
Commercial Single Line, High Voltage, LGH Connector

1. SCOPE

1.1. Content

This specification covers the performance, tests and quality requirements for a family of commercial single line high voltage LGH* connectors. The connectors are designed for industrial environments. These connectors cover three operating dc and ac voltage ranges, 10, 20 and 30 kvdc and 4, 8 and 12 kvac (rms) 60 Hertz respectively.

1.2. Qualification

When tests are performed on the subject product line, the procedures specified in 109-Series Test Specifications shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. 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 (TE) Documents

- A. 109-1: General Requirements for Test Specifications
- B. 109 Series: Test Specifications as indicated in Figure 1.
- C. 108-10015: Contact Stamped and Formed Type XI
- D. 108-10037: Contact Stamped and Formed Type XII
- E. 108-10042: Contact Stamped and Formed Type III+
- F. 114-10002: Application Specification
- G. 501-117: Test Report

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. Material and Finish

- A. Insulating housing and cap: Polyester, glass filled, UL94V-0
- B. O ring: Silicone rubber
- C. Contacts
 - 1. Type III+, Copper alloy, tin plated
 - 2. Type XI, Copper alloy, tin plated
 - 3. Type XII, Copper, tin plated

3.3. Ratings

- A. Current: See Figure 5 for applicable current carrying capability
- B. Voltage: 10, 20 and 30 kvdc
- C. Temperature: -15ø to 85°C

3.4. Performance and Test Description

The product is designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 1. All tests are performed at ambient temperature unless otherwise specified.

3.5. Test Requirements and Procedures Summary

| Test Description | Requirement | Procedure | | | | | | | | | | | | |
|---|---|---|-----------------------|---------------|-----|-----------|-----|-----|---------|--|-----|----------|-----|--|
| Examination of Product | Meets requirements of product drawing and Application Specification 114-10002. | Visual, dimensional and functional per applicable quality inspection plan. | | | | | | | | | | | | |
| ELECTRICAL | | | | | | | | | | | | | | |
| Termination Resistance, Specified Current | See Figure 4 | Measure potential drop of mated contacts assembled in housing, see Figure 6; Test Specification 109-25, calculate resistance. | | | | | | | | | | | | |
| Dielectric Withstanding Voltage | See Figure 5 3 minutes hold. No break-down or flashover; 1 milliampere maximum leakage current. | Test between contacts of mated connector assembly and ground; Test Specification 109-29-1 | | | | | | | | | | | | |
| Insulation Resistance | 5000 megohms minimum initial. | Test between contacts of mated connector assembly and ground; Test Specification 109-28-4. | | | | | | | | | | | | |
| Temperature Rise vs Current | 30°C maximum T-Rise at 15 amperes for type XII contact. | Measure T-Rise vs current; Test Specification 109-45-1. | | | | | | | | | | | | |
| Vibration, Sinusoidal Low Frequency | No discontinuities greater than 1.0 microsecond. See Note. | Subject mated connectors to 10-55-10 Hz traversed in 1 minute at 0.06 inch total excursion; 2 hours in each of 3 mutually perpendicular planes; Test Specification 109-21-1. | | | | | | | | | | | | |
| Physical Shock | No discontinuities greater than 1.0 microsecond. See Note. | Subject mated connectors to 30 G's sawtooth shock pulses of 11 milliseconds duration; 3 shocks in each direction applied along the 3 mutually perpendicular planes total 18 shocks; Test Specification 109-26-7 | | | | | | | | | | | | |
| Mating Force | <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Type Contact</th> <th>Force, Pounds Maximum</th> </tr> </thead> <tbody> <tr> <td>III+</td> <td>3</td> </tr> <tr> <td>XI</td> <td>2</td> </tr> <tr> <td>XII</td> <td>15</td> </tr> </tbody> </table> | Type Contact | Force, Pounds Maximum | III+ | 3 | XI | 2 | XII | 15 | Measure force necessary to mate connector assembly with coupling rings inactivated incorporating free floating fixture at a rate of .5 inch/per minute; Test Specification 109-42, cond A. | | | | |
| Type Contact | Force, Pounds Maximum | | | | | | | | | | | | | |
| III+ | 3 | | | | | | | | | | | | | |
| XI | 2 | | | | | | | | | | | | | |
| XII | 15 | | | | | | | | | | | | | |
| Contact Separating Force | <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Min. Ounces minimum per contact.</th> <th>Type</th> <th>Force, Pounds</th> </tr> </thead> <tbody> <tr> <td>1.5</td> <td>Type III+</td> <td>1.5</td> </tr> <tr> <td>.75</td> <td>Type XI</td> <td>.75</td> </tr> <tr> <td>5.0</td> <td>Type XII</td> <td>5.0</td> </tr> </tbody> </table> | Min. Ounces minimum per contact. | Type | Force, Pounds | 1.5 | Type III+ | 1.5 | .75 | Type XI | .75 | 5.0 | Type XII | 5.0 | Size 3 times using gage as indicated in Figure 7, insert gage and measure force to separate; Test Specification 109-35, separation depth Figure 7. |
| Min. Ounces minimum per contact. | Type | Force, Pounds | | | | | | | | | | | | |
| 1.5 | Type III+ | 1.5 | | | | | | | | | | | | |
| .75 | Type XI | .75 | | | | | | | | | | | | |
| 5.0 | Type XII | 5.0 | | | | | | | | | | | | |
| Durability | No physical damage. | Mate and unmate connector assembly for 500 cycles at a maximum rate of cycles/hour; Test Specification 109-27. | | | | | | | | | | | | |

