

METRIC

MIL-PRF-85045/25A

19 January 2010

SUPERSEDING

MIL-PRF-85045/25

18 May 2001

PERFORMANCE SPECIFICATION SHEET

CABLE, FIBER OPTIC, SEVEN TUBE, BLOWN OPTICAL FIBER, STANDARD AND ENHANCED PERFORMANCE, CABLE CONFIGURATION TYPE 5 (TUBE), APPLICATION B (SHIPBOARD), CABLE CLASS SM AND MM (METRIC)

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-PRF-85045.

CLASSIFICATION:

Fiber optic cable configuration type (Tube): 5

Fiber cable class: MM (graded-index, glass core and glass cladding, multimode)

SM (dispersion-unshifted, glass core and glass cladding, single mode)

DESIGN AND CONSTRUCTION:

Blown optical fiber tube:

Dimensions and configuration: See [figure 1](#).

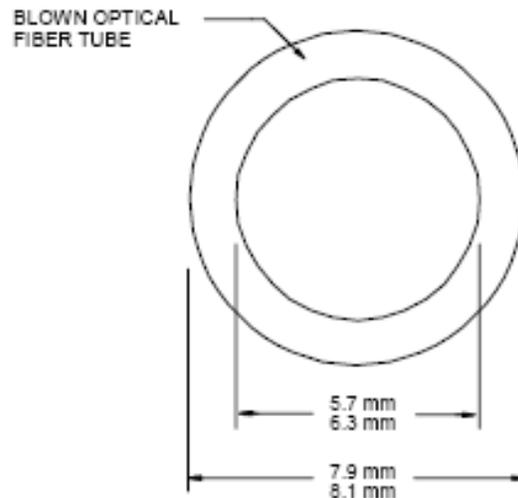


FIGURE 1. Blown optical fiber tube.

Short-term minimum bend diameter: 127 millimeters

Long-term minimum bend diameter: 127 millimeters

Tensile loading: ≥ 89 Newtons

Tube material: The tube shall be composed of a low halogen, low smoke, low toxicity polymer material.

Tube marking: Each tube shall be uniquely marked with a number between 1 and 7. The form of the marking shall be the printed spelling of the number, followed by a dash, followed by the printed Arabic numeral. The marking shall be applied and repeated every 0.10 meters (4 inches) along the tube. Tube number 1 shall be located in the center of the cable.

Finished cable:

Dimensions and configuration: See [figure 2](#). Six tubes shall be helically laid over a central tube. The minimum outer jacket thickness shall be not less than 1.65 mm.

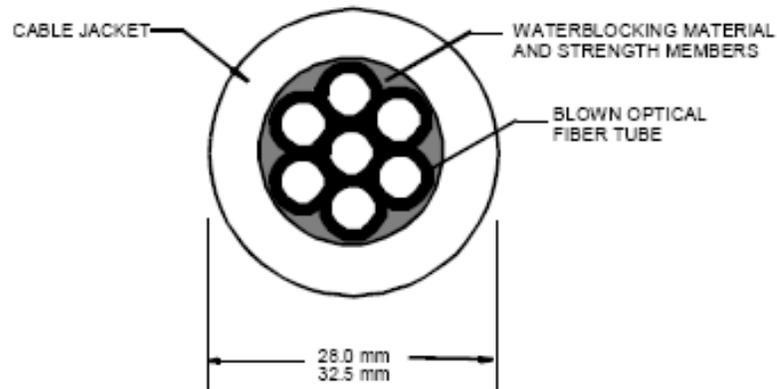


FIGURE 2. Seven-tube cable.

Concentricity: ≥ 0.65

Jacket material: The overall jacket shall be composed of a low halogen, low smoke, and low toxicity polymer material.

Cable jacket color: Shall be black or blue

Mass per unit length: ≤ 775.0 kg/km

Short-term minimum bend diameter: 0.45 meters. (The short-term minimum bend diameter is to be used in all environmental and mechanical tests that specify a cable minimum bend diameter.)

Long-term minimum bend diameter: 0.45 meters

PERFORMANCE REQUIREMENTS:

Specimen lengths: 3 units, 0.305 kilometers each

Optical properties:

Attenuation rate: Not applicable

Change in optical transmittance: Not applicable

Crosstalk: Not applicable

Mechanical properties:

Tensile loading and elongation: Applicable, tensile loading $\geq 3,300$ Newtons. Change in optical transmittance is not applicable. A ball bearing with a minimum outer diameter of 4.0 millimeters shall pass through each tube after the test.

Operating tensile loading: Applicable, except change in optical transmittance is not applicable. A ball bearing with a minimum outer diameter of 4.0 millimeters shall pass through each tube during and after the test.

