

METRIC

MIL-DTL-83522/16C
28 June 2013
SUPERSEDING
MIL-C-83522/16B
11 May 1995

DETAIL SPECIFICATION SHEET

CONNECTOR, FIBER OPTIC, SINGLE TERMINUS, PLUG, BAYONET COUPLING (ST STYLE),
2.5 MILLIMETERS DIAMETER FERRULE, EPOXY

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the product described herein shall consist of this specification sheet and MIL-DTL-83522.

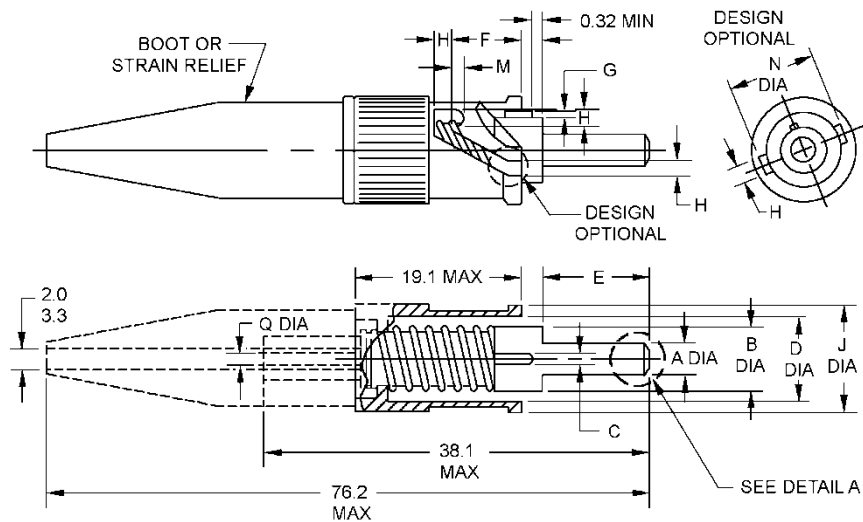
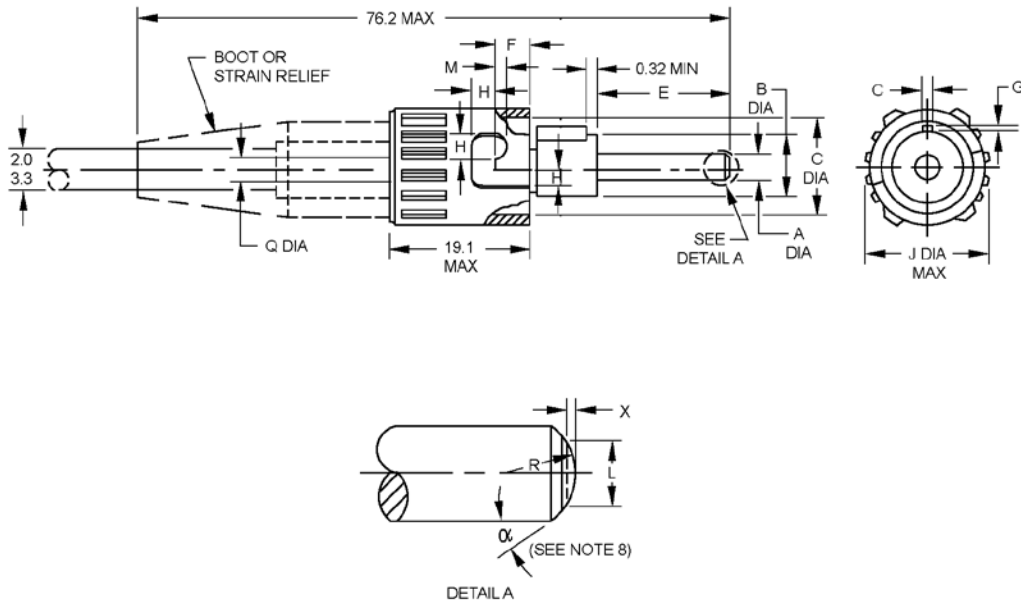


FIGURE 1. Dimensions and configuration.

