CORNING OPTICAL COMMUNICATIONS GENERIC SPECIFICATION FOR MULTIPORT ASSEMBLY

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Revision 1

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

Master Format 27 11 19 Communication Termination Blocks and Patch Panels

1.0 Multiport Housing: General

The FlexNAP System Multiport Assembly and/or Pigtail shall have a factory-terminated patch panel that is compact, durable, and secure. The Multiport shall be available as a pigtail or as an Optitip factory-terminated cable assembly for fast, cost-effective installation and compatibility with other FlexNAP System products that have an OptiTip. The Multiport will be available in 2-, 4-, 6-, 8-, and 12-fiber configurations. It will use OptiTap Single Fiber Connector ports utilizing singlemode fiber. The Multiport is rated for outdoor, above-ground or below-grade use.

2.0 Fiber Characteristics

2.1 Detailed information on the fiber types available for this cable assembly design can be found in the following documents:

2.1.1 Dispersion Un-shifted and Non-zero Dispersion Shifted Single-mode Fiber: Generic Specification F1, “Generic Specification for Single-mode Optical Fiber in Loose Tube and Ribbon Cables.”

3.0 Multiport Specifications - General

3.1 The dimensions in cm (in) for the Multiport shall be:

3.1.1 4-fiber panel – 27.4 x 6.6 x 7.3 (10.8 x 2.6 x 2.9)

3.1.2 6- or 8-fiber panel – 31.2 x 7.6 x 8.6 (12.3 x 3.0 x 3.4)

3.1.3 12-fiber panel – 38.1 x 10.1 x 14.7 (15.0 x 4.0 x 5.8)

3.2 Multiport designed and tested to GR-771 for outside plant (above or below ground) environments.

3.3 The ferrule material for the multiport connectors shall be ceramic in nature.

3.4 The insertion loss for OptiTap connectors is 0.4dB max with a reflectance of < -65 dB max for single-mode.

3.5 The insertion loss for OptiTip MT connectors is 0.65dB max with a reflectance of < -65 dB max for single-mode.

3.6 The OptiTip connector shall be available in pin-less configuration.

3.7 The Multiport Pigtail and Assembly shall have a length of 10ft or 3m up to 2000ft or 600m.

3.8 The maximum pulling tension during installation when attached to the OptiTip connector's pulling eye shall be 445 N (100 lbf).

4.0 Cable Construction and Specifications

4.1 Optical fibers shall be placed inside a loose buffer tube. The nominal outer diameter of the buffer tube shall be 3.0 mm.

4.2 Each buffer tube shall contain up to 12 fibers.

4.3 The fibers shall not adhere to the inside of the buffer tube.

4.4 Each fiber shall be distinguishable by means of color coding in accordance with TIA/EIA-598-B, "Optical Fiber Cable Color Coding."

4.5 The fibers shall be colored with ultraviolet (UV) curable inks. In buffer tubes containing multiple fibers, the colors shall be stable across the specified storage and operating temperature ranges, and not subject to fading or smearing onto each other or into the gel filling material. Colors shall not cause fibers to stick together.

4.6 Buffer tubes containing fibers shall be color coded with distinct and recognizable colors in accordance with TIA/EIA-598-B, "Optical Fiber Cable Color Coding."

4.7 The buffer tube shall be filled with a non-hygroscopic, non-nutritive to fungus, electrically non-conductive, homogenous gel. The gel shall be free from dirt and foreign matter. The gel shall be readily removable with conventional nontoxic solvents.

4.8 The buffer tubes shall be resistant to external forces and shall meet the buffer tube cold bend and shrinkback requirements of 7 CFR 1755.900.

4.9 Cable jackets shall be continuous, free from pinholes, splits, blisters, or other imperfections. They 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 during normal installation and service.

4.10 Cable jackets shall be marked with the manufacturer's name, month and year of manufacture, sequential meter or foot markings, a telecommunication handset symbol as required by Section 350G of the National Electrical Safety Code® (NESC®), fiber count, and fiber type. The actual length of the cable shall be within -0/+1% of the length markings. The print color shall be white; with the exception that cable jackets containing one or more coextruded white stripes shall be printed in light blue. The height of the marking shall be approximately 2.5 mm.

