

CORNING OPTICAL COMMUNICATIONS GENERIC SPECIFICATION FOR BASE 12 PRE-TERMINATED HD SOLUTIONS

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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
 27 11 16 Communications Cabinets, Racks, Frames and Enclosures

1 Systems: General

Base-12 Pre-terminated systems include factory-terminated system components which can be quickly mated to form an end-to-end optical link between patching locations and/or equipment ports. The solution is a high density system with rapid installation time that enables migration to parallel transmissions from 40G all the way to 400G systems.

- Base-12 Pre-Terminated systems are modular solutions that include fiber trunks terminated with 12-fiber MTP® array connectors which mate at each end to a transition harness or transition module. Harnesses are cable assemblies which transition from a 12-fiber MTP array connector to single-fiber connectors. Modules have an identical configuration but they are protected in a modular case. Modular system solutions offer a greater degree of flexibility in managing equipment moves, adds, or changes. An example of this type of system is given in Figure 1.

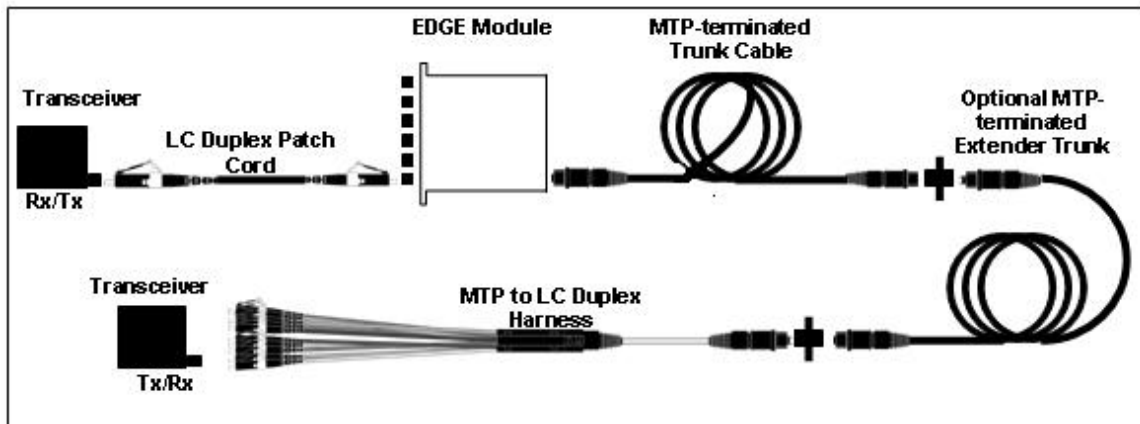


Figure 1: Modular Base-12 Pre-Terminated System connected to Transceiver Ports with jumpers and harnesses.

- 1.1 To maintain proper system polarity, components shall be specified to comply with Universal wiring as described in Section 8 for new builds.
- 1.2 Insertion loss specifications of individual components represent the expected performance when mated to other system components of like specification.

2 Trunk Specifications and Options

2.1 Trunk Function and Construction

- 2.1.1 The operational temperature range for trunks shall be -10 to +60°C.
- 2.1.2 Trunks shall be all-dielectric or armored construction.
- 2.1.3 Trunks shall be constructed with MTP[®] connectors at both ends.
Hybrid Trunks shall be terminated with MTP[®] connectors on one end and LC duplex connectors on the other.
- 2.1.4 Trunk fiber count shall be specified as 12, 24, 36, 48, 72, 96, 144, 192, 216, 288, 432, or 576.
- 2.1.5 Trunks shall be furcated (subdivided) into 12-fiber legs (subunits). Standard leg length shall be 33 in +3/-0 in.
- 2.1.6 Hybrid Trunks standard leg length shall be 33 in. +3/-0 in. (840 mm +70/-0mm) on the MTP end and 12in, 24in, 36in, 48in, 60in, 72in (+3/-0in) on the LC end.
- 2.1.7 Extender trunks shall have a standard leg length of 60 in. (+3/-0 in.)
- 2.1.8 Trunk length shall be specified as the distance between furcation points at each end of the cable and shall not be inclusive of the length of the legs at each end.
- 2.1.9 Dielectric trunk furcation plugs shall consist of a molded outer shell filled with an epoxy encapsulant.
- 2.1.10 The furcation plugs for dielectric trunks with fiber counts up to 144 fibers shall be square in order to facilitate plug rotation in 90 degree increments. This feature allows mounting the trunk into the hardware in any orientation and avoids standing torsional forces applied to the cable.
- 2.1.11 192-576 fiber dielectric plenum count trunks utilize a heat shrink furcation. With LSZH cable versions, 192-288 fiber count trunks will utilize a heat shrink furcation.
- 2.1.12 Dielectric trunks will utilize a single strain relief location in the housings
- 2.1.13 The furcation plug shall accommodate a toolless field installable snap - on device to secure the plug into the hardware. A single and double stack snap on devices shall be offered for the square furcations. Double stack snap - on devices allow securing twice the trunk density within the hardware.
- 2.1.14 The trunk shall incorporate a flexible boot at the back of the epoxy plug, in order to provide a uniformly smooth transition between the plug and the trunk cable.
- 2.1.15. For trunks (192-576 fibers), a single wide snap on device shall be offered.
- 2.1.16 Trunk furcation plugs shall provide a mounting point for a protective pulling grip and shall be capable of sustaining the rated tensile load of 100 lbs.
- 2.1.17 Trunk furcation plugs shall incorporate mechanically designed features that allow securing the trunks inside or outside a connector housing.
- 2.1.18 The trunk components shall be ROHS compliant.
- 2.1.19 Trunks cable shall be manufactured with ultra-bendable fiber and meet the fiber performance mentioned in Table 2.

