METRIC
A-A-59940
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COMMERCIAL ITEM DESCRIPTION

CONNECTORS, FIBER OPTIC, SINGLE OR MULTIPLE FIBER, GENERAL SPECIFICATION FOR

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 connectors with the following attributes: low optical loss performance, high reliability, and compatible with loose tube, tight buffered, and ribbon multimode and single-mode optical fiber.

2. CLASSIFICATION. This CID uses a classification system that is included in the Part or Identification Number (PIN) (see 7.2).

2.1 Termination process. Connector termination process shall be designated as indicated in table I.

TABLE I. Connector termination process.

Termination process	Designation
Epoxy polish	1
Quick-connect – fusion splice	2
Quick-connect – mechanical splice	3

2.2 Type. Connectors covered by this specification shall be of the following types as specified (see 3.1):

a. Type 1 – multimode (MM) – Ultra Physical Contact (UPC).

b. Type 2 – single-mode (SM) – UPC.

c. Type 3 – single-mode (SM) – Angled Physical Contact (APC).

2.3 Fiber/cable type compatibility. The connector fiber/cable compatibility type is designated by a single letter as indicated in table II.

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.

TABLE II. Fiber/cable configuration type.

Fiber/cable configuration type	Designation
Buffered fiber [1/]	A
OFCC – tight structure [2/]	B
OFCC – non-tight structure [3/]	C
Ribbon [4/]	D

NOTES:

1/ The connector can accept buffered fiber with no individual protective jacket or strength member.

2/ The connector can accept buffered fiber with an individual protective jacket and strength member. The cable is considered to be of tight construction. This includes cable in accordance with MIL-PRF-85045/16.

3/ The connector can accept buffered fiber with an individual protective jacket and strength member. The cable is considered a non-tight construction. This includes furcation units in accordance with A-A-59729.

4/ The connector can accept fibers in a ribbon.

2.4 Housing type configurations. Housing type configurations are as follows:

a. Simplex – one optical fiber/ferrule/one ferrule.

b. Duplex – one optical fiber/ferrule/two ferrules.

c. Multiple fiber terminus – multiple optical fibers/one ferrule.

2.5 Temperature range. Temperature range designations are specified in table III.

TABLE III. Temperature range designation.

Temperature range designation	Operating temperature	Non-operating temperature	Storage temperature
	°C (°F)	°C (°F)	°C (°F)
1	-28 to +65 (-18.4 to +149)	-40 to +70 (-40 to +158)	-40 to +70 (-40 to +158)

3. SALIENT CHARACTERISTICS.

3.1 Specification sheets. Individual item requirements shall be as specified herein and in accordance with the applicable specification sheet. In the event of any conflict between the requirements of this CID and the specification sheets, the latter shall govern.

3.1.1 Interchangeability and intermateability. All connectors of the same design (i.e., the same part number and configuration) shall be physically and functionally interchangeable without need for modification of such items or of the mating equipment.

3.1.2 Interface dimensions. The interface dimensions of the connector shall be as defined herein and in the applicable specification sheet (see 3.1).

3.1.3 Cable strain relief. The design of connector cable configuration B, C, and D shall include strain relief for capture of the aramid yarn in the cable.

3.1.4 Bend limiter. The design of all cable configurations shall include a bend limiter (boot) at the rear of the connector.

3.1.5 Optical fiber cable compatibility. Cable designation A connectors have 900-micron fiber and shall properly terminate to 0.900+0.050-millimeter buffered optical fiber. Cable designation B connectors shall properly terminate to MIL-PRF-85045/16 single-fiber cable. Cable designation C connectors shall properly terminate to commercial single-fiber cable with an outer diameter of 1.8 to 2.4 millimeters. Cable designation D connectors shall properly terminate to commercial ribbon cable.