MIL-DTL-83522/16C



mm	Inches
0.32	.0126
2.0	.08
3.3	.13
19.1	.75
	1.50

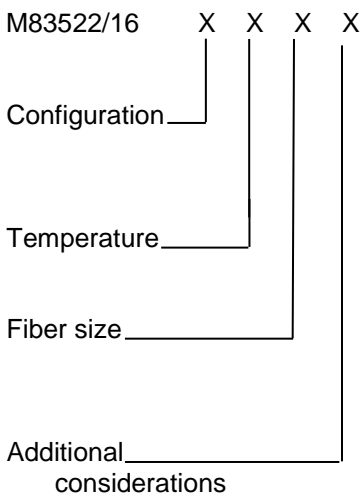
FIGURE 1. Dimensions and configuration – Continued.

Letter	Millimeters		Inches		Notes
	Min	Max	Min	Max	
A (MM/SM)	2.4985	2.4995	0.09837	0.09841	3
A (MM)	2.498	2.500	0.0983	0.0984	3
B	5.25	5.38	0.207	0.212	
C	0.91	1.07	0.036	0.042	
D	7.06 min		0.278 min		
E	7.75	8.00	0.305	0.315	
F	2.56	4.50	0.101	0.177	
G	0.58	0.89	0.023	0.035	
H	1.60 min		0.063 min		
J	9.40	9.80	0.370	0.386	
L	2.00	2.00	0.079	0.079	4
M	0.64	1.12	0.025	0.044	
N	8.56 min		0.337 min		5
Q	1.04	1.60	0.041	0.063	
R (MM/SM)	8	25	0.3	1.0	6
R (MM)	8 min		0.3 min		6
X (MM/SM)	0.020	0.063	0.0008	0.0025	7
X (MM)	0.000	0.063	0.0000	0.0025	7

NOTES:

1. Dimensions are in millimeters.
2. Inch equivalents are given for general information only.
3. Use A (SM/MM) for single mode applications. Use A (SM/MM) or A (MM) for multimode applications.
4. L dimensions is the diameter of a circle on the surface of the ferrule that is concentric with the axis of the ferrule.
5. Design optional.
6. R dimension is for reference of conceptual design considerations only. This dimension is the radius of the end of the ferrule when the surface of the ferrule is spherical, and L is as given.
7. X dimension is the distance that the apex of the end of the ferrule extends beyond the circle described in note 4.
8. a angle to be between 20° and 35°.

Part or Identifying Number (PIN) is a new term encompassing previous terms used in specifications such as part number, type designator, or identification number and is as follows:



- Configuration:
- A (locking boot, long cap)
 - D (nonlocking boot, either long or short cap)
 - E (protective cover)
 - F (90 degree boot, either long or short cap)
- Temperature:
- H (high)
 - N (normal)
- Fiber size:
- X (type I) (125 μm, MM)
 - Y (type II) (125 μm, MM/SM)
 - Z (type I) (140 μm, MM)
- Additional consideration:
- S qualified to space flight requirements

NOTE: Cap refers to the bayonet cap or ST connector outside metal housing. Barrel refers to interior metal part that supports the ferrule and crimp sleeve.

REQUIREMENTS:

Metals: The plug housing and other metal components shall be of corrosion resistant steel in accordance with SAE-QQ-S-763, class 303/316L or ASTM A-276, designation S31803, or nickel-plated brass, alloy 345 or 360, in accordance with ASTM B-16/B16M.

Ferrule material: Ceramic (zirconia).

The dust cover, strain relief boot, and protective cap shall be made of thermoplastic or fluorosilicone.

Epoxies: Use an epoxy approved by the qualifying activity.

Dimensions and configuration: See figure 1.

Fiber optic cable requirements:

Cable configuration: In accordance with MIL-PRF-85045.