- 2.1.20 The trunk cable shall have a minimum bend radius of five times the cable outside diameter.
- 2.1.21 The trunk cable shall meet the application requirements of the National Electric Code® (NEC® Article 770) OFNP and FT-6 listed for plenum.
- 2.1.22 The trunk cable shall meet the outer diameters specified in table 1.

Table 1: Trunks cable outer diameter

Trunk Fiber Count	Trunk Cable OD(mm)
12	5.5
24	7.7
36	8
48	8.5
72	10.5
96	11.9
144	12.5
192	13.5
216	14.0
288	16.0
432	22.9
576	24.5

- 2.1.23 The trunk legs shall be round and have a 2.0mm outer diameter with no preferential bend for easy routing.
- 2.1.24 Trunks shall meet the connector performance specifications of TIA/EIA-568-C.3, *Optical Fiber Cabling Components Standard*, (normative) Annex A.

2.2 Trunk Fiber Types, Optical Specifications, and Jacket Color

- 2.2.1 Available fiber types and their optical performance specifications shall be as indicated in Table 2.
- 2.2.2 Trunk jacket color shall be as indicated in Table 2.

Table 2: Trunks - Available Fiber Types, Optical Specifications, Jacket Colors.

Property	Multimode			Single Mode
	OM3 Ultra-Bendable optimized 50um (850/1300nm)	OM4 Ultra-Bendable optimized 50um (850/1300nm)	OM5 Ultra-Bendable optimized 50um (850/1300nm)	OS2 Bend-Improved Single Mode (1310/1550nm)
Cabled Fiber Attenuation, max (dB/Km)	2.8/1.0	2.8/1.0	2.8/1.0	0.4/0.3
Minimum Over Filled Launch (OFL) Bandwidth (MHz*km) ¹	1500/500	3500/500	3500/500	-/-
Minimum Effective Modal Bandwidth (EMB) (MHz*km) ²	2000/-	4700/-	4700/-	-/-
Jacket Color	Aqua	Aqua	Lime Green	Yellow

Note (1): As predicted by RML BW, per TIA/EIA 455-204 and IEC 60793-1-41, for intermediate performance laser based systems (up to 1 Gb/s).

Note (2): As predicted by minEMBc, per TIA/EIA 455-220 and IEC 60793-1-49 for high performance laser-based systems (up to 10 Gb/s).

2.3 Trunk Connectivity

- 2.3.1 Where modular trunks are specified, connectors shall be MTP[®] having 12 fibers per ferrule.
- 2.3.2 MTP terminated primary trunks shall comply with TIA/EIA 568 Type B array cable.
- 2.3.3 MTP terminated primary trunks shall have non-pinned MTP connectors on both ends.
- 2.3.4 MTP terminated extender trunks shall have pinned MTP connectors on the end to be interconnected with a primary trunk and non-pinned MTP connectors on the other end.
- 2.3.5 MTP terminated extender trunks shall comply with TIA/EIA 568 Type A array cable.
- 2.3.6 Where specified in Hybrid trunks, LC duplex connectors are used.


2.4 Trunk Protective Pulling Grips and Covers

- 2.4.1 Both ends of a trunk shall have a protective packaging over the furcation plug, legs, and connectors. Customer may specify a protective pulling grip on one end, both ends, or neither end.
- 2.4.2 Pulling grips shall be fastened to the epoxy furcation plug in a manner that isolates the cable assembly components (connectors and legs) from tension, torsion, crush, and bending loads encountered when following recommended installation practices.
- 2.4.3 For size 1 and size 2 furcations, the pulling grip consists of three components. The components include a zipper bag, a corrugated tube and two coupling shelves that allow quick and easy removal of the pulling grip.
- 2.4.4 The pulling grip for trunks that utilize a heat shrink furcation consists of three components. The components include a expand mesh, a corrugated tube, and a heat shrink that allow quick and easy removal of the pulling grip.
- 2.4.5 Pulling grips shall withstand a maximum pulling force of 100 lb.
- 2.4.6 Trunk pulling grip diameter and minimum allowable bend radius shall be as indicated in Table 3.
- 2.4.7 The pulling grip shall be a three components design. The components include a zipper bag, a corrugated tube and two coupling shelves that allow quick and easy removal of the pulling grip.