3.1.6 Optical fiber attachment. Optical fiber attachment inside the ferrule and barrel (part into which ferrule is inserted) shall be provided by adhesive bonding. Single fiber cable strength member attachment for epoxy polish connectors shall be provided by crimping.

3.1.6.1 Optical fiber termination (quick-connect connector). The optical fiber termination methodologies used for affixing a quick-connect connector to the fibers to be attached shall meet the requirements specified herein.

3.1.6.1.1 Fusion/mechanical fiber splice (quick-connect connector). When utilized, the mechanical or fusion fiber splice shall be integral to the ferrule body and include the splice housing.

3.1.6.1.2 Fusion/mechanical fiber splice housing (quick-connect connector). The mechanical or fusion fiber splice housing shall restore the environmental and mechanical integrity of the optical fiber terminating to it and meet the performance requirements specified herein. The housing shall not affect the operation of the connector or associated tooling when installing or removing the connector.

3.1.7 Color. In accordance with EIA-339, a portion of the connector housing or boot shall be blue or yellow for single-mode UPC, green for single-mode APC, and beige or slate for multimode.

3.1.8 Endface geometry (quick-connect connector only, single fiber). Connectors with pre-polished fiber stubs shall utilize an enhanced, domed end, physical contact (PC) polish that results in ferrule endface with geometric parameters as follows:

a. Radius of curvature (ROC): 7 millimeters to 25 millimeters.

b. Apex offset: ≤50 microns.

c. Fiber height:

   (1) Protrusion: ≤0.05 microns (50 nanometers).

   (2) Undercut: The maximum value (limit) for the spherical undercut is dependent upon the ROC of the connector under test (see table IV).

TABLE IV. Maximum acceptable undercut.

ROC (mm)	Undercut (nm)
7	125
8	125
9	125
10	125
11	115
12	106
13	98
14	91
15	85
16	80
17	75
18	72
19	68
20	65
21	62
22	59
23	56
24	53
25	50

3.1.8.1 APC endface geometry (quick-connect connector only, single fiber). Connectors with pre-polished APC fiber stubs shall utilize a polish that results in ferrule endface with geometric parameters as follows:

a. Radius of curvature (ROC): 5 millimeters to 12 millimeters.

b. Apex offset: ≤70 microns.

c. Fiber height:

(1) Protrusion: ≤0.05 microns (50 nanometers).

(2) Undercut: ≤0.10 microns (100 nanometers).

3.1.9 Endface condition (quick-connect connector only). The ferrule endface on connectors with pre-polished fiber stubs shall be smooth and free of scratches, pits, chips, and fractures.

3.1.10 Cleaved fiber stub endface condition (quick-connect connector only). For connectors with pre-polished fiber stubs, the endface angle for the cleaved fiber stubs shall be less than 2 degrees from perpendicular to the fiber axis. Cleaved fiber stub surfaces shall be unshattered and free of large chips, fractures, pits, lips, spirals, or other defects (e.g., hackle, mist) that are detrimental to splice performance. Refer to TIA-455-179 for detailed descriptions, illustrations, and interferomic fringe patterns for the various endface defect conditions. Refer to TIA-455-57 for the fiber endface preparation acceptability guidelines.

3.1.11 Ferrule extension and contact force. The ferrule endface position with respect to contact force shall be as specified in the specification sheet (see 3.1) after polishing has been completed.

3.2 Materials.

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

3.2.1.1 Adhesives (epoxies). Adhesives are not precluded from use in the construction of the connectors specified herein. However, the types of adhesives which may be used shall be as specified herein in the applicable specification sheet (see 3.1). Adhesives shall not be used in the optical path of the connector.

3.2.1.2 Index matching gel. Index matching gels are not precluded from use in the construction of quick-connect connectors identified within this specification. If an index matching gel is used, it shall be MIL-PRF-24794 or an index matching gel approved by the approving activity.

3.2.1.3 Sealing compounds. Sealing compounds which may flow at the maximum upper storage temperature specified (see 3.1), or may crack at the minimum lower storage temperature specified (see 3.1.1), shall not be used.

