

Nickel Plated SOLISTRAND* STRATO-THERM* Terminal

1. INTRODUCTION

1.1 Purpose

Testing was performed on the TE Connectivity* (TE) Nickel Plated SOLISTRAND STRATO-THERM Terminals to determine their conformance to the requirements of Product Specification 108-32046, Rev. A.

1.2 Scope

This report covers the electrical, mechanical and environmental performance of the Nickel Plated SOLISTRAND STRATO-THERM Terminals. Testing was performed at the Harrisburg Electrical Components Test Laboratory and Experior Laboratories, Inc. (1635 Ives Avenue Oxnard, CA 93033) between September 9, 2013 and December 17, 2013. The documentation for this testing is on file at the Harrisburg Electrical Components Test Laboratory and the test file number is EA20130438T.

1.3 Conclusion

The specimens listed in paragraph 1.4 met the electrical, mechanical and environmental performance requirements of Product Specification 108-32046, Rev. A. See paragraph 2 for results summaries for all testing.

1.4 Test Specimens

The test specimens were representative of normal production lots. A Certification of Conformance was issued by the test requestor. Specimens identified in Tables 1 through 4 were used for testing for Test Groups 1 through 4, respectively.

Table 1 – Test Group 1 Test Specimens

Test Set	Qty	Part Number	Description
1	10	323180 Rev. L	5 double ended, 1/0 AWG terminals, with 1/0 AWG SAE AS22759/2 wire
5	10	323177 Rev. K	5 double ended, 2 AWG terminals, with 2 AWG SAE AS22759/2 wire
9	10	323173 Rev. E	5 double ended, 4 AWG terminals, with 4 AWG SAE AS22759/2 wire
13	10	323169 Rev. N	5 double ended, 6 AWG terminals, with 6 AWG SAE AS22759/2 wire
17	10	323166 Rev. H	5 double ended, 8 AWG terminals, with 8 AWG SAE AS22759/2 wire
21	10	323062 Rev. S	5 double ended, 10 AWG terminals, with 10 AWG SAE AS22759/12 wire
25	10	323062 Rev. S	5 double ended, 12 AWG terminals, with 12 AWG SAE AS22759/12 wire
29	10	322693 Rev. T	5 double ended, 14 AWG terminals, with 14 AWG SAE AS22759/12 wire
33	10	322693 Rev. T	5 double ended, 16 AWG terminals, with 16 AWG SAE AS22759/12 wire
37	10	323219 Rev. P	5 double ended, 16 AWG terminals, with 16 AWG SAE AS22759/12 wire
41	10	323219 Rev. P	5 double ended, 18 AWG terminals, with 18 AWG SAE AS22759/12 wire
45	10	323219 Rev. P	5 double ended, 20 AWG terminals, with 20 AWG SAE AS22759/12 wire
49	10	323219 Rev. P	5 double ended, 22 AWG terminals, with 22 AWG SAE AS22759/12 wire
53	10	1958423-1 Rev. 1	5 double ended, 22 AWG terminals, with 22 AWG SAE AS22759/12 wire
57	10	1958423-1 Rev. 1	5 double ended, 24 AWG terminals, with 24 AWG SAE AS22759/12 wire
61	10	1958423-1 Rev. 1	5 double ended, 26 AWG terminals, with 26 AWG SAE AS22759/12 wire

