

# CORNING CABLE SYSTEMS GENERIC SPECIFICATION FOR TIGHT BUFFER OPTICAL FIBER CABLES FOR INTER- AND INTRABUILDING APPLICATIONS

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Revision 7

*Corning Cable Systems reserves the right to update this specification without prior notification.*

## 1.0 General Considerations

- 1.1 The cable must 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. Cables shall be listed OFNP (OFCP).
  - 1.1.2 Non-Plenum Applications - Applicable Flame Test: UL-1666. Cables shall be listed OFNR (OFCR).
- 1.2 Finished cables shall conform to the applicable performance requirements of the Insulated Cable Engineers Association, Inc. (ICEA) *Standard for Fiber Optic Premises Distribution Cable* (ICEA S-104-696).

## 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:
  - 2.1.1 Dispersion Un-shifted Single-mode Fiber: Generic Specification F3, "Generic Specification for Single-mode Optical Fiber in Tight Buffer Cables."
  - 2.1.2 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 The coated fiber shall have a low friction slip layer placed between the acrylate coating of the optical fiber and the thermoplastic buffer. The diameter of the thermoplastic buffer coating shall be  $900 \pm 50 \mu\text{m}$ .
- 3.2 The fiber coating and buffer shall each be removable with commercially available stripping tools in a single pass for connector termination or splicing.
- 3.3 The fibers shall be stranded around a dielectric strength element consisting of a dielectric, glass reinforced plastic (GRP) rod. The purpose of the central member is to provide tensile strength and prevent buckling of the cable. The GRP rod shall be overcoated with a thermoplastic material to achieve dimensional sizing to accommodate and support the 900 µm buffered fibers.

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- 3.4 Water-blocking, strength yarns shall serve as the tensile strength members of the cable. The strength members shall be a high modulus aramid yarn and shall be water swellable to prevent the migration of water throughout the cable. The water-blocking aramid yarns shall be non-nutritive to fungus, electrically non-conductive and homogeneous.
- 3.5 The aramid yarns shall be helically stranded around the 900  $\mu\text{m}$  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 outer jacket.
- 3.6 Outer Cable Jacket:
  - 3.6.1 The jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections. The jacket shall have a consistent, uniform thickness; pressure extruded jackets 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. The jacket shall not promote the growth of fungus.
  - 3.6.2 The OFNP cable jacket shall be a thermoplastic fluoropolymer such as Polyvinylidene Fluoride (PVDF), resistant to prolonged ultraviolet light exposure. For cables with 6 or 12 fibers the nominal thickness of the cable jacket shall be 0.8 mm, and for 24-fiber cable the nominal thickness of the cable jacket shall be 0.95 mm.
  - 3.6.3 The OFNR cable jacket shall be a flame retardant Polyvinyl Chloride (PVC) containing carbon black, resistant to prolonged ultraviolet light exposure. The nominal thickness of the cable jacket shall be 1.0 mm for OFNR listed cables having 6, 12, or 24 fibers.
- 3.7 The cable shall be all-dielectric except as noted in section 3.8 below.
- 3.8 The cables specified herein shall be available with an optional aluminum interlocking armor. The interlocking armor shall be covered with a flame retardant PVC outer jacket for OFNP and OFNR cables. The armor and outer jacket shall be comparable to liquid tight flexible metal conduit.

## 4.0 Identification

- 4.1 The individual 900  $\mu\text{m}$  buffered fibers shall be color coded for identification. The optical fiber color coding shall be in accordance with EIA/TIA-598, "Optical Fiber Cable Color Coding." The coloring material shall be stable over the temperature range of the cable, 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.

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- 4.2 The outer jacket shall be marked with the manufacturer's name or ETL file number, date of manufacture, fiber count, fiber type, flame ratings, listing symbol, sequential length markings every two feet for cables marked in feet or every 1 meter for cables marked in meters, and a telecommunications handset symbol (e.g., "CORNING OPTICAL CABLE - MM/YY - [handset symbol] - 12 SME - TB2 - OFNP FT6 c(ETL)us 00001 FEET"). The marking shall be in contrasting color to the cable jacket.

