

CERTI-SEAL* Aerial Service Wire Splice Closure**1. SCOPE**

1.1. Content

This specification covers performance, tests and quality requirements for the CERTI-SEAL* Aerial Service Wire Splice Closure.

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 line was completed on 11Jan02. The Qualification Test Report number for this testing is 501-519. This documentation is on file at and available from Engineering Practices and Standards (EPS).

2. APPLICABLE DOCUMENTS

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. Tyco Electronics Documents

- 109-197: AMP Test Specifications vs EIA and IEC Test Methods
- 501-519: Qualification Test Report

2.2. Commercial Standards

- ASTM B117: Standard Method of Salt Spray (Fog) Testing
- EIA-364: Electrical Connector/Socket Test Procedures Including Environmental Classifications
- TR-NWT-000014: Generic Requirements for Aerial Cable Terminal
- TR-NWT-000251: Generic Requirements for Service Wire Splice for Buried Service Wire

3. REQUIREMENTS

3.1. Design and Construction

Product shall be of the design, construction 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 product drawing.

3.3. Ratings

- Voltage: 1000 volts AC
- Temperature: -40 to 60°C based on material

3.4. Performance and Test Description

Product is designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 1. Unless otherwise specified, all tests shall be performed at ambient environmental conditions per EIA-364.

3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
Initial examination of product.	Meets requirements of product drawing.	EIA-364-18. Visual and dimensional (C of C) inspection per product drawing.
Final examination of product.	Meets visual requirements.	EIA-364-18. Visual inspection.
ELECTRICAL		
Insulation resistance.	100 megohms minimum.	TR-NWT-000251, Section 4.2.2. Measure resistance between each two-wire conductor pair at 100 volts DC.
MECHANICAL		
Cable pullout.	Cable shall not pull out of closure under a 35 pound [15.88 kg] load. Maintain insulation resistance of 100 megohms minimum.	TR-NWT-000251. The specified load shall be suspended on the service wire in an assembled specimen for 1 minute. The service wire shall not pull out of the specimen nor shall the wire pairs support any of the load. Insulation resistance shall be measured after the test.
Torsion resistance.	Spliced wires shall not break or dislodge. Maintain insulation resistance of 100 megohms minimum.	TR-NWT-000251. A spliced service wire shall be clamped 4 inches [101.6 mm] from each side of the specimen. The installed specimen shall be rotated alternately 90 degrees to each side until a wire is dislodged within the contacts or up to a maximum of 10 rotations to each side. Insulation resistance shall be measured after the test.

Figure 1 (cont)

Test Description	Requirement	Procedure
Bending resistance.	Spliced wires shall not dislodge at contact terminations. Maintain insulation resistance of 100 megohms minimum.	TR-NWT-000251. The wires shall be bent 45 degrees from the axis of the wire, in a plane of the pair of the wires, and in a perpendicular plane. The specimen shall resist 10 wire bends in each of the 2 planes without dislodging the wires at the contacts. Insulation resistance shall be measured after the test.
Impact resistance.	Maintain insulation resistance of 100 megohms minimum. See Note.	TR-NWT-000251. Precondition specimens at 15°F [-9.5°C] for 2 hours. Specimens shall be constrained to prevent the terminal from moving. The impacting head shall have a 2 inch [50.8 mm] spherical diameter on the end that impacts the specimen. The specimen shall be positioned to ensure that the head strikes the specimen at the approximate mid-point of its dimensions. The impact shall be at a force of 5 ft-lbs [6.78 J]. Insulation resistance shall be measured after the test.
Drop test.	See Note.	TR-NWT-000251. Precondition specimens at 15°F [-9.5°C] for 8 hours. Drop specimens from a height of 6 feet [1.83 m] onto a hard surface.
ENVIRONMENTAL		
Humidity-temperature cycling.	Maintain insulation resistance of 100 megohms minimum. See Note.	TR-NWT-000251. Apply 48 volts DC between the tip and ring conductors of each pair. The insulation resistance measurements shall be made initially and weekly at both dwell temperatures of the cycle with an applied voltage of 100 volts DC. Cycling shall be done with 4 hour dwells at each temperature extreme, 40 and 140°F [4.44 and 60°C], and an average rate of temperature change of 25°F [13.9°C] per hour between the extremes. The relative humidity at the upper temperature dwell shall be maintained between 92 and 100%. Duration of the test shall be 30 days. Insulation resistance shall be measured after the test.

