



## Waterproof Signal Double Lock Connector System

### 1. SCOPE

#### 1.1. Content

This specification covers the requirements for application of the waterproof signal double lock connector system and twist and lock connector system with a 2.5 mm centerline. The waterproof signal double lock connector system is available in a 2 through 10 position, single row free hanging panel mount configuration for a 22 to 26 AWG wire range.

The twist and lock connector system is available in a 4 position panel mount configuration for a 22 to 26 AWG wire range.

The optional seals on the waterproof signal double lock and the twist and lock connector system are rated to IP67. If seals are required, the mating interface seal must be used in conjunction with the gang seal. Terminal position assurance (TPA) accessories are available for all wire sizes and may be used on connectors with or without optional seals.

#### 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 on the waterproof signal double lock connector system has been completed. The Qualification Test Report number is [501-143069](#).

Qualification testing on the twist and lock connector system has not yet been completed. The Qualification Test Report number will be issued upon completion of successful qualification testing.

#### 1.4. Revision History

- Correct housing material description in Paragraphs 3.2
- Update contact retention force spec to 25N Min.
- Update rated current to 3.0A for signal double lock connector in Paragraphs 3.3
- Add Glow Wire requirements for signal double lock connector in Figure 2
- Update single row position from 2P to 10P.

### 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

<a href="#">114-143067</a>	Application Specification – Waterproof Signal Double Lock and Twist and Lock Connector System
<a href="#">501-143069</a>	Qualification Test Report – Waterproof Signal Double Lock Connector System
<a href="#">501-161245</a>	Qualification Test Report – Waterproof Signal Double Lock Connector System (7 to 10P)

2.2. Commercial Standards and Specifications

- EIA-364 Electrical Connector/Socket Test Procedures Including Environmental Classifications
- IEC 60335 International Standard – Safety of Household and Similar Appliance
- IEC 60529 International Standard – Degrees of Protection Provided by Enclosures (IP Code)
- IEC 60695 International Standard – Fire Hazard Testing

2.3. Reference Documents

- 109-1 General Requirements for Testing
- 102-950 Qualification of Separable Interface Connectors

**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. Materials

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

- A. Housing: Polyamide 66 (PA66), Natural
- B. Contacts: Tin-Plated Copper Alloy
- C. Seals: Silicon Rubber (Blue)

3.3. Ratings

- A. Voltage Rating: 250 VAC
- B. Current Rating: See Figure 1

Wire Size [AWG]	Maximum Current [A]
22	3.0 for signal double lock connector 2.5 for twist and lock connector
24	2.2
26	2

**Figure 1**

- C. Temperature Rating: -30°C to +105°C

3.4. Performance Requirements and Test Description

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

## 3.5. Test Requirements and Procedure Summary

Test Description	Requirement	Procedure
Examination of Product	Meet requirements of product drawing and TE application specification (114-143067). After testing, there shall be no corrosive influence on the performance and no physical damage that would impair product performance.	EIA-364-18 Visual and dimensional (C of C) inspection per the product drawing.
<b>Electrical</b>		
Termination Resistance	Initial: 10 mΩ (milliohm) (maximum) Final: 20 mΩ (milliohm) (maximum)	EIA-364-23 Subject contacts assembled in a housing to 20mV (max.) open circuit at 10 mA. Measure between contact and at wire 75 mm from end of contact. Protect wire from corrosion during testing. Test on mated connectors. Subtract the resistance of the wire from the measurement. Connection per Figure 5.
Insulation Resistance	Initial: 1000 MΩ (minimum) Final (after thermal shock and humidity-temperature cycling): 1000 MΩ (minimum) Final (after water immersion): 500 MΩ (minimum)	EIA-364-21 Apply 500 VDC and hold for 2 minutes. Test between adjacent contacts on mated connector.
Dielectric Withstanding Voltage	1 minute hold without a creep discharge or flashover. Current Leakage: 5 mA (maximum)	EIA-364-20, Method B Hold at 1.1 kilovolts AC for 1 minute. Test between contacts in adjacent circuits on mated connector.
<b>Mechanical</b>		
Random Vibration	No electrical discontinuity greater than 1 μs shall occur. No physical damage that would impair product performance.	EIA-364-28, Condition VII, Level D Subject mated connector to 3.10G's RMS between 20 and 500 Hz. Apply 15 minutes in each of 3 mutually perpendicular planes.
Mechanical Shock	No electrical discontinuity greater than 1 μs shall occur. No physical damage that would impair product performance.	EIA-364-27, Condition H Subject mated connector to 30G's half-sine shock pulse of 11 ms duration. 3 drops each to normal and reversed directions of X, Y and Z axis. Total of 18 drops.
Durability	No physical damage that would impair product performance.	EIA-364-9 Manually mate and unmate connectors for 30 cycles.
Mating Force	(5.88 # of Positions) N (maximum)	EIA-364-13, Method A Operation Speed: 25.4 mm/min Measure the force required to mate connectors.
Unmating Force	(0.59 x # of Positions) N (minimum)	EIA-364-13, Method A Operation Speed: 25.4 mm/min Measure the force required to unmate connectors.

