# ANGLED ENTRY JACK FOR CATEGORY 6 APPLICATIONS

## 1. INTRODUCTION

### 1.1. Purpose

Testing was performed on the TE Connectivity (TE) Angled Entry Jacks for Category 6 Applications to determine their conformance to the requirements of Product Specification 108-60104 Revision A.

### 1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the Angled Entry Jacks for Category 6 Applications. Testing was performed at the Engineering Assurance Product Testing Laboratory between 26Nov14 and 07May15.

### 1.3. Conclusion

The Angled Entry Jacks for Category 6 Applications listed in paragraph 1.5., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-60104 Revision A.

### 1.4. Product Description

TE Connectivity (TE) Angled Entry Jacks for Category 6 Applications are designed to meet requirements for applications such as networking, computer, and telecommunications equipment.

### 1.5. Test Specimens

Test specimens were representative of normal production lots. Specimens identified with the following part numbers were used for test:

| Test Group | Quantity | Part Number | Description |
|---|---|---|---|
| 1,2,3,4,5 | 50 | 2170668-1 | Angled Entry Jacks for Category 6 Applications |
| 6,7,8,9 | 12 | 2170668-1 | Angled Entry Jacks for Category 6 Applications |

Figure 1

### 1.6. Environmental Conditions

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

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

1.7. Qualification Test Sequence

| Test or Examination | Test Group (a) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| | Test Sequence (b) | | | | | | | | | |
| Initial examination of product | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Solderability | | | | | | | 2 | | | |
| Resistance to soldering heat | | | | | | 2 | | | | |
| Contact resistance | 2,6 | 2,6 | 2,9 | | 2,6 | | | | | |
| Shield Contact Resistance | 3,5 | 3,5 | 3,8 | | 3,5 | | | | | |
| Insulation resistance | | | | 2,5 | | | | | | |
| Surge Test | | | | | | | | | 2 | |
| Withstanding voltage | | | | | | | | 2 | | |
| Vibration, random | 4 | | | | | | | | | |
| Durability | | | 4,7(c) | | | | | | | |
| Mating force. | | | | | | 3 | | | | |
| Unmating force. | | | | | | 4 | | | | |
| Plug retention in jack. | | | | | | 5 | | | | |
| Thermal shock. | | | 5(c) | 3 | | | | | | |
| Humidity/temperature cycling. | | | 6(c) | 4 | | | | | | |
| Temperature life. | | 4 | | | | | | | | |
| Corrosion Testing | | | | | 4 | | | | | |
| Final examination of product | 7 | 7 | 10 | 6 | 7 | 6 | 3 | 3 | 3 | |

NOTE

*(a) See paragraph 4.1.A.*

*(b) Numbers indicate sequence in which tests are performed.*

*(c) 1.-Perform 650 mating-unmating cycles before thermal shock and measure Contact Resistance.*

*2.-Perform 50 cycles of thermal shock and measure Contact Resistance.*

*3.-Perform another 50 cycles of thermal shock and measure Contact Resistance.*

*4.- Perform 33 mating-unmating cycles followed by 7 days of Humidity-temperature cycling.*

*5.- Perform another 33 mating-unmating cycles followed by 14 days of Humidity-temperature cycling.*

Figure 2

## 2. SUMMARY OF TESTING

2.1. Initial Examination of Product - All Test Groups

All specimens submitted for testing were representative of normal production lots. They were inspected and accepted by the Quality Assurance Department.

2.2. Contact Resistance - Test Groups 1, 2, 3 and 5

All contact resistance measurements, taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage had a change in resistance (ΔR) of less than 30 milliohms after testing.

| Test Group | Number of Data Points | Condition | Termination Resistance | | |
|---|---|---|---|---|---|
| | | | Min | Max | Mean |
| 1 | 80 | Initial | 17.15 | 28.57 | 21.68 |
| | | After vibration ΔR | -13.57 | 9.87 | -2.43 |
| 2 | 80 | Initial | 17.09 | 29.19 | 20.77 |
| | | After temperature life ΔR | -6.51 | 18.27 | 4.51 |
| 3 | 80 | Initial | 19.37 | 24.86 | 22.19 |
| | | After durability/thermal shock ΔR | -17.50 | 25.87 | 3.10 |
| | | After durability/Humidity/temperature cycling. ΔR | 16.32 | 26.89 | 21.56 |
| 5 | 80 | Initial | 14.03 | 26.43 | 18.97 |
| | | After Corrosion test ΔR | -10.26 | 18.44 | 2.30 |

NOTE *All values in milliohms.*

Figure 3

2.3. Shield Contact Resistance - Test Groups 1, 2, 3 and 5

| Test Group | Number of Data Points | Condition | Termination Resistance | | |
|---|---|---|---|---|---|
| | | | Min | Max | Mean |
| 1 | 10 | Initial | 1.79 | 6.32 | 4.39 |
| | | After vibration ΔR | -3.47 | 1.16 | -1.06 |
| 2 | 10 | Initial | 0.87 | 1.14 | 1.03 |
| | | After temperature life ΔR | 0.65 | 2.36 | 0.54 |
| 3 | 10 | Initial | 4.05 | 9.23 | 6.62 |
| | | After durability/thermal shock /Humidity/temperature cycling. ΔR | 14.77 | 27.56 | 18.88 |
| 5 | 10 | Initial | 2.92 | 5.85 | 4.73 |
| | | After Corrosion test ΔR | -1.60 | 3.73 | 0.94 |

NOTE *All values in milliohms.*

Figure 4

2.4. Insulation Resistance - Test Group 4

All insulation resistance measurements were greater than 500 megohms.