Dynamic bend: Not applicable

Low temperature flexibility: The following procedure shall be used. A 1.5-meter test specimen shall be placed in a straight configuration and conditioned at the exposure temperature for 4 hours. For standard performance cable, the exposure temperature shall be the minimum operating temperature. For enhanced performance cable, the exposure temperature shall be -40 °C. The test specimen shall be removed from the conditioning chamber and formed into a single loop around a mandrel with a diameter equal to the cable short-term minimum bend diameter. The time between the removal of the cable from the chamber to the completion of the loop shall be a maximum of 50 seconds. The specimen shall be secured to maintain its bent shape and allowed to return to room temperature. A ball bearing with a minimum outer diameter of 4.0 millimeters shall pass through each tube after the test.

Cyclic flexing: 100 cycles at $+25 \pm 2$ °C and 20 cycles at -28 ± 2 °C. Change in optical transmittance is not applicable. A ball bearing with a minimum outer diameter of 4.0 millimeters shall pass through each tube after every 25 cycles for the 100-cycle exposure and after the 20-cycle exposure. The cycling may be halted to perform the ball bearing test.

Crush: Applicable, except that the load shall be 2650 Newtons and the change in optical transmittance and crosstalk are not applicable. A ball bearing with a minimum outer diameter of 4.0 millimeters shall pass through each tube after the load is removed.

Cable twist bending: Not applicable

Radial compression: Applicable, except the change in optical transmittance is not applicable. A ball bearing with a minimum outer diameter of 4.0 millimeters shall pass through each tube during and after the test.

Impact: Applicable, except that the drop hammer mass shall be 6 kilograms. Fifty cycles shall be conducted at $+25 \pm 2$ °C and 20 cycles shall be conducted at -40 ± 2 °C. The change in optical transmittance is not applicable. A ball bearing with a minimum outer diameter of 4.0 millimeters shall pass through each tube after the test.

Corner bend: Applicable, except the change in optical transmittance is not applicable. A ball bearing with a minimum outer diameter of 3.0 millimeters shall pass through each tube during the test. A ball bearing with a minimum outer diameter of 4.0 millimeters shall pass through each tube after the test.

Cable jacket tear strength: Applicable, except the cable jacket tear strength shall be not less than 35 Newtons per centimeter (N/cm) of jacket thickness for standard performance cable.

Tube tensile strength and elongation: Tube specimens shall be tested in accordance with FED-STD-228, Method 3021 and 3031, with 2.5 cm (0.98 inch) benchmarks, 6.35 cm (2.5 inch) jaw separation, and a rate of travel of 25 cm/min (9.8 inch/min). The tensile strength of the tube shall be not less than 900 N/cm². The percent elongation-at-break shall be not less than 125 percent. Capstan grips may be used.

Hosing: Low pressure applicable, except the cable leakage shall be not greater than 175 milliliters. Tube ends shall be capped with end caps during this test.

Hydrostatic: Not applicable

Dripping: Applicable

Cable scraping resistance: 750 cycles

Cable to cable abrasion: 500 cycles

Cable shrinkage: Applicable, except that the total shrinkage shall be not greater than 35 millimeters.

Pressure withstand: One end of three tubes shall be capped and a static pressure of 1.4 MPa (200 psi) applied internal to the tube for 10 minutes. After the test, tubes shall show no evidence of splitting, cracking, or rupture.

Environmental properties:

Temperature range:

Operating: -28 to +65 °C

Nonoperating: -40 to +70 °C

Storage: -40 to +70 °C

Temperature cycling: Change in optical transmittance is not applicable. A ball bearing with a minimum outer diameter of 4.0 millimeters shall pass through each tube at the high temperature plateau, the low temperature plateau, and after the test.

Thermal shock: Not applicable

Temperature humidity cycling: Change in optical transmittance is not applicable. A ball bearing with a minimum outer diameter of 4.0 millimeters shall pass through each tube at the high temperature plateau, the low temperature plateau, and after the test.

Storage temperature: Applicable, except the change in optical transmittance is not applicable. A ball bearing with a minimum outer diameter of 4.0 millimeters shall pass through each tube after the test.

Life aging: Applicable, except the change in optical transmittance is not applicable and a minimum test sample length of 150 meters may be used. For standard performance product, the test shall be conducted as specified in the basic specification. For enhanced performance product, the test shall be conducted as specified in the general specification except that the jacket material shall be tested at +175 °C for 4 hours. A minimum of 2 meters of the sample shall be maintained at the minimum bend diameter throughout the test. A ball bearing with a minimum outer diameter of 4.0 millimeters shall pass through each tube after the test.