**Figure 2 (continued)**

Contact Retention Force	25 N (minimum)	EIA-364-29, Method A Operation Speed: 25.4 mm/min
Housing Locking Strength	35.3 N (minimum)	EIA-364-98 Operation Speed: 12.7 mm/min
Contact Insertion Force	7.84 N (maximum) per Contact	EIA-364-5
Crimp Tensile Strength	<b>Wire Size (AWG)</b>	<b>Crimp Tensile (minimum) (N)</b>
	22	49
	24	29.4
	26	19.6
EIA-364-8 Operation Speed: 25.4 mm/min Apply an axial pull-off load to a wire crimped onto contact secured in the testing machine		
Housing Panel Retention Force	98 N (minimum)	EIA-364-97 Operation Speed: 12.7 mm/min Measure panel retention force using a panel cut with nominal dimensions as specified in the TE customer drawing.
Temperature Rise	30°C maximum when subjected to rated current	EIA-364-70, Method 1 Measure the temperature rise above ambient created by the energizing current. Measurement must be taken at a place where there is no influence from air convection. Contacts to be assembled in housing with all circuits connected. The thermocouple is to be attached to the contact in the center circuit. Stabilize at a single current level until 3 readings at 5 minute intervals are within 1°C.
<b>Environmental</b>		
Thermal Shock	No physical damage that would impair product performance.	EIA-364-32, Method A, Test Condition I Subject mated specimens to 5 cycles between -55°C and 85°C with 30 minute dwell time at temperature extremes and 5 minute transition (maximum) between temperatures.
Humidity-Temperature Cycling	No physical damage that would impair product performance.	EIA-364-31, Method III Subject mated specimen to 10 cycles between 25°C and 65°C at 80-100% RH. Measurements to be recorded after specimens are held for 3 hours at ambient temperature and humidity. 1 cycle is 24 hours
Temperature Life	No physical damage that would impair product performance.	EIA-364-17, Method A, Test Condition 4, Test Condition A Subject mated connector to 105 ± 2°C for a duration of 96 hours. Measurements to be recorded after specimens are held for 3 hours at ambient temperature and humidity.
Salt Spray	Final Termination Resistance: 20 mΩ (maximum)	EIA-364-26, Test Condition B

Figure 2 (continued)

	No physical damage or corrosive influence that would impair product performance.	
Water Immersion	No ingress of water or physical damage that would impair product performance. Final Insulation Resistance: 500 MΩ (minimum)	IEC 60529, Test Condition 14.2.7 Immerse mated samples in water for 30 minutes with the lowest point of the sample 1 meter below the surface. Tank must be 8 inches (minimum) in diameter.
Dust Tightness	No ingress of dust or physical damage that would impair product performance.	IEC 60529, Test Conditions per IP6X requirements Subject mated connector to 8 hours of circulating talcum powder dust. 2 kg of powder per cubic meter of test chamber shall be used. No vacuum pressure required.
Glow Wire Test 750°C	Test at 750°C	IEC 60695-2-11 and IEC 60335-1 Perform visual check and take picture after the test.

