OPTICAL CABLE CORPORATION

FIBER OPTIC CABLE

INDOOR/OUTDOOR & PREMISES

DISTRIBUTION SERIES FIBER OPTIC CABLE
TYPE OFNR RISER PRODUCT SPECIFICATIONS

OPTICAL CABLE CORPORATION

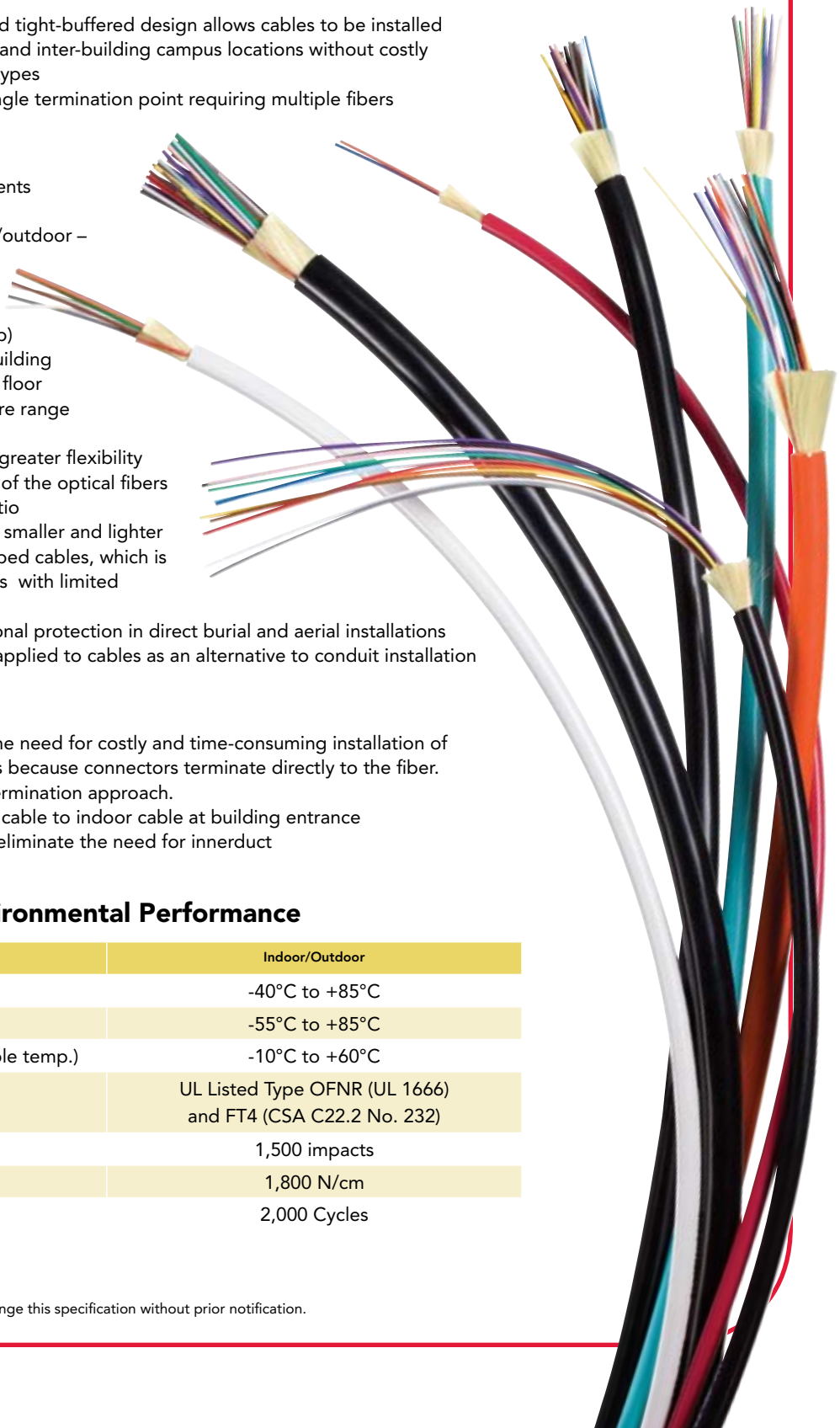
D-Series Riser

Applications

- Indoor/outdoor tight-bound tight-buffered design allows cables to be installed in intra-building backbone and inter-building campus locations without costly transitions between cable types
- Ideal configuration for a single termination point requiring multiple fibers

Features

- High performance components and construction
- Cable materials are indoor/outdoor – UL-listed OFNR and UV, water and fungus resistant
- UL Listed in accordance with NEC section 770.179(b) for use in vertical runs in building riser shafts or from floor to floor
- Wide operating temperature range of -40°C to +85°C
- Helically stranded core for greater flexibility and mechanical protection of the optical fibers
- High strength-to-weight ratio
- 2-144 fiber configuration is smaller and lighter than comparable sub-grouped cables, which is ideal for installation in areas with limited space or tight bends
- Can be armored for additional protection in direct burial and aerial installations
- Interlocking armor can be applied to cables as an alternative to conduit installation



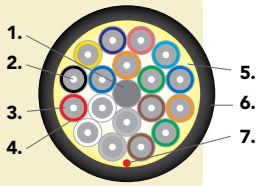
Cost savings

- 900 µm buffer eliminates the need for costly and time-consuming installation of fanout kits or pigtail splices because connectors terminate directly to the fiber. See page PI-4 for typical termination approach.
- No need to splice outdoor cable to indoor cable at building entrance
- High crush resistance may eliminate the need for innerduct

Mechanical and Environmental Performance

	Indoor/Outdoor
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +85°C
Installation Temperature (cable temp.)	-10°C to +60°C
Flame Retardancy	UL Listed Type OFNR (UL 1666) and FT4 (CSA C22.2 No. 232)
Impact Resistance:	1,500 impacts
Crush Resistance:	1,800 N/cm
Flex Resistance:	2,000 Cycles

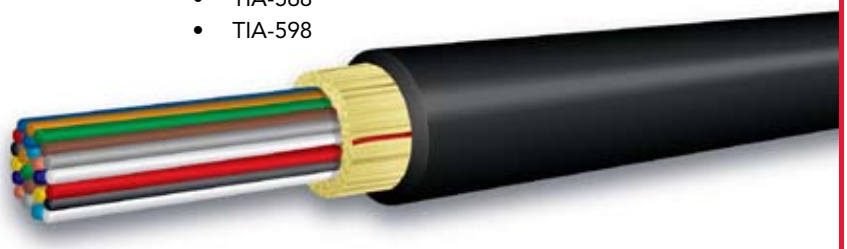
1. Central Filler
2. Optical Fiber
3. Acrylate Fiber Coating
4. Color-Coded 900 µm Diameter Tight-Buffer
5. Aramid Strength Member
6. Outer Jacket
7. Ripcord



Applicable Standards

Optical Cable Corporation indoor/outdoor tight-buffered fiber optic cables meet the functional requirements of the following standards

- ICEA -S-83-596
- ICEA-S-104-696
- GR-409-CORE
- TIA-568
- TIA-598



Cable Characteristics: D-Series Distribution Riser Cables

Fiber Count	Diameter mm (in)	Weight kg/km (lbs/1,000')	Installation Tensile Load N (lbs)	Operational Tensile Load N (lbs)	Minimum Bend Radius Installation cm (in)	Minimum Bend Radius Long-Term cm (in)
2*	4.8 (0.19)	22 (14)	660 (150)	180 (40)	7.3 (2.9)	4.8 (1.9)
4	5.1 (0.20)	24 (16)	1,400 (310)	450 (100)	7.7 (3.0)	5.1 (2.0)
6	5.7 (0.22)	32 (22)	1,400 (310)	450 (100)	8.6 (3.4)	5.7 (2.2)
8	5.9 (0.23)	34 (23)	1,600 (360)	525 (120)	8.9 (3.5)	5.9 (2.3)
10	7.0 (0.28)	43 (29)	1,800 (400)	600 (135)	10.6 (4.1)	7.0 (2.8)
12**	6.5 (0.26)	38 (25)	2,700 (600)	600 (135)	9.8 (3.8)	6.5 (2.6)
12***	7.3 (0.28)	42 (32)	2,700 (600)	600 (135)	10.8 (4.3)	7.3 (2.9)
18	7.2 (0.28)	48 (32)	2,700 (600)	700 (160)	10.8 (4.3)	7.2 (2.8)
24	8.9 (0.35)	67 (45)	3,000 (670)	1,000 (220)	13.4 (5.3)	8.9 (3.5)
30	8.8 (0.35)	75 (50)	3,000 (670)	1,000 (220)	13.3 (5.2)	8.8 (3.5)
36	9.1 (0.36)	73 (49)	3,000 (670)	1,000 (220)	13.7 (5.4)	9.1 (3.6)
48	10.1 (0.40)	93 (63)	4,200 (940)	1,400 (310)	15.2 (6.0)	10.1 (4.0)
60	12.4 (0.49)	135 (91)	4,800 (1,080)	1,600 (360)	18.6 (7.3)	12.4 (4.9)
72	14.0 (0.55)	177 (119)	5,400 (1,210)	1,800 (400)	21.0 (8.3)	14.0 (5.5)
84	14.4 (0.57)	190 (128)	6,000 (1,350)	2,000 (450)	21.6 (8.5)	14.4 (5.7)
96	16.0 (0.63)	225 (151)	6,000 (1,350)	2,000 (450)	24.1 (9.5)	16.0 (6.3)
108	16.8 (0.66)	246 (165)	6,000 (1,350)	2,000 (450)	25.3 (10.0)	16.8 (6.6)
120	17.9 (0.70)	271 (182)	6,000 (1,350)	2,000 (450)	26.8 (10.6)	17.9 (7.0)
132	17.8 (0.70)	291 (195)	6,000 (1,350)	2,000 (450)	26.8 (10.6)	17.8 (7.0)
144	20.3 (0.80)	339 (228)	6,000 (1,350)	2,000 (450)	30.5 (12.0)	20.3 (8.0)

*-40° C to +70° C
**62.5 µm multimode and single-mode fiber
***50 µm multimode fiber
Installation loads in excess of 2,700 N (600 lbs) are not recommended.