Table 3: Pulling Grip Specifications – MTP Terminated Trunks

Cable Type/ Fiber count (Plenum)	Grip Outer Diameter (in)	Recommended Minimum Duct Size with 18-in Elbow
12-36 Fibers	1.6	2.5 in
48-144 Fibers	2.2	3.0 in
192 Fibers	1.5	2.0 in
216 Fibers	1.5	2.0 in
288 Fibers	1.5	2.0 in
432 Fibers	1.9	2.0 in
576 Fibers	1.9	2.0 in

2.5 Trunk Packaging

- 2.5.1 Trunks up to 144 fibers less than 75 ft. (23 m) shall be in a plastic bag packaged inside a cardboard box.
- 2.5.2 Trunks up to 144 fibers that are longer than 75 ft. (23 m) shall be packaged in a corrugated plastic reel. The trunk shall be secured to the reel with shrink wrap.
- 2.5.3 Trunks from 192 to 576 fibers less than 202 ft shall be in a plastic bag packaged inside a cardboard box.
- 2.5.4 Trunks from 192 to 576 fibers longer in length than 202 ft shall be packaged on either a corrugated plastic or plywood reel. The trunk shall be secured to the reel with shrink wrap.
- 2.5.5 The plastic reel shall be constructed with 100% recyclable polypropylene  material.

3 Harness Specifications and Options

3.1 Harness Function and Construction

- 3.1.1 Harnesses shall be 12-fiber cable assemblies used as a transition between MTP[®] terminated trunk legs and end equipment ports or patch panels.
- 3.1.2 Harness cable shall be available with plenum or LSZH rating.
- 3.1.3 The harness shall provide a means to transition from MTP connectors to LC duplex connectors. The break-out legs shall be 2 mm and use a single two-fiber non-preferential bend cable terminated with LC Uniboot connectors and share a single boot.
- 3.1.4 The harness break-out point shall be a molded epoxy plug.
- 3.1.5 Harness shall be color coded according to Table 5.
- 3.1.6 Five specific break-out leg lengths with stagger shall be offered to match the majority of the electronic equipment port layout.
- 3.1.7 Staggered harnesses shall be offered in lengths from 3 ft. to 20 ft. (1 m to 6 m) in length. Non-Staggered harnesses shall be available in lengths from 3 ft. to 200 ft. (1 m to 60 m) in length.
- 3.1.8 Harness length shall be measured from the MTP connector to the end of the furcation point.

3.2 Harness Fiber Types and Optical Specifications

- 3.2.1 Available fiber types and their optical performance specifications shall be as indicated in Table 5.

3.3 Harness Connectivity

- 3.3.1 Harnesses shall be terminated with a pinned or non-pinned MTP[®] PRO connector depending on the application and legs shall be terminated with duplex LC uniboot style connectors.
- 3.3.2 The MTP PRO connector shall have the ability to either add or remove pins with the field tool for MTP PRO connectors.
- 3.3.3 The MTP PRO connector shall have the ability to reverse polarity on MM MTPs utilizing the field tool for MTP PRO connectors without the need to remove the MTP housing.

Table 5: Components Optical Specifications - Available Fiber Types, Colors.

Property	Multimode			Single Mode
	OM3 Ultra-Bendable optimized 50um (850/1300nm)	OM4 Ultra-Bendable optimized 50um (850/1300nm)	OM5 Ultra-Bendable optimized 50um (850/1300nm)	OS2 Bend-Improved Single Mode (1310/1550nm)
Fiber Attenuation, max (dB/Km)	2.8/1.0	2.8/1.0	2.8/1.0	0.4/0.3
Minimum Over Filled Launch (OFL) Bandwidth (MHz*km) ¹	1500/500	3500/500	3500/500	-/-
Minimum Effective Modal Bandwidth (EMB) (MHz*km) ²	2000/-	4700/-	4700/-	-/-
Jacket Color	Aqua	Aqua	Lime Green	Yellow
Break-out leg Color	Aqua	Aqua	Lime Green	Yellow

Note (1): As predicted by RML BW, per TIA/EIA 455-204 and IEC 60793-1-41 for intermediate performance laser based systems (up to 1 Gb/s).

Note (2): As predicted by minEMBc, per TIA/EIA 455-220 and IEC 60793-1-49 for high performance laser-based systems (up to 10 Gb/s).

4 Jumper Specification

4.1 Jumper function and construction

- 4.1.1 The jumper shall be a 2-fiber cable assembly useful as a transition between the LC side of a harness or module and end equipment ports.
- 4.1.2 Jumper shall be plenum rated.
- 4.1.3 Jumper shall have duplex LC connector and share a single boot for both connectors.
- 4.1.4 The boot shall have an overall length from the connector to the boot of 2.63".
- 4.1.5 The jumper should have a mechanism that allows changing the polarity in the field. A way to identify if the jumper polarity has been flipped should be provided on the connector.
- 4.1.6 The jumper shall be constructed with a single 2mm round cable with no preferential bend that allows easy routing and reduces jumper congestion in the housings and vertical managers.

4.2 Jumper Fiber types and Optical Specifications.

- 4.2.1 Available fiber types and their optical performance specifications shall be as indicated in Table 5.

4.3 Jumper Connectivity

- 4.3.1 Jumpers shall be terminated with a pinned or non-pinned MTP[®] PRO connector depending on the application.
- 4.3.2 The MTP PRO connector shall have the ability to either add or remove pins with the field tool for MTP PRO connectors.
- 4.3.3 The MTP PRO connector shall have the ability to reverse polarity on MM MTPs utilizing the field tool for MTP PRO connectors without the need to remove the MTP housing.