Fiber diameter: 50/125 μm, 62.5/125 μm, and 100/140 μm, with the following respective tolerances: 125 ± 2 μm (MM), 125 ± 1 μm (MM/SM), 140 ± 2 μm (MM).

Fiber optic contact:

Method optical alignment: Sleeve/ferrule.

Lens configuration: Not applicable.

Coating requirements: Not applicable.

Nuclear radiation resistance: Not applicable.

Weight: 20 grams maximum.

Polarization: Key/slot.

Safety wire holes: Not required.

Force to engage and disengage:

Longitudinal force: Not applicable.

Torque: Not applicable.

Lubricants: Not applicable.

Water submersion: Not applicable.

Coupling proof torque: Not applicable.

Coupling mechanism retention force: Not applicable.

Tensile loading: The load shall be 230N minimum and shall not result in any physical damage. Optical properties shall be monitored before and after load. The load shall not be applied to the coupling mechanism. Optical transmittance measurements are not required during the test for the non-locking connectors.

Dust (fine sand): Applicable. Perform as specified in the requirements of MIL-DTL 83522 with the following modifications:

- a. The connectors shall not be rotated during steps 1 and 3. Each connector shall be oriented in the chamber such that the key slot is in line with the oncoming air flow. The connectors shall be affixed in such a manner that the orientation of the connector does not change throughout the duration of the test.
- b. The change in optical transmittance shall be measured before the dust test, during the 6 hour exposure period of step 1, before step 3, during the 6 hour exposure period of step 3, and after the test. Samples shall be visually examined, after cleaning, at the conclusion of the dust test.

Ozone exposure: Not applicable.

High impact shock: Applicable to single mode and multimode locking and non-locking connectors.

Fluid immersion: Not applicable.

Residual magnetism: Not applicable.

Shock: For SM/MM connectors assemble on single mode fiber, signal discontinuity is applicable during shock except that the duration for blows to the three axes are relaxed to a maximum of 1 second. For MM non-locking connectors and SM/MM connectors assemble on multimode fiber, signal discontinuity is applicable during shock except that the duration for blows to the side axis are relaxed to a maximum of 500 microseconds.

Plug accessories: Each plug shall be packaged with a minimum of one crimp ferrule, one dust cover, and one strain relief boot.

Protective cover: The protective cover shall consist of a lanyard which attaches to the optical fiber cable and a cap for covering the connector (see figure 2). The protective cover shall be installable after the connector termination process is complete. The protective cover shall be subjected only to the temperature/humidity cycling and fungus tests. The protective cover shall not be provided with the plug connector.

Crimp sleeve: The crimp sleeve shall accept single fiber cordage with a maximum outer diameter of 2.50 mm (.0984 inch). The plug connector shall meet all requirements when the crimp sleeve is assembled to the plug connector using one of the following: A hex crimp die measuring 4.84 mm \pm .05 mm (.190 inch \pm .001 inch) across the flats, a circular indent ring crimp die with a 2.67 mm \pm .08 mm (.105 inch \pm .003 inch) minor diameter and a 3.43 mm \pm .08 mm (.135 inch \pm .003 inch) major diameter, or a circular indent ring crimp die with a 2.29 mm \pm .08 mm (.090 inch \pm .003 inch) minor diameter and a 3.05 mm \pm .08 mm (.120 inch \pm .003 inch) major diameter.

Boot color: Single mode boots are to be blue, 62.5/125 micron multimode boots are to be black 100/140 micron multimode boots are to be black.

ST connector accessories: Each ST connector shall be packaged with a minimum of one crimp sleeve, one dust cover, and one straight boot for a 2.50 mm maximum diameter single fiber cable.

90 degree boot dimensions: ferrule end face to end of 90 degree bend: 76.2 mm (3.0 inch) max, centerline of ferrule to cable protrusion end: 38.1 mm (1.5 inch) max, meet a cable minimum bend radius of 15 mm (0.59 inch).

