REV	SHT	NAVSEA DRAWING NO.	ESWBS
-	1	8283458	499

APPLICATION	
NEXT ASSY	USED ON

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED

This Navy Drawing contains test sample configurations (including the fiber optic components/materials used), test sample fabrication (preparation), launch condition method, specific test practices pertaining to MIL-PRF-29504/14 & /15 termini.

Intent

1. This Navy Drawing supports the initial round of Qualified Products List (QPL) testing for the MIL-PRF-29504/14 & /15 termini when the QPL testing is not performed in conjunction with MIL-PRF-28876 testing.
2. This Navy Drawing supplements MIL-PRF-29504/14 & /15.
3. This Navy Drawing minimizes variables in testing by standardizing areas in fabrication and testing. Minimizing test variables permits more accurate comparison of test results from multiple sources of supply when testing is performed by multiple test laboratories. This consistency with test results allows the comparison with Fleet performance, and if needed, the redress of performance requirements or test methodology.

REV STATUS OF SHEETS	REV																				
	SHEET	1	2	3	4	5	6	7	8												

DISTRIBUTION STATEMENT A: APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:

FRACTIONS +/- DECIMALS .xx+/- ANGLES .xxx+/- P DO NOT SCALE DRAWING

MATERIAL:

FINISHES:

CAGE CODE
CONTRACT NO.

APPROVED	C. Good	10/13/06
ENGINEER	E. Bluebond	10/13/06
CHECKED	M. Brown	10/13/06
PREPARED	E. Bluebond	10/10/06
ACCEPTED FOR NAVSEA	R. Throm	10/13/06
	SIGNATURE DOES NOT DENOTE APPROVAL	
APPROVED BY NAVSEA		
	(SIGN ONLY IF ENGINEERING HAS BEEN "PROVED"BY MANUFACTURE AND TEST	

DEPARTMENT OF THE NAVY
NAVAL SEA SYSTEMS COMMAND
WASHINGTON, D.C. 20362-5101

TERMINI, FIBER OPTIC, MIL-PRF-29504/14 & /15, TEST SAMPLE CONFIGURATIONS/FABRICATION & SPECIFIC METHODS/PRACTICES

SIZE	CAGE	ESWBS	DRAWING NO.	REV
A	53711	499	8283458	

SCALE: NONE | UCI | WT GRP | SHEET 1 OF 8

Contents

Qualification, except interoperability
Interoperability

Notes

1. Background.
   a. Test sample configurations (except interoperability). Dependent upon the inspection/test performed, the termini test samples shall be in one of three configurations:
      (1) Un-terminated termini,
      (2) Termini as part of a single fiber cable,
      (3) Termini as an integral part of a multiple termini connector.
      The inspection/test sequence for each of the three termini test sample configurations is listed in table I. The construction details for each of the three test sample configurations are listed under the section in this drawing for "Qualification except interoperability".
   b. Interoperability. Separate test sample configurations are required for interoperability testing. These test sample configurations are in addition to the ones to be used for the other qualification tests. Test sample configurations for interoperability are described in this drawing under the section "Interoperability".
   c. Multiple party testing considerations. The incentive to minimize test variables, resulting in a level playing field for multiple parties testing, leads the Government to establish a baseline. This baseline includes considerations for fabrication of test samples, methods to employ launch conditions and use of specific test practices in addition to specifics for test sample configurations.
2. MIL-PRF-28876 connectors. Termini, tested independently and not in conjunction with a MIL-PRF-28876 qualification, must be tested in a MIL-PRF-28876 connector, shell size 15 with an 8 cavity insert. At least 16 mated termini pair must be tested for each inspection or test performed. This requirement is consistent with termini tested in conjunction with a MIL-PRF-28876 connector.
3. Source to obtain this document. A copy of this document can be obtained at Web Site: https://fiberoptics.nswc.navy.mil/ in the NAVSEA Drawing section under Component Information.
4. Inquiries and clarifications on this Navy Drawing are to be placed in writing and sent by e-mail to DSCC VQP. Current DSCC-VQP point of contact can be obtained at Web Site: http://www.dscc.dla.mil/programs/qmlqpl/. To obtain current technical contact, select Programs/Contacts followed by selecting on Passive Devices Team.
5. Submittal of vendor documentation (termination procedures and test reports). Original and two copies are to be submitted to DSCC VQP.

