

CORNING OPTICAL COMMUNICATIONS GENERIC SPECIFICATION FOR BUFFERED OPTICAL FIBER CABLES FOR INDOOR DISTRIBUTION APPLICATIONS

September 2017
PGS049
Revision 10

Corning Optical Communications reserves the right to update this specification without prior notification.

Master Format 27 13 23 Communications Optical Fiber Backbone Cabling
or 27 15 23 Communications Optical Fiber Horizontal Cabling

1.0 General Considerations

- 1.1 The cable shall meet the requirements of the National Electrical Code® (NEC)® Section 770 for the intended application space:
 - 1.1.1 Plenum Applications - Applicable Flame Test: NFPA 262. The cable shall be listed OFNP (OFCP).
 - 1.1.2 Non-Plenum Applications - Applicable Flame Test: ANSI/UL-1666. Cables shall be listed OFNR (OFCR).
- 1.2 Finished cables shall be tested to the applicable performance requirements of the Insulated Cable Engineers Association, Inc. (ICEA) *Standard for Fiber Optic Premises Distribution Cable* (ICEA S-83-596).

2.0 Fiber Specifications

- 2.1 Detailed information on the cabled performance of the fiber types available for this cable design can be found in the following documents:

Dispersion Un-shifted Single-mode Fiber: Generic Specification F3,
“Generic Specification for Single-mode Optical Fiber in Tight Buffer
Cables.”

50/125 µm and 62.5/125 µm Multimode Fiber: Generic Specification F4,
“Generic Specification for Multimode Optical Fiber in Tight Buffer
Cables.”

3.0 Cable Construction

- 3.1 All fibers, except white, shall be colored with ultraviolet (UV) curable inks. Fibers occupying the white position shall be left uncolored.
- 3.2 All fibers shall be coated with a low friction slip layer.

- 3.3 Coated fibers shall be buffered with a thermoplastic compound to a diameter of $900 \pm 50 \mu\text{m}$.
- 3.4 Individual fiber's 900 μm buffer coating shall be color coded for identification. The color coding shall be in accordance with EIA/TIA-598, "Optical Fiber Cable Color Coding." The coloring material shall not be susceptible to migration and shall not affect the transmission characteristics of the optical fibers. Color-coded buffered fibers shall not adhere to one another. Buffered mechanical fibers in filler subunits, where used, shall be white (natural).
- 3.5 When buffered fibers are grouped into individual subunits, each subunit jacket shall be numbered for identification, with the exception of filler subunits where used. The number shall be repeated at regular intervals.
- 3.6 The fiber coating and buffer shall be removable with commercially available stripping tools in a single pass for connectorization or splicing.
- 3.7 Cable Core Construction

- 3.7.1 Non-unitized Cables, 2 to 24 Fibers:

The fiber shall be stranded around a dielectric strength element and surrounded by layered strength yarns. The strength element shall be overcoated with a thermoplastic, when required, to achieve dimensional sizing to accommodate and support the 900 μm buffered fibers. Cables having 12 to 24 fibers shall be dual layered. The strength yarns shall serve as the tensile strength members of the cable. A ripcord may be applied between the strength yarns and the outer jacket to facilitate jacket removal. The outer jacket shall be extruded over the strength yarns for physical and environmental protection.

- 3.7.2 Unitized Cables, 24 to 72 Fibers:

The buffered fibers shall be grouped in six fiber subunits. In each subunit, the individual fibers shall be stranded around a dielectric strength element and surrounded by layered strength yarns. A ripcord shall be incorporated in the subunit design to facilitate access to the individual fibers. The subunit jacket shall be extruded over the strength yarns for additional physical and environmental protection. The subunits shall be stranded around a dielectric central member. A ripcord shall be inserted beneath the outer jacket to facilitate jacket removal. The outer jacket shall be extruded around the subunits.

- 3.7.3 Unitized Cables, 72 to 144 Fibers:

The buffered fibers shall be grouped in twelve fiber subunits. In each subunit, the individual fibers shall be stranded around a dielectric strength element and surrounded by layered strength yarns. A ripcord shall be incorporated in the subunit design to facilitate access to the individual fibers. The subunit jacket shall be extruded over the strength yarns for additional physical and environmental protection. The subunits may be stranded around a dielectric central member. Cables

may contain filler subunits to provide symmetry to the cable design. A ripcord shall be inserted beneath the outer jacket to facilitate jacket removal. The outer jacket shall be extruded around the subunits.