VERIFICATION

Group A inspection: During group A inspections, plug dimension E shall be verified on all items. All other dimensions may be verified on a sampled basis. Weight may be verified on a sampled basis. The qualifying activity shall be notified of all failures during any sampled inspections.

The plug connector mates with MIL-DTL-83522/17 adapter.

Qualification by similarity: bayonet cap and/or barrel materials: Manufacturers who are qualified under this specification sheet for a particular configuration, temperature and fiber size, and whose ST connector with alternate bayonet cap and/or barrel materials passes the size, weight, identification marking, workmanship, insertion loss, tensile loading, flex life, twist, mating durability, temperature/humidity cycling, salt spray, and flammability specified herein, are qualified under this specification sheet for the change in materials. This qualification is valid if the only difference between the previously qualified MIL-DTL-83522/16 ST connector and the one being tested is a change in materials. If dimensions have changed (i.e., nominal and tolerances are not the same or tighter), the ST connector must pass shock also. Size inspection, weight, identification marking and workmanship are to be performed on 30 ST connectors. The remainder of the testing is to be performed on the four mated pair. Test is to be performed in the sequence listed.

Qualification by similarity- change in boot materials: Manufacturers who are qualified under this specification sheet for a particular configuration, temperature and fiber size, and whose ST connector with alternate boot materials passes the size, weight, identification marking, workmanship, flex life, twist, temperature cycling, salt spray (if contains metallic parts). Fungus and flammability specified herein are qualified under this specification sheet for the change in materials. Testing is to be performed on four mated pair and in the sequence listed.

Qualification by similarity for change in fiber size from single mode to multimode: Manufacturers who are qualified under this specification sheet for a particular configuration, temperature and single mode fiber, and whose 62.5/1215 micron multimode ST connector passes insertion loss and shock specified herein, are qualified under this specification sheet for 62.5/125 micron multimode and 100/140 micron multimode fiber sizes. Testing is to be performed on four mated pair.

Qualification by similarity for a change to a 90 degree boot: Manufacturers who are qualified under this configuration (including boot orientation), temperature and fiber size, and whose ST connector with an alternate boot orientation passes the size (partial), weight, identification marking, workmanship, insertion loss and temperature cycling specified herein, are qualified under this specification sheet for the change in boot orientation. This qualification by similarity is valid if the only change is orientation and not material. Testing is to be performed on four mated pair and in the sequence listed.

Qualification by similarity for a change in fiber size from multimode to single mode: Manufacturers who are qualified under this specification sheet for a particular configuration, temperature and multimode fiber size, and whose single mode fiber size passes the tests specified herein for MIL-DTL-83522/16 with the exception of dust, salt spray and fungus, are qualified under this specification sheet for the single mode fiber size. This qualification by similarity is valid if the only difference between the previously qualified MIL-DTL-83522/16 ST connector and the one being tested is a change in the fiber size.

**TABLE I. MIL-DTL-83522/16-ANX, -ANY, -DNX & -DNY ST connector MIL-DTL-83522/17-NX & -NY ST-TO-ST adapter:
Initial qualification, requalification: change in design/material.**