Table I. Qualification inspections (except interoperability).

TEST PERFORMED	Initial Qual	Qualification By Similarity		
	M29504 /14, /15	/3 After /14 & /15 Pass	MM After Passed SM	SM After Passed MM
Unterminated Termini Tests				
Group 1 3/				
Size 1/	X	X	X	X
Weight 1/	X	X		
Identification markings 1/	X	X		X
Workmanship 1/	X	X		X
Circular runout	X			
Group 2 (16 pair minimum) 2/				
Terminus insertion & removal forces	X			
Terminus retention	X			
Maintainance aging	X			
Terminus cleaning	X			
Group 3 (polymeric materials only)				
Ozone	X			
Fungus resistance	X			
Termini As Part Of A Single Fiber Cable Tests				
Group 1				
None				
Group 2 (16 pair – minimum each test)				
Fiber pull out force 4/	X			
Cable pull out force 4/	X			X
Group 3				
None				

TEST PERFORMED	Initial Qual	Qualification By Similarity		
	M29504 /14, /15	/3 After /14 & /15 Pass	MM After Passed SM	SM After Passed MM
Termini As An Integral Part Of A Multiple Termini Connector				
Group I (4 connector mated pair 8/)				
Interoperability 7/	X		X	X
Optical tests				
Insertion loss	X		X	X
Return loss	X			X
Group II (2 mated connectors)				
Mating durability	X			X
Terminus cleaning	X			
Return loss 10/	X			X
Group III (2 connector mated pair)				
Mechanical tests 8/				
Impact	X			
Vibration 9/	X			
Shock, MIL-S-901 9/	X		X	X
Environmental				
Thermal shock	X			
Temperature humidity cycling	X			
Temperature cycling	X			X
Temperature life	X			X
Flammability	X			X
Insertion loss verification 11/	X			X
Return loss 11/	X			X

1/ These inspections are to be performed by the manufacturer at the production facility.
2/ Test fixture for this test is to include fiber optic; MIL-PRF-28876 connectors; both plug and receptacle for retaining the termini during testing.
3/ Sample size. One pair = one pin terminus and one socket terminus. A minimum sample size shall be used to ensure sufficient quantity for termini inspections as part of a single fiber cable and for termini inspections as an integral part of a multiple fiber connector.
4/ Each terminus is to be terminated on one end of a single fiber cable. Cable used is to have provisions compatible with termini strain relief, as applicable. Termini, selected from the group that underwent inspections for un-terminated termini, shall be used. A minimum sample size of 16 pin termini and 16 of the applicable counterpart socket termini, selected from the group that underwent inspections for un-terminated termini, shall be used for each of these tests.
Fiber pullout. Separate test samples for the socket termini must be prepared on single fiber cable without any strain relief. The change in optical transmittance shall be met both during and after the test for socket termini. The fiber pullout test does not need to be performed on the pin terminus.
Cable pullout. Separate test samples for the socket termini must be prepared on single fiber cable with strain relief (arimid yarn on cable affixed to terminus via the crimp sleeve). The change in optical transmittance shall be met both during and after the test for socket termini. The cable pullout test does not need to be performed on the pin terminus.
5/ None.
6/ None.
7/ Interoperability. This testing is done by DSCC-VCB which maintains/retains the interoperability standards. Please note that separate test samples are required for interoperability testing. These test samples will then be retained by DSCC as interoperability standards.
8/ Mechanical tests. Either 2 connector mated pair from Group II or 2 connector mated pair from Group III may be used.
9/ Shock and vibration. Two connector mated pair must be tested. At least four termini pair in the two connector mated pair are to be monitored for optical signal discontinuity (and for change in optical transmittance). Any other mated pair not monitored for optical signal discontinuity is to be monitored for change in optical transmittance.
10/ Return loss after mating durability. If failure occurs, ferrule end faces may be repolished and test redone.
11/ Per MIL-PRF-28876, an insertion loss verification and a return loss test is required after the conclusion of the mechanical tests and after the environmental tests. If both the mechanical tests and the environmental tests are done on the same mated pair, then only one insertion loss verification and one return loss test is performed (after the conclusion of the mechanical and environmental tests).

