DEUTSCH TEST REPORT

HDP SERIES CONNECTOR

APPROVED J.K. Albers DATE 10/9/92

DEUTSCH

1.0 Test Conditions

Unless otherwise specified all tests and measurements will be conducted within the following ambient conditions:

Temperature	+18°C to +35°C
Relative Humidity	5% to 95%
Barometric pressure	650 to 800 mm Mercury

2.0 Test Equipment

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

3.0 Sample Preparation

3.1 Sample Selection

All parts used for Qualification testing will be production parts that have been accepted by QA audit. A total of 12 mated pairs will be used.

3.2 Sample Assembly

All cavities will be filled with production terminals that have been crimped on approved tooling. The wire used will be the minimum wire gauge approved for each cavity and the insulation will be the minimum diameter approved for the seals.

3.3 Sample Assembly

All unsealed cavities will be sealed with sealing plugs. All free wire ends will be sealed with silicone RTV. All millivolt taps will be sealed with silicone RTV and covered with heat shrink tube.

3.4 Sample Description

Parts used were 12 mated pair of HDP Series Connectors. The connector part numbers were HDP24-24-23PN and HDP26-24-23SN. Six mated pair were wired with solid terminals,part numbers 0460-203-16141 and 0462-201-16141 using 18 ga. SXL type wire. The other 6 mated pair were wired with stamped terminals, part numbers 1060-16-0122 and 1062-16-0122. Three mated pairs of sealing plugs

3.4 Sample Description (con't)
were used for each sample. Samples were grouped such that one mated pair with solid terminals and one mated pair with stamped terminals were in each group.

4.0 Test Sequence

Samples will be grouped into six groups of two samples each and subjected to the following tests in the sequence shown.

TEST	GROUP NUMBER					
	1	2	3	4	5	6
Examination of Product (5.1)	X	X	X	X	X	X
Insulation Resistance (5.2)	X	X	X	X	X	X
Dielectric Withstanding Voltage (5.3)	X	X	X	X	X	X
Maintenance Aging (5.4)	X		X			
Temperature Life (5.5)		X		X		X
Contact Retention (5.6)	X		X			
Durability (5.7)		X	X		X	
Tool Abuse (5.8)				X	X	
Salt Spray (5.9)		X	X			X
Fluid Immersion (5.10)	X	X	X	X	X	X
Thermal Cycling (5.11)	X	X				X
Vibration (5.12)	X			X	X	
Impact Test (5.13)	X			X	X	
Insert Retention (5.14)	X		X		X	
Water Immersion (5.15)	X	X	X	X	X	X
Low Voltage Resistance (5.16)		X	X			
Contact Resistance (5.17)	X	X	X	X	X	X
Final Inspection (5.18)	X	X	X	X	X	X

5.0 Test Methods

5.1 Examination of Product: Conduct a visual examination for identification of product, torn seals, cracked plastic, etc.

Requirement: Parts shall have part identification consistent with the envelope print. The part shall also show no evidence of torn seals or part cracks.

Results: Part was identified consistent with the envelope print and showed no torn seals or part cracks.

5.2 Insulation Resistance: Using a 500 VDC Megohmeter, Check each contact to all other contacts and the shell if shell is conductive. Acceptance value is 1000 megohms minimum.

Requirement: Each contact shall be tested to all other contacts. Insulation Resistance must meet 1000 megohm minimum value.

Results: Each contact was tested to all other contacts and met the 1000 megohm minimum value.

5.3 Dielectric Withstanding Voltage: Check each contact to all other contacts and the shell if the shell is conductive, for 1 minute minimum. Current leakage to not exceed 2.0 milliamps at 1500 VAC.

Requirement: Each contact will have a 1500 VAC potential applied between itself and all other terminals. Current leakage must not exceed 2 milliamps.

Results: Each terminal was tested against all other terminals at 1500 VAC. Current leakage did not exceed 2 milliamps.

5.4 Maintenance Aging: Subject 10% of the cavities to ten complete cycles of inserting and removing its respective contact. This process to include any secondary locks and the recommended tools.

Requirement: Parts must be capable of inserting and removing a terminal ten cycles. Failure would consist of an inability to complete 10 cycles or breakage of any of the contact retention mechanism.

Results: Ten cycles were completed on 3 cavities of each sample connector using the standard removal tool, number 0411-204-1605. No breakage of any type was observed. Both pin and socket terminals were removed from the cavities selected.

5.5 Temperature Life: The wired mated connectors shall be subjected to 1000 hours at 125°C. Visual inspect for any damage after test.

Requirement: Part shall show no evidence of torn seals, cracked plastic, etc.

Results: Part showed no damage as a result of temperature life. A slight amount of discoloration in the form of a brownish tint to the gray shell was noted but was not considered detrimental to the performance of the connector.

5.6 Contact Retention: Subject the same cavities used for Maintenance Aging to the load specified in table 1 for a period of 15 seconds in a direction tending to pull the terminal from the rear of the connector. Contact to remain in place.

Requirement: All terminals tested will remain in place while the load per table I is applied for 15 seconds in a tensile manner to remove the terminal.

Results: Both pin and socket terminals were tested in each of the 3 selected cavities per sample. All terminals remained in place under a 25 lb. load.

5.7 Durability: The connector shall be mated and unmated for a total of 100 complete cycles. No mechanical damage to occur.

Requirement: Parts shall show no mechanical defect 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.