5 Adapter Panel Specification

5.1 Adapter panel function and construction

- 5.1.1 Panels shall meet the following dimensions 4.87" X 3.53"x 0.46" (LxWxH).
- 5.1.2 Panels shall provide a means for joining MTP[®] terminated trunks entering the back of an MTP adapter panel to a pinned MTP terminated extender trunk or harness entering at the front of the panel.
- 5.1.3 Panels shall be dimensionally compatible with rack-mountable connector housings.
- 5.1.4 Panel design shall permit front and rear installation into the housings.
- 5.1.5 The MTP adapters on the panels shall have the capability to be changed from a TIA/EIA Type A adapter to a TIA/EIA Type B adapter and vice versa, without the need of any tools. This does not apply to keyed adapters.
- 5.1.6 Panel shall have VFL compatible shutter adapters at the front plane with the exception of SECURE keyed versions. The shutter adapter shall eliminate the need to remove and re-install dust caps at the front. The MTP adapter shall be color coded as indicated in Table 6.
- 5.1.7 72f panel shall have two trunk leg retainers that help with adequate trunk leg routing when exiting the rear of the panel.
- 5.1.8 Panels shall be offered from 24f to 72fiber.
- 5.1.9 SECURE keyed adapter panel color scheme is different to the one shown in table 6. Color scheme for keyed panels represent different security levels specified by the customer. Available colors and keys are highlighted in table 6a and 6b
- 5.1.10 Keyed adapters are available up to 48f and colored adapters are available up to 72f.

6 Module Specifications and Options

6.1 Module Function and Construction

- 6.1.1 Modules shall provide a means for joining MTP terminated trunks entering the back of an appropriately designed connector housing to LC jumpers or cables entering the front of the housing.
- 6.1.2 Modules shall contain one 12-fiber cable assembly within a protective housing.
- 6.1.3 Modules shall have shutter LC adapters at the front.
- 6.1.4 Modules shall be dimensionally compatible with rack-mountable connector housings.
- 6.1.5 The small form module shall meet the following dimensions 4.87" X 3.53"x 0.463" (LxWxH). It shall provide a high density solution when loaded into the 01U and 04U housings.
- 6.1.6 Modules shall permit front and rear installation into the housings.
- 6.1.7 When uninstalling a module from the back; a rear accessible retention trigger and finger handle must be present in order to facilitate this operation. An I.D. and warranty seal label shall be affixed to every module.
- 6.1.8 When mounted in a connector housing, the adapter sleeves shall be accessible from the front, thus providing a cross-connection point with other modules.
- 6.1.9 Modules shall contain discrete fiber and port identification. This fiber and port identification shall be pad printed on top and bottom of the modules.

6.2 Module Connectivity

- 6.2.1 Cable assemblies within modules shall be terminated with MTP[®] pinned connector at the back and LC connector at the front.
- 6.2.2 Each module shall contain 12 fiber terminations.
- 6.2.3 All connectors shall be inside the module but shall be accessible for mating through adapter sleeves mounted through the wall of the module.
- 6.2.4 Module shall have self-retracting shutter adapter mechanism that allows a single hand operation. The shutter adapter shall eliminate the need to remove and re-install dust caps. The shutter adapter shall be VFL compatible. The adapter sleeves shall be color coded as indicated in Table 6.
- 6.2.5 SECURE color scheme for keyed and color MTPs represent different security levels specified by the customer. Available colors and keys are highlighted in table 6a and 6b.
- 6.2.6 SECURE color scheme for keyed and color LCs represent different security levels specified by the customer. Available colors and keys are highlighted in table 6c.

6.3 Module Fiber Types and Optical Specifications

6.3.1 Available fiber types and their optical performance specifications shall be as indicated in Table 6. Module insertion loss performance shall be as indicated in table 7.

Table 6: Modules - Available Fiber Types, Optical Specifications, Adapter Colors

Property	Multimode			Single Mode
	OM3 Ultra-Bendable optimized 50um (850/1300nm)	OM4 Ultra-Bendable optimized 50um (850/1300nm)	OM5 Ultra-Bendable optimized 50um (850/1300nm)	OS2 Bend-Improved Single Mode (1310/1550nm)
Fiber Attenuation, max (dB/Km)	2.8/1.0	2.8/1.0	2.8/1.0	0.4/0.3
Minimum Over Filled Launch (OFL) Bandwidth (MHz*km) ¹	1500/500	3500/500	3500/500	-/-
Minimum Effective Modal Bandwidth (EMB) (MHz*km) ²	2000/-	4700/-	4700/-	-/-
Adapter color: LC MTP®	Aqua Aqua	Aqua Aqua	Lime Green	Blue Black

Table 6a: Panels - Available Adapter Colors

MTP Adapter Colored Options	Colors Available
	Blue
	Orange
	Green
	Brown
	Slate
	White
	Red
	Black
	Yellow
	Violet
	Rose
	Aqua

Table 6b: Panels - Available Keyed Adapter Colors


MTP Adapter Keyed Colored Option	Keyed Colors Available
	Blue
	Orange
	Green
	Brown
	Slate
	Red
	Yellow
	Violet
	Rose
	Aqua

Table 6c: LC Adapter SECURE Color Options

LC Adapter¹	Colors Available
	Blue
	Orange
	Green
	Brown
	Slate
	White
	Red
	Black
	Yellow
	Violet
	Rose
	Aqua

Note (1): No shutters available for keyed LC adapters

6.4 Module packaging

- 6.4.1 The modules shall be packaged in blister packs. The blister pack overall dimensions shall be 4-3/4" x 3/4" x 7-3/16".
- 6.4.2 The blister packs shall have the ability to be stored in a box or hung when using hook merchandising storage devise.
- 6.4.3 The plastic reel shall be constructed with 100% recyclable Polyethylene Terephthalate  material.