Qualification, except Interoperability

1. Test sample configuration for MIL-PRF-29504/14 & /15.
   a. Applicable documentation.
      (1) End Face Geometry. Ferrule end face geometry for domed ferrule with a PC polish shall be inspected for conformance to parameters specified in NSWCCD-SSES ltr 9504 Ser 96315/067 of 31 October 2003. A copy of this document can be obtained at Web Site: https://fiberoptics.nswc.navy.mil/ in the Policy and Guidance section under Testing Information.

(2) Termination procedures. Termination procedure for the test samples shall be in accordance with MIL-STD-2042, Part 5, Method 5A1. A copy of this document can be obtained at Web Site: https://fiberoptics.nswc.navy.mil/ in the Status: Standards section under Specs & Standards Status. Vendors shall be required to use these termination procedures and mark up any deviations taken (such as strip lengths). The marked up drafts shall be submitted before test sample fabrication. Government personnel will verify adequacy of the marked up draft submitted as part of the QPL process. Upon verification, the Government will finalize the procedures for incorporation into Government documentation.

b. Test samples: Un-terminated termini

(1) Quantity: Minimum of 96 pin termini and 96 socket termini for each fiber type (single mode, multimode)

(2) Allocation of these 96 pin termini and 96 socket termini for remaining testing is as follows (see table II):

(a) Unterminated termini.

i Group 2: 16 pin termini and 16 socket termini.

(b) Termini as part of a single fiber cable.

i Group 2 Cable pullout: 16 pin termini and 16 socket termini.

ii Group 2 Fiber pullout: 16 pin termini and 16 socket termini.

(c) Termini as an integral part of a multiple termini connector

i Interoperability:
Counterpart termini (test configurations per Table VI of MIL-DTL-29504). 2 connector mated pair (16 pin termini and 16 socket termini).
Terminus insertion and removal forces, Terminus retention force. An additional 16 pin termini and 16 socket termini (that are un-terminated) are required for the Terminus insertion and removal force and for Terminus retention force.

ii Group 1 Optical (Insertion loss & Return loss) then Group 2 Mechanical tests: 2 connector mated pair (16 pin termini and 16 socket termini).

iii Group 1 Optical (Insertion loss & Return loss) then Group 3 Environmental tests: 2 connector mated pair (16 pin termini and 16 socket termini).

Table II. Termini allocation table. 1/

TEST PERFORMED	Number of Pin Termini	Number of Socket Termini
Unterminated Termini Tests		
Group 1	128	128
Group 2 (16 pair minimum)	16 of 128	16 of 128
Group 3 (polymeric materials only)	None of 128	None of 128
Termini As Part Of A Single Fiber Cable Tests		
Group 1	None	None
Group 2 (16 pair – minimum each test)	32 of 128	32 of 128
Fiber pull out force	16 3/, 4/	16 3/
Cable pull out force	16 3/, 4/	16 3/
Group 3	None	None
Termini As An Integral Part Of A Multiple Termini Connector		
Group I (4 connector mated pair)	32 of 128	32 of 128
Interoperability (terminus-to-ST jumpers) 2/	32 of 128	32 of 128
Group II (2 connector mated pair)	From Group I	From Group I
Group III (2 connector mated pair)	From Group I	From Group I

1/ See 1.b(2) and notes with table I for further detail.
2/ See 1.b(2)(c)i for an additional 16 pin termini and 16 socket termini required.
3/ 16 termini from the 32 termini designed for Group 2.
4/ If one socket terminus is tested at a time, only one pin terminus-to-ST jumper is required for the 16 socket terminus-to-St jumpers tested (see note 4 in table I).

c. Test samples: Termini as part of a single fiber cable.

(1) End Face Geometry. End face geometry requirement shall be a domed ferrule end face with a PC polish for both termini and for ST connectors (or other instrumentation-end connectors). Cable assemblies for submission are to be fabricated per Part 5 of MIL-STD-2042. Termini are to be polished using the standard dome polish specified in Part 5. (A flat, standard dome and enhanced dome polish are in Part 5.)

(2) Quantity: 16 pin termini and 16 socket termini from the lot of un-terminated termini for cable pullout, 16 pin termini and 16 socket termini from the lot of un-terminated termini for fiber pullout.