Off reel testing: Not applicable

Weathering: Not applicable

Fluid immersion:

Standard performance product: Exposure to automobile gasoline and tap water are not required and the test temperature for lubricating oil exposure shall be 73 to 77 °C. The tensile strength retention of the cable jacket material after exposure to hydraulic fluid shall be not less than 30 percent.

Enhanced performance product: Exposure to automobile gasoline and tap water are not required and the following test temperatures shall be used for the fluids indicated: fuel oil (98 to 100 °C), turbine fuel (48 to 50 °C), and lubricating oil (98 to 100 °C).

Flame extinguishing: Applicable. Tube ends shall be plugged with a non-flammable sealant to simulate end caps.

Smoke generation and flame propagation: Applicable. Tube ends shall be plugged with a non-flammable sealant to simulate end caps. The pass/fail criteria shall be as follows. The peak optical density and the average optical density of smoke produced shall be not greater than 1.2 and 0.25, respectively. In addition, the flame spread-time product at the 10-minute point shall be not greater than 27.5 meters-minutes when calculated in accordance with ASTM E84.

Shock: Applicable

Paint susceptibility: Applicable

Chemical properties:

Halogen content: <0.2 percent

Cross-link verification: This test is applicable for cables with cross-linked jackets only. The test shall be conducted in accordance with ICEA standard T-28-562 and run at 200 °C. The test shall be sequenced after the fluid immersion test in the qualification test sequence and in the group C conformance test sequence. The hot creep shall not exceed 100 percent and the hot creep set shall not exceed 10 percent.

Part or identifying number (PIN):

M85045/25-01S (Standard performance)

M85045/25-01E (Enhanced performance, Cross-linked outer jacket)

Qualification by similarity:

Manufacturers who produce products for both MIL-PRF-85045/17 and this specification sheet, and are qualified under MIL-PRF-85045/17, and whose enhanced performance product passes all tests except for the fluid immersion, paint susceptibility, jacket self adhesion or blocking, cable jacket tear strength, cable jacket material tensile and elongation, water absorption, and durability of identification inspections specified herein, are qualified under this specification sheet for enhanced performance product. This qualification by similarity is applicable if the same cable jacket materials are used in the previously qualified MIL-PRF-85045/17 cable and the enhanced performance cable under test.

Manufacturers who produce products for both MIL-PRF-85045/13 and this specification sheet, and are qualified under MIL-PRF-85045/13, and whose standard performance product passes all tests except for the fluid immersion, paint susceptibility, jacket self adhesion or blocking, cable jacket tear strength, cable jacket material tensile and elongation, water absorption, and durability of identification inspections specified herein, are qualified under this specification sheet for standard performance product. This qualification by similarity is applicable if the same cable jacket materials are used in the previously qualified MIL-PRF-85045/13 cable and the standard performance cable under test.

Qualification by similarity for change to outer cable jacket:

Manufacturers who produce products for MIL-PRF-85045/25 using one particular overall cable jacket compound and are qualified under MIL-PRF-85045/25 for that compound and pass visual and mechanical, low temperature flexibility, durability of identification, smoke generation and flame propagation, flame extinguishing, water absorption, acid gas generation, toxicity index, crosslink verification, and all applicable requirements indicated below for cables with a modified overall cable jacket compound are also qualified under MIL-PRF-85045/25 for cables with the modified overall cable jacket compound.

In addition to the requirements identified above, the following requirements are also applicable if a change is made in the outer cable jacket compound. If the base material of the modified cable jacket compound is not the same as the already qualified cable jacket compound, then the modified cable jacket shall also pass fluid immersion, paint susceptibility, jacket self adhesion or blocking, dripping, cable scraping resistance, and cable-to-cable abrasion. If the modified cable jacket compound results in process changes, then the cable with the modified jacket shall also pass hosing: low pressure and cable shrinkage. If the modified jacket compound results in a color change then the modified jacket shall pass fungus resistance and halogen content. The modified jacket compound shall pass fungus resistance unless colorants are fungus inert in accordance with MIL-HDBK-454 and compliance to the halogen content requirement may be achieved by providing formulation of colorants. If the modified cable jacket compound results in a change in jacket color and the jacket material tensile strength and elongation results for the qualified cable jacket are not the same as those for the modified cable jacket, then the modified cable shall pass cyclic flexing, barometric pressure, life aging, and cable jacket tear strength.

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.

Custodians:

Army – CR
Navy – SH
Air Force – 85
NASA – NA

Preparing Activity:

Navy – SH
(Project 6015-2009-002)

Review Activities:

Army – AR, AV, MI
Navy – EC, YD
Air Force – 02, 19, 99
DLA – CC

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <http://assist.daps.dla.mil>.