METRIC

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DEPARTMENT OF DEFENSE
STANDARD PRACTICE

FIBER OPTIC CABLE TOPOLOGY INSTALLATION STANDARD METHODS FOR NAVAL SHIPS

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FOREWORD

1. This Department of Defense Standard Practice is approved for use by the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Department of the Navy, Naval Sea Systems Command, ATTN: SEA 05Q, 1333 Isaac Hull Avenue Southeast, Stop 5160, Washington Navy Yard, DC 20376-5160 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

3. This standard practice provides detailed information and guidance to personnel concerned with the installation of fiber optic cable topologies (fiber optic cabling and associated components) on Naval surface ships and submarines. The methods specified herein are not identifiable to any specific ship class or type, but are intended to standardize and minimize variations in installation methods to enhance the compatibility of the installations on all Naval ships.

4. In order to provide flexibility in the use and update of the installation methods, this standard practice is issued in eight parts; the basic standard practice and seven numbered parts as follows:

Part 1 Cables
Part 2 Equipment
Part 3 Cable Penetrations
Part 4 Cableways
Part 5 Connectors and Interconnections
Part 6 Tests
Part 7 Pierside Connectivity Cable Assemblies and Interconnection Hardware

5. Considering the magnitude of this standard, along with the changing requirements imposed on the fiber optic cable topology, it is inevitable that changes will be required to update these methods. Therefore, when the need for change is recognized, comments should be forwarded to Naval Sea Systems Command (NAVSEA) 05Q. Revisions to this standard will be by issuance of change pages.

CONTENTS

1. SCOPE

1.1 Scope. This standard provides detailed methods for the installation and test of fiber optic cabling and associated components (see 3.2) on Naval surface ships and submarines.

1.1.1 Applicability. These criteria apply to installations on specific ships when invoked by the governing ship specification or other contractual document. They are intended primarily for new construction; however, they are also applicable for conversion or alteration of existing ships. The rapidly changing state of the art in fiber optic technology makes it essential that some degree of flexibility be exercised in enforcing this document. Where there is a conflict between this document and the ship specification or contract, the ship specification or contract shall take precedence. Where ship design is such that the methods herein cannot be implemented, users shall submit new methods or modifications of existing methods for approval prior to implementation to: Department of the Navy, Naval Surface Warfare Center, Dahlgren Division, ATTN: Code B35, 17320 Dahlgren Road, Dahlgren, VA 22448-5100.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4 and 5 of this standard. This section does not include documents cited in other sections of this standards or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3, 4 and 5 of this standard, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards and handbooks. The following specifications, standards and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

STANDARDS

MILITARY

MIL-STD-2042-1 - Fiber Optic Cable Topology Installation, Standard Methods for Naval Ships (Cables) (Part 1 of 7 Parts).

MIL-STD-2042-2 - Fiber Optic Cable Topology Installation, Standard Methods For Naval Ships (Equipment) (Part 2 of 7 Parts).

MIL-STD-2042-3 - Fiber Optic Cable Topology Installation, Standard Methods for Naval Ships (Cable Penetrations) (Part 3 of 7 Parts).

MIL-STD-2042-4 - Fiber Optic Cable Topology Installation, Standard Methods for Naval Ships (Cableways) (Part 4 of 7 Parts).

MIL-STD-2042-5 - Fiber Optic Cable Topology Installation, Standard Methods for Naval Ships (Connectors and Interconnections) (Part 5 of 7 Parts).

MIL-STD-2042-6 - Fiber Optic Cable Topology Installation, Standard Methods For Naval Ships (Tests) (Part 6 of 7 Parts).

MIL-STD-2042-7 - Fiber Optic Cable Topology Installation, Standard Methods For Naval Ships (Pierside Connectivity Cable Assemblies and Interconnection Hardware) (Part 7 of 7 Parts).

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Documents Order Desk, 700 Robbins Ave, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. DEFINITIONS

3.1 Acronyms. The acronyms used in this standard practice are defined as follows:

a. BOF - Blown Optical Fiber
b. FOCP - Fiber Optic Cable Plant
c. FOCT - Fiber Optic Cable Topology
d. FOICB - Fiber Optic Interconnection Box
e. TRB - Tube Routing Box

3.2 BOF cable. A cable that contains one or more BOF tubes through which optical fibers or optical fiber bundles are blown.