3.2.2 Metallic materials. All metals used in connectors shall be corrosion resistant or shall be suitably plated or otherwise finished to prevent corrosion during service life.

3.2.2.1 Dissimilar metals. Dissimilar metals shall not be used in intimate contact unless suitably finished to prevent electrolytic corrosion. Surfaces that may be subjected to abrasive operations during polishing shall not be coated or plated in any manner.

3.2.3 Toxic and hazardous products and formulations. The products used in the connector 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. Connector materials not listed as fungus inert in MIL-HDBK-454 shall be tested in accordance with TIA/EIA-455-56 for a duration of 28 days, and connector 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 Oxygen index. When tested in accordance with ASTM D2863, polymeric connector materials shall have an oxygen index of 28 percent or greater.

3.2.6 Salt spray. When tested in accordance with TIA-455-16 with an exposure duration of 48 hours, connectors shall show no visual evidence of deterioration such as flaking, pitting, blistering, or loosening of finishes; corrosion of metal surfaces; or in the case of plated metals, corrosion which has passed through the plating and attacked the base metal. No corrosive effects shall be seen on the external connector parts that could be detrimental to the operation of the connector.

3.2.7 Flammability. Connectors shall meet the requirements of either 3.2.7.1 or 3.2.7.2.

3.2.7.1 Connector flammability. When mated connectors are tested in accordance with EIA-364-81, and subjected at the region of the mated pair interface to a small-scale, 0.75-inch flame for 60 seconds, there shall be no dripping which will cause the flammable material to ignite and there shall be no violent burning or explosive type fire.

3.2.7.2 Material flammability. When tested in accordance with UL-94, polymeric connector materials shall have a rating of V-1.

3.2.8 Radioactive materials. Radioactive materials shall not be used.

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

3.2.10 Sealing compounds. Sealing compounds shall not be used.

3.2.11 Liquid materials. Liquid materials shall not be used.

3.2.12 Ferrule. Unless otherwise specified (see 3.1), ferrule material shall be ceramic (zirconia).

3.3 Mechanical properties.

3.3.1 Cable pull-out (fiber cable connector configuration B, C, and D only). When tested in accordance with EIA/TIA-455-6, the connector shall be capable of sustaining a static tensile load of at least 67 newtons (15 pounds) applied for 1 minute to the cable behind the back end of the connector without evidence of physical damage to the connector or the optical fiber cable. The connector shall be mated to a fixed connector adapter for this test. The change in optical transmittance shall not exceed 0.5 decibel after the test. The return loss of the connector shall be as specified after the test.

3.3.1.1 Cable pull-out (fiber cable connector configuration B, C, and D only) pull-proof connector design. When tested on a connector with a pull-proof design, in addition to the requirements of 3.3.1, the change in optical transmittance shall not exceed 0.5 decibel during the test.

3.3.2 Fiber pull-out. For quick-connect connector designs the connector shall also meet 3.3.2.1 and 3.3.2.2.

3.3.2.1 Fiber to ferrule pull-out. The fiber pull-out force shall be tested by applying the axial tensile load of 14 newtons (3.1 pounds) between the fiber and the ferrule for a duration of 1 minute. The connector shall meet the optical requirements of 3.5.4 during and after the test.

3.3.2.2 Fiber to splice pull-out. When tested in accordance with TIA-455-28, the fiber-to-splice dynamic strength test load (force in axial tension) at optical failure shall not be less than the values indicated in table V.

TABLE V. Dynamic strength test loads.