4.11 If the initial marking fails to meet the specified requirements (i.e., improper text statement, color, legibility, or print interval), the cable may be remarked using a contrasting alternate color. The numbering sequence shall differ from the previous numbering sequence, and a tag shall be attached to both the outside end of the cable and to the reel to indicate the sequence of remarking. The preferred remarking color shall be yellow, with the secondary choice being blue.

4.12 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 -30 °C to + 70 °C. The operating temperature range for the cable shall be -40 °C to + 70 °C.

4.13 Tensile strength shall be provided by two dielectric strength members situated on either side of the buffer tube.

4.14 The maximum pulling tension during installation when attached to a pigtailed end (bare cable) shall be 1334 N (300 lb_f).

4.15 The cable shall be oval in shape and have nominal major and minor axis lengths of 8.2 mm and 4.5 mm, respectively.

4.16 When tested in accordance with FOTP-3, "Procedure to Measure Temperature Cycling Effects on Optical Fibers, Optical Cable, and Other Passive Fiber Optic Components," the change in attenuation at extreme operational temperatures (-40°C and +70°C) will not exceed 0.15 dB/km at 1550 nm for single-mode fiber.

4.17 When tested in accordance with FOTP-82, "Fluid Penetration Test for Fluid-Blocked Fiber Optic Cable," a 1 m length of un-aged cable will withstand a 1m static head or equivalent continuous pressure of water for 1 hour without leakage through the open cable end.

4.18 When tested in accordance with FOTP-81, "Compound Flow (Drip) Test for Filled Fiber Optic Cable," the cable will exhibit no flow (drip or leak) of filling and/or flooding material at 70^{o}C.

4.19 When tested in accordance with FOTP-41, "Compressive Loading Resistance of Fiber Optic Cables," the cable will withstand a minimum compressive load of 220 N/cm applied uniformly over the length of the

sample. The 220 N/cm load will be applied at a rate of 2.5 mm per minute. The load will be maintained for a period of 1 minute followed by a load decrease to 110 N/cm. Alternatively, it is acceptable to remove the 220 N/cm load entirely and apply the 110 N/cm load within five minutes at a rate of 2.5 mm per minute. The 110 N/cm load will be maintained for a period of 10 minutes. Attenuation measurements will be performed before release of the 110 N/cm load. The change in attenuation will not exceed 0.15 dB at 1550 nm for single-mode.

4.20 When tested in accordance with FOTP-104, "Fiber Optic Cable Cyclic Flexing Test," the cable will withstand 25 mechanical flexing cycles around a sheave diameter ≤20 times the cable diameter. The change in attenuation will not exceed 0.15 dB at 1550 nm for single-mode.

4.21 When tested in accordance with FOTP-25, "Repeated Impact Testing of Fiber Optic Cables and Cable Assemblies," except that the number of impacts will be two at three locations along a one-meter cable length and the impact energy will be at least 4.4 Nm (in accordance with ICEA S-87-640), the change in attenuation will not exceed 0.15 dB at 1550 nm for single-mode fiber.

4.22 When tested in accordance with FOTP-33, "Fiber Optic Cable Tensile Loading and ending Test," using a maximum mandrel and sheave diameter of 560 mm, the cable will withstand a rated tensile load of 1333 N (300 lb_f) and residual load of 30% of the rated installation load. The axial fiber strain shall be ≤60% of the fiber proof level after completion of 60 minute conditioning and while the cable is under the rated installation load. The axial fiber strain shall be ≤20% of the fiber proof level after completion of 10 minute conditioning and while the cable is under the residual load. The change in attenuation at residual load and after load removal shall not exceed 0.15 dB at 1550 nm for single mode fiber.

4.23 When tested in accordance with FOTP-85, "Fiber Optic Cable Twist Test", a length of cable no greater than 2 m will withstand 10 cycles of mechanical twisting. The change in attenuation will not exceed 0.15 dB at 1550 nm for single-mode fiber.

4.24 When tested in accordance with FOTP-37, "Low or High Temperature Bend Test for Fiber Optic Cable," the cable will withstand four full turns around a mandrel of ≤20 times the cable diameter after conditioning for four hours at test temperatures of -30^{o}C and +60^{o}C. Neither the inner or outer surfaces of the jacket will exhibit visible cracks, splits, tears, or other openings. The change in attenuation will not exceed 0.3 dB at 1550 nm for single-mode fiber.