Laser Ultra-Fox™ Fiber Performance

Fiber Code	Core/Cladding Diameter (µm)	Wavelength (nm)	Industry Standard Designation	Gigabit Ethernet Distance (m)	10-Gigabit Ethernet Distance (m)	Maximum Cabled Attenuation (dB/km)	Minimum Laser Bandwidth (MHz-km)	Minimum LED Bandwidth* (MHz-km)
WLS	62.5/125 Standard	(850/1310)	OM1 ISO/IEC 11801	300/600	33/300^	3.5/1.5	220/500	200/500
WLX	62.5/125 XL	(850/1310)	OM1 ISO/IEC 11801	500/1000	33/300^	3.0/1.0	385/500	200/500
ALS	50/125 Standard	(850/1310)	OM2 ISO/IEC 11801	600/600	82/300^	3.5/1.5	510/500	500/500
ALX	50/125 XL	(850/1310)	OM2 ISO/IEC 11801	750/600	150/300^[2]	3.0/1.0[3]	950/500	700/500
ALT	50/125 (300 meter 10-GbE)	(850/1310)	OM3 ISO/IEC 11801	1000/600	300/300^[2]	3.0/1.0[3]	2000/500	1500/500
ALE	50/125 (550 meter 10-GbE)	(850/1310)	OM3 ISO/IEC 11801	1040/600	550[1]/300^[2]	3.0/1.0[3]	4700/500	3500/500
SLX	9[6]/125 Low Water Peak Single-mode	(1310/1550)	ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—
SLA	9[6]/125 Bend-Insensitive Single-mode	(1310/1550)	ITU-T G.657.A ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—
SLB	9[6]/125 Bend-Insensitive Single-mode	(1310/1550)	ITU-T G.657.A & B ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—

Ordering Information

	D	**X**				**D**				**9**		**R**
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12

1 – 2 Distribution Series Ultra-Fox™ = **DX**
3 – 5 Fiber count: (See Cable Characteristics Chart) = **002-144**
6 Jacket type: PVC = **D**
7 – 9 Fiber type: (See Laser Ultra-Fox™ Fiber Performance Table)
10 250 µm fiber with 900 µm tight buffer = **9**
11 Standard Jacket Color: Black = **K**
Optional colors available:
62.5 um multimode (WLS, WLX): Orange = **O**
50 um multimode (ALS, ALX): Orange = **O**
50 um Ten-Gigabit multimode (ALT, ALE): Aqua = **Q**
Single mode: Yellow = **Y**
12 Rating: Riser = **R**

Example: 12-fiber indoor/outdoor riser cable using 62.5 µm standard laser optimized fiber, black jacket –

D	**X**	**0**	**1**	**2**	**D**	**W**	**L**	**S**	**9**	**K**	**R**

* For backward compatibility to LED based systems, overfilled launch (OFL)

^ 1310 nm CWDM lasers (10GBASE-LX4)

[1] Reach assuming 3.0 dB maximum cabled attenuation at 850 nm and 1.3 dB total connection and splice loss

[2] Supports 220 meter 10GBASE-LRM distance, or 300 meter 10GBASE-LRM distance with 300 meter capable equipment

[3] 3.5/1.5 dB/km maximum attenuation applies for DX-Series cables greater than 36 fibers, and for all DX-Series cables with armor (corrugated steel tape or interlocked armor) or any other secondary outer jacketing

[4] 10 km for 1310 nm 1000BASE-LH, and 5 km for 1310 nm 1000BASE-LX

[5] 10 km for 1310 nm 10GBASE-LR, and 40 km for 1550 nm 10GBASE-ER

[6] Nominal Mode Field Diameter at 1310 nm

Note: many other fiber types, fiber bandwidth, and attenuation performances are available.

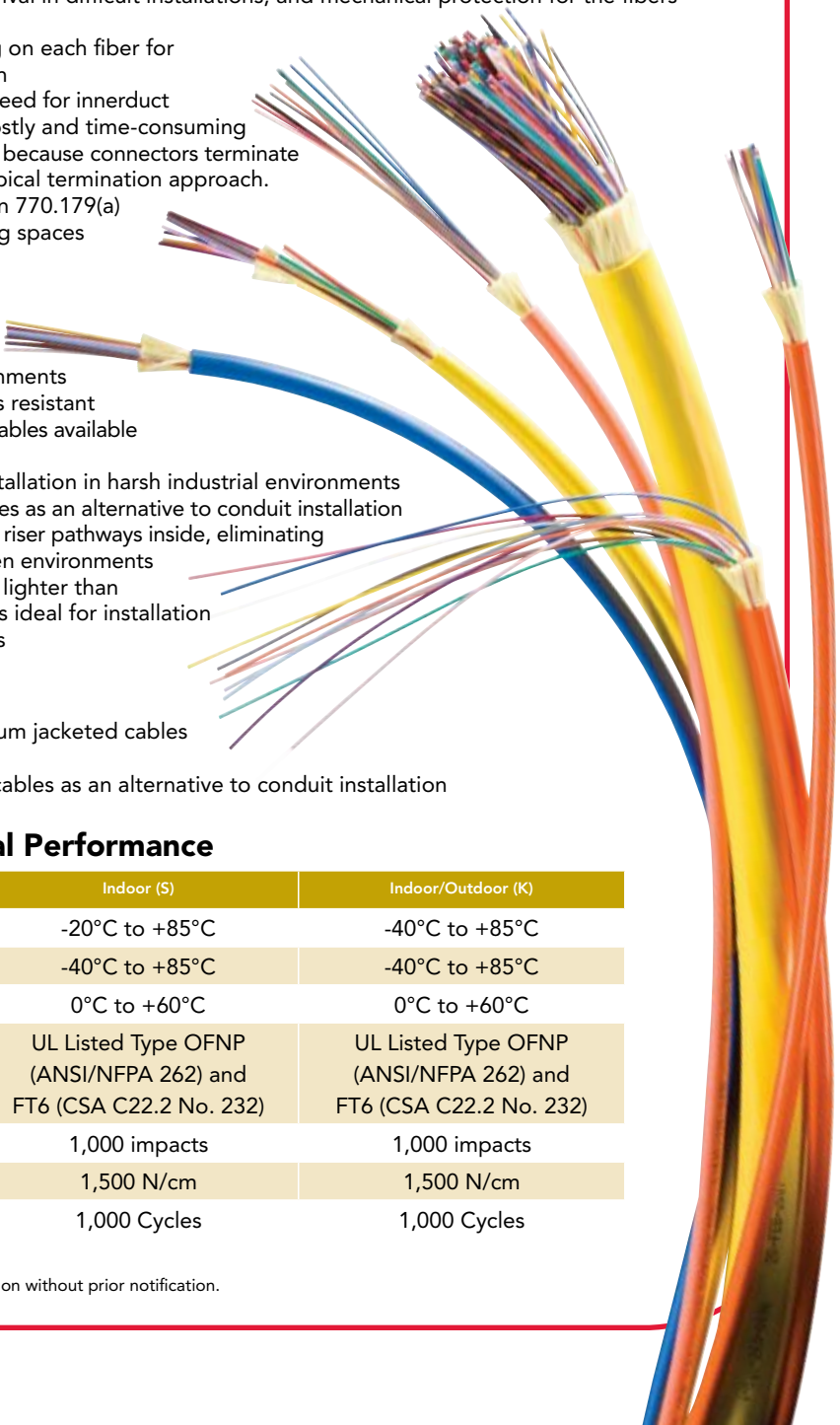
D-Series Plenum

Applications

- Used in trunking, LAN and distribution applications where small size, lightweight, and versatile installation capability are required for ducts, plenums, and air handling spaces
- Ideal configuration for a single termination point requiring multiple fibers

Features

- High performance components and construction
- High specific strength-to-weight ratio and compact cable design for limited conduit space and tight bends in long cable pulls
- Helically stranded core for flexibility, survival in difficult installations, and mechanical protection for the fibers
- Lower installed cost
- High performance tight-buffered coating on each fiber for environmental and mechanical protection
- High crush resistance may eliminate the need for innerduct
- 900 µm buffer eliminates the need for costly and time-consuming installation of fanout kits or pigtail splices because connectors terminate directly to the fiber. See page PI-4 for typical termination approach.
- UL Listed in accordance with NEC section 770.179(a) for use in ducts, plenums and air-handling spaces



Indoor/Outdoor ("K" Jacket)

- Indoor/Outdoor plenum cables eliminate the need for costly cable transitions in different installation environments
- Cable materials are UV, water and fungus resistant
- Higher fiber counts available than similar cables available in subgrouped configuration
- Jacket is highly chemical resistant for installation in harsh industrial environments
- Interlocking armor can be applied to cables as an alternative to conduit installation
- Can be installed outside and in plenum or riser pathways inside, eliminating the need to transition cable types between environments
- 2 to 72 fiber configuration is smaller and lighter than comparable sub-grouped cables, which is ideal for installation in areas with limited space or tight bends

Indoor ("S" Jacket)

- Indoor-only flexible flame retardant plenum jacketed cables
- 2 to 12 fibers
- Can have interlocking armor applied to cables as an alternative to conduit installation

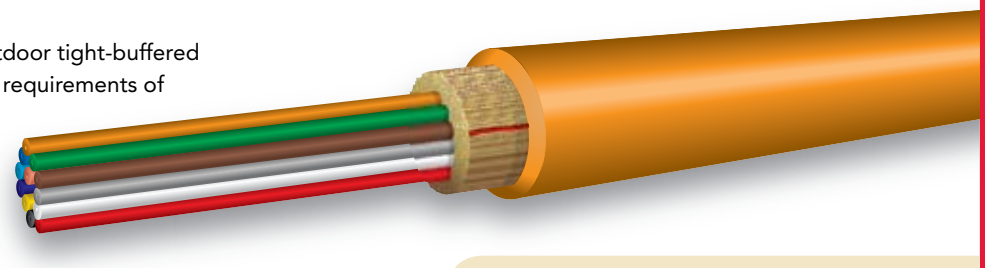
Mechanical and Environmental Performance

