

METRIC

A-A-59731B

September 25, 2012

SUPERSEDING

A-A-59731A

October 1, 2009

COMMERCIAL ITEM DESCRIPTION

TUBE FITTINGS, BLOWN OPTICAL FIBER

The General Services Administration has authorized the use of this commercial item description, for all federal agencies.

1. **SCOPE.** This Commercial Item Description (CID) covers the general requirements for blown optical fiber (BOF) tube fittings (straight tube union couplers, tee tube union couplers, reducer couplers, and end caps) that are used to join together two or more BOF tubes or to terminate a single BOF tube. These tube fittings are designed for use inside shipboard equipment and enclosures.

2. **CLASSIFICATION.** Tube fittings shall conform to the following configuration and nominal outer diameter.

2.1 **Tube fitting configuration.** Tube fittings are of the following configurations:

- a. U = tube union/straight tube coupler
- b. T = tube tee/tee tube coupler
- c. EC = tube end cap
- d. R = reducing tube straight coupler

2.2 **Nominal outer diameter of mating tube.** The nominal outer diameter of the mating tube is either 8 millimeters or 5 millimeters.

2.3 **Pull performance.** Standard or enhanced (see 3.3.1).

Beneficial comments, recommendations, additions, deletions, clarifications, etc. and any data that may improve this document should be sent to: Commander, Naval Sea Systems Command, ATTN: SEA 05S, 1333 Isaac Hull Avenue, SE, Stop 5160, Washington Navy Yard DC 20376-5160 or emailed to CommandStandards@navy.mil, with the subject line "Document Comment". Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.dla.mil>.

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3. SALIENT CHARACTERISTICS.

3.1 Design, construction, and dimensions. Design, construction, and dimensions shall be as specified in [figures 1, 2, 3,](#) and [4;](#) [table I;](#) and [table II.](#)

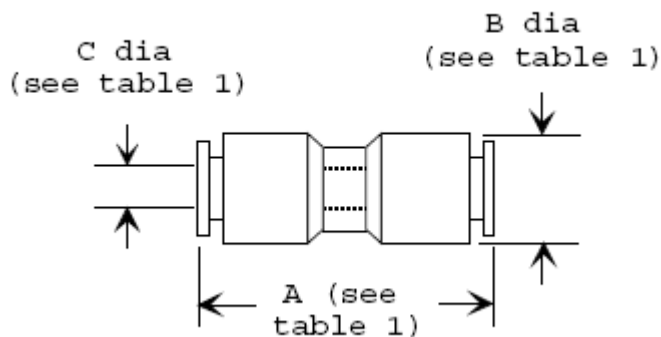


FIGURE 1. BOF tube union/straight tube coupler (configuration U).

NOTE: C diameter refers to the internal bore diameter (represented by dashed lines).

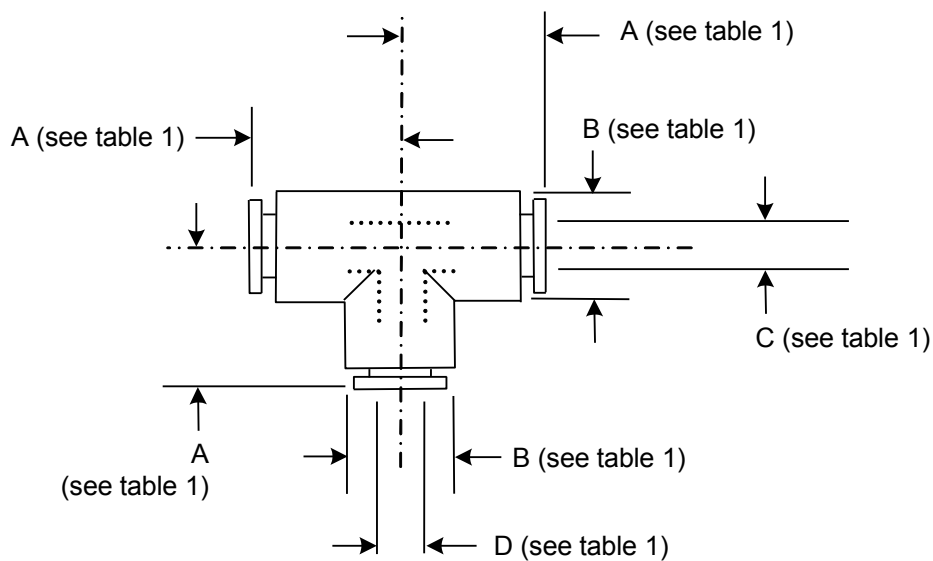


FIGURE 2. BOF tube tee/tee tube coupler (configuration T / TS).