Figure 1 (continued)

| Test Description | Requirement | Procedure |
|------------------------------|---|---|
| ENVIRONMENTAL | | |
| Thermal Shock | See Note. | Subject mated to 5 cycles between -15° and 85°C; Test Specification 109-22. |
| Humidity-Temperature Cycling | 100 megohms final insulation resistance and DWV between connector and ground. See Figure 5 at sea level and 1500 feet for test voltage. | Subject mated connectors insulation resistance and to 10 humidity-temperature cycles between 25° and 65°C at 95% RH; Test Specification AMP Spec 109-23, method III, cond B. Less steps 7a and 7b. Measure DWV after 2 hours drying at room ambient |

NOTE

(a) Shall remain mated and show no evidence of damage, cracking or chipping.

Figure 1 (end)

3.6. Product Qualification and Requalification Tests

| Test or Examination | Test Group (a) | | |
|---|-------------------|-------|------|
| | 1 | 2 | 3 |
| | Test Sequence (b) | | |
| Examination of Product | 1, 9 | 1, 9 | 1, 8 |
| Termination resistance, Specified Current | 3, 7 | 2, 7 | |
| Dielectric Withstanding Voltage | | | 2, 6 |
| Insulation Resistance | | | 3, 7 |
| Temperature Rise vs Current | | 3, 8 | |
| Vibration | 5 | | |
| Vibration, Energized | | 6 (c) | |
| Physical Shock | 6 | | |
| Mating Force | 2 | | |
| Contact Separating Force | 8 | | |
| Durability | 4 | | |
| Thermal Shock | | 4 | 4 |
| Humidity-Temperature Cycling | | 5 | 5 |

NOTE

- (a) See Para 4.1.A.
- (b) Numbers indicate sequence in which tests are performed.
- (c) Energize type XII tin plated contacts with 15 amperes. No discontinuity check for this group.

Figure 2

3.7. Retention of Qualification

| Test or Examination | Test Group (a) | |
|---|-------------------|-------|
| | 1 | 2 |
| | Test Sequence (b) | |
| Examination of Product | 1, 8 | 1, 7 |
| Termination Resistance, Specified Current | | 3, 6 |
| Dielectric Withstanding Voltage | 3, 7 | |
| Insulation Resistance | 2, 6 | |
| Mating Force | | 2 |
| Separating Force | | 4 |
| Thermal Shock | 4 | |
| Humidity-Temperature Cycling | 5 | 5 (c) |

NOTE

- (a) See Para 4.1.A.
- (b) Numbers indicate sequence in which tests are performed.
- (c) Precondition samples with 10 cycles durability.

Figure 3

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Sample Selection

Connector housings and contacts shall be prepared in accordance with applicable Instruction Sheets. They shall be selected at random from current production. Test groups shall consist of 5 connectors of the type for which qualification is desired. The contacts shall be wired using wire having insulation ratings compatible with connectors being tested and wire conductor of maximum size for which the applicable contact is designed

4.2. Retention of Qualification

If, in a five-year period, no changes to the product or process occur, the product shall be subjected to the two groups of the testing described in the test sequence, see Figure 3. Justification for exceeding this time limit must be documented and approved by the division manager.