7 Components Insertion Loss Specifications

All components shall meet the maximum insertion loss values indicated in table 7.

Table 7: Components Optical Specifications - Available Fiber Types

Property	Multimode			Single Mode
	OM3 Ultra- Bendable optimized 50um (850/1300nm)	OM4 Ultra- Bendable optimized 50um (850/1300nm)	OM5 Ultra- Bendable optimized 50um (850/1300nm)	OS2 Bend- Improved Single Mode (1310/1550nm)
	Insertion Loss, max (dB) ⁽¹⁾			
MTP Mated Pair LL ⁽²⁾	0.35	0.35	0.35	0.75
LC Mated Pair LL	0.15	0.15	0.15	0.25
Module LL	0.50	0.50	0.50	1.0
	Insertion Loss, max (dB) ⁽¹⁾			
MTP Mated Pair ULL ⁽³⁾	0.25	0.25	0.25	0.35
LC Mated Pair ULL	0.10	0.10	0.10	0.25
Module ULL	0.35	0.35	0.35	0.60

Note (1): Insertion loss specifications when mated to other system components of a like performance specification.

Note (2): LL stands for Low Loss

Note (3): ULL stands for Ultra Low Loss

8 Advanced Optic conversion module

8.1 Module Function and Construction

- 8.1.1 Modules shall provide connectivity for 12 fiber based MTP[®] terminated trunks entering the back of an appropriately designed connector housing to MTP jumpers or cables entering the front of the housing.
- 8.1.2 Modules shall contain a cable assembly within a protective housing that provides two or four 12-fiber MTP connectivity at the back of the module to three or six 8-fiber MTP connectivity at the front respectively. This conversion shall allow fully utilizing all the fibers at the trunk backbone in 40 Gig applications.
- 8.1.3 Modules shall have reversible polarity shutter MTP adapters at the front. This shutter adapter shall be VFL compatible.
- 8.1.4 Modules shall be dimensionally compatible with Corning Cable Systems EDGE rack-mountable connector housings.
- 8.1.5 The small form module shall meet the following dimensions 5.68" X 3.53"x 0.5" (LxWxH). It shall provide a high density solution when loaded into the 01U, 02U and 04U EDGE housings.
- 8.1.6 Modules shall permit front and rear installation into the EDGE housings.
- 8.1.7 When uninstalling a module from the back; a rear accessible retention trigger must be present in order to facilitate this operation.
- 8.1.8 An I.D. and warranty seal label shall be affixed to every module.
- 8.1.9 Modules shall contain port identification. This port identification shall be pad printed on top and bottom of the module.

8.2 Module Connectivity

- 8.2.1 Cable assemblies within modules shall be terminated with MTP[®] pinned connector at the back and at the front.
- 8.2.2 All connectors shall be inside the module but shall be accessible for mating through adapter sleeves mounted through the wall of the module.
- 8.2.3 Module shall have shutter adapters at the front of the module. The shutter adapter shall eliminate the need to remove and re-install dust caps. The shutter adapter shall be VFL compatible. The adapter sleeves shall be color coded as indicated in Table 1.

8.3 Module Fiber Types and Optical Specifications

- 8.3.1 Available fiber types and their optical performance specifications shall be as indicated in Table 1. Module insertion loss performance shall be as indicated in table 2.

Table 1: Modules - Available Fiber Types, Optical Specifications, Adapter Colors.

Property	Multimode
	OM4 Ultra-Bendable Multimode 50 μm (850/1300 nm)
Fiber Attenuation, max (dB/Km)	2.8/1.0
Minimum Over Filled Launch (OFL) Bandwidth (MHz*km)	3500/500
Minimum Effective Modal Bandwidth (EMB) (MHz*km)	4700/-
Adapter color MTP®	Aqua

Note (1): As predicted by RML BW, per TIA/EIA 455-204 and IEC 60793-1-41, for *intermediate performance laser based systems* (up to 1 Gb/s).

Note (2): As predicted by minEMBc, per TIA/EIA 455-220 and IEC 60793-1-49 for *high performance laser-based systems* (up to 10 Gb/s)

8.4 Module packaging

8.4.1 The modules shall be packaged in blister packs. The blister pack overall dimensions shall be 9-5/8" x 5 1/4" x 1" (LxWxH).

8.4.2 The blister packs shall have the ability to be stored in a box or hung when using hook merchandising storage device.

8.5 Components Insertion Loss Specifications

All components shall meet the maximum insertion loss values indicated in table 2.

Table 2: Components Optical Specifications - Available Fiber Types.

Property	Multimode
	OM4 Ultra-Bendable Multimode 50 μm (850/1300 nm)
Insertion Loss, max (dB) ⁽¹⁾	
MTP® mated pair loss	0.25
Module Loss	0.5

Note (1): Insertion loss specifications when mated to other system components of a like performance specification.