NOTE: C diameter refers to the internal bore diameter (represented by dashed lines).

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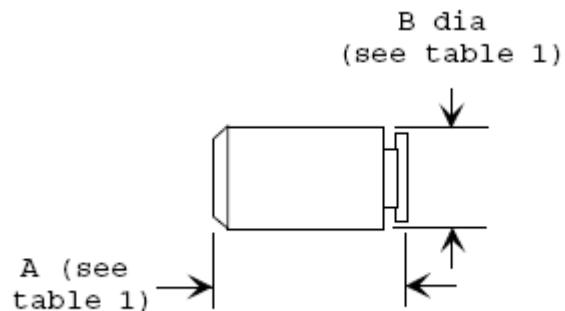


FIGURE 3. BOF end cap (configuration EC).

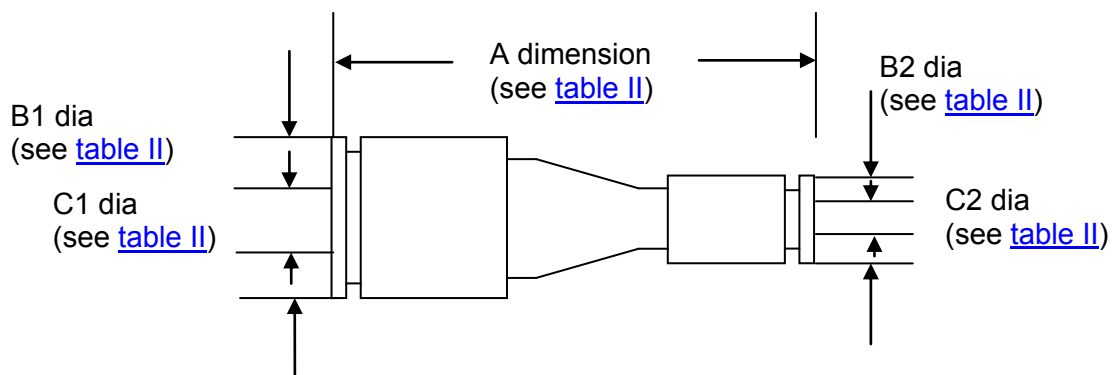


FIGURE 4. BOF tube reducing straight coupler (configuration R).

TABLE I. Tube fitting dimensions.

Tube Fitting Configuration	A Dimension Max		B Diameter Max		C Diameter		D Diameter	
	8 mm	5 mm	8 mm	5 mm	8 mm	5 mm	8 mm	5 mm
U (tube union/straight tube coupler)	52	40	18.5	12	6.0 - 6.5	3.0 - 3.2	N/A	N/A
T (tube tee/tee tube coupler)	26	N/A	18.5	N/A	6.0 - 6.5	N/A	6.0 - 6.5	N/A
TS (small bore tee tube coupler)	26	N/A	18.5	N/A	6.0 - 6.5	N/A	0.1	N/A
EC (tube end cap)	20	20	18.5	12	N/A	N/A	N/A	N/A
NOTES:								
1. Dimensions are in millimeters.								
2. C diameter is tube fitting internal bore diameter.								

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TABLE II. BOF tube reducing straight coupler dimensions.

Tube Fitting Configuration	A Dimension Max	B Diameter Max		C Diameter	
		B1 (8 mm end)	B2 (5 mm end)	C1 (8 mm end)	C2 (5 mm end)
R (Reducing tube straight coupler)	43	18.5	12	6.0 - 6.5	3.0 - 3.2
NOTES:					
1. Dimensions are in millimeters.					
2. C diameter is tube fitting internal bore diameter.					

