FORGE* Connectors

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for the TE Connectivity (TE) FORGE* 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.

2. APPLICABLE DOCUMENTS

The following documents and forms constitute a part of this specification to the extent specified herein. Unless otherwise indicated, the latest edition of the document applies.

2.1. TE Documents

- 114-13299: Application Specification (FORGE Electrical Connectors)
- 501-134047: Qualification Test Report (FORGE* Connectors)

2.2. Industry Document

EIA-364: Electrical Connector/Socket Test Procedures Including Environmental Classifications

2.3. Reference Documents

- 108-1268: Product Specification (AMPLIMITE* HDP-22 Subminiature D Connector with Removable F Crimp Contacts)
- 108-1682: Product Specification (Connector, Metrimate Power Drawer With POWERBAND* Contacts)
- 108-2285: Product Specification (ELCON* Drawer Series Connectors)
- 109-197: Test Specification (TE Test Specifications vs EIA and IEC Test Methods)

3. REQUIREMENTS

3.1. Design and Construction

Product shall be of the design, construction, materials and physical dimensions specified on the applicable product drawing

3.2. Ratings

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

Contact Type	Voltage Rating (volts AC)	Estimated CSA Current Rating (amperes at 30°C temperature rise)
*Size 22	50	1.9
Size 12	250	22A when 8 contacts are energized
Size 8	250	33A when 4 contacts are energized
Size 4	250	90A when 2 contacts are energized 78A when 4 contacts are energized
Size 0	250	145A when 2 contacts are energized 130A when 6 contacts are energized

NOTE
Contact TE Engineering to obtain higher voltage configurations.
*Size 22 tested with 26 awg wire

Figure 1

3.3. Test Requirements and Procedures Summary

Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

Test Description	Requirement	Procedure
Initial examination of product.	Meets requirements of product drawing and Application Specification 114-13299.	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. 25 milliohms maximum final. 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.
Contact resistance, specified current (power contacts only).	Average values will be recorded at the current levels in 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. One milliampere maximum leakage current.	EIA-364-20, Condition I. Volts AC, (per UL1977 requirements) at sea level. Test between adjacent contacts of mated specimens.
Temperature rise vs current.	30°C and 50°C maximum temperature rise at specified current.	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. Testing shall be done for individual contact groups initially. Testing shall be done for all contact groups collectively. See Figure 1.

Figure 2 (continued)

MECHANICAL		
Test Description	Requirement	Procedure
Random vibration.	No discontinuities of 1 microsecond or longer duration. See Note.	EIA-364-28, Test Condition VII, Condition D. Subject mated specimens to 3.10 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 H. Subject mated specimens to 30 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 50 cycles at a maximum rate of 500 cycles per hour.
Mating force.	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.	See Figure 5.	EIA-364-13. Measure force necessary to unmate specimens at a maximum rate of 12.7 mm [.5 in] per minute.
ENVIRONMENTAL		
Thermal shock.	See Note.	EIA-364-32, Test Condition VIII. Subject specimens to 5 cycles between -40 and 105°C with 30 minute dwells at temperature extremes.
Humidity/temperature cycling.	See Note.	EIA-364-31, Method III. Subject 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, Test Time Condition C. Subject mated specimens to 105°C for 500 hours.
Mixed flowing gas.	LLCR ΔR 10 milliohms maximum for signal contacts. See Note.	EIA-364-65, Class IIA. Subject unmated specimens to environmental Class IIA for 7 days followed by additional 7 days exposure in the mated condition. Precondition with 5 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 2.

Figure 2 (end)

3.6. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group (a)		
	1	2	3
	Test Sequence (b)		
Initial examination of product	1	1	1
LLCR	3,7	2,7,11	
Contact resistance, specified current		5,13	
Insulation resistance			2,6
Withstanding voltage			3,7
Temperature rise vs current		4,12	
Random vibration	5	10	
Mechanical shock	6		
Durability	4	3	
Mating force	2		
Unmating force	8		
Thermal shock			4
Humidity/temperature cycling			5
Temperature life		9	
Mixed flowing gas		6(c),8	
Final examination of product	9	14	8

NOTE

(a) *Each test group shall consist of a minimum of 5 specimens and* shall be selected at random from current production.

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

(c) *Precondition specimens with 5 durability cycles*

Figure 3

Contact Type	Voltage Drop
Size 22	N/A
Size 12	10.6 millivolts at 25 amperes
Size 8	18.9 millivolts at 45 amperes
Size 4	14.7 millivolts at 100 amperes
Size 0	11.4 millivolts at 150 amperes

NOTE

Contact TE Engineering for current derating based on contact loading and configurations.

Figure 4

Contact Type	Individual Contact Insertion Value (N [lbf] maximum)	Individual Contact Extraction Value (N [lbf] minimum)
Size 22	1.7 [0.38]	0.5 [0.13]
Size 12	20.5 [4.6]	1.7 [0.4]
Size 8	44.5 [10]	8.9 [2]
Size 4	57.9 [13]	8.45 [1.9]
Size 0	21 [4.7]	5.3 [1.2]

NOTE

Numbers are for reference only. See paragraph 2.3 for documents containing up-to-date information.

Figure 5