

POSITIVE LOCK Receptacle Housing .250 Series Material Evaluation

1. INTRODUCTION

1.1 Purpose

Testing was performed on the TE Connectivity POSITIVE LOCK housings to evaluate a new material.

1.2 Scope

This report covers the electrical, mechanical, and environmental performance of POSITIVE LOCK receptacle housing. The specimens listed in Table 1 of paragraph 1.4 were subject to the test sequence outlined in Table 2 of paragraph 1.5. Testing was performed at the Shanghai Electrical Components Test Laboratory during 11AUG2018 to 03SEP2018. The associated test number is TP-18-02247, and TP-18-02280.

1.3 Conclusion

Based on the test results, all specimens meet the specification. See summary of testing for more details.

1.4 Test Specimens

The specimens submitted for testing are identified in Table 1.

Table 1

Test Group	Part No	Description	Qty.	Comments
1	63933-2	PL 250 TERMINAL RECEPTACLE 18-14 AWG BR	5	
	3-521120-1	PL 250 HOUSING RECEPTACLE NYLON 6/6	5	
2	63933-2	PL 250 TERMINAL RECEPTACLE 18-14 AWG BR	5	
	60613-1	Test Tab	5	
3	63933-2	PL 250 TERMINAL RECEPTACLE 18-14 AWG BR	5	
	3-521120-1	PL 250 HOUSING RECEPTACLE NYLON 6/6	5	
	60613-1	Test Tab	5	
4	63933-2	PL 250 TERMINAL RECEPTACLE 18-14 AWG BR	5	
5	63933-2	PL 250 TERMINAL RECEPTACLE 18-14 AWG BR	12	
	60613-1	Test Tab	6	
6	63933-2	PL 250 TERMINAL RECEPTACLE 18-14 AWG BR	5	
	3-521120-1	PL 250 HOUSING RECEPTACLE NYLON 6/6	5	
7	63933-2	PL 250 TERMINAL RECEPTACLE 18-14 AWG BR	5	
	3-521120-1	PL 250 HOUSING RECEPTACLE NYLON 6/6	5	

1.5 Test Sequence

The specimens in Table 1 were subjected to the testing outlined in Table 2.

Table 2-Test sequence

Test	Test Group						
	1	2	3	4	5	6	7
	Test Sequence						
Examination of Product	1	1	1	1,3	1	1	1
Retention Force Test	2						
Mating Force& Unmating Force (without housing)		2					
Mating force/Engaging force/Extraction Force (with housing)			2				
Humidity and temperature cycling				2			
Temperature Raise					2		
Damp Heat Steady State						2	
Leakage Current Test						3	
Insulation Resistance							2

(a) The numbers indicate sequence in which tests were performed

1.6 Environmental Conditions

Unless otherwise stated, the following environmental conditions prevailed during testing:

Temperature: 15°C to 35°C
 Relative Humidity: 25% to 75%

2. SUMMARY OF TESTING

2.1 Retention Force Test

Refer to table 3 for contact retention force summary data in pounds and figure 1 for typical force profile plots. All recorded values were summarized as below.

Table 3-Contact retention force summary data in pounds, test set 1

Pounds	Contact Retention force
Minimum	14.25
Maximum	16.44
Mean	15.10
Standard Deviation	0.98
N=	5

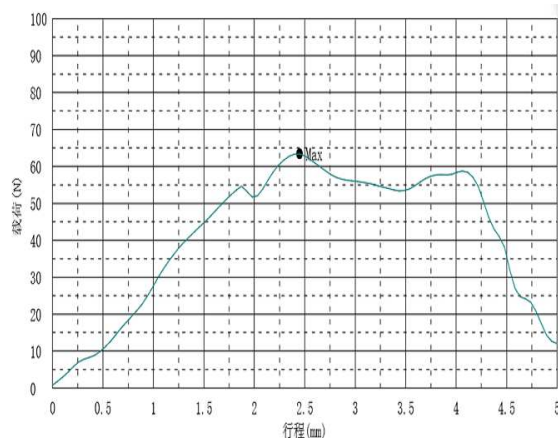


Figure 1 – test curve for retention force

2.2 Mating Force& Unmating Force (without housing)

Refer to table 4 for contact retention force summary data in pounds and figure 2 for typical force profile plot. All recorded values were summarized as below.