Splice type	Fiber coating/buffer diameter	Force
Mechanical	250 µm	≥2.0 N (≥0.45 lb)
	900 µm	≥5.0 N (≥1.12 lb)
Fusion	250 µm / 900 µm	≥8.9 N (≥2.0 lb)

3.3.3 Flex (fiber cable connector configuration B, C, and D only). When tested in accordance with TIA/EIA-455-1, the connector shall withstand 200 flexing cycles. An initial 100 flexing cycles shall be performed; after which the connector/cable shall be rotated 90 degrees and subjected to an additional 100 flexing cycles for a total of 200 flexing cycles. The flexing rate shall not exceed 12 to 14 cycles per minute. The change in optical transmittance shall not exceed 0.5 decibel during (every 50 cycles) and after the test. After the test, the return loss of the connector shall be as specified. Upon visual examination, there shall be no evidence of physical damage detrimental to the operation of the connector.

3.3.4 Twist (fiber cable connector configuration B, C, and D only). When tested in accordance with TIA/EIA-455-36, the connector shall withstand 500 twisting cycles with a 1.5-kilogram (3.3-pound) applied load. The twisting rate shall not exceed 30 cycles per minute. The change in optical transmittance shall not exceed 0.5 decibel during testing, measurements taken every 250 cycles, and after the test. After the test, the return loss of the connector shall be as specified (see 3.5.3). Upon visual examination, there shall be no evidence of physical damage detrimental to the operation of the connector.

3.3.5 Force to engage/disengage. When tested in accordance with TIA/EIA-455-187, the connector engagement/disengagement force shall be not greater than as specified (see 3.1).

3.3.6 Impact (fiber cable connector configuration B, C, and D only). When tested in accordance with TIA-455-2, Method A, the connector shall not be damaged or otherwise rendered unfit for operational use. The unmated connector with protective cover (i.e., dust cap over ferrules) shall be impacted against a steel block with a ½-inch (1.2-centimeter) minimum thickness, a total of eight times. The cable shall be clamped so that, with the connector plug hanging under its own weight, the end of the plug extends 59 inches (1.5 meters) below the cable clamp to the center of the steel block. The plug shall then be raised to the height of the clamp, and with the cable extended, released so as to strike the block. The change in optical transmittance shall not exceed 0.5 decibel after the test. The return loss of the connector shall be as specified after the test (see 3.5.3). Upon visual examination, there shall be no evidence of physical damage detrimental to the operation of the connector.

3.3.7 90-degree cable pull-out (fiber cable connector configuration B, C, and D only). When tested in accordance with TIA-455-6, the connector shall be capable of sustaining a static tensile load of at least 33 newtons (7.5 pounds) applied at a 90-degree angle to the connector longitudinal axis for 1 minute to the cable behind the back end of the connector without evidence of physical damage to the connector or the optical fiber cable. The connector shall be mated to a fixed connector adapter for this test. The change in optical transmittance shall not exceed 0.5 decibel after the test. The return loss of the connector shall be as specified after the test.

3.3.8 Strength of coupling mechanism. When tested in accordance with TIA-455-185, the connector shall not unlatch under a tensile load of 67 newtons (15 pounds).

3.3.9 Mating durability. When tested in accordance with TIA-455-21, the connector shall withstand 500 mating cycles and show no evidence of mechanical damage to the coupling device or physical deterioration of the mating surfaces or component parts. Minor damage, such as scratches or abraded finishes, is acceptable. The mating cycle rate shall not exceed 300 cycles per hour. The change in optical transmittance shall not exceed 0.5 decibel during (every 100 cycles) and after the test. Connector endfaces shall be cleaned and visually inspected using 400 times magnification after every 100 cycles. The return loss of the connector shall be as specified during (every 100 cycles) and after the test.

3.3.10 Shock-COTS. When tested in accordance with TIA-455-14, Test Conditions J, A, and B, there shall be no evidence of broken, loose, deformed, or displaced parts, cracks, chips, or other damage. Connector mated pairs shall be subjected to sinusoidal shocks with magnitudes of 30 G to 75 G on each axis. Each specified test condition of TIA-455-14 shall be performed for three impacts per direction along three mutually perpendicular directions of the connector (nine impacts total). Optical discontinuities shall not exceed 0.5 decibel for a duration of 50 microseconds or more. The change in optical transmittance shall not exceed 0.5 decibel after any impact and after the test. The return loss of the connector shall be as specified after the test.