3.8 The strength members shall consist of high modulus strength yarns. The strength yarns shall be helically stranded around the buffered fibers. Non-toxic, non-irritant talc shall be applied to the yarns to allow them to be easily separated from the fibers and the jacket.

3.9 Cable Jacket:

3.9.1 The jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections. The jacket shall have a consistent, uniform thickness; jackets extruded under high pressure are not acceptable. The jacket shall be smooth, as is consistent with the best commercial practice. The jacket shall provide the cable with a tough, flexible, protective coating, able to withstand the stresses expected in normal installation and service.

3.9.2 The nominal thickness of the cable outer jacket shall be sufficient to provide adequate cable protection while meeting the mechanical, flammability, and environmental test requirements of this document over the life of the cable.

3.9.3 The cable jacket and subunit jacket color shall be orange for cables/subunits containing multimode fiber except for cables/subunits containing 50/125 μm Laser Optimized Fiber, which shall have an aqua colored jacket. The cable/subunit jacket color shall be yellow for cables containing single-mode fiber.

3.10 The cable shall be all-dielectric.

4.0 Cable Identification

4.1 Jacket Printing

The outer cable jacket shall be marked with the manufacturer's name or ETL file number, date of manufacture, fiber count, fiber type, flame rating, listing symbol, and sequential length markings every two feet (e.g., "CORNING OPTICAL CABLE – MM/YY - 12 SME - EOS - OFNR FT4 c(ETL)us 00001 FEET"). The marking shall be in contrasting color to the cable jacket.

5.0 Cable Performance Specifications

5.1 Temperature Range.

The storage temperature range for the cable on the original shipping reel shall be $-40\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$. The installation temperature range for riser cables shall be $-10\text{ }^{\circ}\text{C}$ to $+60\text{ }^{\circ}\text{C}$. The operational temperature range for riser cables shall be $-20\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$. Testing shall be in accordance with FOTP-3.

5.2 Crush Resistance

When tested in accordance with FOTP-41, "Compressive Loading Resistance of Fiber Optic Cables," the cable shall withstand a minimum compressive load of 100 N/cm (57 lbf/in) applied uniformly over the length of the compression plate. While under compressive load, the fiber shall not experience an attenuation change greater than 0.40 dB at 1550 nm (single-mode) or greater than 0.60 dB at 1300 nm (multimode).

5.3 Cyclic Flexing

When tested in accordance with FOTP-104, "Fiber Optic Cable Cyclic Flexing Test," the cable shall withstand 25 mechanical flexing cycles at a rate of 30 ± 1 cycles per minute. The fiber shall not experience an attenuation change greater than 0.40 dB at 1550 nm (single-mode) or greater than 0.60 dB at 1300 nm (multimode). The jacket shall not crack, split, or tear.

5.4 High and Low Temperature Bend

When tested in accordance with FOTP-37, "Fiber Optic Cable Bend Test, Low and High Temperature," the cable shall withstand four full turns around a mandrel at the installation temperatures of $-10\text{ }^{\circ}\text{C}$ and $+60\text{ }^{\circ}\text{C}$. The mandrel diameter shall be the greater of 20 times the cable OD or 150 mm. The fibers shall not experience an attenuation change greater than 0.40 dB at 1550 nm (single-mode) or greater than 0.60 dB at 1300 nm (multimode).

5.5 Impact Resistance

When tested in accordance with FOTP-25, "Repeated Impact Testing of Fiber Optic Cables and Cable Assemblies," the cable shall withstand a minimum of 2 impact cycles at 3 locations spaced a minimum distance of 150 mm. The impact energy shall be 2.94 N•m. The fibers shall not experience an attenuation change greater than 0.40 dB at 1550 nm (single-mode) or greater than 0.60 dB at 1300 nm (multimode). The jacket shall not crack, split or tear.