(3) Configurations and fabrication. Test sample configurations (single mode and multimode on tight buffer cable) and fabrication of termini-to-ST connector jumpers shall conform as specified below. Other instrumentation-end connectors

may be used in lieu of ST connectors. Each cable assembly shall consist of 10 meters of cable with the DUT in the middle (at 5 meters) and single ferrule connectors on the ends to mate with the optical instrumentation. This cable assembly configuration requires each terminus-to-ST connector jumper to have a cable length of 5 meters. Submit request for any alternate cable length proposal to DSCC-VQP. A justification with proposed length deviation and test setup that would allow for successful performance with the proposed deviated length must be included.

(a) Cable pullout. Separate test samples for the pin and the socket termini must be prepared on single fiber cable with strain relief (arimid yarn on cable affixed to terminus via the crimp sleeve).

(b) Fiber pullout. Separate test samples for the pin and the socket termini must be prepared on single fiber cable without any strain relief.

(4) Cable type. Cable used must be of same configuration as MIL-PRF-85045/16; however, this cable does not need to meet environmental specifications in MIL-PRF-85045/16. The fiber in the cable used must be the same or equivalent to MIL-PRF-49291/6 for multimode optical fiber or MIL-PRF-49291/7 for single mode fiber. Submit request for alternate cable to DSCC-VQP. Requesting party must submit documentation showing equivalency for optical, mechanical, environmental, material and other applicable performance parameters for both fiber being requested and for fiber in which equivalency is being claimed. Documentation is to include specification sheets and a prepared equivalency matrix/table. Otherwise, MIL-PRF-85045/16 cable shall be used.

(5) Test methods and practices. Launch conditions and measurements for the change in optical transmittance shall conform as specified in 3.a below.

d. Test samples: Termini as an integral part of a multiple termini connector

(1) End Face Geometry. End face geometry requirement shall be a domed ferrule end face with a PC polish for both termini and for ST connectors (or other instrumentation-end connectors). Cable assemblies for submission are to be fabricated per Part 5 of MIL-STD-2042. Termini are to be polished using the standard dome polish specified in Part 5. (A flat, standard dome and enhanced dome polish are in Part 5.)

(2) Cable type. Cable used must be MIL-PRF-85045 eight (8) fiber cable to MIL-PRF-85045/13 or MIL-PRF-85045/17.

(3) Fabrication: At a minimum, separate sets of test samples shall be tested on cable assemblies fabricated with single mode fiber, and a reduced set of test samples shall be tested on cable assemblies with multimode fiber. The reduced set (two connector pair) of test sample for cable assemblies tested with multimode fiber is made under the provision that a full qualification is being done with single mode fiber and a qualification by similarity will be followed with multimode fiber. A MIL-PRF-28876 shell size 15 connector shall be used with a fully populated 8 cavity insert. All 8 channels are to be active optically for termini qualification testing. Otherwise, connector configurations used for termini qualification shall conform to 4.4.1.1 of MIL-PRF-28876.

(a) Single mode. Termini on cable assemblies with instrumentation connectors (such as ST connectors) on the other end and with single mode cable shall conform as follows:

Ferrule hole diameter: Termini shall be selected for best (tightest) fit to the optical fiber to achieve maximum connector (optical) performance. Fitting the optical fiber to the next larger ferrule hole diameter may affect connector performance.

Fiber size: Single mode (9.3/125 micron at 1310 nm per MIL-PRF-49291/7)

Cable type: MIL-PRF-85045/13 or /17.

Epoxy type: Approved sources of supply for MIL-PRF-24792, PIN M24792-A, as listed in the Navy Recommended Fiber Optic Components Parts List. A copy of this document can be obtained at Web Site: https://fiberoptics.nswc.navy.mil/ in the Recommended Parts List section under Recommended Parts List.

Quantity: 4 mated pair, see 1.d (4) (b) below.

Tests performed: Full test sequence, see 1.d (4) (b) below. Alternative is to qualify with multimode fiber first, then qualify with single mode fiber under the qualification by similarity (see table 1) with a reduced set of test samples.

(b) Multimode. Termini on cable assemblies with instrumentation connectors (such as ST connectors) on the other end and with multimode cable shall conform as follows:

Ferrule hole diameter: Termini shall be selected for best (tightest) fit to the optical fiber to achieve maximum connector (optical) performance. Fitting the optical fiber to the next larger ferrule hole diameter may affect connector performance.

Fiber size: Multimode (62.5/125 micron per MIL-PRF-49291/6).