3.2 Materials.

3.2.1 Nonmetallic materials. Nonmetallic materials shall not be affected by the use of alcohol based cleaning solutions. Nonmetallic materials shall not degrade when the tube fitting is operated under the environmental conditions defined herein.

3.2.2 Metallic materials. Metallic materials shall be corrosion resistant. Dissimilar metals shall not be used in intimate contact unless suitably finished to prevent electrolytic corrosion.

3.2.3 Toxic and hazardous products and formulations. The products used in the tube fitting construction shall not give off toxic or explosive fumes when exposed to flame. Materials used shall have no adverse effect on the health of personnel when used for the intended purpose.

3.2.4 Fungus. When tested in accordance with MIL-STD-1678-3, Measurement 3401.1, for a duration of 28 days, tube fitting materials shall show sparse or very restricted microbial growth and reproduction with minor or inhibited substrate utilization. There shall be little or no chemical, physical, or structural change detectable.

3.2.5 Flammability. When tested in accordance with UL 94, the material(s) of the tube fitting's external body shall have a rating of V-1. All other components of the tube fitting shall have a rating of HB.

3.2.6 Sealing compounds. If utilized, sealing compounds shall not flow at the maximum specified storage temperature or exhibit cracking at the minimum specified storage temperature.

3.2.7 Lubricants. If utilized, lubricants used shall be permanent and shall not require replacement during the lifetime of the tube fitting. Lubricants shall be useful over the environmental conditions specified herein.

3.2.8 Tube retention mechanism. Tube retention mechanisms shall utilize metallic materials.

3.3 Mechanical properties.

3.3.1 Tube pull-out. When tested in accordance with TIA-455-6, the tube fitting shall sustain a static tensile load not less than 67 Newtons (15 pounds) applied for 1 minute between the tube fitting and a BOF tube from an approved MIL-PRF-85045/25 or MIL-PRF-85045/26 BOF cable. Tube ends shall be fully seated within the tube fitting at the beginning of the test. The use of retaining clips or equivalent on the tube fitting release mechanism is not allowed. After the test, the tube fitting shall meet the operational pressure sealing requirements specified herein. Upon visual examination, there shall be no evidence of physical damage detrimental to the operation of the tube fitting or the polymer tube. For enhanced pull performance of straight tube couplers and tee tube couplers (see 7.2), the movement of the tube end within the tube fitting during the pull test shall be not greater than 0.5 millimeters.

3.3.2 Impact. When dropped eight times onto a steel block from a height of 1.5 meters, tube fittings shall show no visual evidence of physical damage detrimental to the operation of the tube fitting. After the test, the tube fitting shall meet the operational pressure sealing requirements specified herein.

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3.3.3 Mating durability. When subjected to 10 mate/demate cycles, the tube fitting seals and tube capture mechanisms shall maintain physical integrity. Mated tube fitting/polymer BOF tube (tubing from MIL-PRF-85045/25 or MIL-PRF-85045/26 BOF cable, polyethylene, or equivalent) assemblies shall be used for test purposes. The same tubing shall be used and shall not be cut back for all 10 cycles. After the last mate/demate cycle the tube fitting may be cleaned using compressed air or with a dry cotton swab to remove tube shavings. After the test, the tube fitting shall meet the tube pull-out and operational pressure sealing requirements herein. Upon visual examination, there shall be no evidence of physical distortion or other physical damage detrimental to the operation of the tube fitting.

3.4 Environmental properties.

3.4.1 Temperature ranges. The tube fitting shall operate over a temperature range from -28 to $+65$ °C and shall be capable of withstanding storage under temperatures from -40 to $+70$ °C.

3.4.2 Temperature cycling. When tested for 5 cycles in accordance with MIL-STD-1678-3, Measurement 3301, the tube fitting shall withstand exposure to cyclical temperatures between the operating temperature extremes. Mated tube fitting/polymer BOF tube (tubing from MIL-PRF-85045/25 or MIL-PRF-85045/26 BOF cable, polyethylene, or equivalent) assemblies shall be used for test purposes. During one high temperature extreme and one low temperature extreme the tube fitting shall be demated and mated from the polymer tubes a minimum of two times. At the high and low temperature extremes and after the exposure, the tube fitting shall meet the operational pressure sealing requirements specified herein. Upon visual examination, there shall be no evidence of physical distortion, separation of bonded surfaces, or other physical damage detrimental to the operation of the tube fitting.