3.3.11 Vibration. When tested in accordance with TIA-455-11, Test Conditions II and VI, there shall be no evidence of broken, loose, deformed, or displaced parts, cracks, chips, or other damage. The frequency range for Test Condition II shall be extended to a low frequency of 5 Hertz. From 5 to 500 Hertz the vibration excursion shall be 1.52 millimeters double amplitude, or 10 G, whichever is less. The Root Mean Square (RMS) level for the random vibration shall be a minimum of 10 G. The test duration for Test Condition VI shall be 30 minutes for each axis. The change in optical transmittance shall be less than 0.5 decibel after the test. The return loss of the connector shall be as specified after the test. Optical discontinuities shall not exceed 0.5 decibel for a duration of 50 microseconds or more.

3.4 Environmental properties.

3.4.1 Temperature. The connector shall operate over a temperature range corresponding to the temperature range designation for the connector (see 2.5).

Note: Operating temperature performance is verified in the temperature cycling test. Storage temperature performance is verified in the thermal shock and storage temperature tests.

3.4.2 Temperature humidity cycling. When tested in accordance with TIA/EIA-455-5, Method B, there shall be no visual evidence of deterioration of component parts or constituent materials, loosening of finishes, physical distortion, corrosion of metals, entrapment of moisture, separation of bonded surfaces, or other damages. The -10 °C (14 °F) sub cycle shall be included. Connector mated pairs shall be subjected to cyclical temperatures in the presence of high humidity (about 95 percent RH) at ambient temperatures up the operating temperature defined in table III during portions of each cycle. The change in optical transmittance shall not exceed 0.5 decibel during and after the test. The return loss of the connector shall be as specified after the test. Mated pairs shall not be un-mated during/for this test.

3.4.3 Temperature cycling. When tested in accordance with TIA-455-3, there shall be no evidence of physical damage to the connectors. Connector mated pairs shall be subjected to cyclical temperatures between the operating temperature extremes. Five temperature cycles from the low operating temperature extreme to the high operating temperature extremes are conducted at a maximum ramp rate of 40 °C (104 °F) per hour. Mated pairs shall not be un-mated during/for this test. The change in optical transmittance shall not exceed 0.5 decibel during and after the test. The return loss of the connector shall be as specified during and after the test.

3.4.4 Life aging (temperature life). When tested in accordance with TIA/EIA-455-4, connector mated pairs shall show no visual evidence of dimensional change, opening of seals, cracking, or other physical damage. The connector shall be exposed to 110 °C (230 °F) for 240 hours. The change in optical transmittance and the connector insertion loss shall be measured after the connector assemblies have returned to ambient temperature condition. The return loss of the connector shall be as specified after the test. If an alternate test temperature is desired for this test, multiply the test time by 2.5 for every 10 °C (50 °F) (50 °C [122 °F] decrease in the test temperature). A cable retention test is not required as part of the final inspection for this test.

3.4.5 Thermal shock. When tested in accordance with TIA-455-71, Test Condition C-0, there shall be no evidence of mechanical damage, loosening of component parts, separation of bonded surfaces, or other damage. Connector mated pairs shall be subjected to fast cyclical temperatures (less than 5-minute transition time between temperature extremes) between the storage temperature extremes. The change in optical transmittance shall not exceed 0.5 decibel after the test. The return loss of the connector shall be as specified after the test. Mated pairs shall not be un-mated during/for this test.

3.5 Performance requirements. The connector types (see 2.2) shall meet the following specified performance requirements when tested with adapters (receptacles) that conform to TIA-604-10. Once tested and approved, any change in construction or material shall require connector re-testing to these requirements.

