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NAVAL SURFACE WARFARE CENTER  
CARDEROCK DIVISION

NAVAL SHIP SYSTEMS  
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IN REPLY REFER TO

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From: Commander, Carderock Division, Naval Surface Warfare  
Center, Philadelphia Station, Philadelphia, PA 19112-5083  
To: Commander, Naval Sea Systems Command (SEA 03J2)

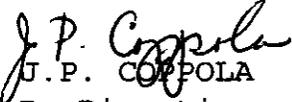
Subj: MIL-C-83522 QPL TEST CLARIFICATIONS

Encl: (1) MIL-C-83522 QPL Test Clarifications and Commentary  
dated 3 August 1997  
(2) Test Agenda, MIL-C-83522 ST Connector, Initial  
Qualification Test dated 3 August 1997

1. This letter addresses clarifications for the Qualified Products List (QPL) testing of fiber-optic shipboard ST connectors specified in MIL-C-83522/16 and ST-to-ST adapters specified in MIL-C-83522/17. This letter is the first one addressing ST connector clarifications.
2. QPL testing is to be performed in accordance with MIL-C-83522, amendment 1 to MIL-C-83522, and the appropriate MIL-C-83522 specification sheet with the clarifications addressed in this letter.
3. Enclosure (1) is the test clarifications which will be included in the next revision to MIL-C-83522 and the applicable specification sheets. Also, this enclosure includes commentary (or notes) on questions that arose during QPL testing.
4. Enclosure (2) is a revised test agenda for performing the MIL-C-83522 initial qualification testing. This revised test agenda will be included in the next revision to MIL-C-83522.
5. Technical correspondence on the concurrence for testing should be addressed to the Carderock Division, Naval Surface Warfare Center (NSWCCD-SSES), Code 9542 (Attn: E. Bluebond), Philadelphia, PA 19112-5083.

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6. NSWCCD-SSES point of contact for this matter is E. Bluebond.  
He can be reached at (215) 897-8510, FAX (215) 897-8509.

  
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NSWCDD-SSES 95,954,9542(2)

3 August 1997

MIL-C-83522 QPL Test Clarifications and Commentary

1. Test clarifications.

a. Qualification by similarity: Amend the applicable qualification by similarity paragraph in MIL-C-83522/16 for a change in bayonet cap and/or barrel materials as follows:

"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, temperature cycling, salt spray, and flammability specified herein, are qualified under this specification sheet for the change in materials. This qualification by similarity is valid if the only difference between the previously qualified MIL-C-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 four mated pair. Test is to be performed in the sequence listed."

b. Qualification by similarity: Amend the applicable qualification by similarity paragraph in MIL-C-83522/16 for a change in the boot materials as follows:

"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 matallic 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."

Enclosure (1)

c. Qualification by similarity: Amend the applicable qualification by similarity paragraph in MIL-C-83522/16 for a change in fiber size from single mode to multimode as follows:

"Manufacturers who are qualified under this specification sheet for a particular configuration, temperature and single mode fiber, and whose 62.5/125 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."

d. Qualification by similarity: Amend the applicable qualification by similarity paragraph in MIL-C-83522/16 for a change to a 90 degree boot as follows:

"Manufacturers who are qualified under this specification sheet for a particular 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."

e. Qualification by similarity: Amend the applicable qualification by similarity paragraph in MIL-C-83522/17 for a change in fiber size from single mode to multimode as follows:

"Manufacturers who are qualified under this specification sheet for a particular temperature and single mode fiber, and whose 62.5/125 micron multimode ST-to-ST adapter 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."

f. Qualification by similarity: Amend the applicable

qualification by similarity paragraph in MIL-C-83522/17 for a change in the ST-to-ST adapter alignment sleeve as follows:

"Manufacturers who are qualified under this specification sheet for a particular temperature, fiber size and alignment sleeve, and whose ST-to-ST adapter with an alternate alignment sleeve passes the size (partial), weight, workmanship (includes mating check), insertion loss (10 matings, no cut back), mating durability, impact, shock, thermal shock, temperature cycling, and flammability specified herein, are qualified under this specification sheet for the change in the alignment sleeve. This qualification by similarity is valid if the only difference between the previously qualified MIL-C-83522/17 ST-to-ST adapter and the one being tested is a change in materials. Size inspection, weight and workmanship are to be performed on 30 ST-to-ST adapters. The remainder of the testing is to be performed on four mated pair. Test is to be performed in the sequence listed. Tests may be added or waived depending on alignment sleeve configuration and material."

g. Qualification by similarity: Amend the applicable qualification by similarity paragraph in MIL-C-83522/17 for a change in housing material as follows:

"Manufacturers who are qualified under this specification sheet for a particular temperature and fiber size, and whose ST-to-ST adapter with an alternate housing material passes the size, weight, identification marking, workmanship, insertion loss, temperature humidity cycling, temperature cycling and salt spray specified herein, are qualified under this specification sheet for the change in housing material. This qualification by similarity is valid if the only difference between the previously qualified MIL-C-83522/17 ST-to-ST adapter and the one being tested is a change in housing material. If dimensions have changed (i.e., nominal and tolerances are not the same or tighter), the ST-to-ST adapter must pass shock also. Size inspection, weight, identification marking and workmanship are to be performed on 30 ST-to-ST adapters. The remainder of the testing is to be performed on four mated pair. Test is to be performed in the sequence listed."

h. Revise the Configuration under the Part Identification Number (PIN) for MIL-C-83522/16 as follows:

- (1) Delete configuration "B" and "C" and supersede them with configuration "D".
- (2) Add the following to MIL-C-83522/16 as configuration "F": "F (90 degree boot, either long or short cap)."
- (3) Add the following note after configurations A through F: "Note: Cap refers to the bayonet cap or ST connector outer metal housing. Figure 1, page 1 of 6 is designated the "long cap" and figure 1, page 2 of 2 the "short cap". Barrel refers to interior metal part that supports the ferrule and crimp sleeve."

i. Add the Boot Color under MIL-C-83522/16 as follows: "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." *or black*

j. Add the ST connector accessories under MIL-C-83522/16 as follows: "ST connector accessories: Each ST connector shall be packaged with a minimum of one crimp sleeve, one dust cover, one straight boot for a 2.50 mm maximum diameter, single fiber cable, ~~one sleeve for 900 micron fiber.~~"

k. Add the 90 degree boot dimensions for the ST connector under MIL-C-83522/16 as follows: "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)."

l. Revise the following dimensions under MIL-C-83522/16 crimp sleeve paragraph: "2.50 mm (0.0984 inch), 3.43 ± .08 mm (0.135 inch ± .003 inch), 3.05 ± .08 mm (0.120 inch ± .003 inch)."

m. Add the minimum patch panel thickness dimension for the ST-to-ST adapter under MIL-C-83522/17 as follows: "Patch panel thickness: ST-to-ST adapter is mounted to a patch panel with a 4.0 mm (0.16 inch) minimum thickness."

n. Revise the pin-to-pin length dimension (currently 18.94

to 22.28 mm) on the ST-to-ST adapter under MIL-C-83522/17 as follows: "Pin-to-pin length on figure 1, page 1 of 3: 20.20 to 20.83 mm."

o. Revise the items in MIL-C-83522 as follows:

- (1) Delete second sentence in 4.7.10.
- (2) Delete the phrase "(at least one mated and one unmated)" in the first sentence and the words " and unmated" in the second sentence of 4.8.3.
- (3) Delete the words "and unmated" in the first sentence of 4.8.4.
- (4) Delete the phrase "(at least one mated and one unmated)" in the first sentence of 4.8.12.
- (5) Add the phrase "For multimode ST connectors," to the beginning of the second sentence in Amendment 1, 4.7.6.

p. Qualification by similarity: Add the applicable qualification by similarity paragraph in MIL-C-83522/16 for a change in fiber size from multimode to single mode as follows:

"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-C-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-C-83522/16 ST connector and the one being tested is a change in the fiber size."

q. Qualification by similarity: Add the applicable qualification by similarity paragraph in MIL-C-83522/17 for a change in fiber size from multimode to single mode as follows:

"Manufacturers who are qualified under this specification sheet for a particular temperature and multimode fiber size, and whose single mode fiber size passes the tests specified herein for MIL-C-83522/17 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-C-83522/17 ST-to-ST adapter and the one being tested is a change in the fiber size."

r. Revise the Shock requirement under MIL-C-83522/16 as follows: "For SM/MM connectors assembled 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 assembled 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.

## 2. Commentary on QPL Tests.

a. The "L" dimension specified on page 3 of MIL-C-83522/16B has the same value for both its minimum and maximum. Note 4, which clarifies the intent of the "L" dimension will be revised to state: "L dimension is for reference or conceptual design considerations only. L dimension is the diameter of a circle on the surface of the ferrule that is concentric with the axis of the ferrule.". The "L" dimension should be shown on figure 1, page 2 of MIL-C-83522/16B as a dotted line and not a center line.

The purpose of defining the "L" dimension can be understood in its relationship to the "X" dimension and the ferrule end face. Notice that the end face has a domed or radial curvature. The "X" dimension is from the apex of this curvature to an imaginary inscribed circle on the ferrule end face that is concentric with the axis of the ferrule. The intent of the "L" dimension is to define the diameter of this imaginary inscribed circle. The fixing of the "X" dimension is critical to active device manufacturers. This dimension defines protrusion limits, before polishing, that will fix ferrule location and prevent ferrule penetration into the active device.

b. The imaginary inscribed circle specified by the "L" dimension on page 3 of MIL-C-83522/16B can occur on either the domed curvature portion or the chamfered portion of the ferrule end face. A manufacturer may elect to restrict their particular design to the domed curvature portion of the ferrule end face. The advantage of this restriction is to enable the "X" dimension measurement to be made by calibration standards (such as a special fixture with a depth micrometer). Interferometric surface profiles or stylus profilometers along with the appropriate mathematical computations can be used to determine the "X" dimension when it falls in either the domed curvature portion or the chamfered portion of the ferrule end face.

**TEST AGENDA  
MIL-C-83522/16 ST CONNECTOR  
INITIAL QUALIFICATION TEST**

TEST PERFORMED	O/D/ M/E/ S&V	DURATION PER GROUP (DAYS)	OPTICAL DATA	TEST STATUS		
				START DATE	END DATE	ACTUAL MANDAYS
Material procurement						
Test cable fabrication						
Group 1-12SM & 4MM mated pair						
Visual & mechanical						
Weight						
Size						
Identification marking						
Workmanship						
Cable strain relief						
Optical						
Insertion loss						
Return loss-SM only						
Ambient light susceptibility						
Group 2-4 SM mated pair						
Tensile loading			OOT			
Flex life			OOT,OIL			
Twist			OOT,OIL			
Mating durability			OOT,OIL,ORL			
Return loss (SM only)						
Impact			OOT			
Insertion loss (restr+over)						
Vibration (4 channels per test)			MSG			
Shock(4 channels per test) *			MSG			
Group 3-4 SM mated pair						
Thermal shock			OOT			
Temperature/humidity cycling			OOT,OIL			
Temperature cycling			OOT,OIL			
Temperature life			OOT,OIL			
Insertion loss (restr+over)						
Pressure altitude			OOT			
Dust (fine sand)			OOT			
Marking						
Group 4						
Nuclear radiation resistance						
Salt spray - 2 assembled ST						
Flammability-2 SM mated pair			OOT			
Fungus-2 assembled ST						
Test Report						
Totals			---			

Notes:

1. OOT = Change in optical transmittance.
2. OIL = Insertion loss.
3. ORL = Return loss.
4. MSG = Signal discontinuity.

\* 4 MM Mated pairs are for Group 1 and shock testing only.

DOC: ST1QB.DOC

Enclosure (2)