9 QSFP Harness Specifications and Options

9.1 QSFP Harness Function and Construction

- 9.1.1 Harness shall provide connectivity from two 12-fiber MTPs to three 8-fiber MTPs. This conversion shall allow full utilization of all the fibers at the trunk backbone in 40Gig applications.
- 9.1.2 Harnesses shall be 24-fiber cable assemblies used as a transition between MTP[®] 12-fiber terminated trunk legs and QSFP equipment ports.
- 9.1.3 Harness cable shall be plenum rated.
- 9.1.4 The harness cable shall be round with a 3.1mm O.D. Harness break-out legs shall be also round with a 2.6mm O.D.
- 9.1.5 The harness break-out point shall be a molded epoxy plug.
- 9.1.6 Harness shall be color coded according to Table 3.
- 9.1.7 Harness length shall be measured from the end of the furcation point to the end of the furcation point.
- 9.1.8 Harness shall be available with 12, 24, 36, 48 and 72 inches legs.
- 9.1.9 The harness shall be offered up to 200Ft length.

9.2 Harness Fiber Types and Optical Specifications

- 9.2.1 Available fiber types and their optical performance specifications shall be as indicated in Table 3.

9.3 Harness Connectivity

- 9.3.1 Harnesses shall be terminated with pinned 12-fiber MTP[®] connectors to non-pinned 8-fiber MTP[®] connectors.

Table 3: Components Optical Specifications - Available Fiber Types, Colors.

Property	Multimode	
	OM3 Ultra-Bendable Multimode 50µm (850/1300 nm)	OM4 Ultra-Bendable Multimode 50 µm (850/1300 nm)
Fiber Attenuation, max (dB/Km)	2.8/1.0	2.8/1.0
Minimum Over Filled Launch (OFL) Bandwidth (MHz*km)	1500/500	3500/500
Minimum Effective Modal Bandwidth (EMB) (MHz*km)	2000/-	4700/-
Jacket Color Leg Color	Aqua Aqua	Aqua Aqua

Note (1): As predicted by RML BW, per TIA/EIA 455-204 and IEC 60793-1-41, for intermediate performance laser based systems (up to 1 Gb/s).

Note (2): As predicted by minEMBc, per TIA/EIA 455-220 and IEC 60793-1-49 for high performance laser-based systems (up to 10 Gb/s).

10 SFP Harness Specifications and Options

10.1 Harness Function and Construction

10.1.1 Harnesses shall be an 8-fiber cable assembly providing connectivity between electronic equipment and cable infrastructure.

10.1.2 Harness MTP cable shall be plenum rated.

10.1.3 The harness shall provide a means to transition from MTP[®] connectors to LC duplex connectors. The break-out legs shall use two-fiber non-preferential bend, 2.0mm cable terminated with duplex LC connectors and share a single boot and allow polarity reversal if required.

10.1.4 Harness cable shall be 2mm OD for reduced cable congestion.

10.1.5 The harness break-out point shall be a molded epoxy plug.

10.1.6 Harness shall be color coded according to Table 4.

10.1.7 Break-out legs shall be available with 12, 24, 36 inches leg length.

10.1.8 The harness shall be offered up to a length of 200 feet. Harness is measured from the MTP[®] connector to the end of the furcation point.

10.2 Harness Fiber Types and Optical Specifications

10.2.1 Available fiber types and their optical performance specifications shall be as indicated in Table 4.

10.3 Harness Connectivity

10.3.1 Harnesses shall be terminated with a non-pinned or pinned MTP[®] connector depending on application. Harness legs shall be terminated with duplex LC uniboot style connectors.

Table 4: Components Optical Specifications - Available Fiber Types, Colors.

Property	Multimode	
	OM3 Ultra-Bendable Multimode 50µm (850/1300 nm)	OM4 Ultra-Bendable Multimode 50 µm (850/1300 nm)
Fiber Attenuation, max (dB/Km)	2.8/1.0	2.8/1.0
Minimum Over Filled Launch (OFL) Bandwidth (MHz*km)	1500/500	3500/500
Minimum Effective Modal Bandwidth (EMB) (MHz*km)	2000/-	4700/-
Jacket Color Leg Color	Aqua Aqua	Aqua Aqua

Note (1): As predicted by RML BW, per TIA/EIA 455-204 and IEC 60793-1-41, for intermediate performance laser based systems (up to 1 Gb/s).

Note (2): As predicted by minEMBc, per TIA/EIA 455-220 and IEC 60793-1-49 for high performance laser-based systems (up to 10 Gb/s).

10.4 Harness polarity Management

10.4.1 Harness polarity shall be universal wiring.

11 MTP® Jumper Specification

11.1 Jumper function and construction

11.1.1 The jumper shall be a 12-fiber cable assembly used as a transition between the MTP side of a module or trunk and equipment ports.

11.1.2 Jumper shall be plenum rated.

11.1.3 The jumper shall be constructed with a single 2mm round cable with no preferential bend that allows easy routing and reduces jumper congestion in the housings and vertical managers.

11.1.4 MTP jumpers shall be available in TIA/EIA 568 Type A and Type B.

11.1.5 MTP jumpers shall be offered in any combination of pinned and non-pinned versions

11.1.6 MTP jumpers shall be available in plenum or LSZH rating.

11.1.7 MTP connectors shall incorporate a shroud extender to facilitate removal of the connector from MTP adapters.

11.1.8 The MTP PRO connector shall have the ability to either add or remove pins with the field tool for MTP PRO connectors.

11.1.9 The MTP PRO connector shall have the ability to reverse polarity on MM MTPs utilizing the field tool for MTP PRO connectors without the need to remove the MTP housing.