3.3 BOF cable furcation. An assembly that joins the multiple tubes in a multi-tube BOF cable to multiple single tube BOF cables.

3.4 BOF cable splice. A joint of two BOF cable ends in which the tube ends are connected together using tube couplers and the joint environmentally sealed using a shrink sleeve.

3.3 BOF fiber. An optical fiber with a special coating that allows the fiber to be blown into a BOF tube.

3.4 BOF bundle. A group of optical fibers within a special jacket that allows the entire bundle to be blown into a BOF tube.

3.5 End user equipment. End user equipment refers to any cabinet, case, panel, or device, that contains components that are either the origin or destination of an optical signal.

3.6 Fiber optic cable plant (FOCP). A subset of the FOCT that excludes local cables and their associated components. A conventional FOCP includes FOICBs, trunk cables and their associated connectors and splices. A BOF FOCP consists of FOICBs, TRBs, tube couplers, BOF trunk cables, BOF fibers, BOF bundles, tube furcation units, and associated connectors and splices.

3.7 Fiber optic cable topology (FOCT). An integrated optical fiber distribution system that provides the optical interconnection between end user equipments. A conventional FOCT includes the conventional FOCP components and outlet boxes, local cables and their associated connectors and splices. A BOF FOCT includes the BOF FOCP components, BOF cable furcations, local cables, local BOF cables, outlet boxes, and associated connectors and splices.

3.8 Local cable.

3.8.1 Local conventional cable. A conventional optical fiber cable that runs between end user equipment and an FOICB (or outlet box), or between an FOICB and an outlet box.

3.8.2 Local BOF cable. A BOF cable that runs between end user equipment and a TRB, or between a TRB and an outlet box.

3.9 Outlet box. An outlet box is a small termination box used to break out a local cable from an interconnection box to one or more equipments within a compartment.

3.10 Trunk cable. An optical fiber cable that runs between two fiber optic interconnection boxes. Typically, trunk cables are run in the main cableways and have higher fiber counts per cable than local cables.

3.10.1 Conventional trunk cable. A conventional optical fiber cable that runs between two fiber optic interconnection boxes.

3.10.2 BOF trunk cable. A single BOF cable connecting two FOCP TRBs or between a FOCP TRB and a FOCP FOICB. A BOF trunk cable contains multiple BOF trunk tubes.

3.10.3 BOF Trunk tube. A BOF tube bundled within a BOF trunk cable that runs between two FOCP TRBs or between a FOCP TRB and a FOCP FOICB.

3.11 Tube coupler. A device used to join two BOF tubes together.

3.12 Tube furcation unit. An assembly attached to the end of a BOF tube in a BOF cable used to separate the fibers and provide a cable structure to facilitate the termination of the optical fibers from that BOF tube.

3.13 Tube routing box (TRB). An enclosure for holding BOF cables (trunk and local), BOF tubes (trunk and local), and BOF tube couplers to interconnect BOF tubes.

4. GENERAL REQUIREMENTS

4.1 Organization. This standard is comprised of eight different parts, each of which is a separate publication with a unique identification number. This organization provides maximum flexibility in using, referencing and revising the standard. The complete standard consists of the basic standard and seven numbered parts as follows:

MIL NUMBER	TITLE
MIL-STD-2042	Fiber Optic Cable Topology Installation Standard Methods For Naval Ships.
MIL-STD-2042-1	Fiber Optic Cable Topology Installation Standard Methods for Naval Ships (Cables)(Part 1 of 6 Parts).
MIL-STD-2042-2	Fiber Optic Cable Topology Installation Standard Methods for Naval Ships (Equipment)(Part 2 of 6 Parts).
MIL-STD-2042-3	Fiber Optic Cable Topology Installation Standard Methods for Naval Ships (Cable Penetrations)(Part 3 of 6 Parts).
MIL-STD-2042-4	Fiber Optic Cable Topology Installation Standard Methods for Naval Ships (Cableways)(Part 4 of 6 Parts).
MIL-STD-2042-5	Fiber Optic Cable Topology Installation Standard Methods for Naval Ships (Connectors and Interconnections)(Part 5 of 6 Parts).
MIL-STD-2042-6	Fiber Optic Cable Topology Installation Standard Methods for Naval Ships (Tests)(Part 6 of 6 Parts).
MIL-STD-2042-7	Fiber Optic Cable Topology Installation Standard Methods for Naval Ships (Pierside Connectivity Cable Assemblies and Interconnection Hardware) (Part 7 of 7 Parts)