Figure 1 (cont)

Test Description	Requirement	Procedure
Low temperature handling.	Closure shall be installable at below freezing temperatures. Maintain insulation resistance of 100 megohms minimum. See Note.	TR-NWT-000251. The specimen and the wires to be spliced shall be pre-conditioned for a minimum of 2 hours at 15 to 20°F [-9.5 to -6.5°C] before splicing. Insulation resistance shall be measured after the test.
Thermal shock.	Maintain insulation resistance of 100 megohms minimum. See Note.	TR-NWT-000251. An assembled specimen shall be subjected to a 16 hour temperature cycle with 4 hour dwells at -40 and 140°F [-40 and 60°C] using a temperature change rate of 4 hours between dwells. Test shall run for 10 days or 15 complete cycles. Insulation resistance shall be measured after the test.
Water intrusion.	Maintain insulation resistance of 100 megohms minimum. See Note.	TR-NWT-000014. Specimens shall be mounted in its typical mounting position and sprayed with water. Cable stubs of the specimen shall extend a minimum of 12 inches [30 cm] beyond the entrance point of the closure. Temperature of the water shall be adjusted to be equal to or warmer than the temperature of the specimen to avoid condensation. A water spray head shall be used to direct water at the specimen so that the water stream will strike the specimen at a downward angle of 45 degrees. The flow of the water shall be 15 gallons [56.8 l] per minute, with 10 psi [68.9 kPa] head pressure. The spray head shall be adjusted so that water impinges fairly uniformly over the specimen surface. The duration of the test shall be five minutes per side. Insulation resistance shall be measured after the test.

Figure 1 (cont)

Test Description	Requirement	Procedure
Water immersion.	Maintain insulation resistance of 100 megohms minimum. See Note.	TR-NWT-000251. Immerse specimens in tap water to a depth of 24 inches [0.61 m] at a temperature between 65 and 80°F [18.5 and 26.7°C] with 48 volts DC between tip and ring of each pair for 14 days. The insulation resistance shall be measured after 1 hour, and daily thereafter at 100 volts DC.
Salt fog spray.	Maintain insulation resistance of 100 megohms minimum. See Note.	TR-NWT-000014. Subject specimens to a salt fog spray for 30 days in accordance with ASTM B117. During exposure, the test pairs at one end of the terminal shall be energized with 48 volts DC while the other end shall be cleared or capped. All tips shall be joined together and all rings shall be similarly treated as 1 ring conductor. The insulation resistance between each two-wire conductor pair shall be measured at 100 volts DC daily. The 48 volts DC shall be removed during the measurement process.
Sealant consistency.	Sealant shall not creep or run out of the closure.	TR-NWT-000251. Sealant, as packaged, shall be conditioned at 140°F [60°C] for 2 weeks.

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.*

Figure 1 (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)							
Initial examination of product	1	1	1	1	1	1	1	1
Insulation resistance	2,4,6,8	2,4,6,8	2,4,6		3,5	2,4	2,4	2,4
Cable pullout	3							
Torsion resistance		3						
Bending resistance		5						
Impact resistance			3					
Drop test				2				
Humidity-temperature cycling		7				3		
Low temperature handling					2			
Thermal shock	7		5		4			
Water intrusion							3	
Water immersion	5							
Salt fog spray								3
Sealant consistency				3				
Final examination of product	9	9	7	4	6	5	5	5

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

Figure 2

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. Test groups 1, 2 and 3 shall each consist of 4 closures with 2-pair splice and 4 closures with 6-pair splice. Test group 4 shall consist of 1 packaged closure. Test groups 5, 6, 7 and 8 shall each consist of 3 closures with 2-pair splice and 3 closures with 6-pair splice. All testing shall be done with unfilled splices.

B. Test Sequence

Qualification inspection shall be verified by testing specimens 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. 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.