Product
Specification

LightCrimp* Plus Singlemode SC Connector (Field Installable)

1.   SCOPE

1.1.   Content

This specification, which is based on ANSI/TIA-568-C.3, covers the performance, tests and quality
| requirements for the TE Connectivity (TE) LightCrimp* Plus Singlemode SC Connector (Field
Installable).

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(s) and product drawing(s).

1.3.   Qualification Test Results

Successful qualification testing on the subject product line was completed on 01Dec08. The
Qualification Test Report number for this testing is 501-577. 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
requirements of this specification and the product drawing, the product drawing shall take precedence.
In the event of conflict between requirements of this specification and referenced documents, this
specification shall take precedence.

| 2.1.   TE Documents

- 408-4471: Instruction Sheet (LightCrimp Plus SC Simplex Connector Kits)
- 501-577: Qualification Test Report (LightCrimp* Plus Singlemode SC Connector (Field
  Installable))

2.2.   Commercial Standards

- TIA/EIA-455-B: Standard Test Procedures for Fiber Optic Fibers, Cables, Transducers, Sensors,
  Connecting and Terminating Devices and Other Fiber Optic Components
- ANSI/TIA-568-C.3: Optical Fiber Cabling Components Standard
- TIA-604-3B: FOCIS-3 Fiber Optic Connector Intermateability Standard, Type SC and SC-APC

2.3.   Reference Document

102-952: Quality Specification (Qualification of Fiber Optic Connectors and Cable Assemblies)

3.   REQUIREMENTS

3.1.   Design and Construction

Product shall be of the design, construction and physical dimensions specified on the applicable product
drawing(s).

3.2. Optical Power Source

The optical power source wavelengths shall be 1310 ± 30 nm and 1550 ± 30 nm unless otherwise stated in the Qualification Test Report.

3.3. Ratings

Performance	Wavelength (nm)	Value				Units
		Buffered Fiber			Jacketed Cable	
		Standard PC	APC Digital	APC Analog	Standard PC	
Attenuation (Insertion Loss), Typical, see Note (a)	1310	0.19	0.24	0.26	0.29	dB
	1550	0.12	0.24	0.26	0.22	
Return Loss, Typical, see Note (a)	1310	56	56	63	56	dB
	1550	57	62	65	58	
Storage Temperature, see Note (b)	NA	-40 to 75				°C
Operating Temperature	NA	-10 to 60				°C
Cable Retention (0 degree)	NA	5 [1.12]			50 [11.24]	N [lbf]
Cable Retention (90 degree)	NA	2 [.45]			19.4 [4.4]	N [lbf]
Mating Durability	NA	500				Cycles
Flex	NA	100				Cycles
Twist	NA	10				Cycles

NOTE (a) *Typical values represent the median of the sample data. See Figure 2 for maximum insertion loss and minimum return loss values.*
(b) *Storage temperature range is not a requirement of* ANSI/TIA-568-C.3.

Figure 1

3.4. Performance and Test Description

Product is designed to meet the mechanical, environmental and optical transmittance 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
Visual and mechanical inspection.	Meets requirements of product drawing, including end face geometry. Complies with dimensional requirements of FOCIS TIA-604-3B for all dimensions.	TIA/EIA-455-13A. Visual, dimensional and functional per applicable quality inspection plan. See Note (a).

Figure 2 (continued)

Test Description	Requirement	Procedure
Attenuation (insertion loss).	Maximum attenuation for any single specimen is 0.75 dB. See Note (b).	TIA/EIA-455-171A, Method D3, except launch and receive are both part of the pair under test and are not reference quality. Test at 1310 ± 30 nm and 1550 ± 30 nm. Precondition by cleaning plug and adapter per manufacturer's instructions. Only the fundamental mode shall propagate at the connector interface and at the detector. Use the following protocol for connector termination: Terminate the connector in accordance with the appropriate TE Instruction Sheet. If the initial attenuation reading is < 0.35 dB when mated against a reference quality test lead, the test specimen may be used for subsequent tests.
Return loss.	Minimum return loss for any single specimen is: Standard PC, 26 dB; APC Digital, 48 dB; APC Analog, 60 dB. See Note (b).	TIA/EIA-455-107A. Test at 1310 ± 30 nm and 1550 ± 30 nm. Precondition by cleaning plug and adapter per manufacturer's instructions. Only the fundamental mode shall propagate at the connector interface and at the detector.
Low temperature.	Maximum attenuation for any single specimen is 0.75 dB before and after test. Maximum attenuation increase for any single specimen is 0.3 dB during test. Return loss requirement shall be met after test. See Note (b).	EIA/TIA-455-188. Specimen shall be mated and optically functioning. Precondition by cleaning plug and adapter per manufacturer's instructions and maintain specimens undisturbed in the chamber at room ambient (23 ± 5°C and 20 to 70% RH) for 24 hours prior to recording initial optical measurements. Subject specimens to -10 ± 3°C for 96 hours. Attenuation shall be measured before test, at a maximum interval of 1 hour during test and after test. Maintain specimens at room ambient for at least 1 hour after test before measuring final attenuation and return loss. See paragraph 5.2.