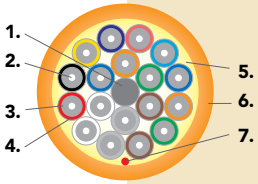
	Indoor (S)	Indoor/Outdoor (K)
Operating Temperature	-20°C to +85°C	-40°C to +85°C
Storage Temperature	-40°C to +85°C	-40°C to +85°C
Installation Temperature (cable temp.)	0°C to +60°C	0°C to +60°C
Flame Retardancy	UL Listed Type OFNP (ANSI/NFPA 262) and FT6 (CSA C22.2 No. 232)	UL Listed Type OFNP (ANSI/NFPA 262) and FT6 (CSA C22.2 No. 232)
Impact Resistance:	1,000 impacts	1,000 impacts
Crush Resistance:	1,500 N/cm	1,500 N/cm
Flex Resistance:	1,000 Cycles	1,000 Cycles

Applicable Standards

Optical Cable Corporation indoor/outdoor tight-buffered fiber optic cables meet the functional requirements of the following standards

- ICEA -S-83-596
- ICEA-S-104-696
- GR-409-CORE
- TIA-568
- TIA-598





1. Central Filler
2. Optical Fiber
3. Acrylate Fiber Coating
4. Color-Coded 900 µm Diameter Tight-Buffer
5. Aramid Strength Member
6. Outer Jacket
7. Ripcord

Cable Characteristics: D-Series Distribution Plenum Cables ("K" Jacket)

Fiber Count	Diameter mm (in)	Weight kg/km (lbs/1,000')	Installation Tensile Load N (lbs)	Operational Tensile Load N (lbs)	Minimum Bend Radius Installation cm (in)	Minimum Bend Radius Long-Term cm (in)
6	4.8 (0.19)	24 (16)	1,400 (310)	450 (100)	7.2 (2.8)	7.2 (2.8)
8	5.1 (0.20)	30 (20)	1,600 (360)	525 (120)	7.7 (3.0)	8.1 (3.2)
12	6.2 (0.24)	31 (21)	2,700 (600)	900 (200)	9.3 (3.7)	9.3 (3.7)
18	6.1 (0.24)	42 (28)	2,700 (600)	900 (200)	9.2 (3.6)	9.2 (3.6)
24	7.8 (0.31)	68 (46)	3,000 (670)	1,000 (220)	11.8 (4.6)	11.8 (4.6)
30	8.2 (0.32)	79 (53)	3,000 (670)	1,000 (220)	12.4 (4.9)	12.4 (4.9)
36	8.2 (0.32)	78 (53)	3,000 (670)	1,000 (220)	12.4 (4.9)	12.4 (4.9)
48	9.5 (0.37)	104 (70)	4,200 (940)	1,400 (310)	14.3 (5.6)	14.3 (5.6)
60	10.7 (0.42)	129 (87)	4,800 (1,080)	1,600 (360)	16.1 (6.3)	16.1 (6.3)
72	13.0 (0.51)	181 (122)	5,400 (1,200)	1,800 (400)	19.6 (7.7)	19.6 (7.7)

Cable Characteristics: D-Series Distribution Plenum Cables ("S" Jacket)

Fiber Count	Diameter mm (in)	Weight kg/km (lbs/1,000')	Installation Tensile Load N (lbs)	Operational Tensile Load N (lbs)	Minimum Bend Radius Installation cm (in)	Minimum Bend Radius Long-Term cm (in)
2	3.9 (0.15)	15 (10)	1,200 (270)	400 (90)	5.9 (2.3)	3.9 (1.5)
4	4.5 (0.18)	18 (12)	1,200 (270)	400 (90)	6.7 (2.6)	4.5 (1.8)
6	4.7 (0.19)	22 (15)	1,400 (310)	450 (100)	7.1 (2.8)	4.7 (1.9)
8	5.7 (0.22)	37 (25)	1,600 (360)	525 (120)	8.6 (3.4)	5.7 (2.2)
12	6.2 (0.24)	40 (27)	1,800 (400)	600 (135)	9.3 (3.7)	6.2 (2.4)

Installation loads in excess of 2,700 N (600 lbs.) are not recommended.
Other fiber counts available upon request.

Laser Ultra-Fox™ Fiber Performance

Fiber Code	Core/Cladding Diameter (µm)	Wavelength (nm)	Industry Standard Designation	Gigabit Ethernet Distance (m)	10-Gigabit Ethernet Distance (m)	Maximum Cabled Attenuation (dB/km)	Minimum Laser Bandwidth (MHz-km)	Minimum LED Bandwidth* (MHz-km)
WLS	62.5/125 Standard	(850/1310)	OM1 ISO/IEC 11801	300/600	33/300^	3.5/1.5	220/500	200/500
WLX	62.5/125 XL	(850/1310)	OM1 ISO/IEC 11801	500/1000	33/300^	3.0/1.0	385/500	200/500
ALS	50/125 Standard	(850/1310)	OM2 ISO/IEC 11801	600/600	82/300^	3.5/1.5	510/500	500/500
ALX	50/125 XL	(850/1310)	OM2 ISO/IEC 11801	750/600	150/300^[2]	3.0/1.0[3]	950/500	700/500
ALT	50/125 (300 meter 10-GbE)	(850/1310)	OM3 ISO/IEC 11801	1000/600	300/300^[2]	3.0/1.0[3]	2000/500	1500/500
ALE	50/125 (550 meter 10-GbE)	(850/1310)	OM3 ISO/IEC 11801	1040/600	550[1]/300^[2]	3.0/1.0[3]	4700/500	3500/500
SLX	9[6]/125 Low Water Peak Single-mode	(1310/1550)	ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—
SLA	9[6]/125 Bend-Insensitive Single-mode	(1310/1550)	ITU-T G.657.A ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—
SLB	9[6]/125 Bend-Insensitive Single-mode	(1310/1550)	ITU-T G.657.A & B ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—

Ordering Information

	D	**X**								**9**		**P**
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12

1 – 2 Distribution Series Ultra-Fox™ = **DX**
3 – 5 Fiber count: (Indoor) = **002 - 012**, (Indoor/Outdoor) = **002 - 072**
6 Jacket type: Soft Plenum (indoor) = **S**, Fluoropolymer (indoor/outdoor) = **K**
7 – 9 Fiber type: (See Laser Ultra-Fox™ Fiber Performance Table)
10 250 µm fiber with 900 µm tight buffer = **9**
11 Standard Jacket Colors:
62.5 µm multimode (WLS, WLX): Orange = **O**
50 µm multimode (ALS, ALX): Orange = **O**
50 µm Ten-Gigabit multimode (ALT, ALE): Aqua = **Q**
Single-mode*: Yellow = **Y**
12 Rating: Plenum = **P**

Example: 12-fiber indoor cable using 62.5 µm standard laser optimized fiber, orange jacket –

D	**X**	**0**	**1**	**2**	**S**	**W**	**L**	**S**	**9**	**O**	**P**

12-fiber indoor/outdoor cable using 62.5 µm standard laser optimized fiber, orange jacket –

D	**X**	**0**	**1**	**2**	**K**	**W**	**L**	**S**	**9**	**O**	**P**

*Note: Other colors available upon request. Contact your sales rep for part number details.

* For backward compatibility to LED based systems, overfilled launch (OFL)

^ 1310 nm CWDM lasers (10GBASE-LX4)

[1] Reach assuming 3.0 dB maximum cabled attenuation at 850 nm and 1.3 dB total connection and splice loss

[2] Supports 220 meter 10GBASE-LRM distance, or 300 meter 10GBASE-LRM distance with 300 meter capable equipment

[3] 3.5/1.5 dB/km maximum attenuation applies for DX-Series cables greater than 36 fibers, and for all DX-Series cables with armor (corrugated steel tape or interlocked armor) or any other secondary outer jacketing

