



AMPSEAL 16* Connector System

1. SCOPE**1.1. Content**

This specification covers performance, tests and quality requirements for the AMPSEAL 16* 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. Qualification Test Results

Successful qualification testing of the Plug, Cap and Blind Plug Assembly was completed in 2003, 2025 and 2026. The Qualification Test Report number for this test is 501-708. This documentation is on file and available from Engineering Practices and Standards (EPS).

2. APPLICABLE DOCUMENTS AND FORMS

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the latest edition of the document applies. In the event of conflict between the requirements of this specification and the product drawing, the product drawing shall take precedence. In the event of conflict between the requirements of this specification and the referenced documents, this specification shall take precedence.

2.1. TE Connectivity Specifications

501-708	Qualification Test Report (AMPSEAL 16* Connector System)
114-13065	Application Specification (AMPSEAL 16 Connector System)
114-13045	Application Specification (HDSF Size 16 Pin and Socket Contacts)

2.2. Commercial Standards and Specifications

ASTM B117	Standard Practice for Operating Salt Spray (Fog) Apparatus
EIA-364	Electrical Connector/Socket Test Procedures Including Environmental Classifications
IEC 60512	Electromechanical Components for Electronic Equipment; Basic Testing Procedures and Measuring Methods Part 1: General
SAE J1455	Recommended Environmental Practices for Electronic Equipment Design in Heavy Duty Vehicle Applications (Rev March 2017)
SAE J2030	Heavy Duty Electrical Connector Performance Standard (Rev June 2015)
ISO 20653	Road vehicles - Degrees of Protection (IP code) - Protection of Electrical Equipment Against Foreign Objects, Water and Access (Edition 2013)

2.3. Reference Documents

109-197	Test Specification (TE Test Specifications vs EIA and IEC Test Methods)
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3. REQUIREMENTS**3.1. Design and Construction**

Products shall be of the design, construction, materials, and physical dimensions specified on the applicable product drawing.

3.2. Materials

Materials used in the construction of this product shall be as specified on the applicable TE product drawing.

3.3. Ratings

- Voltage Rating: 250 volts DC
- Current Rating: See Figure 1 (all readings in amperes)

Connector Loading	Wire Size (AWG)		
	14	18	20
Single Circuit Energized	16.0	10.0	7.0
All Circuits Energized (12-position connector)	9.0	6.0	5.0

Figure 1

- Temperature Rating: -40°C to +125°C
- Ingress Protection (IP) level: IP67, IP68, IP69K (with backshell protection)
- Flammability: UL94HB

3.4. Performance Requirements and Test Description

The product should meet the electrical, mechanical and environmental performance requirements specified in Figure 2. Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

3.5. Test Requirements and Procedure Summary

Test Description	Requirement	Procedure
Visual Inspection	Meets the requirements of product drawing.	Visual inspection of product before (and after) unmating connectors for conditions such as torn seals, cracked plastic, evidence of fluid or dust ingress in sealed connector systems, arcing, charring, melting, or anything that affects the performance or serviceability of the product as deemed by qualified Engineer.
ELECTRICAL		
Low Signal Termination Resistance	6 milliohms maximum for 14 and 16 AWG wire. 9 milliohms maximum for 18 AWG wire.	SAE J2030 6.2. Measure connection resistance across mated terminals and subtract bulk resistance of Equal Wire Lengths (EWL).

Figure 2 (continued)