Figure 2 (continued)

Test Description	Requirement	Procedure
Temperature life.	Maximum attenuation for any single specimen is 0.75 dB before and after test. Return loss requirement shall be met after test. See Note (b).	TIA/EIA-455-4C. Specimen shall be mated and optically functioning. Plug and adapter may be cleaned per the manufacturer's instructions before preconditioning. Maintain specimens at room ambient (23 ± 5°C and 20 to 70% RH) for 2 hours prior to recording initial attenuation and return loss. Subject specimens to 60°C for 96 hours. At the completion of testing, maintain specimens undisturbed in the chamber at room ambient for 1 to 2 hours before measuring final attenuation and return loss. See paragraph 5.2.
Humidity, steady state.	Maximum attenuation for any single specimen is 0.75 dB before and after test. Maximum attenuation increase for any single specimen is 0.4 dB during test. Return loss requirement shall be met after test. See Note (b).	TIA/EIA-455-5C, Method A, Test Condition A. Specimen shall be mated and optically functioning. Before preconditioning, the plug and adapter may be cleaned per the manufacturer's instructions. Maintain specimens at 50 ± 5°C and <33% RH for 24 hours, then stabilize at ambient for at least 1 hour before recording initial optical measurements. Subject specimens to 40 ± 2°C with 90 to 95% RH for 96 hours. Attenuation shall be measured before test and at a maximum interval of 1 hour during test. At the completion of testing, maintain specimens undisturbed in the chamber at room ambient for 1 to 2 hours before recording final attenuation and return loss. See paragraph 5.2.
Flex.	Maximum attenuation for any single specimen is 0.75 dB before and after test. Return loss requirement shall be met after test. See Note (b).	TIA/EIA-455-1B. Apply load to mated specimen. Load shall be 2 N [0.45 lbf] for each buffered fiber. For cables with strength members terminated to the connector, the load shall be 4.9 N [1.1 lbf]. Flex loaded side ± 90 degree per cycle for 100 cycles, at a maximum rate of 30 cycles per minute. Attenuation and return loss shall be measured before and after test with the load removed.

Figure 2 (continued)

Test Description	Requirement	Procedure
Twist.	Maximum attenuation for any single specimen is 0.75 dB before and after test. Return loss requirement shall be met after test. See Note (b).	EIA-455-36A. Apply tensile load at 0 degree pull angle at a point 25 cm [10 in] from ferrule end face of the mated specimen. Load shall be 2 N [0.45 lbf] for each buffered fiber. For cables with strength members terminated to the connector, the load shall be 15 N [3.4 lbf]. Rotate the loaded side ± 2.5 revolutions per cycle for 10 cycles at a maximum rate of 30 cycles per minute. Attenuation and return loss shall be measured before and after test with the load removed.
Strength of coupling mechanism.	Maximum attenuation for any single specimen is 0.75 dB before and after test. Return loss requirement shall be met after test. See Note (b).	EIA/TIA-455-185. Specimen shall be mated and optically functioning. Adapter shall be rigidly attached to the mounting fixture. Precondition by cleaning plug and adapter per manufacturer's instructions. Apply a tensile load of 40 N [9.0 lbf] to the connector (not the fiber) at a rate of 2 N [0.45 lbf] per second. Hold load for a minimum of 5 seconds. Attenuation and return loss shall be measured before and after test.
Cable retention, 0 degree.	Maximum attenuation for any single specimen is 0.75 dB before and after test. Maximum attenuation increase for any single specimen is 0.5 dB after test. Return loss requirement shall be met after test. See Note (b).	EIA/TIA-455-6B. Specimen shall be mated. Adapter shall be rigidly attached to the mounting fixture. Apply a tensile load to the connector-to-fiber joint at a rate of 5 N [1.12 lbf] per second for reinforced cables and 0.5 N [0.11 lbf] per second for buffered fiber. Load shall be 5 N [1.12 lbf] for each buffered fiber. For cable with strength members terminated to the connector, the load shall be 50 N [11.24 lbf]. Hold for a minimum of 5 seconds. Attenuation and return loss shall be measured before and after test with the load removed.