[4] 10 km for 1310 nm 1000BASE-LH, and 5 km for 1310 nm 1000BASE-LX

[5] 10 km for 1310 nm 10GBASE-LR, and 40 km for 1550 nm 10GBASE-ER

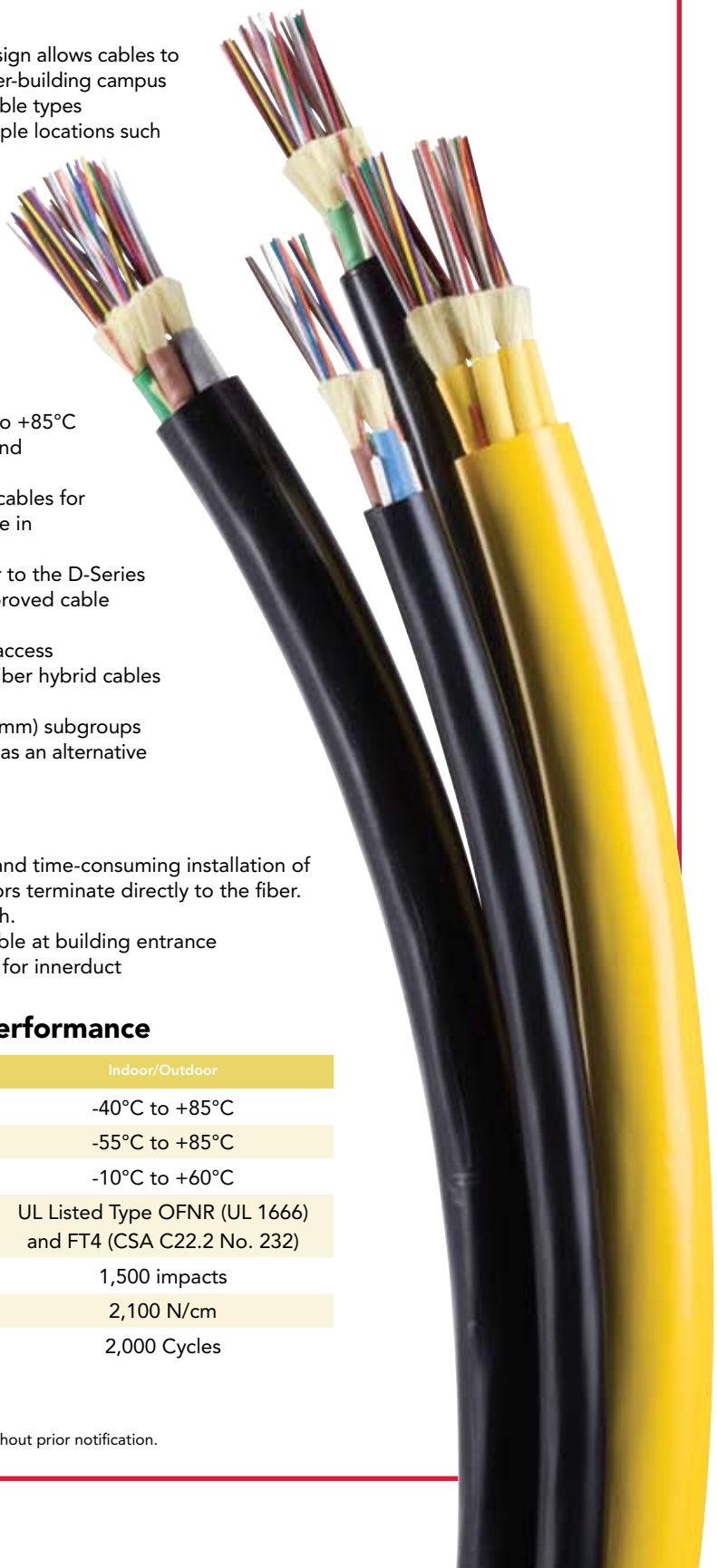
[6] Nominal Mode Field Diameter at 1310 nm

Note: many other fiber types, fiber bandwidth, and attenuation performances are available.

G-Series Riser

Applications

- Indoor/outdoor tight-bound tight-buffered design allows cables to be installed in intra-building backbone and inter-building campus locations without costly transitions between cable types
- Design allows sub-cables to be routed to multiple locations such as wiring racks and closets



Features

- High performance components and construction
- UL Listed in accordance with NEC sections 770.179(b) for use in vertical runs in building riser shafts or from floor to floor
- Cable materials are indoor/outdoor: UV, water and fungus resistant
- Wide operating temperature range of -40°C to +85°C
- Helically stranded core for greater flexibility and mechanical protection of the optical fibers
- Core-Locked™ outer jacket surrounds the subcables for excellent crush resistance, survivability and use in long vertical installations
- Multifiber color-coded subcables, each similar to the D-Series Distribution cable, are easy to identify for improved cable management during installation
- Subgrouping cable design permits mid-span access
- Best design for multimode and single-mode fiber hybrid cables
- Ideal for direct pulling with wire mesh grips
- Available with 6-fiber (4.5mm) or 12-fiber (5.5mm) subgroups
- Can have interlocking armor applied to cables as an alternative to conduit installation

Cost Savings

- 900 µm buffer eliminates the need for costly and time-consuming installation of fanout kits or pigtail splices because connectors terminate directly to the fiber. See page PI-5 for typical termination approach.
- No need to splice outdoor cable to indoor cable at building entrance
- High crush resistance may eliminate the need for innerduct

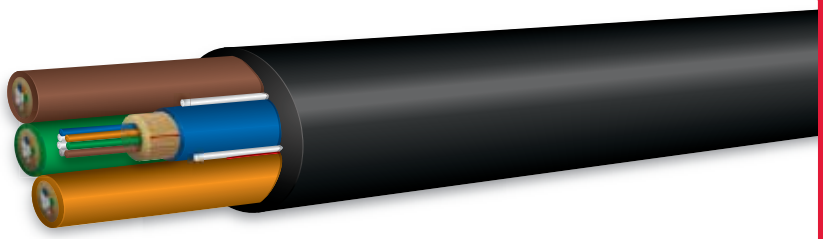
Mechanical and Environmental Performance

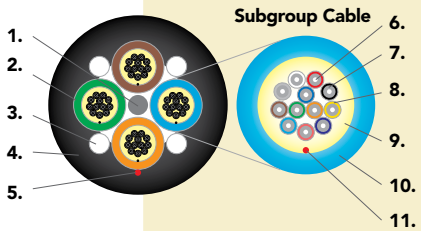
	Indoor/Outdoor
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +85°C
Installation Temperature (cable temp.)	-10°C to +60°C
Flame Retardancy	UL Listed Type OFNR (UL 1666) and FT4 (CSA C22.2 No. 232)
Impact Resistance:	1,500 impacts
Crush Resistance:	2,100 N/cm
Flex Resistance:	2,000 Cycles

Applicable Standards

Optical Cable Corporation indoor/outdoor tight-buffered fiber optic cables meet the functional requirements of the following standards

- ICEA –S-83-596
- ICEA-S-104-696
- GR-409-CORE
- TIA-568
- TIA-598





1. Central Filler
2. Color-Coded Subgroup Cable
3. Fillers
4. Core-Locked™ Outer Jacket
5. Ripcord

Subgroup Cable

6. Optical Fiber
7. Acrylate Fiber Coating
8. Color-Coded 900 µm Diameter Tight-Buffer
9. Aramid Strength Member
10. Color-Coded Subgroup Cable Jacket
11. Ripcord

Cable Characteristics: 6-Fiber Subgroups (4.5mm Bundles)

Fiber Count	Diameter mm (in)	Weight kg/km (lbs/1,000')	Installation Tensile Load N (lbs)	Operational Tensile Load N (lbs)	Minimum Bend Radius Installation cm (in)	Minimum Bend Radius Long-Term cm (in)
12	14.2 (0.56)	207 (139)	3,800 (850)	1,200 (270)	21.4 (8.4)	14.2 (5.6)
18	14.2 (0.56)	205 (138)	4,700 (1,060)	1,800 (400)	21.4 (8.4)	14.2 (5.6)
24	14.2 (0.56)	203 (136)	5,600 (1,260)	1,800 (400)	21.4 (8.4)	14.2 (5.6)
30	14.9 (0.59)	217 (145)	7,500 (1,690)	2,400 (540)	22.5 (8.9)	14.9 (5.9)
36	16.4 (0.65)	245 (164)	8,900 (2,000)	2,850 (640)	24.6 (9.7)	16.4 (6.4)

Cable Characteristics: 12-Fiber Subgroups (5.5mm Bundles)

Fiber Count	Diameter mm (in)	Weight kg/km (lbs/1,000')	Installation Tensile Load N (lbs)	Operational Tensile Load N (lbs)	Minimum Bend Radius Installation cm (in)	Minimum Bend Radius Long-Term cm (in)
24	16.6 (0.65)	243 (164)	4,600 (1,030)	1,500 (340)	25.0 (9.8)	16.6 (6.5)
36	16.6 (0.65)	240 (161)	5,900 (1,330)	1,050 (440)	25.0 (9.8)	16.6 (6.5)
48	16.6 (0.65)	237 (159)	7,200 (1,620)	2,400 (540)	25.0 (9.8)	16.6 (6.5)
60	18.5 (0.73)	318 (213)	9,500 (2,140)	3,150 (710)	27.8 (10.9)	18.5 (7.3)
72	19.2 (0.76)	330 (222)	11,300 (2,540)	3,750 (840)	28.9 (11.4)	19.2 (7.6)
84	21.0 (0.83)	402 (270)	13,100 (2,950)	4,350 (980)	31.6 (12.4)	21.0 (8.3)
96	22.8 (0.90)	472 (317)	14,900 (3,350)	4,950 (1,110)	34.2 (13.5)	22.8 (9.0)
108	24.8 (0.98)	565 (380)	18,200 (4,090)	6,000 (1,350)	37.3 (14.7)	24.8 (9.8)
120	27.5 (1.08)	691 (464)	19,500 (4,380)	6,450 (1,450)	41.3 (16.3)	27.5 (10.8)
132	27.9 (1.10)	724 (487)	20,800 (4,680)	6,900 (1,550)	41.9 (16.5)	27.9 (11.0)
144	27.9 (1.10)	721 (484)	22,100 (4,970)	7,350 (1,650)	41.9 (16.5)	27.9 (11.0)

Installation loads in excess of 2,700 N (600 lbs.) are not recommended.
Other fiber counts with 6-fiber sub-units available upon request.