4.3. Requalification Testing

If changes significantly affecting form, fit, or function are made to the product or to the 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

4.4. 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. When product failure occurs, corrective action shall be taken and samples resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

4.5. Quality Conformance Inspection

The applicable quality inspection plan will 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.

| Type Contact | Wire Size AWG | Test Current amperes | Resistance, milliohms maximum initial |
|--------------|---------------|----------------------|---------------------------------------|
| XI | 20 | 4.0 | 11.0 |
| | 22 | 3.0 | 11.5 |
| III+ | 16 | 13 | 6.5 |
| | 18 | 10 | 7.5 |
| | 20 | 7.5 | 9.0 |
| | 24 | 3.0 | 14.5 |
| XII | 12 | 23* | 1.4 |
| | 14 | 17 | 1.7 |
| | 16 | 13 | 2.7 |

NOTE Test current limited by contact interface design. 15 amperes for tin plating.

Figure 4

| Connector Ratings | Test Voltage for 3 minutes | | | |
|-------------------|----------------------------|------------------|-----------|------------------|
| | Sea Level | | 1500 feet | |
| | kvlc | kvac (rms) 60 Hz | kvlc | kvac (rms) 60 Hz |
| 10 kvdc/4 kvac | 15 | 6 | 15 | 6 |
| 20 kvdc/8 kvac | 30 | 12 | 30 | 12 |
| 30 kvdc/12 kvac | 40 | 16 | 40 | 16 |

Figure 5

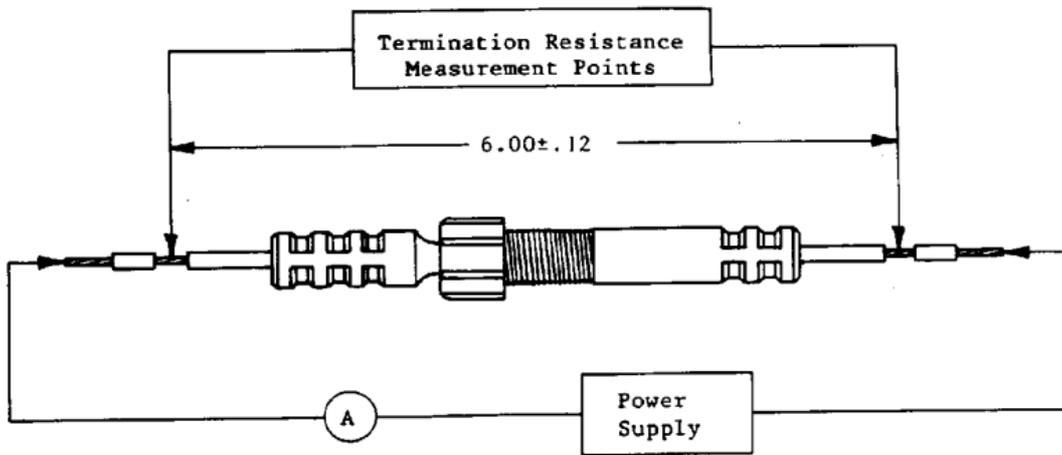
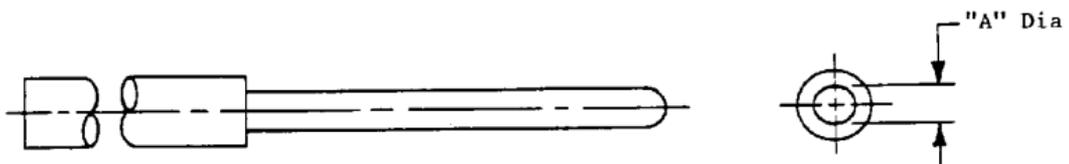
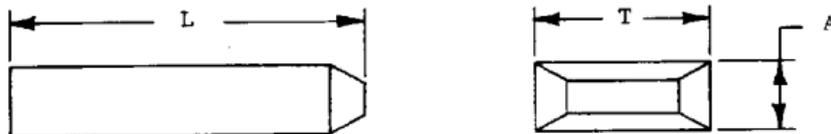


Figure 6
Termination Resistance Measurements Points Typical



| Gage Number | A Dia | Contact Type |
|-------------|-------|------------------|
| 1-27280-1 | .0615 | III ⁺ |
| 27280-7 | .0390 | XI |



| L min. | A | T | Contact Type |
|--------|--------------------------|-------------|--------------|
| .500 | .100 +.0001 -.0000 | .250 ± .020 | XII |

Figure 7
Separating Force Gage Pin