Table 4-Contact retention force summary data in pounds, test set 2

Pounds	Mating force	Unmating Force 1 st	Unmating Force 6 th
Minimum	5.17	38.13	9.21
Maximum	6.04	43.87	11.87
Mean	5.66	41.35	10.80
Standard Deviation	0.41	2.65	1.10
N=	5	5	5

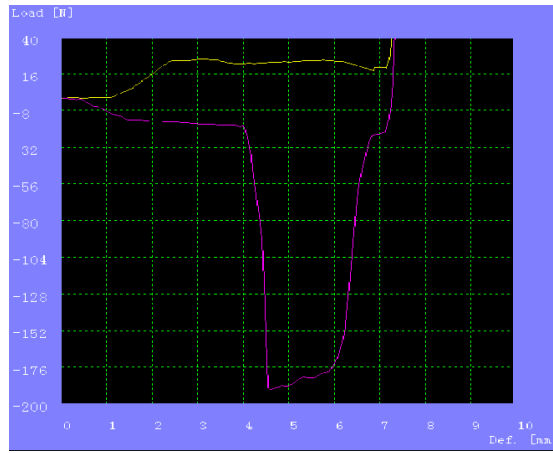


Figure 2 – test curve for Mating/Unmating force

2.3 Mating force/Engaging force/Extraction Force (with housing)

Refer to table 5 for contact retention force summary data in pounds and figure 3 for typical profile force plot. All recorded values were summarized as below.

Table 5-Contact retention force summary data in pounds, test set 3

Pounds	Mating force	Unmating Force
Minimum	5.33	4.56
Maximum	6.24	4.96
Mean	5.82	4.80
Standard Deviation	0.35	0.16
N=	5	5

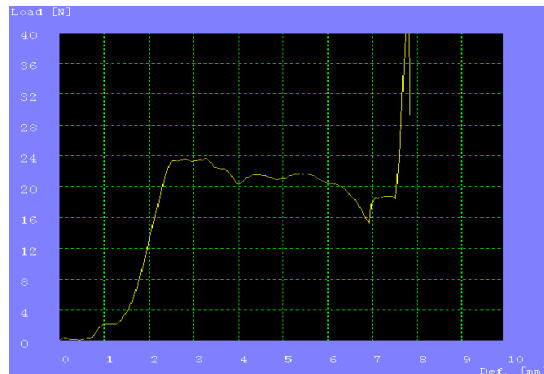
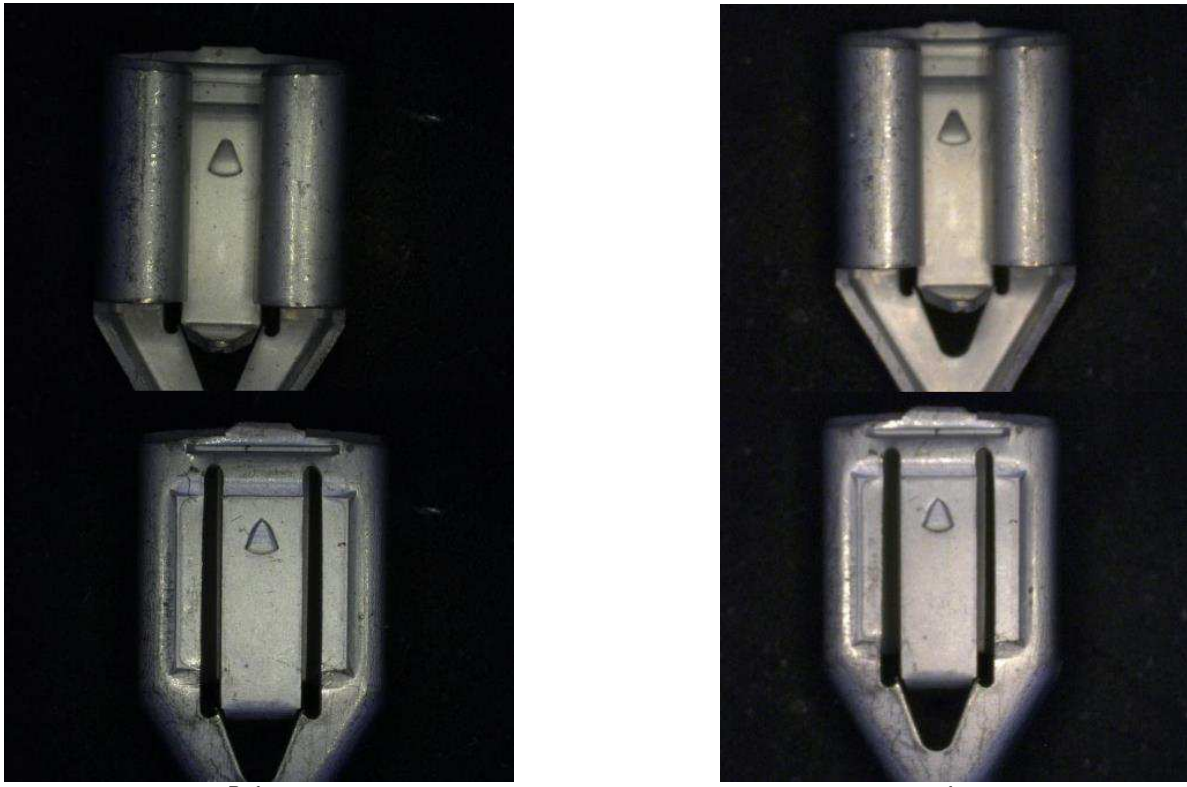