Table 2 – Test Group 2 Test Specimens

Test Set	Qty	Part Number	Description
2	10	323180 Rev. L	5 double ended, 1/0 AWG terminals, with 1/0 AWG SAE AS22759/2 wire
6	10	323177 Rev. K	5 double ended, 2 AWG terminals, with 2 AWG SAE AS22759/2 wire
10	10	323173 Rev. E	5 double ended, 4 AWG terminals, with 4 AWG SAE AS22759/2 wire
14	10	323169 Rev. N	5 double ended, 6 AWG terminals, with 6 AWG SAE AS22759/2 wire
18	10	323166 Rev. H	5 double ended, 8 AWG terminals, with 8 AWG SAE AS22759/2 wire
22	10	323062 Rev. S	5 double ended, 10 AWG terminals, with 10 AWG SAE AS22759/12 wire
26	10	323062 Rev. S	5 double ended, 12 AWG terminals, with 12 AWG SAE AS22759/12 wire
30	10	322693 Rev. T	5 double ended, 14 AWG terminals, with 14 AWG SAE AS22759/12 wire
34	10	322693 Rev. T	5 double ended, 16 AWG terminals, with 16 AWG SAE AS22759/12 wire
38	10	323219 Rev. P	5 double ended, 16 AWG terminals, with 16 AWG SAE AS22759/12 wire
42	10	323219 Rev. P	5 double ended, 18 AWG terminals, with 18 AWG SAE AS22759/12 wire
46	10	323219 Rev. P	5 double ended, 20 AWG terminals, with 20 AWG SAE AS22759/12 wire
50	10	323219 Rev. P	5 double ended, 22 AWG terminals, with 22 AWG SAE AS22759/12 wire
54	10	1958423-1 Rev. 1	5 double ended, 22 AWG terminals, with 22 AWG SAE AS22759/12 wire
58	10	1958423-1 Rev. 1	5 double ended, 24 AWG terminals, with 24 AWG SAE AS22759/12 wire
62	10	1958423-1 Rev. 1	5 double ended, 26 AWG terminals, with 26 AWG SAE AS22759/12 wire

Table 3 – Test Group 3 Test Specimens

Test Set	Qty	Part Number	Description
3	10	323180 Rev. L	5 double ended, 1/0 AWG terminals, with 1/0 AWG SAE AS22759/2 wire
7	10	323177 Rev. K	5 double ended, 2 AWG terminals, with 2 AWG SAE AS22759/2 wire
11	10	323173 Rev. E	5 double ended, 4 AWG terminals, with 4 AWG SAE AS22759/2 wire
15	10	323169 Rev. N	5 double ended, 6 AWG terminals, with 6 AWG SAE AS22759/2 wire
19	10	323166 Rev. H	5 double ended, 8 AWG terminals, with 8 AWG SAE AS22759/2 wire
23	10	323062 Rev. S	5 double ended, 10 AWG terminals, with 10 AWG SAE AS22759/12 wire
27	10	323062 Rev. S	5 double ended, 12 AWG terminals, with 12 AWG SAE AS22759/12 wire
31	10	322693 Rev. T	5 double ended, 14 AWG terminals, with 14 AWG SAE AS22759/12 wire
35	10	322693 Rev. T	5 double ended, 16 AWG terminals, with 16 AWG SAE AS22759/12 wire
39	10	323219 Rev. P	5 double ended, 16 AWG terminals, with 16 AWG SAE AS22759/12 wire
43	10	323219 Rev. P	5 double ended, 18 AWG terminals, with 18 AWG SAE AS22759/12 wire
47	10	323219 Rev. P	5 double ended, 20 AWG terminals, with 20 AWG SAE AS22759/12 wire
51	10	323219 Rev. P	5 double ended, 22 AWG terminals, with 22 AWG SAE AS22759/12 wire
55	10	1958423-1 Rev. 1	5 double ended, 22 AWG terminals, with 22 AWG SAE AS22759/12 wire
59	10	1958423-1 Rev. 1	5 double ended, 24 AWG terminals, with 24 AWG SAE AS22759/12 wire
63	10	1958423-1 Rev. 1	5 double ended, 26 AWG terminals, with 26 AWG SAE AS22759/12 wire