3.4.3 Temperature/humidity cycling. When tested for 10 cycles in accordance with MIL-STD-1678-3, Measurement 3302, the tube fitting shall withstand exposure to cyclical temperature in the presence of high humidity. Mated tube fitting/polymer BOF tube (tubing from MIL-PRF-85045/25 or MIL-PRF-85045/26 BOF cable, polyethylene, or equivalent) assemblies shall be used for test purposes. The sub-cycle shall be included in the test. At the high and low temperature extremes and after the exposure, the tube fitting shall meet the operational pressure sealing requirements specified herein. After the test, the tube fitting shall be demated from and mated with the polymer tubes a minimum of two times, after which it shall meet the operational pressure sealing requirements specified herein. Upon visual examination, there shall be no evidence of deterioration of component parts or materials, physical distortion, corrosion of metals, separation of bonded surfaces, or other physical damage detrimental to the operation of the tube fitting.

3.4.4 Life aging. When tested for 240 hours at 110 °C in accordance with MIL-STD-1678-3, Measurement 3303, the tube fitting shall withstand exposure to accelerated aging conditions. Mated tube fitting/polymer BOF tube (tubing from MIL-PRF-85045/25 or MIL-PRF-85045/26 BOF cable, polyethylene, or equivalent) assemblies shall be used for test purposes. When using tubing from MIL-PRF-85045/25 or MIL-PRF-85045/26 BOF cable, testing may be conducted for 480 hours at 100 °C. After the exposure, the tube fitting shall meet the operational pressure sealing and tube pull-out requirements specified herein. After the test, the tube fitting shall be demated from and mated with the polymer tubes a minimum of two times, after which it shall meet the operational pressure sealing requirements specified herein. Upon visual examination, there shall be no evidence of deterioration of component parts or materials, physical distortion, cracking, separation of bonded surfaces, or other physical damage detrimental to the operation of the tube fitting.

3.4.5 O-ring material aging. Change in o-ring material elongation shall be collected and reported when dry-air aged in accordance with ASTM D573 for 70 hours at 125 °C.

3.4.6 Thermal shock. When tested for 5 cycles over the storage temperature extremes in accordance with MIL-STD-1678-3, Measurement 3304, Test Condition C-0, the tube fitting shall withstand cyclical exposure to the defined storage temperature extremes. Mated tube fitting/polymer BOF tube (tubing from MIL-PRF-85045/25 or MIL-PRF-85045/26 BOF cable, polyethylene, or equivalent) assemblies shall be used for test purposes. After the exposure, the tube fitting shall meet the operational pressure sealing requirements specified herein. Upon visual examination, there shall be no evidence of deterioration of component parts or materials, physical distortion, separation of bonded surfaces, cracking, or other physical damage detrimental to the operation of the tube fitting.

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3.4.7 Vibration. When tested in accordance with TIA-455-11, Test Condition II, the tube fitting shall withstand exposure to sinusoidal vibration over frequencies from 5 to 500 Hertz (the frequency range for Test Condition II shall be extended to a low frequency of 5 Hertz). From 5 to 55 Hertz the vibration amplitude shall be 1.52 millimeters double amplitude. Acceleration levels shall be 10 gravity units from 55 to 500 Hertz. Alternatively, to obtain shipboard approval only, testing can be conducted in accordance with TIA-455-11, Test Condition I where the frequency range for Test Condition I shall be extended to a low frequency of 5 Hertz. Mated tube fitting/polymer BOF tube (tubing from MIL-PRF-85045/25 or MIL-PRF-85045/26 BOF cable, polyethylene, or equivalent) assemblies shall be used for test purposes. There shall be no tube detachment during the test. During and after the exposure, the tube fitting shall meet the operational pressure sealing requirements specified herein. Upon visual examination, there shall be no evidence of broken, loose, deformed, or displaced parts, cracks, chips, or other physical damage detrimental to the operation of the tube fitting.