Laser Ultra-Fox™ Fiber Performance

Fiber Code	Core/Cladding Diameter (µm)	Wavelength (nm)	Industry Standard Designation	Gigabit Ethernet Distance (m)	10-Gigabit Ethernet Distance (m)	Maximum Cabled Attenuation (dB/km)	Minimum Laser Bandwidth (MHz-km)	Minimum LED Bandwidth* (MHz-km)
WLS	62.5/125 Standard	(850/1310)	OM1 ISO/IEC 11801	300/600	33/300^	3.5/1.5	220/500	200/500
WLX	62.5/125 XL	(850/1310)	OM1 ISO/IEC 11801	500/1000	33/300^	3.0/1.0	385/500	200/500
ALS	50/125 Standard	(850/1310)	OM2 ISO/IEC 11801	600/600	82/300^	3.5/1.5	510/500	500/500
ALX	50/125 XL	(850/1310)	OM2 ISO/IEC 11801	750/600	150/300^[2]	3.0/1.0[3]	950/500	700/500
ALT	50/125 (300 meter 10-GbE)	(850/1310)	OM3 ISO/IEC 11801	1000/600	300/300^[2]	3.0/1.0[3]	2000/500	1500/500
ALE	50/125 (550 meter 10-GbE)	(850/1310)	OM3 ISO/IEC 11801	1040/600	550[1]/300^[2]	3.0/1.0[3]	4700/500	3500/500
SLX	9[6]/125 Low Water Peak Single-mode	(1310/1550)	ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—
SLA	9[6]/125 Bend-Insensitive Single-mode	(1310/1550)	ITU-T G.657.A ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—
SLB	9[6]/125 Bend-Insensitive Single-mode	(1310/1550)	ITU-T G.657.A & B ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—

Ordering Information

	G					**D**				**9**	**K**	**R**
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12

1 Subgrouped Series Ultra-Fox™ = **G**
2 6-Fiber subgroups = **B**; 12-Fiber subgroups = **X**
3 – 5 Fiber count: 6-fiber subgroups = **012 - 036**, 12-fiber subgroups = **024 - 144**
6 Jacket type: PVC = **D**
7 – 9 Fiber type: (See Laser Ultra-Fox™ Fiber Performance Table)
10 250 µm fiber with 900 µm tight buffer = **9**
11 Standard Jacket Colors: Black = **K**
Optional colors available:
62.5 um multimode (WLS, WLX): Orange = **O**
50 um multimode (ALS, ALX): Orange = **O**
50 um Ten-Gigabit multimode (ALT, ALE): Aqua = **Q**
Single mode: Yellow = **Y**
12 Rating: UL-Riser = **R**

Example: 48-fiber cable (12-fiber subgroups) using 62.5 µm standard laser optimized fiber, black jacket –

G	**X**	**0**	**4**	**8**	**D**	**W**	**L**	**S**	**9**	**K**	**R**

* For backward compatibility to LED based systems, overfilled launch (OFL)

^ 1310 nm CWDM lasers (10GBASE-LX4)

[1] Reach assuming 3.0 dB maximum cabled attenuation at 850 nm and 1.3 dB total connection and splice loss

[2] Supports 220 meter 10GBASE-LRM distance, or 300 meter 10GBASE-LRM distance with 300 meter capable equipment

[3] 3.5/1.5 dB/km maximum attenuation applies for DX-Series cables greater than 36 fibers, and for all DX-Series cables with armor (corrugated steel tape or interlocked armor) or any other secondary outer jacketing

[4] 10 km for 1310 nm 1000BASE-LH, and 5 km for 1310 nm 1000BASE-LX

[5] 10 km for 1310 nm 10GBASE-LR, and 40 km for 1550 nm 10GBASE-ER

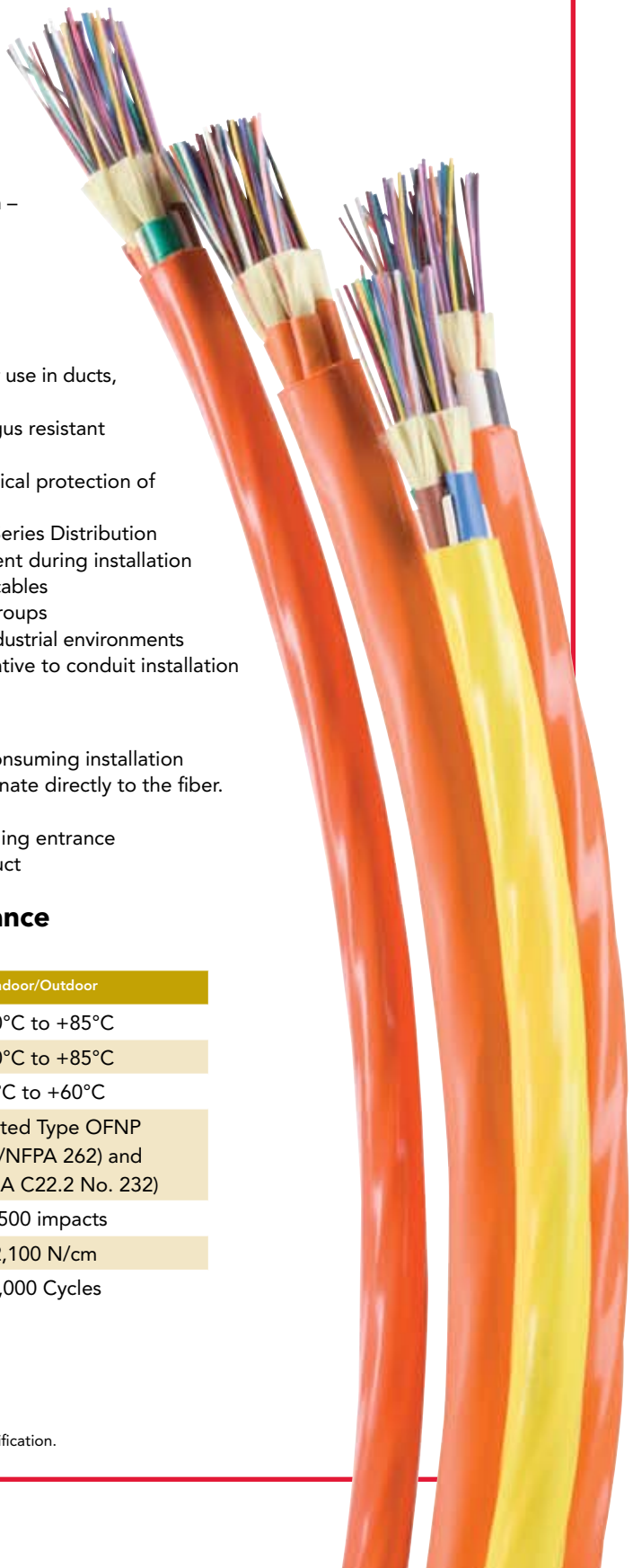
[6] Nominal Mode Field Diameter at 1310 nm

Note: many other fiber types, fiber bandwidth, and attenuation performances are available.

G-Series Plenum

Applications

- Used in trunking, LAN and distribution applications where versatile installation capability is required for ducts, plenums, and air handling spaces
- Design allows subcables to be routed to multiple locations such as wiring racks and closets.
- Suitable for both indoor plenum and outdoor installation – no need to splice outdoor cable to indoor cable at the building entrance



Features

- High performance components and construction
- UL Listed in accordance with NEC sections 770.179(a) for use in ducts, plenums and air-handling spaces
- Cable materials are indoor/outdoor – UV, water and fungus resistant
- Wide operating temperature range of -40°C to +85°C
- Helically stranded core for greater flexibility and mechanical protection of the optical fibers
- Multifiber color-coded subcables, each similar to the D-Series Distribution cable, are easy to identify for improved cable management during installation
- Best design for multimode and single-mode fiber hybrid cables
- Available with 6-fiber (4.5mm) or 12-fiber (5.5mm) sub-groups
- Jacket highly chemical resistant for installation in harsh industrial environments
- Interlocking armor can be applied to cables as an alternative to conduit installation

Cost Savings

- 900 µm buffer eliminates the need for costly and time-consuming installation of fanout kits or pigtail splices because connectors terminate directly to the fiber. See page PI-5 for typical termination approach.
- No need to splice outdoor cable to indoor cable at building entrance
- High crush resistance may eliminate the need for innerduct

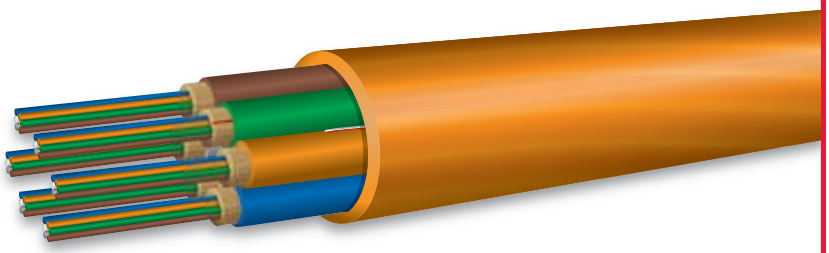
Mechanical and Environmental Performance

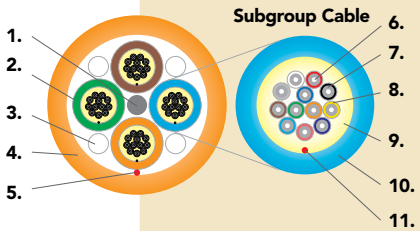
	Indoor/Outdoor
Operating Temperature	-40°C to +85°C
Storage Temperature	-40°C to +85°C
Installation Temperature (cable temp.)	0°C to +60°C
Flame Retardancy	UL Listed Type OFNP (ANSI/NFPA 262) and FT6 (CSA C22.2 No. 232)
Impact Resistance:	1,500 impacts
Crush Resistance:	2,100 N/cm
Flex Resistance:	2,000 Cycles

Applicable Standards

Optical Cable Corporation indoor/outdoor tight-buffered fiber optic cables meet the functional requirements of the following standards:

- ICEA –S-83-596
- ICEA-S-104-696
- GR-409-CORE
- TIA-568
- TIA-598





1. Central Filler
2. Subgroup Cable
3. Fillers
4. Outer Jacket
5. Ripcord

Subgroup Cable

6. Optical Fiber
7. Acrylate Fiber Coating
8. Color-Coded 900 µm Diameter Tight-Buffer
9. Aramid Strength Member
10. Color-Coded Subgroup Cable Jacket
11. Ripcord

Cable Characteristics: 6-Fiber Subgroups (4.5mm Bundles)

Fiber Count	Diameter mm (in)	Weight kg/km (lbs/1,000')	Installation Tensile Load N (lbs)	Operational Tensile Load N (lbs)	Minimum Bend Radius Installation cm (in)	Minimum Bend Radius Long-Term cm (in)
12	14.1 (0.56)	217 (146)	3,800 (850)	1,200 (270)	21.2 (8.3)	21.2 (8.3)
18	14.1 (0.56)	211 (142)	4,700 (1,060)	1,500 (340)	21.2 (8.3)	21.2 (8.3)
24	14.1 (0.56)	206 (138)	5,600 (1,260)	1,800 (400)	21.2 (8.3)	21.2 (8.3)
30	14.7 (0.58)	243 (163)	7,500 (1,690)	2,400 (540)	22.1 (8.7)	22.1 (8.7)
36	16.1 (0.63)	262 (176)	8,900 (2,000)	2,850 (640)	24.2 (9.5)	24.2 (9.5)

Cable Characteristics: 12-Fiber Subgroups (5.5mm Bundles)

Fiber Count	Diameter mm (in)	Weight kg/km (lbs/1,000')	Installation Tensile Load N (lbs)	Operational Tensile Load N (lbs)	Minimum Bend Radius Installation cm (in)	Minimum Bend Radius Long-Term cm (in)
24	15.4 (0.61)	273 (183)	4,600 (1,030)	1,500 (340)	23.2 (9.1)	23.2 (9.1)
36	15.4 (0.61)	263 (177)	5,900 (1,330)	1,950 (440)	23.2 (9.1)	23.2 (9.1)
48	15.4 (0.61)	254 (170)	7,200 (1,620)	2,400 (540)	23.2 (9.1)	23.2 (9.1)
60	16.9 (0.67)	293 (197)	9,500 (2,140)	3,150 (710)	25.4 (10.0)	25.4 (10.0)
72	18.4 (0.72)	317 (213)	11,300 (2,540)	3,750 (840)	27.6 (10.9)	27.6 (10.9)

Installation loads in excess of 2,700 N (600 lbs.) are not recommended.
Other fiber counts available upon request.

