

AMPSEAL* Connectors, Reduced Wire Size

1. SCOPE

1.1. Content

This specification covers performance, tests, and quality requirements for the AMPSEAL* Reduced Wire Size Connectors

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

1.3. Qualification Test Results

Successful qualification testing on the subject product was completed on . The Qualification Test Report number for this testing is 501-160470. This document is on file at and available from TE.com

2. APPLICABLE DOCUMENTS AND FORMS

The following documents and forms constitute a part of this specification to the extent specified herein. Unless otherwise indicated, 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 referenced documents, this specification shall take precedence.

2.1. TE Documents

- 114-16016: Application Specification (AMPSEAL* Plug Connector and Header Assembly)
- 501-160470: Qualification Test Report (AMPSEAL* Reduced Wire Size)

2.2. Industry Documents

- EIA-364: Test Specification (General Requirements for Test Specifications)
- USCAR-2: Test Specification (Current Rating Verification)

2.3. Reference Document

- [109-197](#) Test Specification (TE Test Specification vs EIA and IEC Test Methods)

3. REQUIREMENTS

3.1. Design and Construction

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

3.2. Ratings

Voltage	Current	Temperature
250 Volts AC	See Figure	-40° to 105°C

3.3. Test Requirements and Procedures Summary

Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

TEST DESCRIPTION	REQUIREMENT	PROCEDURE
Examination of product	Meets requirements of product drawing and Application Specification 114-160206	EIA-364-18 Visual, dimensional, and functional per applicable quality inspection plan
ELECTRICAL		
Termination Resistance, Dry Circuit	20 AWG ≤ 0.55 milliohms 22 AWG ≤ 0.55 milliohms 24 AWG ≤ 0.64 milliohms	USCAR-21 Rev 4, 4.5.3 Voltage ≤ 20 milli volt Current ≤ 100 milli amp
Insulation Resistance	100 megaohms minimum	EIA-364-21E Test between adjacent contacts of mated specimens
Dielectric Withstand Voltage	One minute hold with no breakdown or flashover	EIA-364-20D 1000 volts AC at sea level. Test between adjacent contacts of mated specimens
Temperature Rise vs Current	40C maximum temperature rise at specified current	EIA-364-70B Measure temperature rise vs current. See Figures
Current Cycling	See Note	EIA-364-55A Condition B, Test Method 4. Subject mated specimens to 500cycles at 125% of rated current for 45 minutes ON and 15 minutes OFF
Voltage Drop	10 megaohms max	EIA-364-06C Test current 20AWG 3 amps 22AWG 1.8 amps 24AWG 1.2 amps
MECHANICAL		
Crimp Tensile	Wire Size Crimp AWG Tensile (N) 20 ≥75 22 ≥50 24 ≥50	USCAR-21 Rev4, 4.4 Determine crimp tensile at a maximum rate of 25.4mm per minute

Figure 1

TEST DESCRIPTION	REQUIREMENT	PROCEDURE
MECHANICAL (cont)		
Conductor Crimp Cross Section	Cross-section views of conductor crimps must comply with USCAR-21, Rev 4, Figure 4.3.5-1	USCAR-21 Rev 4 Cross-section analysis shall be performed on all conductor crimp applications at each crimp height setting (nominal, min, and max tolerance)
Terminal Insertion	10N maximum per contact	EIA-364-05B Measure force necessary to insert contacts into the housing
Maintenance Aging, Durability	Conditioning	EIA-364-24B Subject at least 8 circuits, or 10 percent, to five cycles of inserting and removing its respective terminal
Terminal Cycling	Conditioning	Cycle each sample 10 times
ENVIRONMENTAL		
Temperature/Humidity cycling	See Note	Subject mated specimens to 10 24 hour temperature humidity cycles. See Figure 3
Temperature/Humidity cycling	See Note	USCAR-21, Rev 4, 4.5.4 Expose test samples to four cycles of the sequence described below: a. 16 hours @ +65 °C ± 3 °C 95 to 98% RH b. 2 hours @ -40 °C ± 3 °C Humidity not controlled c. 2 hours @ +85 °C ± 3 °C Humidity not controlled d. 4 hours @ +23 °C ± 3 °C Humidity not controlled
Thermal Shock	See Note	USCAR-21, Rev 4, Figure 4.5.5.4 72 cycles One cycle consists of: 30 minutes at 125°C 5 minutes max transition 30 minutes at -40°C 5 minutes max transition