Test performed	Optical test done as part of test performed	Initial qualification for M83522 /16 & /17	Requalification for M83522/16 & /17			
			Initial qualification ANX & ANY after DNX & DNY qualification	Change in boot material	ANX, ANY change in boot insert design	Change in metallic material ^{5/}
Group 1 (10 mated pair)^{12/, 13/}						
Visual & mechanical		X	X			X
Size		X	X ^{6/}	X ^{6/}	X ^{6/}	X ^{6/}
Weight		X	X	X	X	X
Identification marking		X	X	X	X	X
Workmanship		X	X	X	X	X
Functional						
Cable strain relief						
Force to engage/disengage						
Coupling proof torque						
Coupling mech retention force						
Optical-8SM & 4MM mated pair						
Insertion loss	OIL	X	X	X	X	X
Return loss-SM only	ORL	X	X			X
Ambient light susceptibility		X				
Group 2 (4 mated pair)						
Tensile loading	OOT-a/d	X	X		X	X
Cable strain relief						
Flex life	OOT-d	X	X	X		
Twist	OOT-a	X				X
Mating durability	OOT-d	X	X			X
Return loss (SM only)	ORL	X	X			X
Impact	OOT-a	X	X			
Insertion loss verification	OIL	X	X			
Vibration	MSG/OOT-a	X				
Mechanical shock-4SM & 4MM ^{12/}	MSG/OOT-d	X	X		X	X
Water submersion	OOT-d		X			
Group 3 (4 mated pair)						
Thermal shock	OOT-a	X				
Temperature humidity cycling	OOT-d	X		X		X
Temperature cycling	OOT-d	X	X			X
Life aging	OOT-a	X		X		
Return loss (SM only)	ORL	X				
Pressure altitude	OOT-d	X	X			
Insertion loss verification	OIL	X				
Sand and dust	OOT-d					
Force to engage/disengage						
Identification marking		X				
Group 4 (2 mated pair & parts)						
Nuclear radiation resistance ^{9/}	OOT-d					
Fluid immersion (2 mated pair)						
Salt spray (2 mated pair)		X			X ^{6/}	X
Flammability (1 mated pair)	OOT-a	X		X		
Fungus resistance ^{10/}		X	X ^{6/}	X	X ^{1/}	
Ozone exposure ^{10/}						

TABLE I. MIL-DTL-83522/16-ANX, -ANY, -DNX & -DNY ST connector MIL-DTL-83522/17-NX & -NY ST-TO-ST adapter: Initial qualification, requalification: change in design/material – Continued.

Test performed	Optical test done as part of test performed	Initial qualification for M83522 /16 & /17	Requalification for M83522/16 & /17			
			Initial qualification ANX & ANY after DNX & DNY qualification	Change in boot material	ANX, ANY change in boot insert design	Change in metallic material ^{5/}
Group 5 – ^{11/}						
Thermal vacuum outgassing						
Residual magnetism						
Odor						
Toxicity						

Notes:

1. OOT = Change in optical transmittance
 -a = measurement after test
 -d = measurement during & after test
2. OIL = Insertion loss.
3. ORL = Return loss.
4. MSG = Signal discontinuity.
- 5/ Change in material for this note relates to a change in the metallic material for the ST connector bayonet cap, barrel, and (if metal) boot insert and for the ST-to-ST adapter housing.
- 6/ If there is a change in material.
- 7/ If the material change is a non-metal one.
- 8/ Perform a subset of dimensional inspection. Subset = subset of dimensional inspections that pertain to part (such as barrel, bayonet cap or boot) being changed.
- 9/ Either an additional four mated pair can be fabricated for this test or the Group 3 samples may be used after completion of Group 3 tests.
- 10/ Polymeric parts from 1 mated pair.
- 11/ Two mated pair from Group 2.
- 12/ When performing initial qualification or re-qualification for both single mode (SM) and for multimode (MM), four MM Mated pairs must undergo Group 1 and shock testing only. Ten single mode mated pair undergo specified inspections/tests. This multimode qualification by similarity is applicable if only differences, between SM and MM, are ferrule diameter dimension, ferrule hole diameter dimension, boot color (optional) and markings.
- 13/ Group 1 mated pair are to be used for Groups 2, 3 and 4.

Referenced documents. In addition to MIL-DTL-83522, this specification sheet references the following documents:

- MIL-DTL-83522/17
- MIL-PRF-85045
- SAE AMS-QQ-S-763
- ASTM A-276
- ASTM B-16/B16M

Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

CONCLUDING MATERIAL

Custodians:

Army – CR
Navy – SH
Air Force – 85
DLA - CC
NASA – NA

Preparing activity:

DLA - CC

Review activity:

Navy – EC, AS, MC, OS
Air Force – 02, 19, 99

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