11.2 Jumper Fiber types and Optical Specifications.

11.2.1 Available fiber types and their optical performance specifications shall be as indicated in Table 4.

Table 4: Components Optical Specifications - Available Fiber Types.

Property	Multimode		Single Mode
	OM3 Ultra-Bendable Multimode 50µm (850/1300 nm)	OM4 Ultra-Bendable Multimode 50 µm (850/1300 nm)	OS2 Bend-Improved Single-Mode (1310/1550 nm)
Insertion Loss, max (dB) ⁽¹⁾			
MTP® mated pair loss	0.25	0.25	0.75
Jumper loss	0.5	0.5	1.5

Note (1): Insertion loss specifications when mated to other system components of a like performance specification.

11.1 Jumper polarity Management

11.1.1 For Universal wired Systems, MTP jumper polarity shall be type B.

6 Quality Assurance Provisions

6.1 All cabled optical fibers > 1000 meters in length shall be 100% attenuation tested. The attenuation of each fiber shall be provided with each cable reel.

6.2 The cable manufacturer shall be TL 9000 registered

7 Miscellaneous

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

11.2 Module polarity Management

11.2.1 Module shall be wired with EDGE Advanced Optical Universal wiring.

12 Universal Polarity Management System

12.1 Trunks, modules, harnesses shall follow the fiber routing schematic of Figure 2 and Figure 3.

12.1.1 Standard Ribbon Position is defined as having the end face of the blue fiber on the left of the MTP connector as the MTP end face is viewed in the key up position.

12.1.2 Reverse Ribbon Position is defined as having the end face of the blue fiber on the right of the MTP[®] connector as the MTP end face is viewed in the key up position.

12.1.3 Keys schematically represented in the down position are drawn with a dashed line.

12.2 All MTP connectors shall mate key-up to key-down.

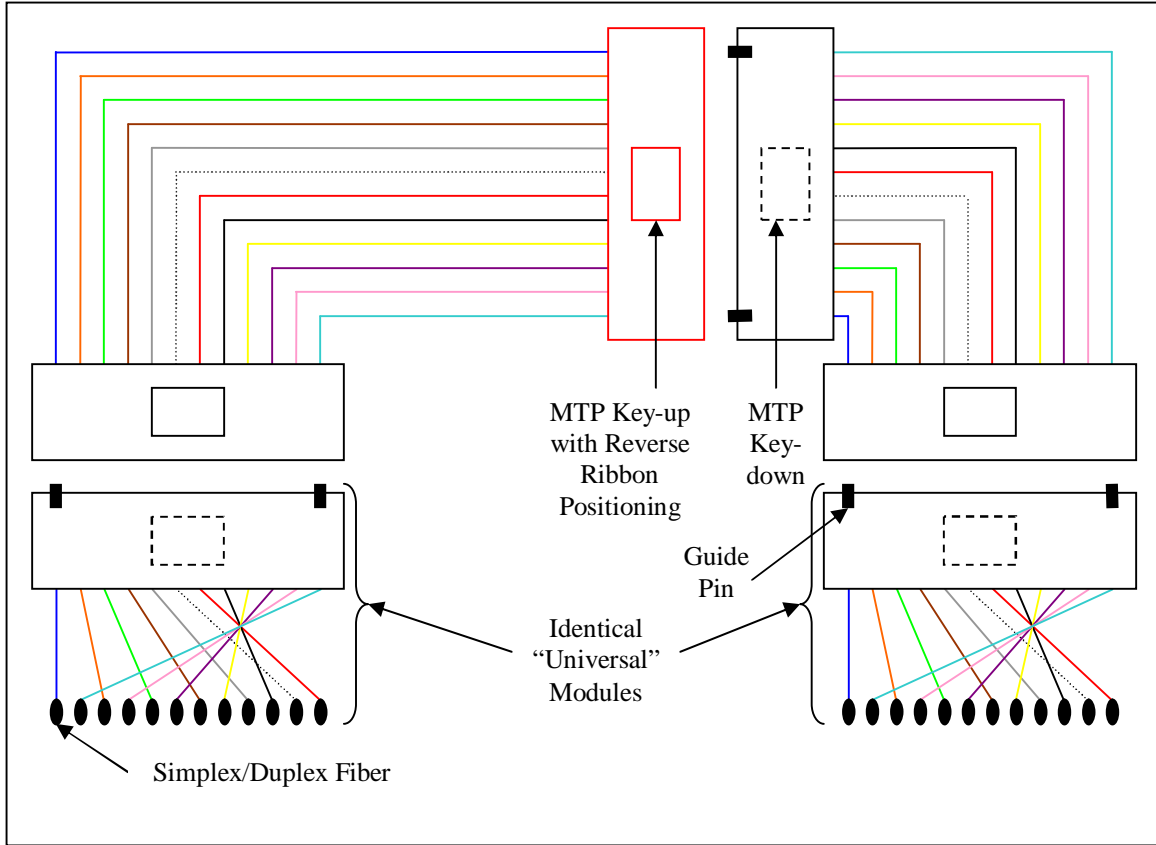
12.3 Primary trunks shall have MTPs on one end oriented in the Standard Ribbon Position and MTPs on the other end oriented in the Reverse Ribbon Position.