Figure - 3 test curve for Mating/Unmating force

2.4 Humidity and temperature cycling

Refer to figure - 4 for visual check before and after humidity and temperature cycling test, there were no physical damage after test.



Before after
Figure – 4 Visual check before and after humidity and temperature cycling

2.5 Temperature rise

Refer to table - 6 for contact temperature rise summary data in Celsius. All recorded values were under the product spec.

Table – 6 contact temperature rise summary in Celsius, test set 5

Unit: °C	Temperature rise
Current set	7A
Minimum	5.2
Maximum	6.6
Mean	6.05
Standard Deviation	0.63
N=	6
Requirement	30°C Max

2.6 Leakage current testing

Parts were held at 90F at 90% RH for at least 48 hours before testing. Refer to table - 7 for contact DWV test result and refer to table – 8 for Dielectric strength test result.

Table – 7 DWV test summary, test set 6

Specimen ID	1	2	3	4	5
DWV result	No Breakdown	No Breakdown	No Breakdown	No Breakdown	No Breakdown

Table – 8 dielectric strength test summary, test set 6

Unit: mA	Leakage Current
Minimum	0.019
Maximum	0.022
Mean	0.02
Standard Deviation	0.001
N=	5

2.7 Insulation Resistance

Refer to table - 9 for contact resistance summary data. All recorded values were summarized as below.

Table – 9 dielectric strength test summary, test set 7

Unit: 10 ¹¹ Ω	Leakage Current
Minimum	1.23
Maximum	4.13
Mean	2.42
Standard Deviation	1.13
N=	5

3. TEST METHODS

3.1 Examination of Product

Visual Inspection: appearance, and function of specimens pursuant to the applicable inspection plan.

Requirements: Meets requirements of product drawing and no physical damage.

Test Method: EIA-364-18B-2007(R2012)

3.2 Retention Force Test

The housing was clamped to a free-floating x/y and rotational table at the base of the tensile/compression machine. The wire of the terminal was clamped in an air jaw to the moveable crosshead of the tensile/compression machine. Force was then applied in an upward direction at a rate of 100 mm/min until the terminal was fully removed from the housing. Refer to figure – 5 for test set up.



Figure – 5 retention force test set up

3.3 Mating Force & Unmating Force (without housing)

Execute visual check before test, and take picture. Mount test specimen with fixtures in a normal manner, and take picture set up as figure - 6. Edit test procedure according to test method then perform test. Test Condition: Measure the force required to insert contact into housing. Test Speed: 25.4 mm/min. Export test data and test curve, execute visual check and take picture after test. Refer to figure 5 for an image of the typical test setup. Testing was performed in accordance with EIS-364-05B

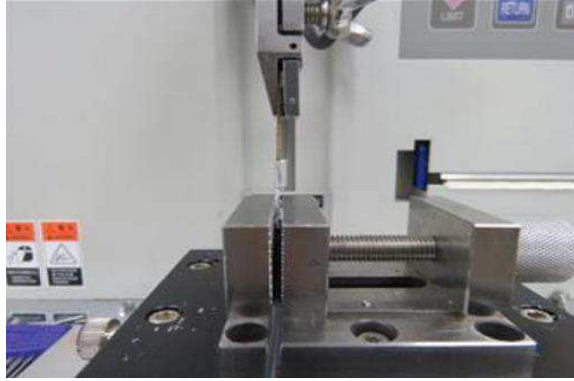


Figure – 6 Mating/Unmating test set up

3.4 Mating force/Engaging force/Extraction Force (with housing)

The housing was clamped to a free-floating x/y and rotational table at the base of the tensile/compression machine. The wire of the terminal was clamped in an air jaw to the moveable crosshead of the tensile/compression machine. Force was then applied in an upward direction at a rate of 100 mm/min until the terminal was fully removed from the housing.



Figure – 7 Mating/Unmating test set up

3.5 Humidity and temperature cycling

Subject mated contacts to environment at 37.8° C and 96% RH for 24 hours. Sample shall be placed in the chamber out of the path of falling water drops. Measurement shall be taken upon completion of exposure period. Refer to figure - 15 for test setup. Test was performed accordance with ANSI/EIA-364-31E-2017.