3.5.1 Insertion loss, initial. When tested in accordance with TIA/EIA-455-34 (for multimode use Method A1 and A2, for single-mode use Method B), the initial insertion loss shall be less than 0.75 decibel or as specified (see 3.1). For multimode connectors, initial insertion loss shall be measured using both overfilled and restricted (70/70) launch conditions. For multimode connectors, the insertion loss requirement is specified for and verified using a 62.5/125 micron fiber size.

3.5.2 Ambient light susceptibility. When exposed to light with an intensity representative of natural sunlight in accordance with TIA-455-22, the optical power of the light coupled into the optical fiber within the connector mated pair shall be not greater than -50 dBm. The output power of the optical fiber in the “on” state shall be referenced to 1 milliwatt, test temperature shall be 25 °C.

3.5.3 Return loss. When tested in accordance with TIA-455-107, the minimum return loss shall be 30 decibels per mated pair for connectors with a standard single-mode polish and 40 decibels per mated pair for connectors with an enhanced single-mode polish or as specified (see 3.1). The return loss requirement is specified for single-mode fiber size only.

3.5.4 Insertion loss, verification. When tested in accordance with TIA/EIA-455-34 (for multimode use Method A2, for single-mode use Method B), the maximum insertion loss at any time shall not exceed 1.25 decibels, unless otherwise specified (see 3.1). Multimode insertion loss verification after the initial insertion loss test shall use the restricted launch condition only. Insertion loss verification shall be performed after a series of mechanical or environmental tests. For multimode applications, the insertion loss requirement shall be specified for and verified using a 62.5/125 micron fiber size.

3.5.5 Change in optical transmittance. When tested in accordance with TIA-455-20, the change in optical transmittance shall be not greater than 0.5 decibel, as specified for each test.

3.5.6 Signal discontinuities. When tested in accordance with TIA-455-32, there shall be no signal discontinuities when the connector is subjected to shock and vibration. A signal discontinuity is defined as a change in the transmittance in the light duty optical fiber connector in excess of 0.5 decibel for a single and multimode optical fiber for a duration of 50 microseconds or more.

3.6 Maintainability.

3.6.1 Cleaning. Cleaning operations shall not degrade the performance of the connector. Optical end faces shall be accessible to facilitate cleaning. Disassembly of the connector shall not be required for cleaning.

3.6.2 Field termination. Connectors shall be able to be terminated in the field without the use of manufacturer-specific tools.

3.6.3 Dust cover. Connectors shall be provided with a throw-away dust cover to protect the ferrule end face. The dust cover shall be free of lubricants or mold release and the material shall minimize connector end face contamination.

3.7 Size. When visually inspected in accordance with TIA-455-13, the envelope dimensions of a fully assembled connector shall meet the requirements as specified (see 3.1).

3.8 Mass. When measured with scales, the mass of a connector or adapter shall meet the requirements as specified (see 3.1).

3.9 Workmanship. When visually inspected in accordance with TIA-455-13, connectors shall be uniform in quality, and shall be free from sharp edges, burrs, or other defects that affect life, performance, or appearance.

3.10 Marking. The connector shall be visually inspected in accordance with TIA-455-13. Connectors shall be marked with the manufacturer's Commercial and Government Entity (CAGE) code, name, or logo. Markings shall be legible and permanent.

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).

5. PRODUCT CONFORMANCE PROVISIONS.

5.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection, examination, and test requirements specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections, examinations, or tests set forth in this description where such inspections, examinations, and tests are deemed necessary to assure supplies and services conform to prescribed requirements.

TABLE VI. Inspection requirements.