5.6 Temperature Cycling

When tested in accordance with FOTP-3, "Procedure to Measure Temperature Cycling Effects on Optical Fiber, Optical Cable, and Other Passive Fiber Optic Components," the change in attenuation after the second cycle at the extreme operational temperatures shall not exceed 0.40 dB/km at 1550 nm (single-mode) or 0.60 dB/km at 1300 nm (multimode). The change in attenuation is measured with respect to the baseline values measured at room temperature before temperature cycling.

5.7 Twist-Bend

When tested in accordance with FOTP-85, "Fiber Optic Cable Twist Test," a length of cable no greater than 2 meters shall withstand 10 cycles of mechanical twisting and bending. The fibers shall not experience an attenuation change

greater than 0.40 dB at 1550 nm (single-mode) or 0.60 dB at 1300 nm (multimode).

5.8 Tensile and Fiber Strain

When tested in accordance with FOTP-33, "Fiber Optic Cable Tensile Loading and Bending Test," and FOTP-38, "Measurement of Fiber Strain in Cables Under Tensile Load," a length of cable shall be tested to the rated tensile load. For cables $\leq 12\text{f}$ the rated tensile load is 660 N (148 lbf) and for cables $> 12\text{f}$ the rated tensile load is 1320 N (297 lbf). While under the rated tensile load, the fiber shall not experience a measured fiber strain greater than 60% of the fiber proof test level. After being held at the residual load (30% of the rated tensile load), the fiber shall not experience a measured fiber strain greater than 20% of the fiber proof test level nor an attenuation change greater than 0.40 dB at 1550 nm (single-mode) or greater than 0.60 dB at 1300 nm (multimode). After the tensile load is removed, the fibers shall not experience an attenuation change greater than 0.40 dB at 1550 nm (single-mode) or greater than 0.60 dB at 1300 nm (multimode).

6.0 Packing and Shipping

6.1 The cable shall be packaged in cartons and/or wound on spools. Each package shall contain only one continuous length of cable. The packaging shall be constructed so as to prevent damage to the cable during shipping and handling.

6.2 When the length of an order requires a wooden reel the cable shall be covered with a three-layer laminated protective material. The outer end of the cable shall be securely fastened to the reel head so as to prevent the cable from becoming loose in transit. The inner end of the cable shall project into a slot in the side of the reel or into a housing on the inner slot of the drum, in such a manner and with sufficient length to make it available for testing.

6.3 Test tails shall be at least two meters long. The inner end shall be fastened so as to prevent the cable from becoming loose during shipping and installation.

6.4 Reel Marking and Labeling. Every cable shall come with the following information:

6.4.1 Reel Label:

- Part number
- Reel number
- Length (ft/m)
- Marking (ft/m) top and bottom
- Date of manufacture
- Listing information

6.4.2 Bar Code Label:

- Package ID

Reel number
Quantity
Customer ID
Package count
Factory order number
Release part number
Length (ft)
“Ship to:” address
“Attention to:”

6.4.3 Stenciling:

Manufacturer’s name and address
Direction of rotation
Reel size
“DO NOT LAY REEL ON SIDE”

7.0 Quality Assurance Provisions

7.1 All optical fibers in cables lengths of 300 m or greater shall be 100 % attenuation tested. The attenuation shall be measured at 1310 nm and 1550 nm. The manufacturer shall store these values for a minimum of 5 years. These values shall be available upon request.

7.2 The cable manufacturer shall be TL 9000 registered.

8.0 Miscellaneous

8.1 At the request of the customer, the cable manufacturer shall provide installation procedures and technical support concerning the items contained in this specification.

Gen Spec PGS049 Revision History

Revision #	Date	Reason for Change
3	July 00	Title change; Corning name change
4	June 01	Replaced “teflon” with “low friction slip layer
5	Sep 01	Removed references to “UL” listings and replaced with “ETL”. Did not change UL when referring to standard tests, ie., UL1666.
6	Aug 02	Added aqua jacket color
7	Nov 02	Editorial changes, end of year review
8	Sept 06	Updated jacket printing
9	Sept 17	Reformatted, added Master Format number
10	June 24	Added Plenum Application Listings