Results: No mechanical defects or noticeable increase in torque was observed as the result of 100 mating cycles.

5.8 Tool Abuse: This test applies only to connectors that utilize a removal tool instead of a wedge lock. Up to five cavities from each sample will be selected. The applicable removal tool shall be inserted into the connector and an axial load of 5 lbs applied. With the force applied, the tool shall be rotated 180° and then removed, also removing the terminal. This test to be completed three times on each cavity. Cavity to then be inspected for damage.

Requirement: Both pin and socket terminals will be removed from 5 cavities of each sample connector a total of 3 times each using the procedure above. No damage may occur to either the terminal locking feature or the wire seals.

Results: No damage to the terminal locking fingers or the rear wire seals were observed.

5.9 Salt Spray: Connector shall be fully mated then submerged in a fine mist of 5% by weight salt solution for 96 hours. There should be no evidence of corrosion on the connector or terminals after the connector is removed from the test and cleaned with tap water.

Requirement: The connector shall show no corrosion that detrimentally affects the performance of the connector after the salt spray test.

Results: The connector showed no detrimental corrosion at the end of the salt spray test.

5.10 Fluid Immersion: Subject each sample group to one fluid only. The wired mated connectors shall be submerged in the fluids below which are 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 to be completed a total of 5 cycles. Inspect for visual damage after test.

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

Requirements: Connectors shall show no visual damage after the fluid test.

Results: The connectors showed no detrimental damage after fluid immersion. Some samples showed minor rear seal swelling as a result of some of the fluids. This was not a cause for failure.

5.11 Thermal Cycle: 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 to be cycled a total of 20 complete cycles.

Requirement: Connector shall show no visual damage as a result of thermal cycling.

Results: There was no visual damage as a result of thermal cycling.

5.12 Vibration: Connectors to be tested to the following conditions;

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

Apply current as specified in table II for first 3 hours in each axis. Monitor for discontinuities in excess of 1 microsecond at 20 mv and 100ma during last hour of vibration in each axis.

Requirements: There shall be no discontinuities or visual damage as a result of vibration testing.

Results: There were no discontinuities found in vibration testing. In addition there was no visual damage to the sample connectors as a result of vibration.

5.13 Impact: Wired mated connector to be dropped from a height of 4 ft. on a cement floor. This action to be completed a total of 5 times. Inspect for damage at the end of test.

Requirements: There shall be no cracking, un-coupling,or part breakage as a result of impact testing.

Results: Mated connectors were dropped 5 times each. There was no damage that would be detrimental to performance after impact testing. There was minor damage to the connector shells at the impact points, but these did not result in cracks,breakage or un-coupling.

5.14 Insert Retention: Apply a load to the wires that exit the rear of the connector for a period of 1 minute. The amount of load to be 25 lbs time the number of cavities up to a maximum of 100 lbs.

Requirements: There shall be no damage as a result of a 100 lbs. pull test on the wire bundle.

Results: The connector halves remained mated and no other damage occurred as a result of a 100 lbs. tensile test to the mated pair.

5.15 Water Immersion: 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. Samples to remain in water for 4 hours minimum. Check Insulation Resistance after samples are removed from the water. Connectors must meet the requirements of Insulation Resistance.

Requirements: Each contact will be checked to all other contacts at 500 VDC. Insulation resistance must be 1000 megohms minimum.

Results: All samples passed the Insulation Resistance requirement after water immersion. All samples were opened to verify that there was no water inside the connectors.

5.16 Low Voltage Resistance: Test sample connectors to Mil-Std-1344 Method 3002.1. Maximum voltage drop allowed are shown in table III. The resistance of an equal length of wire will be subtracted from all readings to determine the added resistance of the terminal.

Requirements: Resistance values will be converted into voltage drop using 100 ma current. The voltage drop for the equal length of wire will be subtracted from the voltage drop to find the voltage drop of the terminal. All values will be less than specification.

Results: All resistance values were less than specification.

5.17 Contact Resistance: Test in accordance with Mil-C-39029 using test currents in table III. Maximum allowable mv drop values are shown in table III. The resistance of an equal length of wire will be subtracted from all readings to determine the increase in resistance due to the terminals.

Requirements: Voltage drop will be measured across the mated connector. The voltage drop of an equal length of wire will then be subtracted. The maximum voltage drop across the terminal will beper table III.

Results: All samples measured less than specification.

5.18 Final Examination: Conduct a visual examination of the mated connectors and each connector half. Inspect for torn seals, broken plastic, broken welds, etc.

5.18 Requirements: All samples will show no damage that would detrimentally affect the performance of the connector. This would include but is not limited to cracking, connector dis-assembly, broken parts, etc.

Results: All samples passed Final Examination.

APPENDIX

Table I (Contact Retention)

Contact Size	Force (lbs.)
20	20
16	25
12	30
8	35
4	35

Table II (Current Level for Vibration Test)

Contact Size	Wire Ga.	Test Current (amps)
20	22	3
	20	5
16	18	8
	16	10
12	14	13
	12	17
8	10	23
	8	33
4	6	46

Table III (Contact Resistance)

Contact Size	Wire Ga.	Current(amps)	Resistance(mv) SOLID	Resistance(mv) STAMPED
20	20	7.5	60	
16	18	10	60	100
	16	13	60	100
12	14	18	60	
	12	25	60	
8	10	40	60	
	8	60	60	
4	6	100	60	