Table 4 – Test Group 4 Test Specimens

Test Set	Qty	Part Number	Description
4	10	323180 Rev. L	5 double ended, 1/0 AWG terminals, with 1/0 AWG SAE AS22759/2 wire
8	10	323177 Rev. K	5 double ended, 2 AWG terminals, with 2 AWG SAE AS22759/2 wire
12	10	323173 Rev. E	5 double ended, 4 AWG terminals, with 4 AWG SAE AS22759/2 wire
16	10	323169 Rev. N	5 double ended, 6 AWG terminals, with 6 AWG SAE AS22759/2 wire
20	10	323166 Rev. H	5 double ended, 8 AWG terminals, with 8 AWG SAE AS22759/2 wire
24	10	323062 Rev. S	5 double ended, 10 AWG terminals, with 10 AWG SAE AS22759/12 wire
28	10	323062 Rev. S	5 double ended, 12 AWG terminals, with 12 AWG SAE AS22759/12 wire
32	10	322693 Rev. T	5 double ended, 14 AWG terminals, with 14 AWG SAE AS22759/12 wire
36	10	322693 Rev. T	5 double ended, 16 AWG terminals, with 16 AWG SAE AS22759/12 wire
40	10	323219 Rev. P	5 double ended, 16 AWG terminals, with 16 AWG SAE AS22759/12 wire
44	10	323219 Rev. P	5 double ended, 18 AWG terminals, with 18 AWG SAE AS22759/12 wire
48	10	323219 Rev. P	5 double ended, 20 AWG terminals, with 20 AWG SAE AS22759/12 wire
52	10	323219 Rev. P	5 double ended, 22 AWG terminals, with 22 AWG SAE AS22759/12 wire
56	10	1958423-1 Rev. 1	5 double ended, 22 AWG terminals, with 22 AWG SAE AS22759/12 wire
60	10	1958423-1 Rev. 1	5 double ended, 24 AWG terminals, with 24 AWG SAE AS22759/12 wire
64	10	1958423-1 Rev. 1	5 double ended, 26 AWG terminals, with 26 AWG SAE AS22759/12 wire

1.5 Test Sequence

The specimens listed in Tables 1 through 4 were tested to the test sequences listed in Table 5.

Table 5 – Test Sequences

Test or Examination	Test Group			
	1	2	3	4
	Test Sequence (a)			
Initial Examination of Product	1	1	1	1
Voltage Drop	2, 4	2, 4	2, 4	2, 4
Current Cycling	3			
Vibration		3		
Termination Tensile Strength		6	6	
Salt Spray			3	
Temperature Cycling				3
Final Examination of Product	5	5	5	5

NOTE

(a) Numbers indicate sequence which tests are performed.

1.6 Environmental Conditions

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

Temperature: 15°C to 35°C
 Relative Humidity: 20% to 80%

2. SUMMARY OF TESTING

2.1 Initial Visual Examination (All Groups)

Per Product Specification 108-32046, Rev. A, a Certification of Conformance was issued stating that all specimens in this test package have been produced, inspected and accepted as conforming to product drawing requirements.

2.2 Voltage Drop (All Groups)

Initially and after testing, all specimens in all test groups had voltage drop measurements that were less than the maximum millivolt drop values of an equivalent length of wire plus the appropriate value, as specified in Figure 3 of Product Specification 108-32046, Rev. A and SAE AS7928B, paragraph 3.5.1.

2.3 Current Cycling (Group 1)

Following current cycling, all specimens met the subsequent testing criteria as specified in SAE AS7928B, paragraph 3.5.2.

2.4 Vibration (Group 2)

Following vibration, all specimens met the visual requirements and criteria as specified in Figure 1, Note 2 of Product Specification 108-32046, Rev. A. All specimens met the subsequent testing criteria and there was no evidence of cracking, breaking, or loosening of parts, as specified in SAE AS7928B, paragraph 3.5.6.

2.5 Termination Tensile Strength (Group 2 and Group 3)

All specimens met the minimum tensile strength requirement as specified in Figure 3 of Product Specification 108-32046, Rev. A and SAE AS7928B, paragraph 3.5.7, prior to breaking the terminal, breaking the conductor or the terminal separating from the conductor.

2.6 Salt Spray (Group 3)

Following salt spray exposure, all specimens met the visual requirements and criteria specified in Figure 1, Note 1 and Note 2 of Product Specification 108-32046, Rev. A. All specimens met the subsequent testing criteria specified in SAE AS7928B, paragraph 3.5.4.

2.7 Temperature Cycling (Group 4)

Following temperature cycling exposure, all specimens met the visual requirements and criteria specified in Figure 1, Note 2 of Product Specification 108-32046, Rev. A.

2.8 Final Visual Examination

All specimens met the visual requirements and criteria specified in Figure 1, Note 1 and Note 2 of Product Specification 108-32046, Rev. A.

3. TEST METHODS

3.1 Initial Examination of Product

All specimens were visually examined by eye corrected to normal vision without magnification, in accordance with EIA-364-18B. A Certification of Conformance was issued stating that the samples in this test package have been produced, inspected and accepted as conforming to product drawing requirements, and made using the same core manufacturing processes and technologies as production parts.