Requirement	Paragraph
General	
Specification sheet	3.1
Interchangeability and intermateability	3.1.1
Interface dimensions	3.1.2
Cable strain relief	3.1.3
Bend limiter	3.1.4
Optical fiber compatibility	3.1.5
Optical fiber attachment (ferrule, quick-connect)	3.1.6
Optical fiber termination (quick-connect)	3.1.6.1
Fusion/mechanical fiber splice	3.1.6.1.1
Fusion/mechanical fiber splice housing	3.1.6.1.2
Color	3.1.7
Endface geometry (quick-connect)	3.1.8
Endface condition (quick-connect)	3.1.9
Cleaved fiber stub endface condition (quick-connect)	3.1.10
Ferrule extension and contact force	3.1.11
Materials	
Nonmetallic materials	3.2.1
Adhesives (epoxies)	3.2.1.1
Index matching gel	3.2.1.2
Sealing compounds	3.2.1.3
Metallic materials	3.2.2
Dissimilar metals	3.2.2.1
Toxic and hazardous products and formulations	3.2.3
Fungus	3.2.4
Oxygen index	3.2.5
Salt spray	3.2.6
Flammability	3.2.7
Connector flammability	3.2.7.1
Material flammability	3.2.7.2
Radioactive materials	3.2.8
Lubricants	3.2.9
Sealing compounds	3.2.10
Liquid materials	3.2.11
Ferrule	3.2.12

TABLE VI. Inspection requirements – Continued.

Requirement	Paragraph
Mechanical Properties	
Cable pull-out	3.3.1
Fiber pull-out	3.3.2
Fiber-to-ferrule pull-out	3.3.2.1
Fiber-to-splice pull-out	3.3.2.2
Flex	3.3.3
Twist	3.3.4
Force to engage/disengage	3.3.5
Impact	3.3.6
90-degree cable pull-out	3.3.7
Strength of coupling mechanism	3.3.8
Mating durability	3.3.9
Shock-COTS	3.3.10
Vibration	3.3.11
Environmental Properties	
Temperature	3.4.1
Temperature humidity cycling	3.4.2
Temperature cycling	3.4.3
Life aging (temperature life)	3.4.4
Thermal shock	3.4.5
Performance requirements	
Insertion loss, initial	3.5.1
Ambient light susceptibility	3.5.2
Return loss	3.5.3
Insertion loss, verification	3.5.4
Change in optical transmittance	3.5.5
Signal discontinuities	3.5.6

TABLE VI. Inspection requirements – Continued.

Requirement	Paragraph
Maintainability	
Cleaning	3.6.1
Field termination	3.6.2
Dust cover	3.6.3
Size	3.7
Mass	3.8
Workmanship	3.9
Marking	3.10

5.2 Conformance tests. Connectors for delivery under this CID shall be subjected, at a minimum, to the following inspections:

a. Marking.

b. Workmanship.

5.3 Product conformance. The contractor shall certify and maintain objective quality evidence that the product offered meets the requirements of this CID, and that the product conforms to the manufacturer'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.

5.3.1 Conformance by similarity for single-mode. Manufacturers who have demonstrated product conformance under this CID for a particular configuration, temperature, and multimode fiber size, and whose single-mode fiber size passes insertion loss, shock, and vibration are compliant with this CID for the single-mode fiber size. Testing is to be performed on four mated pairs. This conformance by similarity is valid if the only difference between the previously conforming CID connector and the one being tested is a change in fiber size.

5.3.2 Conformance by similarity for multimode. Manufacturers who have demonstrated product conformance under this CID for a particular configuration, temperature, and single-mode fiber size, and whose 62.5/125 micron multimode connector passes insertion loss and shock specified herein, are compliant with this CID for the multimode fiber size. Testing is to be performed on four mated pairs. This conformance by similarity is valid if the only difference between the previously conforming CID connector and the one being tested is a change in fiber size.

5.3.3 Equivalent test methods. The use of equivalent test methods is allowed provided that the preparing activity has approved the use of that equivalent test method by that manufacturer.