3.4.8 Shock. When tested in accordance with MIL-S-901, Grade A, Class I, Type B, the tube fitting shall withstand exposure to shipboard shock levels. Mated tube fitting/polymer BOF tube (tubing from MIL-PRF-85045/25 or MIL-PRF-85045/26 BOF cable, polyethylene, or equivalent) assemblies shall be used for test purposes. The use of retaining clips or equivalent on the tube fitting release mechanism is not allowed. There shall be no tube detachment during the test. After the exposure, the tube fitting shall meet the operational pressure sealing requirements specified herein. Upon visual examination, there shall be no evidence of broken, loose, deformed, or displaced parts, cracks, chips, or other physical damage detrimental to the operation of the tube fitting.

3.4.9 Pressure withstand. When the tube fitting is subjected to an internal pressure not less than 1724 kilopascals (kPa) (250 pounds per square inch (psi)), the tube fitting shall maintain physical integrity. Mated tube fitting/polymer BOF tube (tubing from MIL-PRF-85045/25 or MIL-PRF-85045/26 BOF cable, polyethylene, or equivalent) assemblies shall be used for test purposes. The pressure shall be maintained for a minimum of 30 seconds. There shall be no tube detachment during the test. Upon visual examination, there shall be no evidence of broken, loose, deformed, or displaced parts, cracks, or other physical damage detrimental to the operation of the tube fitting.

3.4.10 Operational pressure sealing. When the tube fitting is subjected to an internal pressure not less than 234 kPa (34 psi), the tube fitting shall exhibit no leakage (including leakage at tube fitting to mating tube interfaces). Mated tube fitting/polymer BOF tube (tubing from MIL-PRF-85045/25 or MIL-PRF-85045/26 BOF cable, polyethylene, or equivalent) assemblies shall be used for test purposes. The pressure shall be maintained for a minimum of 5 minutes. Air pressure shall not drop more than 10.3 kPa (1.5 psi) over the 5 minutes.

3.4.11 Initial pressure sealing. When a new tube fitting is subjected to an internal pressure not less than 938 kPa (136 psi), the tube fitting shall exhibit no leakage (including leakage at tube fitting to mating tube interfaces). Mated tube fitting/polymer BOF tube (tubing from MIL-PRF-85045/25 or MIL-PRF-85045/26 BOF cable, polyethylene, or equivalent) assemblies shall be used for test purposes. The pressure shall be maintained for a minimum of 5 minutes. Air pressure shall not drop more than 10.3 kPa (1.5 psi) over the 5 minutes. The tube fitting may be immersed under water during the test to visually inspect for leakage.

3.5 Mass. When measured with scales, the mass of the tube fitting shall be not greater than 15 grams.

3.6 Size. When visually inspected in accordance with MIL-STD-1678-3, Measurement 3101, tube fitting dimensions shall be in accordance with [figures 1, 2, 3, and 4](#); [table I](#); and [table II](#).

3.7 Marking. When visually inspected, tube fittings shall be marked with the manufacturer's Contractor and Government Entity (CAGE) code, name, or logo and the tube fitting Part or Identification Number (PIN) (see 7.2). Alternatively, the tube fitting shall be marked with the manufacturer's CAGE code, name, or logo, and the manufacturer's commercial part number or size designation. Markings shall be legible and permanent.

3.8 Workmanship. When visually inspected, tube fittings shall be free from sharp edges, burrs, or other defects that adversely affect performance or appearance.

4. REGULATORY REQUIREMENTS. The offeror/contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with paragraph 23.403 of the Federal Acquisition Regulation (FAR).

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5. PRODUCT CONFORMANCE PROVISIONS.

5.1 Product conformance. The contractor shall certify and maintain objective quality evidence that the product offered meets the requirements of this Commercial Item Description, and that the product conforms to the producer's own drawings, specifications, standards, quality assurance practices, and is the same as the product provided as a bid sample. The Government reserves the right to require proof of such conformance prior to the first delivery and thereafter as may be otherwise provided for under the provisions of the contract.

