
DEUTSCH* HDP20 Series Connector System IP67, IP6K9K

1. INTRODUCTION

1.1. Purpose

Testing was performed on DEUTSCH HDP20 series connector system to determine conformance to IP67 and IP6K9K. Test procedures are given in SAE J2030, dated 2009/2015; IEC 60529, Edition 2.1 dated 2001-02; and DIN 40050 part 9, dated May 1993.

1.2. Scope

This report covers the environmental sealing performance of the HDP20 series connector system. The tests were completed at the Greensboro Product Test Laboratory from 2020-2022. 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	2010219-REPORT
2	2110268-REPORT
3	2110269-REPORT
4	2110270-REPORT
5	2110272-REPORT
6	2110271-REPORT
7	2203060-REPORT
8	2203059-REPORT
9	2203061-REPORT
10	2204092-REPORT

Figure 1

1.3. Conclusion

The DEUTSCH HDP20 series connector system conformed to the environmental sealing performance requirements for IP67 and IP6K9K when tested per the sequences shown in Figure 3 of this document.

1.4. Test Specimens

Test specimens were representative of normal production lots. Specimens are representative of the entire HD30 family. Specimens identified with the part numbers given in Figure 2 were used for testing.

DEUTSCH RECEPTACLE PART NUMBER	DESCRIPTION	TEST GROUP
HDP24-24-47PE-L017	47 Position, Size 24, Receptacle, E Seal, -L017	1
HDP24-24-31PE	31 Position, Size 24, Receptacle, E Seal	2
HDP24-18-14PN	14 Position, Size 18, Receptacle, N Seal	3
HDP24-18-20PN	20 Position, Size 18, Receptacle, N Seal	4
HDP24-18-21PN	21 Position, Size 18, Receptacle, N Seal	5
HDP24-24-19PE	19 Position, Size 24, Receptacle, E Seal	6
HDP24-24-23PE	23 Position, Size 24, Receptacle, E Seal	7
HDP24-24-21PN	21 Position, Size 24, Receptacle, N Seal	8
HDP24-18-8PN	8 Position, Size 18, Receptacle, N Seal	9
HDP24-18-6PN	6 Position, Size 18, Receptacle, N Seal	10

Figure 2

DEUTSCH PLUG PART NUMBER	DESCRIPTION	TEST GROUP
HDP26-24-47SE-L017	47 Position, Size 24, Plug, E Seal, -L017	1
HDP26-24-31SE	31 Position, Size 24, Plug, E Seal	2
HDP26-18-14SN	14 Position, Size 18, Plug, N Seal	3
HDP26-18-20SN	20 Position, Size 18, Plug, N Seal	4
HDP26-18-21SN	21 Position, Size 18, Plug, N Seal	5
HDP26-24-19SE	19 Position, Size 24, Plug, E Seal	6
HDP26-24-23SE	23 Position, Size 24, Plug, E Seal	7
HDP26-24-21SN	21 Position, Size 24, Plug, N Seal	8
HDP26-18-8SN	8 Position, Size 18, Plug, N Seal	9
HDP26-18-6SN	6 Position, Size 18, Plug, N Seal	10

Figure 2 End

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 Sequences

TEST OR EXAMINATION	TEST GROUP (a)									
	1	2	3	4	5	6	7	8	9	10
	TEST SEQUENCE (b)									
Visual Examination	1,9	1,7	1,7	1,7	1,7	1,7	1,7	1,7	1,7	1,7
Insulation Resistance	3,5,8	3,6	3,6	3,6	3,6	3,6	3,6	3,6	3,6	3,6
Temperature Life	6	4	4	4	4	4	4	4	4	4
Protection Against Dust (IP6KX)	7	5	5	5	5	5	5	5	5	5
Protection Against Water (IPX7)	2	2	2	2	2	2	2	2	2	2
Protection Against High Pressure/Steam Jet Cleaning (IPX9K)	4									

