reasonably be done by hand.
  - D. Result: **PASSED.**
  
- 2.8. Tool Abuse (Groups 4,5)
  - A. Procedure: DEUTSCH Test Procedure, rev 1/92
  - B. Method: Test up to 5 cavities from each sample shall be selected. The applicable removal tool shall be inserted into the connector and an axial load of 5 pounds applied. With the force applied, the tool shall be rotated 180° and then removed, also removing the terminal. This test is to be completed three 3 times on each cavity. Inspect cavity for damage.
  - C. Requirement: No damage may occur to either the terminal locking feature or the wire seal.
  - D. Result: **PASSED.**
  
- 2.9. Salt Spray (Groups 2,3,6)
  - A. Procedure: DEUTSCH Test Procedure, rev 1/92
  - B. Method: Connector shall be fully mated, then submerged in a fine mist of 5% by weight of salt solution for 96 hours.
  - C. Requirement: The connector shall show no corrosion that detrimentally affect the performance of the connector.
  - D. Result: **PASSED.**
  
- 2.10. Fluid Immersion (Groups 1-6)
  - A. Procedure: DEUTSCH Test Procedure, rev 1/92
  - B. Method: 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 5 minutes, then removed from the fluid to air dry for 24 hours. This cycle is to be completed a total of 5 cycles. Inspect for visual damage after test.

Fluid	Temperature °C
Motor Oil 30 weight	+60
Brake Fluid (disc type 1)	+60
Gasoline	+25
Diesel Fuel #2	+60
50/50 Ethlene Glycol/Water	+60
Gear Oil 90 weight	+60

- C. Requirement: Connectors shall show no visual damage after test.
- D. Result: **PASSED.** Some samples showed minor rear seal swell as a result of some fluids. This is not a failure.

2.11. Thermal Cycle (Groups 1,2,6)

- A. Procedure: DEUTSCH Test Procedure, rev 1/92
- B. Method: Cycle mated connectors from -55°C to 125°C at a rate of 3°C per minute. Connectors to remain at each temperature extreme for 1 hour minimum. Mated connectors are to be cycled a total of 20 complete cycles.
- C. Requirement: Connector shall show no visual damage after test.
- D. Result: **PASSED.**

2.12. Vibration (Groups 1,4,5)

- A. Procedure: DEUTSCH Test Procedure, rev 1/92
- B. Method: Connectors to be tested to the following conditions

Parameter	Requirement
Sine Sweep	10 to 2000 Hz
Initial Displacement	0.07 inch DA
Maximum Acceleration	20 G's
Test Duration	12 hours
Time Per Axis X, Y, Z	4 hours
Test Current first 3 hours each axis	8A

Monitor for discontinuity in excess of 1 microsecond at 20mV and 100mA during last hour of vibration in each axis.

- C. Requirement: There shall be no discontinuities or visual damage as result of test.
- D. Result: **PASSED.**

2.13. Impact (Groups 1,4,5)

- A. Procedure: DEUTSCH Test Procedure, rev 1/92
- B. Method: Wired mated connector shall be dropped from a height of 4 feet on a cement floor. This action is to be completed a total of 5 times. Inspect for damage.
- C. Requirement: There shall be no cracking, un-coupling or breakage as a result of test.
- D. Result: **PASSED.** No detrimental damage to performance. There was minor damage to the connector shells at the impact points, but these did not result in cracks, breakage or un-coupling.

2.14. Insert Retention (Groups 1,3,5)

- A. Procedure: DEUTSCH Test Procedure, rev 1/92
- B. Method: Apply a load to the wires that exit the rear of the connector for a period of 1 minute. The amount of load is to be 25 lbs. times the number of cavities up to a maximum of 100 lbs.
- C. Requirement: There shall be no damage as a result of a 100 lbs. pull test.
- D. Result: **PASSED.**

2.15. Water Immersion (Groups 1-6)

- A. Procedure: DEUTSCH Test Procedure, rev 1/92
- B. Method: Heat mated connectors to 125°C for 2 hours. Submerge mated connectors in water to a depth of 3 feet. The free ends of the mated connectors must remain out of the water. Sample to remain in water for 4 hours minimum. Check Insulation Resistance after samples are removed from the water. Connectors must meet Insulation Resistance
- C. Requirement: Each contact shall be checked to all other contacts at 500 VDC. Insulation Resistance must be 1000 MΩ minimum.
- D. Result: **PASSED.** Also, all samples were opened to verify that there was no water inside the connectors.

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- 2.16. Low Voltage Resistance (Groups 2,3)
- A. Procedure: DEUTSCH Test Procedure, rev 1/92
  - B. Method: Test sample connectors to MIL-STD-1344, Method 3002.1. The resistance of an equal length of wire shall be subtracted from all readings to determine the added resistance of the terminal.
  - C. Requirement: Maximum voltage drop 7.5mΩ maximum for 18 AWG wire.
  - D. Result: **PASSED.**
- 2.17. Contact Resistance (Groups 1-6)
- A. Procedure: DEUTSCH Test Procedure, rev 1/92
  - B. Method: Test in accordance with MIL-C-39029 using 8A for 18 AWG wire. The resistance of an equal length of wire shall be subtracted from all readings to determine the added resistance of the terminal.
  - C. Requirement: Maximum contact resistance is 60mV (solid) and 100mV (S&F)
  - D. Result: **PASSED.**
- 2.18. Final Examination (Groups 1-6)
- A. Procedure: DEUTSCH Test Procedure, rev 1/92
  - B. Method: Conduct a visual examination for identification or product, torn seals, cracked plastic, etc.
  - C. Requirement: The part shall also show no evidence of torn seal or part cracks
  - D. Result: **PASSED.**

**3. REVISION HISTORY**

Rev Ltr	Brief Description of Change	Date	Dwn	Apvd
A	Initial Release	13-Aug-2019	DM	DM
B	Rewrote original DEUTSCH test report using 501 template	27-Jan-2020	DM	DM