Cable type: MIL-PRF-85045/13 or /17.

Epoxy type: Approved sources of supply for MIL-PRF-24792, PIN M24792-A, as listed in the Navy Recommended Fiber Optic Components Parts List. A copy of this document can be obtained at Web Site: https://fiberoptics.nswc.navy.mil/ in the Recommended Parts List section under Recommended Parts List.

Quantity: 4 mated pair, see 1.d (4) (c) below.

Tests performed: Full test sequence, see 1.d (4) (c) below. Alternative is to qualify with single mode fiber first, then qualify with multimode fiber under the qualification by similarity (see table 1) with a reduce set of test samples.

(4) Quantities and tests performed for termini undergoing the full qualification.

(a) Cable assembly configuration. In general, each cable assembly shall consist of 10 meters of cable with the DUT in the middle (at 5 meters) and single ferrule connectors on the ends to mate with the optical instrumentation. For insertion loss tests on multiple termini connectors where a cut-back must be performed, a 13 meter length of cable is used with the DUT placed 8 meters from the launch end of the cable. This allows 3 cut-backs to be performed, each cut-back being one meter long.

(b) Full test sequence for qualifying with single mode fiber. Four mated pair with single mode fiber and 2 mated pair with multimode fiber. Each four mated pair (using Shell Size 15 MIL-PRF-28876 qualified connectors) shall contain a total of 32 pin termini and 32 socket termini from the lot of un-terminated termini. Each connector shall contain an 8 channel (cavity) insert and be fully populated. Full test sequence is to be performed on cable assemblies fabricated with single mode fiber (4 mated pair) and the reduced test sequence per the qualification by similarity shall be performed with multimode fiber (2 mated pair). Each mated pair shall contain only one fiber type.

(c) Full test sequence for only qualifying with multimode fiber. As an alternative, and more limited, qualification to the full test sequence for single mode listed above, testing may be performed only on test samples consisting of four mated pair with multimode fiber. Each four mated pair (using Shell Size 15 MIL-PRF-28876 qualified connectors) shall contain a total of 32 pin termini and 32 socket termini from the lot of un-terminated termini. Each connector shall contain an 8 channel (cavity) insert and be fully populated. Full test sequence is to be performed on cable assemblies fabricated with multimode fiber (4 mated pair). A more extensive, but still limited test sequence may be performed at a later date per the qualification by similarity to qualify with single mode fiber (an additional 4 mated pair). Each mated pair shall contain only one fiber type.

2. Other fabrication and test sample assembly requirements.

a. Hand versus machine polish. Test samples may be terminated using a machine polish for one or more of the polishing steps. This leeway does not exclude the vendor from submitting a marked up procedure (in Part 5 of MIL-STD-2042) with a hand polish for use in the Fleet/Field.

3. Test methods and practices.

a. Launch conditions.

(1) Fiber size 9/125 micron. A mandrel diameter shall be used as the means of mode conditioning to filter out higher order modes. The technique of wrapping the fiber around a mandrel shall be performed as specified see 3.5 of TIA/EIA-455-34. A diameter of 30 mm shall be used with 3 complete turns of the fiber wrapped around the mandrel.

(2) Fiber size 62.5/125 micron. For 62.5/125 micron optical fiber, use a 2 meter minimum length of 50/125 micron optical fiber with a 0.2 NA.

b. Specific test practices. Testing shall be performed as specified in MIL-PRF-29504/14 & /15 using cited test standards (such as TIA/EIA). Specific test practices for the optical performance tests, including clarifications and further details, are found in the Optical Test Measurement Guide. A copy of this document can be obtained at Web Site: https://fiberoptics.nswc.navy.mil/ in the Policy and Guidance section under Testing Information.

(1) Shock test. Standard shock fixture 4A for bulkhead mounting shall be used. Supplement test fixture that shall be used and the mounting shall be performed as specified in Mechanical Shock (Hi-Impact) Test and Measurement Guide letter. A copy of this document can be obtained at Web Site: https://fiberoptics.nswc.navy.mil/ in the Policy and Guidance section under Testing Information.