Laser Ultra-Fox™ Fiber Performance

Fiber Code	Core/Cladding Diameter (µm)	Wavelength (nm)	Industry Standard Designation	Gigabit Ethernet Distance (m)	10-Gigabit Ethernet Distance (m)	Maximum Cabled Attenuation (dB/km)	Minimum Laser Bandwidth (MHz-km)	Minimum LED Bandwidth* (MHz-km)
WLS	62.5/125 Standard	(850/1310)	OM1 ISO/IEC 11801	300/600	33/300^	3.5/1.5	220/500	200/500
WLX	62.5/125 XL	(850/1310)	OM1 ISO/IEC 11801	500/1000	33/300^	3.0/1.0	385/500	200/500
ALS	50/125 Standard	(850/1310)	OM2 ISO/IEC 11801	600/600	82/300^	3.5/1.5	510/500	500/500
ALX	50/125 XL	(850/1310)	OM2 ISO/IEC 11801	750/600	150/300^[2]	3.0/1.0[3]	950/500	700/500
ALT	50/125 (300 meter 10-GbE)	(850/1310)	OM3 ISO/IEC 11801	1000/600	300/300^[2]	3.0/1.0[3]	2000/500	1500/500
ALE	50/125 (550 meter 10-GbE)	(850/1310)	OM3 ISO/IEC 11801	1040/600	550[1]/300^[2]	3.0/1.0[3]	4700/500	3500/500
SLX	9[6]/125 Low Water Peak Single-mode	(1310/1550)	ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—
SLA	9[6]/125 Bend-Insensitive Single-mode	(1310/1550)	ITU-T G.657.A ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—
SLB	9[6]/125 Bend-Insensitive Single-mode	(1310/1550)	ITU-T G.657.A & B ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—

Ordering Information

	G					**K**				**9**		**P**
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12

1 Subgrouped Distribution Series Ultra-Fox™ = **G**
2 6-fiber subgroups = **B**; 12-fiber subgroups = **X**
3 – 5 Fiber count: 6-fiber subgroups = **012 – 036**, 12-fiber subgroups = **024 – 144**
6 Jacket type: Fluoropolymer = **K**
7 – 9 Fiber type: (See Laser Ultra-Fox™ Fiber Performance Table)
10 250 µm fiber with 900 µm tight buffer = **9**
11 Standard Jacket Colors:
62.5 µm multimode (WLS, WLX): Orange = **O**
50 µm multimode (ALS, ALX): Orange = **O**
50 µm Ten-Gigabit multimode (ALT, ALE): Aqua = **Q**
Single-mode: Yellow = **Y**
12 Rating: Plenum = **P**

Example: 48-fiber cable (12-fiber subgroups) using 62.5 µm standard laser optimized fiber, orange jacket –

G	**X**	**0**	**4**	**8**	**K**	**W**	**L**	**S**	**9**	**O**	**P**

* For backward compatibility to LED based systems, overfilled launch (OFL)

^ 1310 nm CWDM lasers (10GBASE-LX4)

[1] Reach assuming 3.0 dB maximum cabled attenuation at 850 nm and 1.3 dB total connection and splice loss

[2] Supports 220 meter 10GBASE-LRM distance, or 300 meter 10GBASE-LRM distance with 300 meter capable equipment

[3] 3.5/1.5 dB/km maximum attenuation applies for DX-Series cables greater than 36 fibers, and for all DX-Series cables with armor (corrugated steel tape or interlocked armor) or any other secondary outer jacketing

[4] 10 km for 1310 nm 1000BASE-LH, and 5 km for 1310 nm 1000BASE-LX

[5] 10 km for 1310 nm 10GBASE-LR, and 40 km for 1550 nm 10GBASE-ER

[6] Nominal Mode Field Diameter at 1310 nm

Note: many other fiber types, fiber bandwidth, and attenuation performances are available.

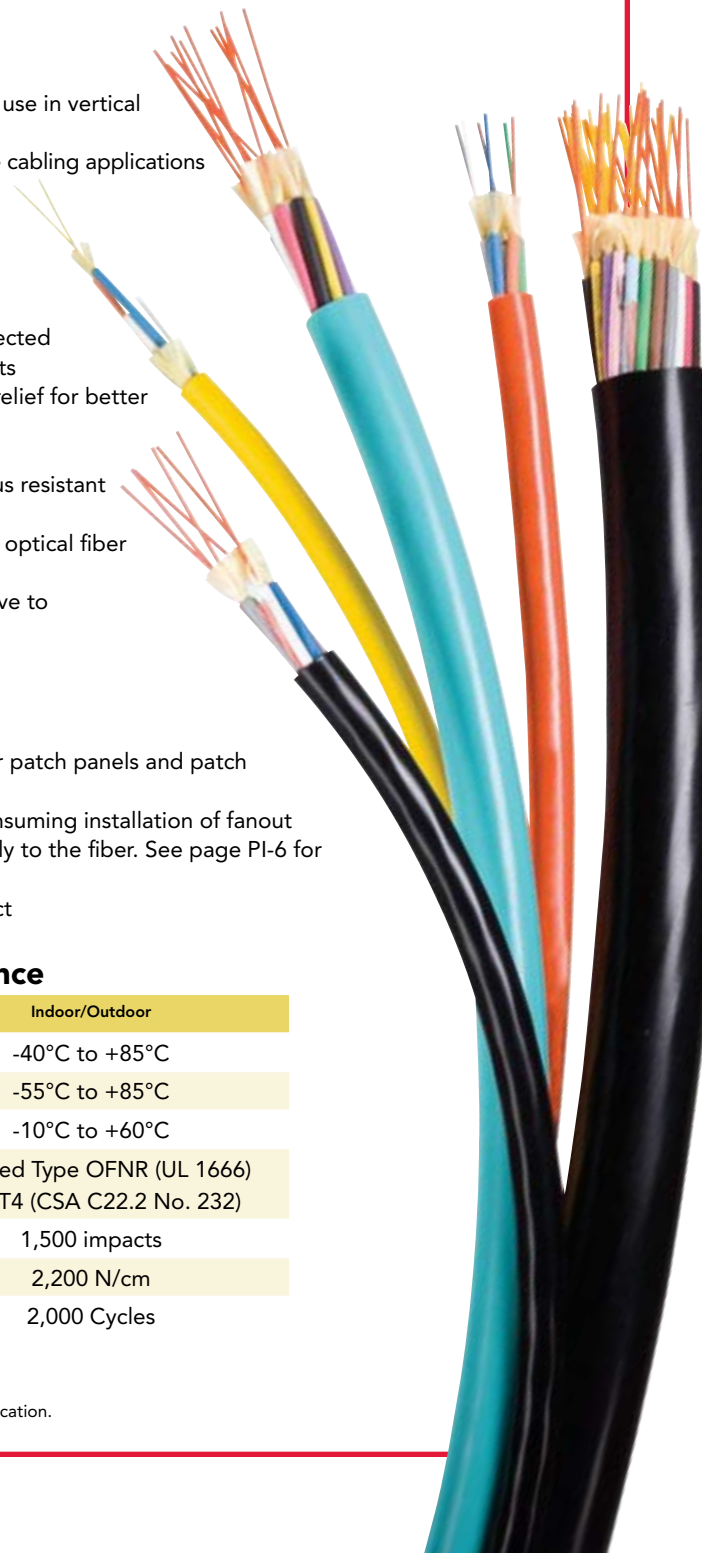
B-Series Riser

Applications

- Ideal for installations requiring an extremely rugged and reliable cable design where maximum mechanical and environmental protection are necessary
- Easiest cable to install where direct termination of connectors to sub-units and direct run to panels and equipment is desired

Features

- High performance components and construction
- UL Listed in accordance with NEC sections 770.179(b) for use in vertical runs in building riser shafts or from floor to floor
- Most rugged and easy to install cable design for enterprise cabling applications
- Core-Locked™ outer jacket design for installation survivability, long-term, trouble free service
- Ideal for use in long, vertical installations
- 2.5mm subcables can be direct-terminated with standard connectors (2.0mm and 2.9mm subcables also available)
- Subcabled fiber is environmentally and mechanically protected
- Ideal for use in point-to-point runs in adverse environments
- Direct termination to subcable provides additional strain relief for better connector retention during moves, adds, and changes
- Design is ideal for direct pulling with mesh grips
- Cable materials are indoor/outdoor – UV, water and fungus resistant
- Wide operating temperature range of -40°C to +85°C
- High performance 900 µm tight-buffered coating on each optical fiber for environmental and mechanical protection
- Interlocking armor can be applied to cables as an alternative to conduit installation
- 2 to 72 fibers



