
ELCON* Drawer Series Connectors

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for ELCON* Drawer Series Connectors.

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. Successful qualification testing on the subject product line was completed on 14Aug09. The Qualification Test Report number for this testing is 501-720. This documentation is on file at and available from Engineering Practices and Standards (EPS).

2. APPLICABLE DOCUMENTS

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. Tyco Electronics Documents

- 114-13206: Application Specification (ELCON* Drawer Series Connectors)
- 501-720: Qualification Test Report (ELCON* Drawer Series Connectors)

2.2. Industry Documents

- Cisco EDCS-164608 Revision A.1: Qualification of Electrical Connectors
- EIA-364: Electrical Connector/Socket Test Procedures Including Environmental Classifications

2.3. Reference Document

109-197: Test Specification (AMP Test Specifications vs EIA and IEC Test Methods)

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. Materials

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

3.3. Ratings

- Voltage: see Figure 1
- Current: see Figure 1
- Operating temperature: -40 to 105°C

Contact Type	Voltage Rating (volts)	UL Current Rating (amperes)	CSA Current Rating (amperes at 30°C temperature rise)
28 AWG	250	1	1
20 AWG	250	5	4
16 AWG	250	15	10
12 AWG high voltage spacing	600	35	25
12 AWG	250	35	25
Size 12 Hot Plug	250	25	25
Size 8	250	75	55
Size 4	250	125	100
Size 0 or Size 0 probe-proof	250	200	150
Size 0 using bus bar	250	200	200

Figure 1

3.4. Performance and Test Description

Product is designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 2. Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
Initial examination of product.	Meets requirements of product drawing and Application Specification 114-13206.	EIA-364-18. Visual and dimensional (C of C) inspection per product drawing.
Final examination of product.	Meets visual requirements.	EIA-364-18. Visual inspection.
ELECTRICAL		
Low Level Contact Resistance (LLCR).	Signal contacts: 15 milliohms maximum initial. ΔR 10 milliohms maximum from initial. Power contacts: 1 milliohm maximum initial. 3 milliohms maximum final.	EIA-364-23. Subject specimens to 100 milliamperes maximum and 20 millivolts maximum open circuit voltage.

Figure 2 (continued)

Test Description	Requirement	Procedure
Contact resistance, specified current.	See Figure 4.	EIA-364-6. Measure millivolt drop at specified current. See Figure 4.
Insulation resistance.	5000 megohms minimum.	EIA-364-21. 500 volts DC, 2 minute hold. Test between adjacent contacts of mated specimens.
Withstanding voltage.	One minute hold with no breakdown or flashover.	EIA-364-20, Condition I. 1500 volts DC at sea level. 2200 volts for 600 volt Application Drawers at sea level. Test between adjacent contacts of mated specimens.
Temperature rise vs current.	30 and 50°C maximum temperature rise.	EIA-364-70, Method 2. Increment through a minimum of 4 current levels, stabilizing each until 3 readings at 5 minute intervals are within 1°C.
MECHANICAL		
Random vibration.	No discontinuities of 1 microsecond or longer duration. See Note.	EIA-364-28, Test Condition VII, Condition Letter E. Subject mated specimens to 4.90 G's rms between 20 to 500 Hz. Fifteen minutes in each of 3 mutually perpendicular planes.
Mechanical shock.	No discontinuities of 1 microsecond or longer duration. See Note.	EIA-364-27, Condition A. Subject mated specimens to 50 G's half-sine shock pulses of 11 milliseconds duration. Three shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks.
Durability.	See Note.	EIA-364-9. Mate and unmate specimens for 250 cycles for regular plugging and 50 cycles for hot plugging at a maximum rate of 500 cycles per hour.
Mating force.	311.3 N [70 lbf] maximum. See Figure 5.	EIA-364-13. Measure force necessary to mate specimens at a maximum rate of 12.7 mm [.5 in] per minute.
Unmating force.	26.7 N [6 lbf] minimum. See Figure 5.	EIA-364-13. Measure force necessary to unmate specimens at a maximum rate of 12.7 mm [.5 in] per minute.