5.3.3.1 Alternate forms of conformance inspection and equivalent test methods. Requests for alternate forms of conformance inspection must be submitted to the preparing activity. Alternate forms of conformance inspection may be used upon written approval by the preparing activity. The use of equivalent test methods is allowed. The Government reserves the right to request the manufacturer to conduct both test methods and have submitted complete test data to the preparing activity verifying the equivalency of each alternate test method proposed.

5.4 Market acceptability. The item offered must have been sold to the Government or commercial market for a minimum of 6 months.

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

7. NOTES.

7.1 Intended use. Connectors in accordance with this CID are intended to be used in a sheltered environment with commercial fiber optic cabling, fiber optic cabling in accordance with MIL-PRF-85045, and blown optical fiber tube furcation units in accordance with A-A-59729.

7.2 PIN. The following PIN procedure is for Government purposes and does not constitute a requirement for the contractor.

AA59940	**/XX**	**-**	**X**	**X**	**X**	**X**	**X**	**X**
CID number	Specification sheet		Termination process	Connector type	Temperature range	Housing	Strain relief	Fiber/cable configuration (when specified)

7.3 Recycled, recovered, environmentally preferable, or biobased materials. Recycled, recovered, environmentally preferable, or biobased materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs. Table VII lists the Environmental Protection Agency's (EPA) top seventeen hazardous materials targeted for major usage reduction. Use of these materials should be minimized or eliminated unless needed to meet the requirements specified herein (see section 3).

TABLE VII. EPA top seventeen hazardous materials.

Benzene	Dichloromethane	Tetrachloroethylene
Cadmium and Compounds	Lead and Compounds	Toluene
Carbon Tetrachloride	Mercury and Compounds	1,1,1 - Trichoroethane
Chloroform	Methyl Ethyl Ketone	Trichloroethylene
Chromium and Compounds	Methyl Isobutyl Ketone	Xylenes
Cyanide and Compounds	Nickel and Compounds	

7.4 Source of documents.

7.4.1 ASME. ASME standards are available from ASME, 22 Law Drive, P.O. Box 2900, Fairfield, NJ 07007-2900 or online at www.asme.org.

7.4.2 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.

7.4.3 EIA. EIA standards are available from the Electronic Components Industry Association, Engineering Department, 2001 Eye Street, NW, Washington, DC 20006 or online at http://www.eciaonline.org/standards.

7.4.4 Federal Government publications. Federal Government publications are available online at http://quicksearch.dla.mil/ or https://assist.dla.mil.

7.4.5 Fiber Optic Military Specification and related NAVSEA Drawings. Fiber Optic Military Specification and related NAVSEA Drawings are available online at https://fiberoptics.nswc.navy.mil.

7.4.6 TIA. TIA standards are available online at http://www.tiaonline.org/.

7.4.7 UL. UL standards are available from COMM 2000, 151 Eastern Avenue, Bensenville, IL 60106 or online at www.comm-2000.com.

7.5 Ordering data. Purchasers should specify the following:

a. CID document number, revision, and CID PIN.

b. When this CID is used for procurement, the product conformance clause must appear in the solicitation.

c. Preservation, packaging, packing, and marking requirements.

d. Quantity and type of connectors required.

7.6 Storage. Connector materials may degrade upon extended exposure to ozone, sunlight, or sources of ultraviolet radiation. Storage of connectors in a dark airtight environment is recommended.

7.7 Commercial products. 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 web site at https://fiberoptics.nswc.navy.mil. Navy Recommended Fiber Optic Components Parts List may also be obtained by sending a request to DLGR_NSWC_Foweb@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).

7.8 Key words.

Cable, fiber optic

Epoxy

Optical performance requirements

Splice

Strain relief

MILITARY INTERESTS

Custodians:
Army – CR
Navy – SH
Air Force – 11

Preparing Activity:
Navy – SH
(Project 6060-2013-006)

Review Activities:
Air Force – 13, 19, 93, 99
MISC – DI

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.