(2) Return loss requirements for multimode fiber. Whenever in the test sequence a return loss measurement for single mode fiber size is specified, a measurement for the multimode fiber size shall be performed also (when test samples with multimode fiber are being tested). The optical performance requirement for return loss using multimode fiber shall be determined from tests results obtained during the QPL testing. For standardization (consistency), the multimode return loss shall be performed using a single mode coupler or single mode ORLM. The optical source used shall be at the 1310 nm wavelength. Specific test practices shall be used for return loss and the other optical performance tests as cited in the Optical Test measurement Guide. A copy of this document can be obtained at Web Site: https://fiberoptics.nswc.navy.mil/ in the Policy and Guidance section under Testing Information.

Interoperability.

1. Policy to perform testing.

a. Background. In the past, the Government has partnered with termini/connector companies that were undergoing Qualified Products List testing in an effort to verify interoperability of fiber optic, multiple termini connectors that conform to MIL-PRF-28876. This partnership allows the Government to verify the interoperability of connectors with that of participating companies. DSCC-TEB is now the Government entity that performs the testing for interoperability. This partnership for interoperability testing is now extended to other termini/connectors including qualifying only the MIL-PRF-29504/14 & /15 termini.

b. Test sample retention. One stipulation is that the test samples are to be retained by the Government for use as standards in future interoperability testing to be performed by the Government in-house personnel. Only personnel to be present during interoperability testing are Government, in-house personnel. At no time would other parties have access to or examination of the interoperability standards.

c. Replacement/refurbishment. Another stipulation is that your company agrees to replace or refurbish these interoperability standards as the need arises. Any items requiring replacement/refurbishment in this agreement is to be performed by your company at no cost to the Government.

2. Test Sample submission. Vendors are responsible for the fabrication and submittal of cable assemblies (test samples) in the configurations specified below to the Government for Interoperability testing.

a. Notification for submission. Initial notification to submit test samples for interoperability shall be made to DSCC-VQP Qualifications Group.

b. Arrangements to perform interoperability testing. Once approved by DSCC-VQP, the vendor shall make financial, test and shipping arrangements with the DSCC-TEB Passive Test Section.

Point of contact: DSCC-VQP will provide current DSCC-TEB point of contact.
Shipping address: Defense Supply Center Columbus
3990 East Broad St.
Bldg 11, Section 7, TEB
Columbus OH 43213-1199

3. Test sample configuration for MIL-PRF-29504/14 & /15.

a. Applicable documentation.

(1) End Face Geometry. Ferrule end face geometry for domed ferrule with a PC polish shall be inspected for conformance to parameters specified in NSWCCD-SSES ltr 9504 Ser 96315/067 of 31 October 2003. A copy of this document can be obtained at Web Site: https://fiberoptics.nswc.navy.mil/ in the Policy and Guidance section under Testing Information.

(2) Termination procedure for the test samples shall be in accordance with MIL-STD-2042, Part 5, Method 5A1. A copy of this document can be obtained at Web Site: https://fiberoptics.nswc.navy.mil/ in the Status: Standards section under Specs & Standards Status. Vendors shall be required to use these termination procedures and mark up (red line) any deviations taken (such as strip lengths). The marked up drafts shall be submitted before test sample fabrication. Government personnel will verify adequacy of the marked up draft submitted as part of the QPL process. Upon verification, the Government will finalize the procedures for incorporation into Government documentation.

b. Test configurations that must be interoperable. All termini of the same PIN shall be interoperable.

c. Designated cable assemblies. Testing shall be performed using two separately designated cable assemblies with fully populated, MIL-PRF-28876 Shell Size 15 connectors. Each connector shall contain an 8 channel (cavity) insert.

d. Components to be submitted:

(1) Interoperability of counterpart terminus.

(a) Connector receptacle. MIL-PRF-28876 Shell Size 15 qualified wall (panel) mounting connector receptacle, 8 channel (cavity) insert, key position 1, no backshell (minimum quantity: 1).

(b) Connector plug. MIL-PRF-28876 Shell Size 15 qualified connector plug, 8 channel (cavity) insert, key position 1, no backshell (minimum quantity: 1).

(c) Candidate pin terminus-to-ST connector jumper (minimum quantity: 32 of each fiber size to be tested). 1/, 2/, 3/, 4/, 5/

(d) Candidate socket terminus-to-ST connector jumper (minimum quantity: 32 of each fiber size to be tested). 1/, 2/, 3/, 4/, 5/

1/ Cable with minimum length of 2 meters and terminated with terminus on one end and commercial ST connector on instrument end. End face geometry requirement is for a domed ferrule end face and PC polish for both terminus and for ST connector. Cable assemblies for submission are to be fabricated per Part 5 of MIL-STD-2042. Termini and ST connectors are to be polished using the standard dome polish specified in Part 5. (A flat, standard dome and enhanced dome polish are in Part 5.)