## 5.0 Cable Specifications

- 5.1 Temperature Range.

The storage temperature range for the cable on the original shipping reel shall be -40 °C to +70 °C. The installation temperature range for the cable shall be 0 °C to +60 °C for plenum cables and -10 °C to +60 °C for riser cables. The operating temperature range for the cable shall be -40 °C to +70 °C. Testing shall be in accordance with FOTP-3.

- 5.2 Tensile Loading 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. The rated tensile load shall be 1335 N (300 lbf). After being held at the residual load (30% of the rated tensile 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). 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).

- 5.3 Compressive Loading Test

When tested in accordance with FOTP-41, "Compressive Loading Resistance of Fiber Optic Cables," the cable shall withstand a minimum compressive load of 220 N/cm (125 lbf/in) applied uniformly over the length of the sample. The 220 N/cm (125 lbf/in) load shall be applied at a rate of 2.5 mm (0.1 in) per minute. The load shall be maintained for a period of 1 minute. The load shall then be decreased to 110 N/cm (63 lbf/in). Alternatively, it is acceptable to remove the 220 N/cm (125 lbf/in) load entirely and apply the 110 N/cm (63 lbf/in) load within five minutes at a rate of 2.5 mm (0.1 in) per minute. The 110 N/cm (63 lbf/in) load shall be maintained for a period of 10 minutes. Attenuation measurements shall be performed before release of the 110 N/cm (63 lbf/in) load. The change in attenuation shall not exceed 0.40 dB at 1550 nm for single-mode fibers and 0.60 dB at 1300 nm for multimode fiber.

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## 5.4 Cyclic Flexing Test

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  $30 \pm 1$  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). No cracks, splits, tears or other opening shall be present on the inner or outer surface of the jacket. No visible cracks greater than 5 mm in the armor, if present, shall be present.

## 5.5 Twist Test

When tested in accordance with FOTP-85, "Fiber Optic Cable Twist Test," a length of cable no greater than 2 meters will withstand 10 cycles of mechanical twisting. 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). No cracks or splits in the jacket shall be present when inspected under 5X magnification.

## 5.6 Low Temperature Bend

When tested in accordance with FOTP-37, "Fiber Optic Cable Bend Test," the cable shall withstand four full turns around a mandrel at test temperatures of 0 °C. 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).

## 5.7 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 separated by at least 150 mm. The impact energy shall be 4.4 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 presence of visible cracks, splits, tears, or other openings on the outer surface of the jacket constitute a failure.

## 5.8 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 2 cycles at the low and high operational temperatures (-40 °C to +70 °C) 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 after the last low and last high temperature.

## 5.9 Water Penetration

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When tested in accordance with FOTP-82, "Fluid Penetration Test for Fluid-Blocked Fiber Optic Cable", a one meter length of unaged cable shall withstand a one meter static head or equivalent continuous pressure of water for one hour without leakage through the open cable end. Retesting using a 3 meter length of cable shall not be permitted.

## 5.10 Cold Impact Test

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 separated by at least 150 mm. The impact energy shall be 2.9 N•m. The cable shall be conditioned for at least 4 hours at the minimum installation temperature (0 °C for plenum and -10 °C for riser). The presence of visible cracks on either the inner or outer surface of the jacket constitutes a failure. No optical measurements are required.

## 6.0 Packing and Shipping

- 6.1 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 The completed cable shall be packaged for shipment on a wooden reel and 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. Both ends of the cable shall be sealed to prevent the ingress of moisture.

- 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

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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 850 nm and 1300 nm for multimode fibers. The attenuation shall be measured at 1310 nm and 1550 nm for single-mode fibers. 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 ISO 9001 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.