Test Description	Requirement			Procedure
Voltage Drop	Wire Size (AWG)	Test Current (amperes)	Voltage Drop (millivolts maximum)	SAE J2030 6.4. Averaged measurements after 30 seconds, 15 minutes and 30 minutes of current being applied. EWL subtracted.
	14	13	100	
	16	10	100	
	18	8	100	
Insulation Resistance	20 megohms minimum.			SAE J2030 6.3. Insulation resistance at 1000 volts DC adjacent terminals measured after 60 seconds or until stabilization occurs.
MECHANICAL				
Random Vibration	No discontinuities. See Note.			EIA-364-28. Subject mated specimens to 21 G's rms between 25 to 2000 Hz. Twenty hours in each of 3 mutually perpendicular planes.
Durability	See Note.			SAE J2030 6.11. 50 cycles.
Terminal Retention, Axial	Contacts shall not dislodge more than 0.8 mm.			IEC 512-8, Test 51a. Apply axial load of 111 N to contacts at a maximum rate of 10 N per second (or 50 mm per minute) and hold for 10 seconds.
Mating/Unmating Force	135 N maximum.			SAE J2030 6.9. and 6.10. Measure force necessary to mate and unmate specimens at a maximum rate of 50 mm per minute.
Polarizing Mis-Mating Force	220 N minimum.			SAE J2030 6.21. Attempt to mate specimen against polarizing or keying feature.
Maintenance Aging	See Note.			SAE J2030 6.6. Insert and remove terminal for 8 cycles on 20% of the terminals.
ENVIRONMENTAL				
Temperature Life	See Note.			EIA-364-17. Subject specimens to 120 ± 5°C and 125°C for 500 hours.
Thermal Shock	See Note.			SAE J2030 6.13. Subject specimens to 10 cycles between -40°C and +120°C. Dwell time at each temperature: 1 hour

Figure 2 (continued)

Test Description	Requirement	Procedure
External Sealing Pressure	35 kPa, pre-test, no bubbles. 35 kPa, post-test, no bubbles.	EIA-364-2. Subject specimens to specified pressure for 30 minutes.
Pressure Washing	With Backshell See Note.	SAE J2030 6.5. and SAE J1455 4.5. Subject specimens to spray for 3 seconds of a 6 second period for a total of 375 cycles consisting of a volume of 9.46 liters per minute at a pressure of 7000 kPa and a temperature of 40°C from a distance of 20 to 30 cm. No detergent.
Chemical Exposure	See Note.	SAE J2030 6.14. Subject specimens to 5 cycles of a 5 minute dip in the following chemicals followed by air drying for 24 hours: 1) Diesel fuel at 60 ± 3°C; 2) Engine oil at 100 ± 3°C; 3) Transmission drive train oil at 100 ± 3°C; 4) Final drive axle oil at 100 ± 3°C; 5) Ethylene glycol (50%) and water (50%) at 100 ± 3°C; 6) Propylene glycol (50%) and water (50%) at 100 ± 3°C; 7) Brake fluid at 25 ± 3°C.
Salt Exposure	See Note.	SAE J2030 6.12. and ASTM B117. Subject specimens to a 5% salt solution at 35°C for 96 hours.
Steam Cleaning	With Backshell See Note.	SAE J1455 4.5. Subject specimens to spray for 3 seconds of a 6 second period for a total of 375 cycles of pressure washing at 85°C, consisting of a volume of 9.46 liters per minute at a pressure of 1400 kPa from a distance of 20 to 30 cm. No detergent.
Ingress Protection (IPX7)	See Note.	ISO 20653 Submerge the mated connector in a room temperature freshwater tank to a depth of 1.00 m ± 50 mm for 30 ± 5 minutes.

Figure 2 (continued)

Test Description	Requirement	Procedure
Ingress Protection (IPX8)	See Note.	ISO 20653 Submerge the mated connector in room temperature freshwater tank to a depth of 1.00 m $\pm$ 50 mm for 4 hours $\pm$ 15 minutes.
High Pressure Spray (IPX9K)	With Backshell See Note.	ISO 20653 Mount the test sample onto the device holder such that the connector lays flush against the turntable. Position the sprayer at 0° and initiate spray and turntable rotation. With the table rotating, spray the test sample for 30 seconds. Repeat at each spray angle Turntable speed = 5 $\pm$ 1 rpm, Position angle of (0°, 30°, 60° and 90°) $\pm$ 5°, Distance of 100-150 mm, Fan jet nozzle α =30° $\pm$ 10°, Water Flow 14-16 L/min, Water Pressure Approx. 8,000 to 10,000 Kpa, Water Temperature 80 $\pm$ 5°C, Exposure Time 30 sec/ position of spray angle
Dust Protection (IP6KX)	With Backshell See Note.	ISO 20653 Use Arizona Fine Road Dust per SAE J726. Mount the test sample in the dust chamber in its normal operating position. One cycle is 6 seconds of air/dust mixture then a 15-minute pause. Repeat 20 cycles (approx. 5 hours test time).
2-hr Temperature life	Conditioning Only.	Subject specimens to 120 $\pm$ 5° C for 2 hours.
Accessory Mounting Torque (Blind Plug Assembly Only)	0.40 Nm minimum.	Manual torquing of the specimen using an 8.00mm long EJOT Delta PT® 30 Screw with a 0.50mm thick washer.