5.0 OptiTip Construction and Specifications

5.1 The OptiTip shall be available in fiber counts of 2, 4, 6, 8 and 12.

5.2 The OptiTip shall have an 8º angled end face for single –mode and shall always mate “key up” to “key down. The connector housings shall be keyed to ensure proper connector mating relative to the end face angle.

5.3 The largest diameter of the connector housing shall be 17.5 mm, and the assembly terminated with this connector shall be designed to fit through 1.25” duct. The maximum pulling tension via the connector pulling eye shall be 445 N (100 lbf) during installation.

5.4 Connector alignment shall be achieved through 2 alignment pins located in the “pinned” hardened MT connector.

5.5 The OptiTip is designed to meet the applicable performance criteria of GR-3152, IP 69K, and IP 68.

5.6 When tested in accordance with FOTP-1, "Cable Flexing for Fiber Optic Connectors", the assembly shall be mounted to a cable tension test device with a weight of 0.9kg. Each assembly is rotated through the angles of +90 to –90 degrees for a total of 100 cycles. Measurements of loss and reflectance are made at the beginning and at the end of the test. At the end of the test each connector shall maintain a maximum insertion loss of ≤ 0.65 dB, a mean insertion loss of ≤ 0.30 dB, an insertion loss increase of ≤ 0.30 dB, a maximum reflectance of ≤ -60 dB, and a reflectance change of ≤ 5 dB.

5.7 The assembly shall not become uncoupled when subjected to the following series of the tests. The test sample shall undergo a series of straight pulls (4.5 kg_f (10 lbf) 0° for ≥5 sec, wait 10 sec to measure, then 6.8 kg_f (15 lbf) at 0° ≥5 sec, wait 10 sec to measure) and 90^o side pulls (2.3 kg_f (5 lbf) 0° for ≥5 sec, wait 20 sec to measure, then 3.4 kgf (7.5 lbf) at 0° for 5 sec, wait 20 sec to measure). At the end of the test each connector shall maintain a maximum insertion loss of ≤ 0.65 dB, a mean insertion loss of ≤ 0.30 dB, an insertion loss increase of ≤ 0.30 dB, a maximum reflectance of ≤ -60 dB, and a reflectance change of ≤ 5 dB.

5.8 When tested in accordance with FOTP-2, "Impact Test Measurements for Fiber Optic Devices", each assembly is subjected to eight impact cycles by being dropped from a height of 1.5 m. Each connector was cleaned after the test and re-mated. Measurements of maximum loss and reflectance were measured before and after the impacts. At the end of the test each connector shall maintain a maximum insertion loss of ≤0.65 dB, a mean insertion loss of ≤ 0.30 dB, an insertion loss increase of ≤0.30 dB, a maximum reflectance of ≤-60dB, and a reflectance change of ≤5dB.

5.9 When tested in accordance with FOTP-21, “Mating Durability for Fiber Optic Interconnecting Devices", each assembly is disconnected and then reconnected 50 times. The assemblies are cleaned after every 10th mating. Measurements of loss and reflectance are made before and after each cleaning cycle. At the end of the durability test each connector shall maintain a maximum insertion loss of ≤ 0.65 dB, a mean insertion loss of

≤ 0.30 dB, an insertion loss increase of ≤ 0.30 dB, a maximum reflectance of ≤ -60 dB, and a reflectance change of ≤ 5 dB.

5.10 The OptiTip assembly shall show no evidence of water leakage as a result of the applied Seal Under Load Test method. The side load applied shall be 2.5 lbs while being placed under 10ft of waterhead for seven days.

5.11 The OptiTip assembly shall not permanently deform more than 10%, nor temporarily deform more than 20%, when it is compressed by a uniformly distributed load. In addition, application of the compressive load shall not cause any mechanical damage to the closure or its contents. The applicable compressive loads are 300lbs for the buried/underground environment and 100lbs for all other deployment environments.