Cost Savings

- Direct termination to subcable may eliminate the need for patch panels and patch cords and reduce connector loss
- 900 µm buffer eliminates the need for costly and time-consuming installation of fanout kits or pigtail splices because connectors terminate directly to the fiber. See page PI-6 for typical termination approach.
- High crush resistance may eliminate the need for innerduct

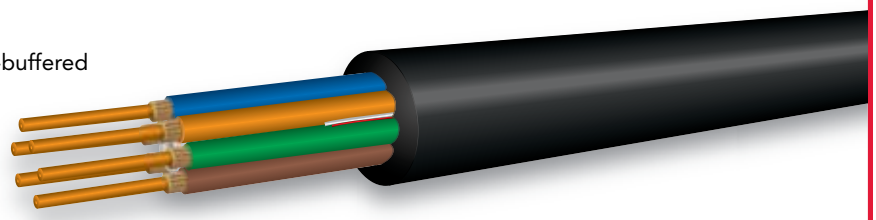
Mechanical and Environmental Performance

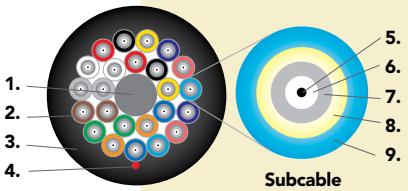
	Indoor/Outdoor
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +85°C
Installation Temperature (cable temp.)	-10°C to +60°C
Flame Retardancy	UL Listed Type OFNR (UL 1666) and FT4 (CSA C22.2 No. 232)
Impact Resistance:	1,500 impacts
Crush Resistance:	2,200 N/cm
Flex Resistance:	2,000 Cycles

Applicable Standards

Optical Cable Corporation indoor/outdoor tight-buffered fiber optic cables meet the functional requirements of the following standards

- ICEA –S-83-596
- ICEA-S-104-696
- GR-409-CORE
- TIA-568
- TIA-598





1. Central Filler
2. Subcable
3. Core-Locked™ Outer Jacket
4. Ripcord

Subcable

5. Optical Fiber
6. Acrylate Fiber Coating
7. 900 µm Diameter Tight-Buffer
8. Aramid Strength Member
9. Color-Coded Subcable Jacket

Cable Characteristics: B-Series Breakout Riser Cables (with 2.5mm subcables)

Fiber Count	Diameter mm (in)	Weight kg/km (lbs/1,000')	Installation Tensile Load N (lbs)	Operational Tensile Load N (lbs)	Minimum Bend Radius Installation cm (in)	Minimum Bend Radius Long-Term cm (in)
2	7.0 (0.28)	41 (28)	1,200 (270)	500 (110)	10.5 (4.1)	7.0 (2.8)
4	8.1 (0.32)	65 (44)	2,000 (450)	800 (180)	12.2 (4.8)	8.1 (3.2)
6	9.6 (0.38)	84 (56)	3,000 (670)	1,200 (270)	14.4 (5.7)	9.6 (3.8)
8	11.6 (0.46)	126 (85)	4,000 (900)	1,700 (380)	17.5 (6.9)	11.6 (4.6)
12*	13.0 (0.51)	142 (95)	6,000 (1,350)	2,500 (560)	19.5 (7.7)	13.0 (5.1)
18	15.3 (0.60)	216 (145)	8,000 (1,800)	3,500 (790)	23.1 (9.1)	15.3 (6.0)
24	17.6 (0.69)	279 (188)	10,000 (2,250)	3,800 (850)	26.5 (10.4)	17.6 (6.9)
36	20.3 (0.80)	360 (242)	14,000 (3,150)	6,000 (1,350)	30.6 (12.0)	20.3 (8.0)
48	23.6 (0.93)	483 (325)	18,000 (4,050)	7,500 (1,690)	35.5 (13.9)	23.6 (9.3)
60	28.5 (1.12)	744 (500)	22,000 (4,950)	8,800 (1,980)	42.7 (16.8)	28.5 (11.2)
72	28.9 (1.14)	738 (496)	26,000 (5,845)	11,000 (2,470)	43.4 (17.1)	28.9 (11.4)

**62.5 µm multimode fiber. Specifications vary by fiber type.*
Installation loads in excess of 2,700 N (600 lbs.) are not recommended.
Other fiber counts available upon request.

Note: 2.5mm subcables standard. 2.0 and 2.9mm subcable diameters available upon request.

Laser Ultra-Fox™ Fiber Performance

Fiber Code	Core/Cladding Diameter (µm)	Wavelength (nm)	Industry Standard Designation	Gigabit Ethernet Distance (m)	10-Gigabit Ethernet Distance (m)	Maximum Cabled Attenuation (dB/km)	Minimum Laser Bandwidth (MHz-km)	Minimum LED Bandwidth* (MHz-km)
WLS	62.5/125 Standard	(850/1310)	OM1 ISO/IEC 11801	300/600	33/300^	3.5/1.5	220/500	200/500
WLX	62.5/125 XL	(850/1310)	OM1 ISO/IEC 11801	500/1000	33/300^	3.0/1.0	385/500	200/500
ALS	50/125 Standard	(850/1310)	OM2 ISO/IEC 11801	600/600	82/300^	3.5/1.5	510/500	500/500
ALX	50/125 XL	(850/1310)	OM2 ISO/IEC 11801	750/600	150/300^[2]	3.0/1.0[3]	950/500	700/500
ALT	50/125 (300 meter 10-GbE)	(850/1310)	OM3 ISO/IEC 11801	1000/600	300/300^[2]	3.0/1.0[3]	2000/500	1500/500
ALE	50/125 (550 meter 10-GbE)	(850/1310)	OM3 ISO/IEC 11801	1040/600	550[1]/300^[2]	3.0/1.0[3]	4700/500	3500/500
SLX	9[6]/125 Low Water Peak Single-mode	(1310/1550)	ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—
SLA	9[6]/125 Bend-Insensitive Single-mode	(1310/1550)	ITU-T G.657.A ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—
SLB	9[6]/125 Bend-Insensitive Single-mode	(1310/1550)	ITU-T G.657.A & B ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—

Ordering Information

	B	**X**				**D**				**9**	**K**	**R**
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12

1 – 2 Breakout Series Ultra-Fox™ = **BX**
3 – 5 Fiber count: (See Cable Characteristics Chart) = **002 – 072**
6 Jacket type: PVC = **D**
7 – 9 Fiber type: (See Laser Ultra-Fox™ Fiber Performance Table)
10 250 µm fiber with 900 µm tight buffer = **9**
11 Standard Jacket Colors: Black = **K**
Optional colors available:
62.5 um multimode (WLS, WLX): Orange = **O**
50 um multimode (ALS, ALX): Orange = **O**
50 um Ten-Gigabit multimode (ALT, ALE): Aqua = **Q**
Single mode: Yellow = **Y**
12 Rating: Riser = **R**

Example: 12 fiber cable using 62.5 µm standard laser optimized fiber, black jacket –

B	**X**	**0**	**1**	**2**	**D**	**W**	**L**	**S**	**9**	**K**	**R**

* For backward compatibility to LED based systems, overfilled launch (OFL)

^ 1310 nm CWDM lasers (10GBASE-LX4)

[1] Reach assuming 3.0 dB maximum cabled attenuation at 850 nm and 1.3 dB total connection and splice loss

[2] Supports 220 meter 10GBASE-LRM distance, or 300 meter 10GBASE-LRM distance with 300 meter capable equipment

[3] 3.5/1.5 dB/km maximum attenuation applies for DX-Series cables greater than 36 fibers, and for all DX-Series cables with armor (corrugated steel tape or interlocked armor) or any other secondary outer jacketing

[4] 10 km for 1310 nm 1000BASE-LH, and 5 km for 1310 nm 1000BASE-LX

[5] 10 km for 1310 nm 10GBASE-LR, and 40 km for 1550 nm 10GBASE-ER

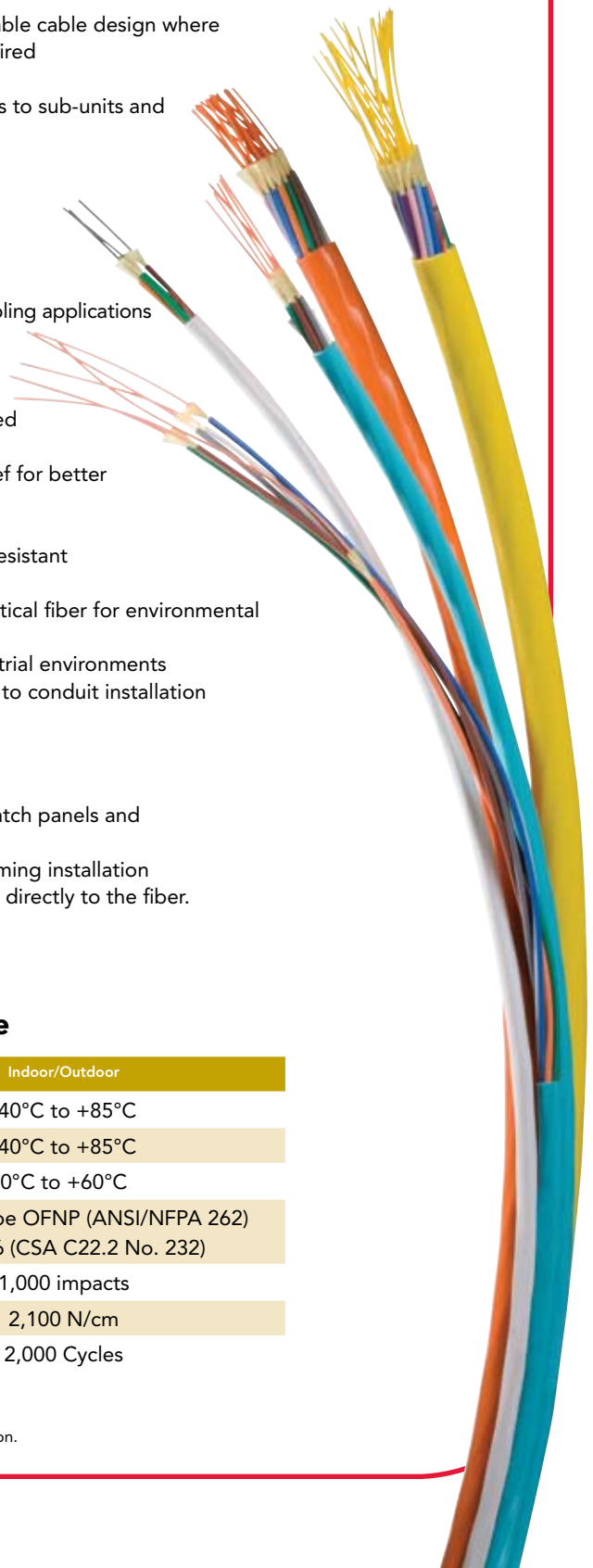
[6] Nominal Mode Field Diameter at 1310 nm

Note: many other fiber types, fiber bandwidth, and attenuation performances are available.