3.2 Voltage Drop

The specimens were tested as specified in Product Specification 108-32046 Rev. A and SAE AS7928B paragraph 4.7.2.

The terminals were securely bolted back-to-back in a test chain with a minimum clearance in free air of 18 inches in all directions. The test chain was connected in series with a calibrated shunt and connected to a dc power supply. The test chain was energized at the specified test current until thermal stability was achieved. Thermal stability is defined as three consecutive readings within $\pm 1^{\circ}\text{C}$ at intervals of three minutes each.

The specimen's voltage drop measurements were taken 1/16" from the back of the wire-receiving end of the terminal to the intersection of the tongue and barrel. Four voltage drop measurements of the current-carrying conductor were made at the same probe distance as that of the test specimens. These four measurements were averaged, and recorded as the equivalent length of wire (EWL) voltage drop. These EWL's were then added to the appropriate value specified in Figure 3 of Product Specification 108-32046, Rev. A to determine the maximum allowable voltage drop requirement.

3.3 Current Cycling

The specimens were tested as specified in Product Specification 108-32046 Rev. A and SAE AS7928B paragraph 4.7.3.

The terminals were securely bolted back-to-back in a test chain with a minimum clearance in free air of 18 inches in all directions. The test chain was connected in series with a calibrated shunt and connected to a dc power supply as shown in Figure 1. The test chain was then subjected to 50 current cycles. Each current cycle consisted of 30 minutes at 125% of the test current, followed by 15 minutes at no load, as specified in Figure 3 of Product Specification 108-32046 Rev. A and Table 2 of SAE AS7928B.

3.4 Vibration

The test specimens were subjected to a sinusoidal vibration test as stated in specification SAE AS7928B, paragraph 4.7.7 in accordance with specification MIL-STD-202G, Method 201.

The test specimens were subjected to a simple harmonic motion having an amplitude of 0.06 inch double amplitude (maximum total excursion). The vibration frequency was varied uniformly between the approximate limits of 10 to 55 Hertz (Hz). The entire frequency range of 10 to 55 Hz and return to 10 Hz was traversed in approximately 1 minute.

The motion was applied to the specimens in two mutually perpendicular axes to each other and the axes of the wire. For test specimens 12 AWG and larger, this motion was applied for a period of 18 hours on each of the two axes for a total period of 36 hours per test specimen. For test specimens 14 AWG and smaller, this motion was applied for a period of 2 hours on each of the two axes for a total period of 4 hours per test specimen. The motion was applied to the two mutually perpendicular axes by changing the direction of the motion instead of changing the mounting configuration.

3.5 Termination Tensile Strength

The specimens were subjected to a tensile pull test in accordance with paragraph 4.7.8 of SAE AS7928B.

Prior to testing, the double ended specimens were cut in half so that each termination could be subjected to the termination tensile strength test individually. The terminal ends of the specimens were bolted to a fixture that was secured to the tensile/compression machine base. The wire ends of the specimens were held in a clamp mounted to the load cell of the tensile/compression machine crosshead.

The crosshead was raised at a rate of 1 inch per minute until failure occurred. The maximum force required to remove the conductor from the terminal, break the terminal or break the conductor was recorded as the crimp tensile strength.

3.6 Salt Spray

The test specimens were subjected to a salt spray test as stated in specification SAE AS7928B, paragraph 4.7.5 in accordance with specification MIL-STD-202G, Method 101, Test Condition B.

The specimens were subjected to the salt spray for a period of 48 hours. Following the exposure they were washed with distilled water and air dried for a minimum of 1 hour prior to examination.

3.7 Temperature Cycling

The test specimens were subjected to a temperature cycling test as stated in specification IEC 60512-11-4, First Edition 2002-02, in accordance with specification IEC 60068-2-14, Rapid Change of Temperature. Testing was performed at Experior Laboratories, Inc.

Per Product Specification 108-32046 Rev. A the specimens were subjected to 50 cycles of temperature cycles as follows:

30 minutes at -55°C
30 minutes at room temperature
30 minutes at 343°C
30 minutes at room temperature

3.8 Final Examination of Product

All specimens were visually examined by eye corrected to normal vision without magnification, in accordance with EIA-364-18B.