Figure - 8 test set up for humidity and temperature test

3.6 Temperature rise test

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. Stabilize temperature at a single current level until 3 readings at 5 minute intervals are within 1° C. The probing point shall be soldered to stabilize the measurement reading. Refer to figure - 10 for an image of the typical test setup. Testing was performed in accordance with IEC 60512-5-1-2002.

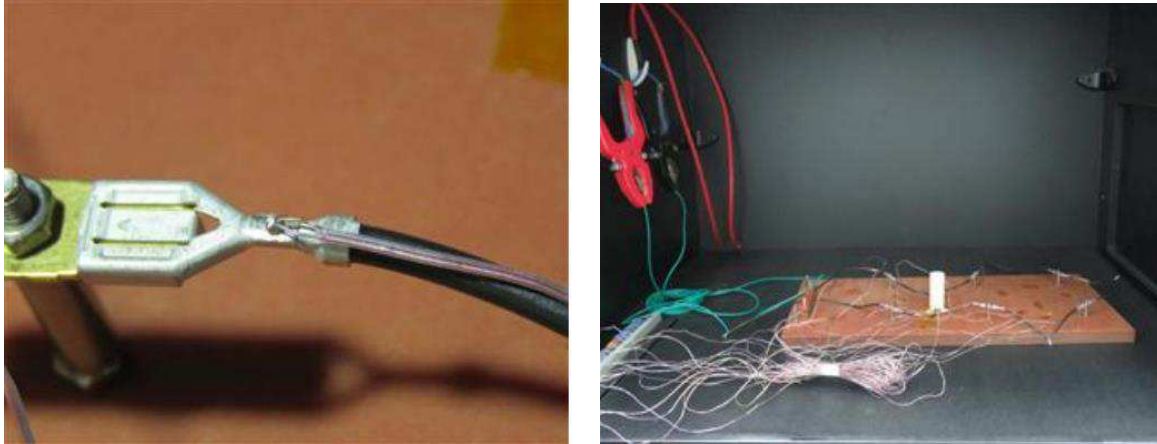


Figure - 9 typical thermocouple location and test setup

3.7 Leakage Current Test

Pre-treatment Conditioned – Parts were held at 90F at 90% RH for at least 48 hours before testing. Refer to figure – 10 for typical Temperature-Humidity chamber set up; The test voltage shall be raised from zero to the specified value as uniformly as possible, at a rate of approximately 500 volts (AC or DC) per second. Execute visual check before test, and take picture of initial testing to make insurance of the same method is used. Dielectric withstanding voltage was measured separately between the surface of housing and contact at 2 kV for 2 minutes. Execute visual check for inside of the lid after test. Measure and record the performance of the specimens if they got leakage. Foil wrap was set 1mm between the edge of specimen. Refer to figure – 11 for Dielectric strength test setup.

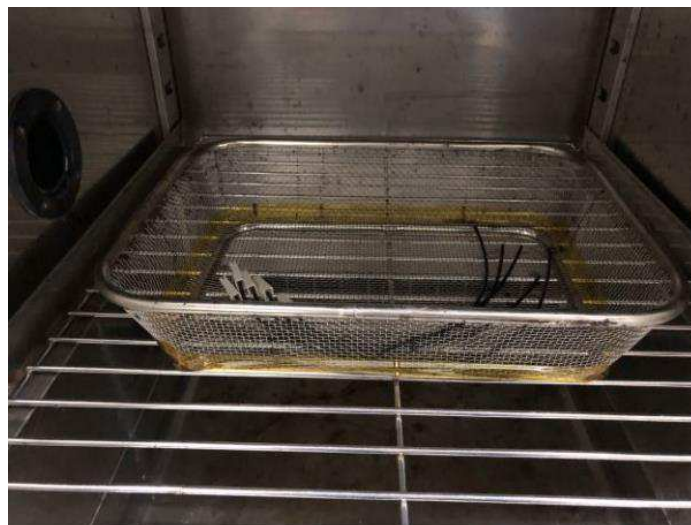


Figure - 10 typical Temperature-Humidity chamber set up



Figure - 11 typical Dielectric strength test setup

3.8 Contact Resistance

The specimens were tested in the unmated condition. Measure and record the insulation resistance separately between the surface of housing and contact at 500V DC for 1 minute. Take picture of initial testing to make insurance of the same method is used. Measure and record the performance of the specimens. Execute visual check after test. Refer to figure – 12 for typical resistance test setup.



Figure - 12 typical contact resistance test setup