- (a) Specimens were prepared in accordance production drawings and were selected at random from current production.
- Group 1 specimens consisted of 47 position connectors with DEUTSCH solid size 16 nickel pins and sockets with 16 AWG wire.
 - Group 2 specimens consisted of 31 position connectors with DEUTSCH solid size 16 nickel pins and sockets with 16 AWG wire.
 - Group 3 specimens consisted of 14 position connectors with DEUTSCH solid size 16 nickel pins and sockets with 16 AWG wire.
 - Group 4 specimens consisted of 20 position connectors with DEUTSCH solid size 16 and size 20 nickel pins and sockets with 16 AWG and 20 AWG.
 - Group 5 specimens consisted of 21 position connectors with DEUTSCH solid size 20 nickel pins and sockets with 20 AWG wire.
 - Group 6 specimens consisted of 19 position connectors with DEUTSCH solid size 12 and size 16 nickel pins and sockets with 12 AWG and 16 AWG wire.
 - Group 7 specimens consisted of 23 position connectors with DEUTSCH solid size 16 nickel pins and sockets with 16 AWG wire.
 - Group 8 specimens consisted of 21 position connectors with DEUTSCH solid size 12 and size 16 nickel pins and sockets with 12 AWG and 16 AWG wire.
 - Group 9 specimens consisted of 8 position connectors with DEUTSCH solid size 12 nickel pins and sockets with 12 AWG wire.
 - Group 10 specimens consisted of 6 position connectors with DEUTSCH solid size 4 and size 16 nickel pins and sockets with 6 AWG and 16 AWG wire.
- (b) Numbers indicate sequence that tests were performed.

Figure 3

2. SUMMARY OF TESTING

- 2.1. Visual Examination (Groups 1-10)
- A. Procedure: SAE J2030
 - B. Method: The visual examination should be performed prior to testing, noting in detail any manufacturing or material defects such as cracks, tarnishing, deformities, etc.
 - C. Requirement: No physical defects detrimental to product performance.
 - D. Result: **PASSED.**
- 2.2. Insulation Resistance (Groups 1-10)
- A. Procedure: SAE J2030
 - B. Method: Each contact was checked to all other contacts and the shell, if the shell is conductive. Test was performed using a 1000 VDC megohmmeter.
 - C. Requirement: > 20 MΩ
 - D. Result: **PASSED.**
- 2.3. Temperature Life (Group 1-10)
- A. Procedure: SAE J2030
 - B. Method: Mated connectors were placed in the environmental chamber at a temperature of 125±3°C for 2 hours.
 - C. Requirement: No evidence of cracking, chipping, or other damage detrimental to the normal operation of the connector.
 - D. Result: **PASSED.**

- 2.4. Protection Against Dust (IP6X) (Groups 1-10)
- A. Procedure: DIN 40050, Part 9
 - B. Method: The mated assemblies were placed in a dust chamber at room ambient temperature with $<35\% \pm 5$ RH and exposed to 20 cycles. Each cycle consists of an air-blast for 6 seconds, creating dust/ air movement in the dust chamber, then followed by a 15-minute pause of the air-blast. The chamber size is 14.3 cubic ft. (36"x24"x23"H) which required 8.8 lbs. of dust to meet the dispersion rate below. Blast of air is produced by one nozzle at 58 psi downward toward the dust pile creating an upward or vertical plume of dust which then settles down onto the test samples. The dust does not circulate. Type of dust used was Arizona Fine Dust. The dispersion or suspensions rate of dust was approximately 0.25 grams/m².
 - C. Requirement: Insulation Resistance > 20 M Ω and no dust visible inside connector.
 - D. Result: **PASSED.**
- 2.5. Protection Against Water (IPX7) (Group 1-10)
- A. Procedure: IEC 60529
 - B. Method: Test samples were first subject to thermal shock then submersed in ambient water to a depth of 1 meter for 3 hours.
 - C. Requirement: Insulation Resistance > 20 M Ω
 - D. Result: **PASSED.**
- 2.6. Protection Against High Pressure/Steam Jet Cleaning (IPX9K) (Group 1)
- A. Procedure: DIN 40050, Part 9
 - B. Method: Mated assemblies were attached to a rotating table. The rotation speed of the table was set at 5 ± 1 RPM. The sample was sprayed with a flat fan type nozzle for 30 seconds from approximately 5 inches (127 mm) while rotating. The water temperature was approximately $80^{\circ}\text{C} \pm 5^{\circ}\text{C}$. The spray nozzle was positioned at an angle of 0° to the test sample. This procedure was repeated three more times with the spray nozzle repositioned each time to spray at an angle of 30° , 60° , and 90° to the test sample. The water flow rate was measured at approximately 14.5 LPM, and the water pressure measured at approximately 8274 KPa (1200 psi).
 - C. Requirement: Insulation Resistance > 20 M Ω
 - D. Result: **PASSED.**

3. REVISION HISTORY

Rev Ltr	Brief Description of Change	Date	Dwn	Apvd
A	Initial Release	10AUG2022	HD	IG