Figure 2 (continued)

Test Description	Requirement	Procedure
Cable retention, 90 degree.	Maximum attenuation for any single specimen is 0.75 dB before and after test. Maximum attenuation increase for any single specimen is 0.5 dB after test. Return loss requirement shall be met after test. See Note (b).	EIA/TIA-455-6B. Specimen shall be mated. Apply a tensile load to the fiber or cable at a 90 degree angle. Load shall be 2 N [0.45 lbf] for each buffered fiber. For cable with strength members terminated to the connector, the load shall be 19.4 N [4.4 lbf]. Hold for a minimum of 5 seconds. Attenuation and return loss shall be measured before and after test with the load removed.
Impact.	Maximum attenuation for any single specimen is 0.75 dB before and after test. Return loss requirement shall be met after test. See Note (b).	TIA/EIA-455-2C, Method B, with the following exceptions: 1.5 m [4.9 ft] drop height, 5 drops. Drop surface is steel plate with minimum thickness of 12.5 mm [0.5 in]. Dust caps shall be used to protect the fiber endface. Plug and adapter may be cleaned per manufacturer's instructions prior to recording initial optical measurements. Measure attenuation and return loss before and after test. At the completion of testing, clean plug before recording final optical measurements.
Mating durability.	Maximum attenuation for any single specimen is 0.75 dB before and after test. Return loss requirement shall be met after test. See Note (b).	EIA-455-21A. Plug and adapter may be cleaned per manufacturer's instructions prior to recording initial optical measurements. Engage and separate plug and adapter 500 times with 3 seconds minimum between engagement and separation. Clean plug and adapter per manufacturer's instructions as necessary during test. Attenuation and return loss shall be measured before and after test.

NOTE

(a) *Dimensions not measured on actual test specimens are covered by First Article approval, which includes verification of product drawings per dimensions specified in TIA-604-3.*

(b) *Shall meet visual requirements, show no physical damage, and shall meet the requirements of additional tests as specified in the Product Qualification Test Sequence in Figure 3.*

Figure 2 (end)

3.6.   Product Qualification Test Sequence

After visual and mechanical inspection, specimens must first be tested for initial attenuation and return loss on new product, after which the remaining tests may be performed in any order.

Test or Examination	Test Sequence	Minimum Specimen Quantity (see Note (b))
Visual and mechanical inspection	1	24
Attenuation (insertion loss)	2	24
Return loss	3	24
Low temperature	See Note (a)	8
Temperature life		8
Humidity, steady state		8
Flex		8
Twist		8
Strength of coupling mechanism		8
Cable retention, 0 degree		8
Cable retention, 90 degree		8
Impact		8
Mating durability		8

NOTE   (a)   *Tests 4 through 13 may be performed on the same specimens or different specimens, in any sequence, as long as specimens are sourced as shown.*
(b)   *A specimen consists of a mated connector pair, see paragraph 4.1.A.*

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. Specimen shall be defined as a mated SC connector pair consisting of the following: a launch cable terminated with a LightCrimp Plus singlemode SC connector and a receive cable terminated with an epoxy-style SC connector. Connector plugs form a mated pair.

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 requirements of Figure 2. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify the product. When 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 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.

5. SPECIAL INSTRUCTIONS

5.1. Cleaning

If at any time, a connector specimen is uncoupled during qualification testing, the optical interfaces shall be cleaned according to the applicable Instruction Sheet prior to any subsequent optical measurements. Additional cleaning techniques deemed necessary by Product Engineering shall be described in the Test Report. If, after cleaning the connector as prescribed, loss performance exceeds the specified limit, or, if the operator suspects the presence of debris at the optical interface, perform the cleaning procedure a second time. If the resultant optical reading still exceeds the specification, clean the interface a third time and accept that reading.

5.2. Control Cables

Control cables shall be subjected to climatic environmental tests. Transmittance shall be recorded each time a specimen transmittance is made. Changes in control cable power of less than 0.05 dB may be neglected in the test specimen power and loss calculations. If control cable power changes by more than 0.05 dB during the duration of the test or sequence of tests, change in control cable power shall be included in power and loss calculations per TIA/EIA-455-20B.