NOTE

Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the Product Qualification and Requalification Test Sequence shown in Figure 3, and Figure 4.

Figure 2 (end)

3.6. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group (a)							
	1	2	3	4	5	6	7	8
	Test Sequence (b)							
Visual Inspection	1,13	1,6	1,11	1,11	1,6	1,7	1,8	1,7
Low Signal Termination Resistance	2,6		3,6	2,6,9				
Voltage Drop	3,7		4,7	3,7,10				
Insulation Resistance	10,12					2,4,6	2,5,7	2,4,6
Random Vibration	5							
Durability			9					
Terminal Retention, Axial		2	8					
Mating/unmating force			2					
Polarizing Mis-mating force			10					
Maintenance Aging				4	5			
Temperature Life				5	3			
2-hr Temperature Life							3	
Thermal Shock	4		5					
External Sealing Pressure, pre-test		3			2			
External Sealing Pressure, post-test	8	5			4			
Pressure Washing	9							
Chemical Exposure		4						
Salt Exposure				8				
Steam Cleaning	11							
Ingress Protection (IPX7)						3		
Ingress Protection (IPX8)							4	
High Pressure spray (IPX9K)								3
Dust Protection (IP6KX)						5	6	5



NOTE

(a) See paragraph 4.1.

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

Figure 3: Plug and Cap Assembly Test Sequences

Test or Examination	Test Group (a)					
	1	2 (d)	3	4	5	6
	Test Sequence (b)					
Visual Inspection	1	1,4	1,4,7	1,5	1,3	1,12,16
Insulation Resistance	2,4,6,8,10					2,4,6,8,9,10,13,15
Durability			5			
Mating/Unmating Force			2			
Polarizing Mis-Mating Force			6			
Temperature Life				3		
2-Hr Temperature Life						5
Thermal Shock	3	2	3			
External Sealing Pressure, Pre-Test				2		
External Sealing Pressure, Post-Test	5(c)	3		4		
Pressure Washing	7					
Steam Cleaning	9					
Accessory Mounting Torque					2	
Ingress Protection (IPX7)						3,7
Ingress Protection (IPX8)						14(e)
High Pressure Spray (IPX9K)						9
Dust Protection (IP6KX)						11


NOTE

- (a) See paragraph 4.1. A and Figure 5.
- (b) Numbers indicate the sequence in which tests are performed.
- (c) The 2-position Blind Plug was not tested for the external sealing pressure in this sequence due to sample preparation requirement for Insulation Resistance test.
- (d) This sequence was used to test the 2-position external sealing pressure leak.
- (e) Blind plug assembly tested for 3 hours.

Figure 4: Blind Plug Assembly Test Sequences

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Specimen Selection

Specimens shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production.

a) Plug and Cap Assembly Specimen Selection

Specimens shall consist of 2, 3, and 8 position connectors with TE HDSF size 16 gold-plated pin and socket contacts and 14, 16, and 18 AWG GXL wire.

Test Groups 6 and 7 consisted of 2, 3, and 6 position standard diameter wire seal connectors with TE HDSF size 16 pin and socket contacts with 16 AWG GXL wire. Test Group 8 consisted of all positions.