2/ Quantities listed are for one fiber type. Applicable fiber types for termini are single mode and multimode. A minimum quantity of 32 cable assemblies required to perform interoperability testing is based on the shell size 23 connector. For this reason, the specified number of cable assemblies must be submitted. This case applies even if only termini, and not termini in conjunction with the MIL-PRF-28876 connector, are being qualified. The 32 submitted cable assemblies become interoperability standards for future testing.

3/ Cable type. Interoperability test samples are to be constructed using MIL-PRF-85045/16 single fiber cable.
9/125 micron: M85045/16-02.
62.5/125 micron: M85045/16-01

4/ Fabrication: Termini type with ceramic ferrules.

i Single mode test samples. Candidate terminus-to-ST connector jumpers with single mode 9/125 micron cable shall conform as follows:

Ferrule hole diameter: Termini shall be selected for best (tightest) fit to the optical fiber to achieve maximum connector (optical) performance. Fitting the optical fiber to the next larger ferrule hole diameter may affect connector performance.

Fiber size: Single mode (9.3/125 micron at 1310 nm per MIL-PRF-49291/7)

Cable type: MIL-PRF-85045/16.

Epoxy type: Approved sources of supply for MIL-PRF-24792, PIN M24792-A, as listed in the Navy Recommended Fiber Optic Components Parts List. A copy of this document can be obtained at Web Site: https://fiberoptics.nswc.navy.mil/ in the Recommended Parts List section under Recommended Parts List.

ii Multimode test samples. Candidate terminus-to-ST connector jumpers with multimode cable containing 62.5/125 micron fiber shall conform as follows:

Ferrule hole diameter: Termini shall be selected for best (tightest) fit to the optical fiber to achieve maximum connector (optical) performance. Fitting the optical fiber to the next larger ferrule hole diameter may affect connector performance.

Fiber size: Multimode (62.5/125 micron per MIL-PRF-49291/6).

Cable type: MIL-PRF-85045/16.

Epoxy type: Approved sources of supply for MIL-PRF-24792, PIN M24792-A, as listed in the Navy Recommended Fiber Optic Components Parts List. A copy of this document can be obtained at Web Site: https://fiberoptics.nswc.navy.mil/ in the Recommended Parts List section under Recommended Parts List.

(2) Insert-to-terminus compatibility (Terminus insertion and removal forces, Terminus retention). When both single mode and multimode test configurations are submitted, only 16 socket termini and 16 pin termini need to be submitted. Test samples may be either or a combination of single mode and multimode.

(a) Candidate pin terminus (minimum quantity: 16).

(b) Candidate socket terminus (minimum quantity: 16, un-terminated, with alignment sleeves).

4. Other fabrication and test sample assembly requirements.

a. Hand versus machine polish. Test samples may be terminated using a machine polish for one or more of the polishing steps. This leeway does not exclude the vendor from submitting a marked up procedure with a hand polish for use in the Fleet/Field.

b. Launch conditions. No launch condition jumpers are required for the multimode fiber sizes. Overfilled launch conditions are used for interoperability testing.

(1) Fiber size 9.3/125 micron. A mandrel diameter shall be used as the means of mode conditioning to filter out higher order modes. The technique of wrapping the fiber around a mandrel shall be performed as specified see 3.5 of TIA/EIA-455-34. A diameter of 30 mm shall be used with 3 complete turns of the fiber wrapped around the mandrel.

(2) Fiber size 62.5/125 micron. For 62.5/125 micron optical fiber, use a 2 meter minimum length of 50/125 micron optical fiber with a 0.2 NA.

c. Specific test practices. Testing shall be performed as specified in MIL-PRF-29504/14 & /15 using cited test standards (such as TIA/EIA). Specific test practices for the optical performance tests, including clarifications and further details, are found in the Optical Test measurement Guide. A copy of this document can be obtained at Web Site: https://fiberoptics.nswc.navy.mil/ in the Policy and Guidance section under Testing Information.