5.12 The OptiTip shall meet the Rockwell R87 material hardness specification to meet the rodent resistance requirement.

5.13 When tested in accordance with FOTP-3, "Procedure to Measure Temperature Cycling Effects on Optical Fibers, Optical Cable, and Other Passive Fiber Optic Components", each assembly is subjected to test conditions ranging from 23 °C to 75 °C to -40 °C for 500 hrs. Measurements of loss and reflectance are made at the beginning, at each temperature plateau and at the end of the test or other interim measurements such as 50, 100, 168, 220, 310, 425, and 500 hour intervals. At the end of the temperature cycling each connector shall maintain a maximum insertion loss of ≤ 0.65 dB, a mean insertion loss of ≤ 0.30 dB, an insertion loss increase of ≤ 0.30 dB, a maximum reflectance of ≤ -60 dB, and a reflectance change of ≤ 5 dB

5.14 When tested in accordance with FOTP-4, "Fiber Optic Component Temperature Life Test", each assembly is subjected to test conditions of 85 °C and < 40% RH for 2000 hrs. Measurements of loss and reflectance are made at the beginning, at 168hr, at 500hr, at 1000hr and at the end of the test. At the end of the temperature life test each connector shall maintain a maximum insertion loss of ≤ 0.65 dB, a mean insertion loss of ≤ 0.30 dB, an insertion loss increase of ≤ 0.30 dB, a maximum reflectance of ≤ -60 dB, and a reflectance change of ≤ 5 dB.

5.15 When tested in accordance with FOTP-5 "Humidity Test Procedure for Fiber Optic Components", test type 1, each connector assembly is subjected to test conditions of 75 °C and 90% relative humidity for 1000 hrs. Measurements of loss and reflectance are made at the beginning of the test, at 100 hrs, at 168 hrs, at 500 hrs, and at the end of the test. At the end test each connector shall maintain a maximum insertion loss of ≤0.65 dB, a mean insertion loss of ≤ 0.30 dB, an insertion loss increase of ≤ 0.30 dB, a maximum reflectance of ≤ -60 dB, and a reflectance change of ≤ 5 dB.

5.16 When tested in accordance with FOTP-16, “Salt Spray Test", each connector assembly shall subjected to a 5% (±1%) NaCl by weight

dissolved in distilled water solution over a period of 168 hrs (7 days). At the beginning and end of the test each connector shall maintain a maximum insertion loss of ≤ 0.65 dB, a mean insertion loss of ≤ 0.30 dB, an insertion loss increase of ≤ 0.30 dB, a maximum reflectance of ≤ -60 dB, and a reflectance change of ≤ 5 dB.

5.17 When tested in accordance with ASTM B827-92, “Airborne Contaminants Test”, each connector assembly shall be subjected each of the following gases over a period of 20 days individually: 20ppb Cl_2, 100ppm H_2S, 200ppm NO_2, and 200ppb SO_2. At the end of the test and before cleaning each connector shall maintain a maximum insertion loss of ≤ 0.65 dB, a mean insertion loss of ≤ 0.30 dB, an insertion loss increase of ≤ 0.30 dB, a maximum reflectance of ≤ -60 dB, and a reflectance change of ≤ 5 dB with no visible corrosion.

5.18 When tested in accordance with ASTM G21, “Fungus Resistance Test”, each connector assembly shall not support fungus growth and achieves a rating of 0.

5.19 When tested in accordance with UL-94 and ASTM D-2863-87, “Flammability Test”, each connector assembly shall have a material rating of V-1 or better and an oxygen index of 28 percent or better respectively.

5.20 The connector assemblies shall show no evidence of cracking when exposed over a period of 24 hrs to the following: WD-40 Water Displacing Lubricant, 10% IGEPAL, Cable Filling Compound, as used in the field, Splice Encapsulating Compound, Isopropyl Alcohol Grade HPLC, and Wasp & Hornet Spray.

5.21 Each connector assembly shall show no change in sealing ability and shall not experience a reduction in either tensile strength or elongation properties greater than 20% after submersion in a specified chemical test fluid for 7 days. The chemicals to be used are: Sulfuric Acid (3% H2SO4 by weight), Sodium Hydroxide (0.2 NaOH), IGEPAL (10%), and Kerosene (having flash point > 160°F).

5.22 The connector endface shall meet the geometry requirements as stated in IEC 61755 Part 3-3.

6.0 Quality Assurance Provisions

6.1 The Multiport Pigtail and Assembly manufacturer shall be TL 9000 registered.

6.2 All cable assemblies of any length shall be 100% tested for attenuation and connector geometry.

7.0 Miscellaneous

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

Gen Spec PGS129 Revision History

Revision #	Date	Reason for Change
0	2/12	Initial creation
1	10/17	Reformatted, added Master Format number and removed “FlexNap Systems”.