**Figure 2 (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 3.*

3.6. Product Qualification and Requalification Test Sequence

TEST OR EXAMINATION	TEST GROUP (a)								
	1 Mechanical	2 Mechanical	3 Electrical	4 Environmental	5 Housing Electricals	6 Crimp	7 Panel Retention	8 Dust/Water Tightness	9 Glow Wire (d)
	TEST SEQUENCE (b)								
Examination of Product	1, 9	1, 5	1, 11	1, 5	1, 8	1, 3	1, 3	1, 6	1, 3
Termination Resistance	3, 7		2, 5, 7, 9	2, 4					
Insulation Resistance					2, 6			2, 4	
Dielectric Withstanding Voltage					3, 7				
Random Vibration	5		8						
Mechanical Shock	6								
Durability	4								
Mating Force	2								
Unmating Force	8								
Contact Insertion Force		2							
Contact Retention Force		3							
Housing Locking Strength		4							
Crimp Tensile Strength						2			
Housing Panel Retention Force							2		
Thermal Shock					4				
Humidity-Temperature Cycling			4(c)		5				
Temperature Life			6						
Salt Spray				3					
Water Immersion								3	
Dust Tightness								5	
Temperature Rise			3, 10						
Glow Wire (d)									3

Figure 3



**NOTE**

- (a) See paragraph 4.2.
- (b) Numbers indicate sequence in which tests are performed.
- (c) Connectors for these tests shall be preconditioned with 10 durability cycles.
- (d) Glow Wire Test performed on signal double lock connector and GWT versions of the twist and lock connector.

**4. QUALITY ASSURANCE PROVISIONS**

4.1. Test Conditions

Unless otherwise specified, all the tests shall be performed in any combination of the following test conditions shown in Figure 4.

Temperature	15°C – 35°C
Relative Humidity	45% – 75%
Atmospheric Pressure	86.6 – 106.6 kPa

**Figure 4**

4.2. Qualification Testing

A. Specimen Selection

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

B. Test Sequence

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

4.3. Requalification Testing

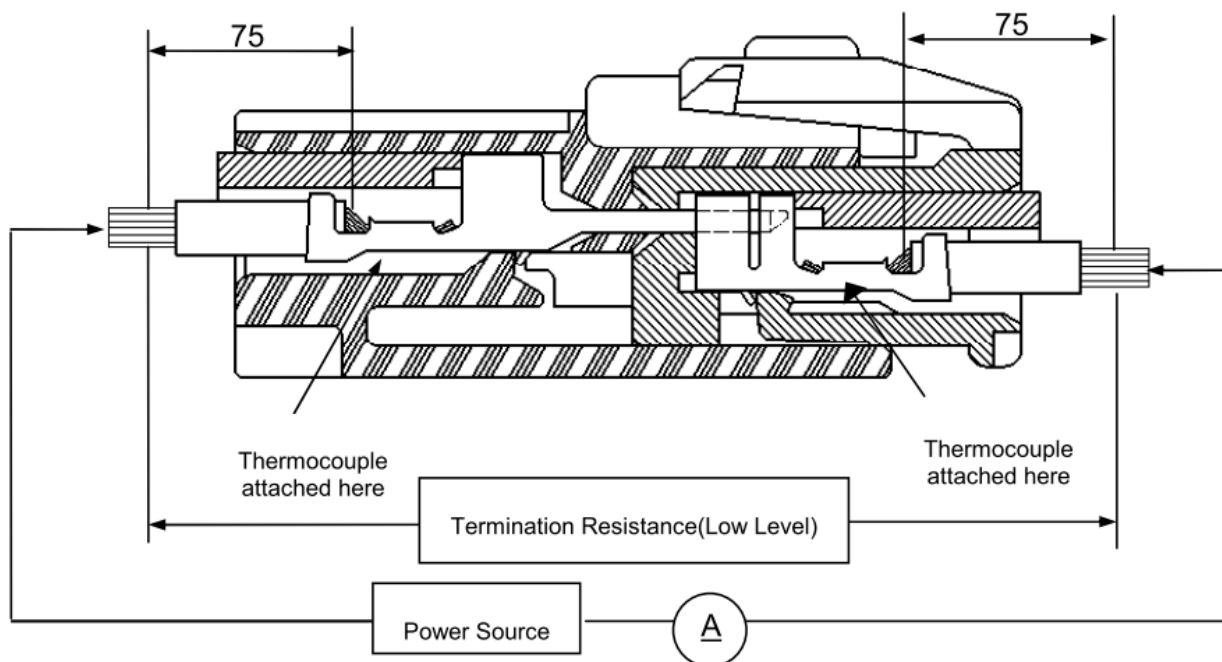
If changes significantly affecting form, fit or function are made to the product or manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality and reliability engineering.

4.4. 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.

4.5. 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.



**Figure 5: Terminal Resistance Measurement Method**