Figure 1 (cont)


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 2

TEST DESCRIPTION	REQUIREMENT	PROCEDURE
ENVIRONMENTAL		
Temperature Life	See Note	EIA-364-17C, Method A Subject mated specimens to temperature life at 105°C for 96 hours
Immersion	Leakage current not to exceed 50 micro-amperes at 48 volts DC	TE Spec 109-74-5. Immerse specimens to a depth of 100 mm in 5% salt water at a temperature of 23 ± 5°C for 1 hour. Check between adjacent circuits and each surface to reference electrode
Immersion	No ingress of water	ISO 20653:2006(E) One meter immersion for 30 minutes
Dust	Dust shall not penetrate the samples under test	ISO 20653:2006(E) Figure 1 20 cycles of 6 seconds of dust movement and 15 minutes off
High pressure Spray	No ingress of water	ISO 20653:2006(E) Fan jet nozzle, Figure 7, enclosure on turntable, speed (5 ± 1)r/min, spray at 0°, 30°, 60°, 90° distance 100 to 150 mm, water flow rate 14-16 l/min, water pressure 8000-10000 kPa, water temperature 80 ± 5 °C, 30 seconds per position
Pressure	No visible bubbles for 15 seconds	USCAR2-6, 5.6.6 Pressurize the sample to 7 psi for 15 seconds

Figure 1 (end)



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 2

3.4. Product Qualification and Requalification Test Sequence

TERMINAL TEST OR EXAMINATION	TEST GROUP (a)				
	1	2	3	4	5
	TEST SEQUENCE (b)				
Examination of product	1	1	1,7	1,7	1,7
Termination resistance, dry circuit			2,4,6		
Insulation resistance					2,5
Dielectric withstand voltage					3,6
Temperature rise vs current				4	
Current cycling				5	
Voltage drop				3,6	
Crimp tensile, USCAR-21		2			
Terminal cycling				2	
Conductor crimp cross section, USCAR-21	2				
Temperature/humidity cycling, Figure 3					4
Temperature/humidity cycling, USCAR-21			5		
Thermal shock			3		

Figure 2a

MAT SEAL TEST OR EXAMINATION	TEST GROUP (a)						
	1	2	3	4	5	6	7
	TEST SEQUENCE (b)						
Examination of product	1,11	1,6	1,5	1,3	1,4	1,3	1,3
Insulation resistance	2,5,9	2,5	2,4				
Dielectric withstand voltage	3,6,10						
Contact insertion				2			
Maintenance aging, durability					2		
Temperature life	7						2
Immersion, TE Spec 109-74-5	4,8						
Immersion, ISO 20653:2006		3					
Dust		4					
High pressure spray			3			2	
Pressure					3		

Figure 2b



NOTE

- (a) See paragraph 4.1.A
- (b) Numbers indicate sequence in which tests are performed

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Sample Selection

Specimens shall be prepared in accordance with applicable application and test specifications and shall be selected at random from current production

- a. Terminal Testing - Group 1 shall consist of 6 samples of each wire size, Group 2 shall consist of 100 samples of each wire size, Group 3 shall consist of 50 samples of each wire size, Group 4 shall consist of 10 samples of each wire size, Group 5 shall consist of 3 fully loaded plug assemblies with smallest and largest wire size
- b. Mat Seal Testing – Group 1 shall consist of 10 fully loaded plug assemblies with smallest wire size, Group 2 shall consist of 10 fully loaded plug assemblies with smallest wire size, Group 3 shall consist of 10 fully loaded plug assemblies with smallest wire size, Group 4 shall consist of 23 terminals with smallest wire size inserted into 3 plug assemblies, Group 5 shall consist of 2 fully loaded plug assemblies with smallest wire size, Group 6 shall consist of 1 fully loaded plug assembly with smallest wire and cavity plugs, Group 7 shall consist of 1 fully loaded plug assembly with smallest wire and cavity plugs

B. Test Sequence

Qualification inspection shall be verified by testing samples as specified in Figure 2.