4.2 Arrangement and contents. Each numbered part of this standard contains a series of standard installation methods. Methods providing similar functions are grouped together for ease of useability and referencing as follows:

MIL-STD-2042 Part Number	Functional group	Function
1 (Cables)	A	Cable end-sealing
	B	Cable jacket repair
	C	BOF cable splicing
	D	BOF cable furcation
	E	OFCC end sealing
2 (Equipment)	A	Cable entrance to equipment via nylon stuffing tubes
	B	Cable entrance to equipment via MCP
	C	Cable and buffered fiber forming and shaping
	D	Splice assembly and alignment
	E	BOF tube furcation unit fabrication
	F	BOF tube furcation unit installation
	G	BOF cable entrance to equipment via nylon stuffing tubes

2 (Equipment)	H	BOF cable entrance to equipment via MCP
	I	BOF cable routing, forming and shaping
	J	BOF tube end sealing
3 (Penetrations)	A	Cable penetrations via metal stuffing tubes
	B	Cable penetrations via Multicable Penetrator (MCP)
4 (Cableways)	-	Methods in DOD-STD-2003 referenced
5 (Connectors and Inter-connections)	A	Multiple terminus connector installation
	B	Single terminus connector installation
	C	Mechanical splice ferrule installation
6 (Tests)	A	Visual inspection of fiber optic components
	B	Cable attenuation test
	C	Cable assembly link loss test
	D	Cable continuity test
	E	Cable topology end-to-end attenuation test
	F	Measurement quality jumper cable selection test
	G	Heavy duty connector mechanical pull test
	H	BOF cable ball bearing test
	I	BOF cable pressurization test
	J	BOF tube seal verification test
	K	Cable assembly return loss test
	L	Cable topology return loss test
7 (Pierside Connectivity Cable Assemblies and Interconnection Hardware)	A	Hermaphroditic connector termination
	B	Shipboard interconnection box interior cable routing
	C	Umbilical assembly cable tie-down guidelines and practices
	D	Umbilical assembly cable spooling operations
	E	Cleaning and mating the hermaphroditic connector
	F	Optical test of pierside connectivity cable plant components
	G	Pier interconnection box installation
	H	Hermaphroditic connector position, mating, and concatenation
	I	Optical return loss testing of pierside connectivity cable assemblies
	J	Optical acceptance testing of pierside connectivity measurement quality jumpers

5. DETAILED REQUIREMENTS (Not applicable)

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The standard methods for installation and test of the fiber optic cable topology depicted in Parts 1 through 7 of this standard are intended primarily for new construction; however, they are also applicable for conversion or alteration of existing ships. In the case of conversion or alteration, the degree of applicability of these criteria shall be specified by the activity preparing instructions for the work.

6.2 Issue of DODISS. When this standard is used in acquisition, the applicable issue of DODISS must be cited in the solicitation (see 2.2.1).

6.3 Subject term (key word) listing.

Arrangement and content
Cable
Organization

6.5 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.

Preparing activity:
NAVY – SH

(Project SESS-0004)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-STD-2042B	2. DOCUMENT DATE (YYMMDD) 25 July 2002

3. DOCUMENT TITLE
FIBER OPTIC CABLE TOPOLOGY INSTALLATION STANDARD METHODS FOR NAVAL SHIPS

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

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c. ADDRESS (Include Zip Code) Commander, Naval Sea Systems Command ATTN: SEA 05Q 1333 Isaac Hull Avenue Southeast, Stop 5160 Washington Navy Yard, DC 20376-5160	**IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:** Defense Standardization Program Office (DLSC-LM) 8725 John J. Kingman Road, Suite 2533 Fort Belvoir, Virginia 22060-6221 Telephone (703) 767-6888 DSN 427-6888