Figure 2 (continued)

Test Description	Requirement	Procedure
ENVIRONMENTAL		
Thermal shock.	See Note.	EIA-364-32, Test Condition VIII. Subject mated specimens to 5 cycles between -40 and 105°C with 30 minute dwells at temperature extremes and 1 minute transition between temperatures.
Humidity/temperature cycling.	See Note.	EIA-364-31, Method III. Subject mated specimens to 10 cycles (10 days) between 25 and 65°C at 80 to 100% RH.
Temperature life.	See Note.	EIA-364-17, Method A, Test Condition 4. Subject mated specimens to 105°C for 584 hours.
Mixed flowing gas (test groups 3a and 3b).	See Note.	EIA-364-65, Class IIIA (4 gas). Subject mounted specimens in the unmated condition to environmental Class IIIA for 10 days followed by an LLCR measurement and an additional 10 days exposure in the mated condition. Precondition with 25 mating cycles with force data recorded.
Mixed flowing gas (test group 5).	See Note.	EIA-364-65, Class IIA (4 gas) per Cisco EDCS-164608 Revision A.1. Subject mounted specimens in the unmated condition to environmental Class IIA for 7 days followed by an LLCR measurement and an additional 7 days exposure in the mated condition. Precondition with 25 mating cycles with force data recorded.

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.

Figure 2 (end)

3.6. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group (a)								
	1a	1b	1c	1d	2	3a	3b	4	5
	Test Sequence (b)								
Initial examination of product	1	1	1	1	1	1	1	1	1
LLCR	3,7	3,5	3,5	2,5	2,5	2,4	2,4		2,4
Termination resistance, specified current					6				
Insulation resistance								2,6	
Withstanding voltage								3,7	
Temperature rise vs current					3,7				
Random vibration	5			3					
Mechanical shock	6			4					
Durability	4	4	4						
Mating force	2	2	2						
Unmating force	8	6	6						
Thermal shock								4	
Humidity/temperature cycling								5	
Temperature life					4(c)				
Mixed flowing gas						3(c)(d)	3(c)(d)		3(c)(e)
Final examination of product	9	7	7	6	8	5	5	8	5

NOTE

- (a) See paragraph 4.1.A.
- (b) Numbers indicate sequence in which tests are performed.
- (c) Precondition specimens with 25 mating cycles with force data recorded.
- (d) Measure LLCR after 10 days of unmated exposure.
- (e) Measure LLCR after 7 days of unmated exposure.

Figure 3

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Specimen Selection

Specimens shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production. Each test group shall consist of a minimum of 5 specimens. Test groups 1a through 1d test different contact variations: 1a, standard contacts; 1b, probe proof; 1c, gold contacts (hot plugs); and 1d, compliant tail. Test group 2 shall consist of standard contacts. Test groups 3a and 3b test different contact plating variations: 3a, standard contacts; 3b, gold contacts. Test group 4 shall consist of standard contacts. Test group 5 shall consist of gold plated contacts.

B. Test Sequence

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

4.2. 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.

4.3. 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. If product failure occurs, corrective action shall be taken and specimens resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

4.4. 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.

Contact Type	Voltage Drop
Size 28	1.7 millivolts at 1 ampere
Size 20	1.7 millivolts at 5 amperes
Size 16	3 millivolts at 15 amperes
Size 12	4.2 millivolts at 35 amperes
Size 12 Hot Plug	4.7 millivolts at 35 amperes
Size 8	6.5 millivolts at 75 amperes
Size 4	8.4 millivolts at 125 amperes
Size 0	6.3 millivolts at 200 amperes
Size 0 probe-proof	5.6 millivolts at 200 amperes

Figure 4
Voltage Drop

Contact Type	Individual Contact Insertion Value (typical, N [lbf])	Individual Contact Extraction Value (typical, N [lbf])
Size 22	0.67 [0.15]	0.13 [0.03]
Size 20	0.9 [0.2]	0.4 [0.1]
Size 16	10.2 [2.3]	3.1 [0.7]
Size 12	12.9 [2.9]	8.5 [1.9]
Size 12 Hot Plug	17.3 [3.9]	8.5 [1.9]
Size 8	19.6 [4.4]	10.7 [2.4]
Size 4	16.9 [3.8]	13.3 [3.0]
Size 0	21.0 [4.7]	13.3 [3.0]
Size 0 probe-proof	21.4 [4.8]	15.6 [3.5]

Figure 5
Mating/Unmating Force