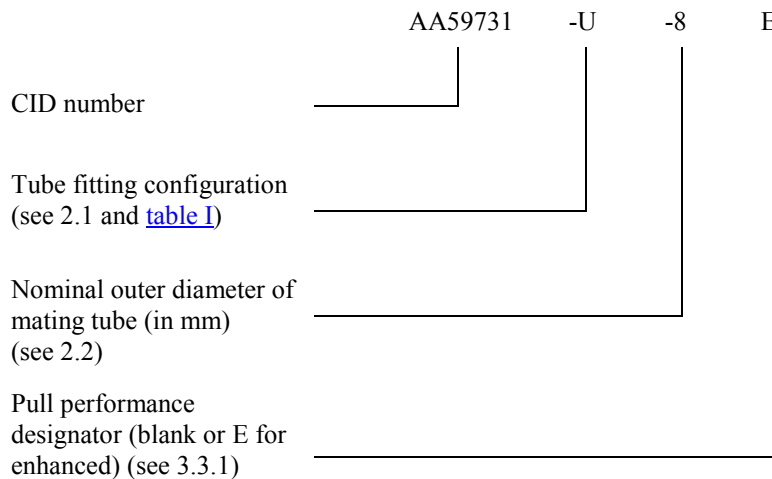
5.2 Market acceptability. The item offered must have been sold to the Government or commercial market for a minimum of one year.

6. PACKAGING. Preservation, packaging, labeling, and marking shall be as specified in the contract or purchase order.

7. NOTES.

7.1 Intended use. Tube fittings in accordance with this CID are intended to be used as specified in MIL-STD-2042 with blown optical fiber cables in accordance with MIL-PRF-85045, and blown optical fiber tube furcation units in accordance with A-A-59729.

7.2 Part or identification number (PIN). The following part or identification numbering procedure is for government purposes and does not constitute a requirement for the contractor.

7.3 Source of documents.

7.3.1 ASTM. ASTM standards are available from ASTM International, 100 Barr Harbor Dr., PO Box C700, West Conshohocken, PA 19428-2959 or online at www.astm.org.

7.3.2 Defense specifications and standards. Defense specifications and standards are available online at <https://assist.dla.mil/quicksearch/> or <https://assist.dla.mil>.

7.3.3 EIA/TIA. EIA/TIA standards are available from the Telecommunications Industry Association, 2500 Wilson Blvd. Suite 300, Arlington, VA 22201-3834 or at <http://www.tiaonline.org>.

7.3.4. FAR. The Federal Acquisition Regulation may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402 or online at <https://www.acquisition.gov/far>.

7.3.5 UL. UL standards are available from COMM 2000, 1414 Brook Drive, Downers Grove, IL 60515 or online at www.ul.com.

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7.4 Ordering data. The contract or order should specify the following:

- a. CID document number, revision, and CID PIN.
- b. Product conformance provisions.
- c. Packaging requirements.

7.5 Storage. Tube fitting materials may degrade upon extended exposure to ozone, sunlight, or sources of ultraviolet radiation. Storage of tube fittings in a dark, airtight environment is recommended.

7.6 Suggested sources of supply. As part of the market analysis and research effort, this CID was coordinated with manufacturers of commercial products. For a list of manufacturers known to meet the requirements of this CID, see the Navy Recommended Fiber Optic Components Parts List website at <https://fiberoptics.nswc.navy.mil>. (NOTE: This information should not be considered as a list of approved manufacturers or be used to restrict procurement to only those manufacturers.)

7.7 Key words.

Cap, end
 Coupler, reducing tube
 Coupler, straight tube
 Coupler, tee
 Fiber, blown optical

MILITARY INTERESTS

Custodians:

Army – CR
 Navy – SH
 Air Force – 85

Review Activities:

Air Force – 13, 19, 93, 99
 Misc – DI

CIVIL AGENCY COORDINATING ACTIVITY:

GSA – FAS

Preparing Activity:

Navy – SH
 (Project 6099-2012-004)

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 <https://assist.dla.mil>.