b) Blind Plug Assembly Specimen Selection

Test Group	Blind Plug Assembly	Mating Assembly	Wire Cover	Wire Size	Wire Type	Mated Connector Quantity	Comments
1	2448820-1	776428-1	2292860-1	16 AWG	TXL	4	—
	2448820-2	776430-1	2292861-1			8	
	2448820-4	776434-1	2292863-1			8	
	2448820-6	776438-1	2292865-1			8	
2	2448820-1	776428-1	—	—	—	4	Sealing Plug
3	2448820-1	776428-1	—	16 AWG	TXL	8	—
	2448820-2	776430-1				8	
	2448820-4	776434-1				8	
	2448820-6	776438-1				8	
4	2448820-1	776428-1	2292860-1	—	—	8	Sealing Plug
	2448820-2	776430-1	2292861-1			8	
	2448820-4	776434-1	2292863-1			8	
	2448820-6	776438-1	2292865-1			8	
5	2448820-1	—	—	—	—	4	EJOT Delta PT® 30
	2448820-2					4	
	2448820-4					4	
	2448820-6					4	
6	2448820-1	776428-1	2292860-1	16 AWG	TXL	8	—
	2448820-2	776430-1	2292861-1			8	
	2448820-4	776434-1	2292863-1			8	
	2448820-6	776438-1	2292865-1			8	

Figure 5: Sample Quantities for Blind Plug Assembly Test Sequences

B. Test Sequence

Qualification inspection shall be verified by testing specimens as specified in Figure 3 and Figure 4.

4.2. Requalification Testing

If changes significantly affecting form, fit, or function are made to the product or manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality and reliability engineering.

4.3. Acceptance

Acceptance is based on verification that the product meets the requirements in Figure 2. Failures attributed to equipment, test setup, or operator deficiencies shall not disqualify the product. If product failure occurs, corrective action shall be taken and specimens resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

4.4. Quality Conformance Inspection

The applicable quality inspection plan shall specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification.

5. SETUP FIGURES

External Sealing Pressure

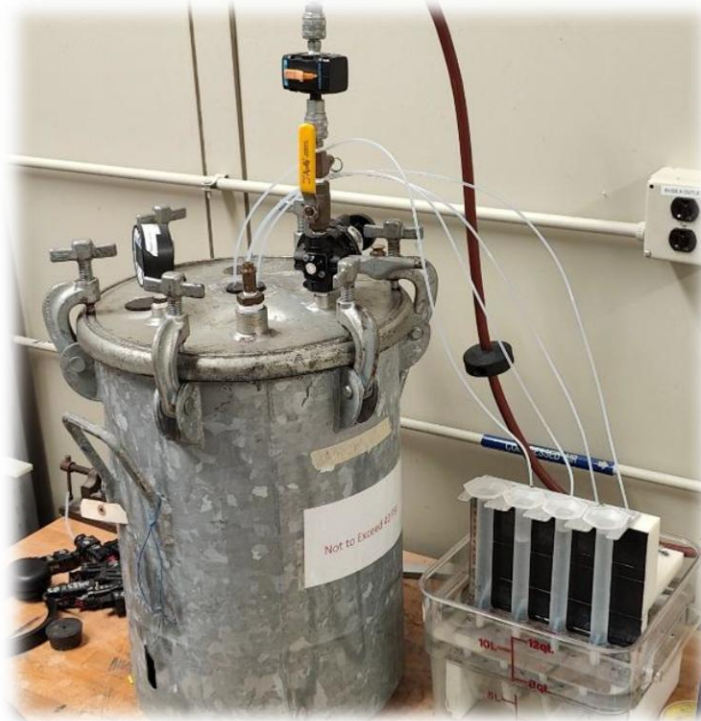


Figure 6

Ingress Protection (IPX7/IPX8)



Figure 7

High Pressure Spray (IPX9K)



Figure 8

Ingress Protection (IP6KX)



Figure 9

6. REVISION HISTORY

Rev.	Brief Description of Change	Change Date YYYY-MM-DD	Created By	Approved By
C	Chapter 2.2: - Added new specifications and relevant revision information Chapter 3.5: - Updated steam cleaning procedure for better clarification - Corrected test description wording from water ingress to Ingress Protection - Added accessory mounting torque test requirement Chapter 3.6: - Added Figure 4 for Blind Plug Assembly test sequences Chapter 4.1: - Added Figure 5 for Blind Plug Assembly specimen selection Added new Chapters: - Chapter 5: Setup Figures - Chapter 6: Revision History	2026-06-15	DB	DK