2.5. Surge Test - Test Group 9

Samples tested withstand the test without damage. There is not electrical continuity between contacts after test; electrical continuity plug-jack is kept after test.

2.6. Withstanding Voltage - Test Group 8

No dielectric breakdown or flashover occurred.

2.7. Vibration, Random - Test Group 1

No discontinuities were detected during vibration testing. Following vibration testing, no cracks, breaks, or loose parts on the specimens were visible.

2.8. Durability - Test Group 3

No physical damage occurred as a result of mating and unmating the specimens 750 times.

2.9. Mating Force - Test Group 6

All mating force measurements were less than 20.02 N [4.5 lbf].

2.10. Unmating Force - Test Group 6

All unmating force measurements were less than 20.02 N [4.5 lbf].

2.11. Plug Retention In Jack - Test Group 6

All plug retention in jack measurements were greater than 3.62 kg [8 lb] with no evidence of physical damage.

2.12. Thermal Shock - Test Groups 3 and 4

No evidence of physical damage was visible as a result of thermal shock testing.

2.13. Humidity/temperature Cycling - Test Groups 3 and 4

No evidence of physical damage was visible as a result of humidity/temperature cycling.

2.14. Temperature Life - Test Groups 2

No evidence of physical damage was visible as a result of temperature life testing.

2.15. Corrosion Testing - Test Group 5

No evidence of physical damage was visible as a result of exposure to the pollutants of mixed flowing gas.

2.16. Solderability - Test Group 7

There has not been produced de-wetting after test.

2.17. Resistance to soldering heat - Test Group 6

No functional damage has been produced after test.



| Indicates Change

2.18 Final Examination of Product - All Test Groups

Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

## 3. TEST METHODS

3.1. Initial Examination of Product

A Certificate of Conformance was issued stating that all specimens in this test package were produced, inspected, and accepted as conforming to product drawing requirements, and were manufactured using the same core manufacturing processes and technologies as production parts.

3.2. Low Level Contact Resistance

Low level contact resistance measurements were made using a 4 terminal measuring technique. The test current was maintained at 100 milliamperes maximum with a 20 millivolt maximum open circuit voltage.

3.3. Insulation Resistance

Insulation resistance was measured between adjacent contacts of unmated specimens that were not electrically connected. A test voltage of 500 volts DC was applied for 2 minutes before the resistance was measured.

3.4. Surge test

5 pulses in intervals of 1 minute of each polarity 10/700us 1.5kV have been applied to each samples between adjacent contacts.

3.5. Withstanding Voltage

A test potential of 15 volts AC RMS was applied between the shield of the receptacle and all separable interfaces of the plug and receptacle. This potential was applied for 1 minute and then returned to zero.

3.6. Vibration, Random

Mated specimens were subjected to a random vibration test, specified by a random vibration spectrum, with excitation frequency bounds of 20 and 500 Hz. The spectrum remained flat at 0.02 $G^2$/Hz from 20 to 500 Hz. The root-mean square amplitude of the excitation was 3.10 GRMS. This was performed for 15 minutes in each of 3 mutually perpendicular planes for a total vibration time of 45 minutes. Specimens were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC.

3.7. Durability

Specimens were mated and unmated 750 times at a maximum rate of 600 cycles per hour.

3.8. Mating Force

The force required to mate individual specimens was measured using a tensile/compression device with a free floating fixture and a rate of travel of 12.7 mm [.5 in] per minute.

3.9. Unmating Force

The force required to unmate individual specimens was measured using a tensile/compression device with a free floating fixture and a rate of travel of 12.7 mm [.5 in] per minute.

3.10. Plug Retention In Jack

An 3.62 kg [8 lb] weight was attached to the cable of the plug and suspended for 1 minute. The load was applied in 2 directions with the plug mated in jack and latch engaged, plus axial direction.

3.11. Thermal Shock

100cycles between -40°C and 70°C with 30 minutes in each temperature extreme. Min Average rate of temperature change 3°C/min.

3.12. Humidity/temperature Cycling

Mated specimens were exposed to 21 cycles of humidity/temperature cycling. Each cycle lasted 24 hours and consisted of cycling the temperature between 25 and 65°C twice while maintaining high humidity.

3.13. Temperature Life

Mated specimens were exposed to a temperature of 85°C for 500 hours.

3.14. Corrosion Testing

Mated specimens were exposed for 4 days in a chamber with:

SO 2 0,5 ppm (Volume)
H 2 S 0,1 ppm (Volume)
T= (25 ± 2)ºC
HR= (75 ± 3) %

3.15. Solderability

Solder bath: 235°C; duration: 2 seconds; ageing: 4 hours at 155°C.

3.16. Resistance to soldering heat

Solder bath: 260°C; duration: 5 seconds;