12.4 Extender trunks shall have both MTP connectors installed in the Standard Ribbon Position.

12.5 Modules and harnesses shall contain MTPs in the Standard Ribbon Position.

12.6 Modules shall have polarity-managed fiber routing as shown in Figure 2.

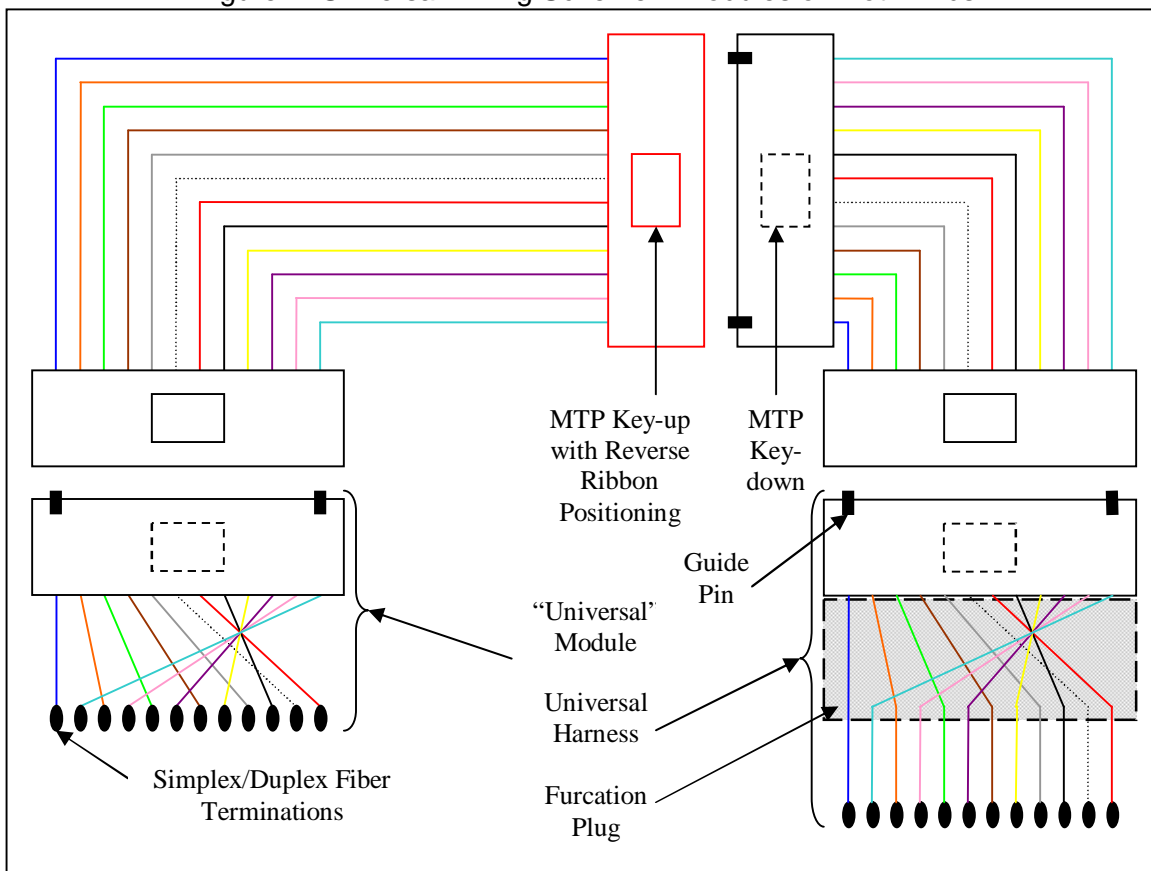
12.7 Harnesses shall have polarity-managed fiber routing within a furcation plug as shown in Figure 3.



Note (1): All MTP connectors shall be installed in standard ribbon position except as noted.

Note (2): Extender trunk shown in upper right corner is optional.

Figure 2: Universal Wiring Scheme – Modules on Both Ends



Note (1): All MTP[®] connectors shall be installed in standard ribbon position except as noted.
Note (2): Extender trunk shown in upper right corner is optional.

Figure 3: Universal Wiring Scheme – Harness on One End

9.0 Quality Assurance Provisions

9.1 The manufacturer shall be TL 9000 registered

10.0 Miscellaneous

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

Gen Spec PGS098 Revision History

Revision #	Date	Reason for Change
0	6/23/09	Initial creation
1	12/01/09	Changed minimum OFL bandwidth for pretium 500 fiber from 1500 to 3500 MHz.km.
2	0912/10	Updated mated pair insertion loss table with new performance.
3	11/02/11	Changed mated pair IL performance for SM to 1.3dB. Added reversible polarity jumper feature.
4	3/7/2014	Changed Evolved density growth enabled to Pretium EDGE. Changed fiber loss to 2.8 db/km. Updated trunk cable ODs to match spec sheet. Included size 2 double stack cradles.
5	??	??
6	9/07/2017	Added SECURE colored and keyed panels, updated with Master Format info.
7	11/29/2017	Added 192-576f trunks, WBMMF, MTP PRO, colored LC adapters on modules, keyhole adapter mounting bracket for heat shrink furcations, new harness furcation, and trunk packaging matrix. Combined AO gen spec
8	3/28/2018	Added jumper connectivity, MTP PRO to jumper, SECURE module, Hybrid and Extender trunks