4.2. Requalification Testing

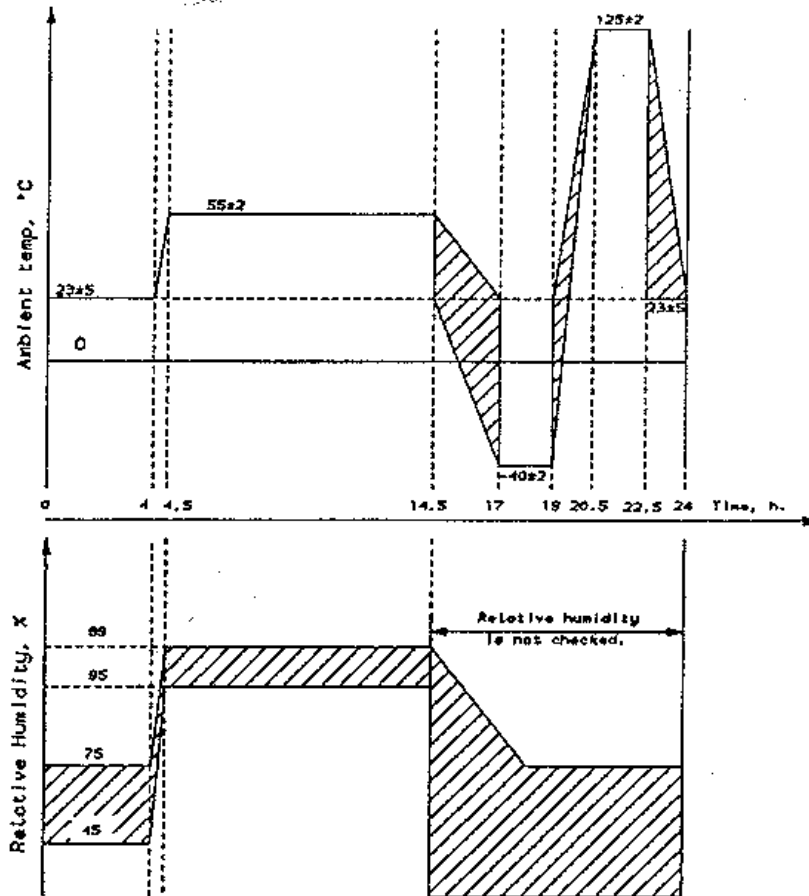
If changes significantly affecting form, fit or function are made to the product or manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality, and reliability engineering.

4.3. Acceptance

Acceptance is based on verification that the product meets the requirements of Figure 1. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify the product. When 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.



1. The temperature/humidity cycling test shall be carried out with the housing having full compliments of contacts. The specimen shall be tested with the cable assembled with the minimum and maximum cross sectional area that the contact system allows
2. Specimens shall be subjected to 10, 24 hour cycles of the following
 - a. Hold at $23 \pm 5^\circ\text{C}$ for 4 hours at 45 to 75% relative humidity (RH)
 - b. Raise chamber temperature to $55 \pm 2^\circ\text{C}$ at 95 to 99% RH within 0.5 hour
 - c. Hold at $55 \pm 2^\circ\text{C}$ for 10 hours at 95 to 99% RH
 - d. Lower chamber temperature to $-40 \pm 2^\circ\text{C}$ within 2.5 hours
 - e. Hold at $-40 \pm 2^\circ\text{C}$ for 2 hours
 - f. Raise chamber temperature to $125 \pm 2^\circ\text{C}$ within 1.5 hour
 - g. Hold at $125 \pm 2^\circ\text{C}$ for 2 hours
 - h. Recover to $23 \pm 5^\circ\text{C}$ within 1.5 hours
3. RH is controlled during periods d, e, f, g, and h
4. At the end of a cycle, the test may be interrupted. During the interruption, the specimens shall remain at ambient conditions defined in period 2a. Interruption time shall be noted in the test report

Figure 3
Temperature/Humidity Cycling