B-Series Plenum

Applications

- Ideal for installations requiring an extremely rugged and reliable cable design where maximum mechanical and environmental protection are required
- Installed in ducts, plenums, and air handling spaces
- Easiest cable to install where direct termination of connectors to sub-units and direct run to panels and equipment is desired



Features

- High performance components and construction
- UL Listed in accordance with NEC sections 770.179(a) for use in ducts, plenums and air-handling spaces
- Most rugged and easy to install cable design for enterprise cabling applications
- Standard 2.0mm subcables can be directly terminated with standard connectors. 2.5mm and 2.9 mm subcable sizes are also available
- Subcabled fiber is environmentally and mechanically protected
- Ideal for use in point-to-point runs in adverse environments
- Direct termination to subcable provides additional strain relief for better connector retention during moves, adds, and changes
- Design is ideal for direct pulling with mesh grips
- Cable materials are indoor/outdoor – UV, water and fungus resistant
- Wide operating temperature range of -40°C to +85°C
- High performance 900 µm tight-buffered coating on each optical fiber for environmental and mechanical protection
- Jacket highly chemical resistant for installation in harsh industrial environments
- Interlocking armor can be applied to cables as an alternative to conduit installation
- 2 to 60 fibers

Cost Savings

- Direct termination to subcable may eliminate the need for patch panels and patch cords and reduce connector loss
- 900 µm buffer eliminates the need for costly and time-consuming installation of fanout kits or pigtail splices because connectors terminate directly to the fiber. See page PI-6 for typical termination approach.
- High crush resistance may eliminate the need for innerduct

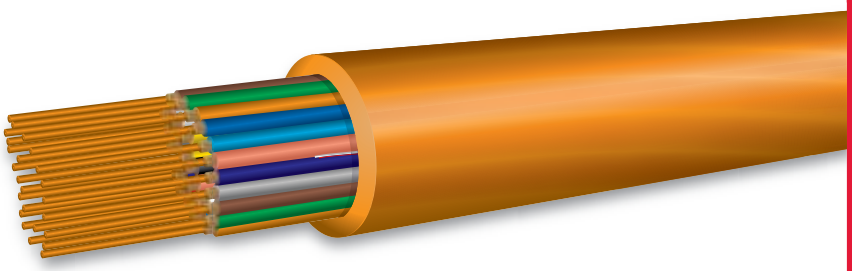
Mechanical and Environmental Performance

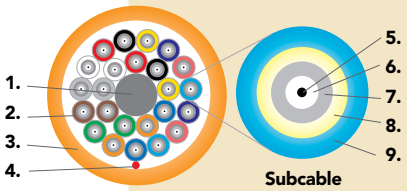
	Indoor/Outdoor
Operating Temperature	-40°C to +85°C
Storage Temperature	-40°C to +85°C
Installation Temperature (cable temp.)	0°C to +60°C
Flame Retardancy	UL Listed Type OFNP (ANSI/NFPA 262) and FT6 (CSA C22.2 No. 232)
Impact Resistance:	1,000 impacts
Crush Resistance:	2,100 N/cm
Flex Resistance:	2,000 Cycles

Applicable Standards

Optical Cable Corporation indoor/outdoor tight-buffered fiber optic cables meet the functional requirements of the following standards.

- ICEA –S-83-596
- ICEA-S-104-696
- GR-409-CORE
- TIA-568
- TIA-598





1. Central Filler
2. Subcable
3. Outer Jacket
4. Ripcord

Subcable

5. Optical Fiber
6. Acrylate Fiber Coating
7. 900 µm Diameter Tight-Buffer
8. Aramid Strength Member
9. Color-Coded Subcable Jacket

Cable Characteristics: B-Series Breakout Plenum Cables (with 2.0mm subcables)

Fiber Count	Diameter mm (in)	Weight kg/km (lbs/1,000')	Installation Tensile Load N (lbs)	Operational Tensile Load N (lbs)	Minimum Bend Radius Installation cm (in)	Minimum Bend Radius Long-Term cm (in)
2	6.5 (0.26)	46 (31)	1,600 (360)	400 (90)	9.8 (3.9)	9.8 (3.9)
4	6.5 (0.26)	46 (31)	1,600 (360)	400 (90)	9.8 (3.9)	9.8 (3.9)
6	7.4 (0.29)	61 (41)	2,400 (540)	600 (130)	11.2 (4.4)	11.2 (4.4)
8	8.7 (0.34)	88 (59)	3,200 (720)	800 (180)	13.1 (5.2)	13.1 (5.2)
12	9.2 (0.36)	94 (63)	4,800 (1,080)	1,200 (270)	13.9 (5.5)	13.9 (5.5)
18	12.2 (0.48)	162 (109)	6,000 (1,350)	1,500 (340)	18.3 (7.2)	18.2 (7.2)
24	14.2 (0.56)	221 (148)	7,200 (1,620)	1,800 (400)	21.3 (8.4)	21.3 (8.4)
36	15.7 (0.62)	274 (184)	9,600 (2,160)	2,400 (540)	23.6 (9.3)	23.6 (9.3)
48	18.4 (0.72)	376 (253)	12,000 (2,700)	3,000 (670)	27.6 (10.9)	27.6 (10.9)
60	21.5 (0.85)	496 (333)	14,400 (3,240)	3,600 (810)	32.3 (12.7)	32.2 (12.7)

Installation loads in excess of 2,700 N (600 lbs.) are not recommended.

Note: 2.0mm subcables standard. 2.5mm subcables available by request. Contact Optical Cable Corporation for ordering details.

Laser Ultra-Fox™ Fiber Performance

Fiber Code	Core/Cladding Diameter (µm)	Wavelength (nm)	Industry Standard Designation	Gigabit Ethernet Distance (m)	10-Gigabit Ethernet Distance (m)	Maximum Cabled Attenuation (dB/km)	Minimum Laser Bandwidth (MHz-km)	Minimum LED Bandwidth* (MHz-km)
WLS	62.5/125 Standard	(850/1310)	OM1 ISO/IEC 11801	300/600	33/300^	3.5/1.5	220/500	200/500
WLX	62.5/125 XL	(850/1310)	OM1 ISO/IEC 11801	500/1000	33/300^	3.0/1.0	385/500	200/500
ALS	50/125 Standard	(850/1310)	OM2 ISO/IEC 11801	600/600	82/300^	3.5/1.5	510/500	500/500
ALX	50/125 XL	(850/1310)	OM2 ISO/IEC 11801	750/600	150/300^[2]	3.0/1.0[3]	950/500	700/500
ALT	50/125 (300 meter 10-GbE)	(850/1310)	OM3 ISO/IEC 11801	1000/600	300/300^[2]	3.0/1.0[3]	2000/500	1500/500
ALE	50/125 (550 meter 10-GbE)	(850/1310)	OM3 ISO/IEC 11801	1040/600	550[1]/300^[2]	3.0/1.0[3]	4700/500	3500/500
SLX	9[6]/125 Low Water Peak Single-mode	(1310/1550)	ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—
SLA	9[6]/125 Bend-Insensitive Single-mode	(1310/1550)	ITU-T G.657.A ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—
SLB	9[6]/125 Bend-Insensitive Single-mode	(1310/1550)	ITU-T G.657.A & B ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—

Ordering Information

	B	**X**				**K**				**9**		**P**
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12

1 – 2 Breakout Series Ultra-Fox™ = **BX**
3 – 5 Fiber count: (See Cable Characteristics Chart) = **002 – 060**
6 Jacket type: Fluoropolymer = **K**
7 – 9 Fiber type: (See Laser Ultra-Fox™ Fiber Performance Table)
10 250 µm fiber with 900 µm tight buffer = **9**
11 Standard Jacket Colors:
62.5 µm multimode (WLS, WLX): Orange = **O**
50 µm multimode (ALS, ALX): Orange = **O**
50 µm Ten-Gigabit multimode (ALT, ALE): Aqua = **Q**
Single-mode: Yellow = **Y**
12 Rating: Plenum = **P**

Example: 12 fiber cable using 62.5 µm standard laser optimized fiber, orange jacket –

	B	**X**	**0**	**1**	**2**	**K**	**W**	**L**	**S**	**9**	**O**	**P**

* For backward compatibility to LED based systems, overfilled launch (OFL)

^ 1310 nm CWDM lasers (10GBASE-LX4)

[1] Reach assuming 3.0 dB maximum cabled attenuation at 850 nm and 1.3 dB total connection and splice loss

[2] Supports 220 meter 10GBASE-LRM distance, or 300 meter 10GBASE-LRM distance with 300 meter capable equipment

[3] 3.5/1.5 dB/km maximum attenuation applies for DX-Series cables greater than 36 fibers, and for all DX-Series cables with armor (corrugated steel tape or interlocked armor) or any other secondary outer jacketing

[4] 10 km for 1310 nm 1000BASE-LH, and 5 km for 1310 nm 1000BASE-LX

[5] 10 km for 1310 nm 10GBASE-LR, and 40 km for 1550 nm 10GBASE-ER

[6] Nominal Mode Field Diameter at 1310 nm

Note: many other fiber types, fiber bandwidth, and attenuation performances are available.

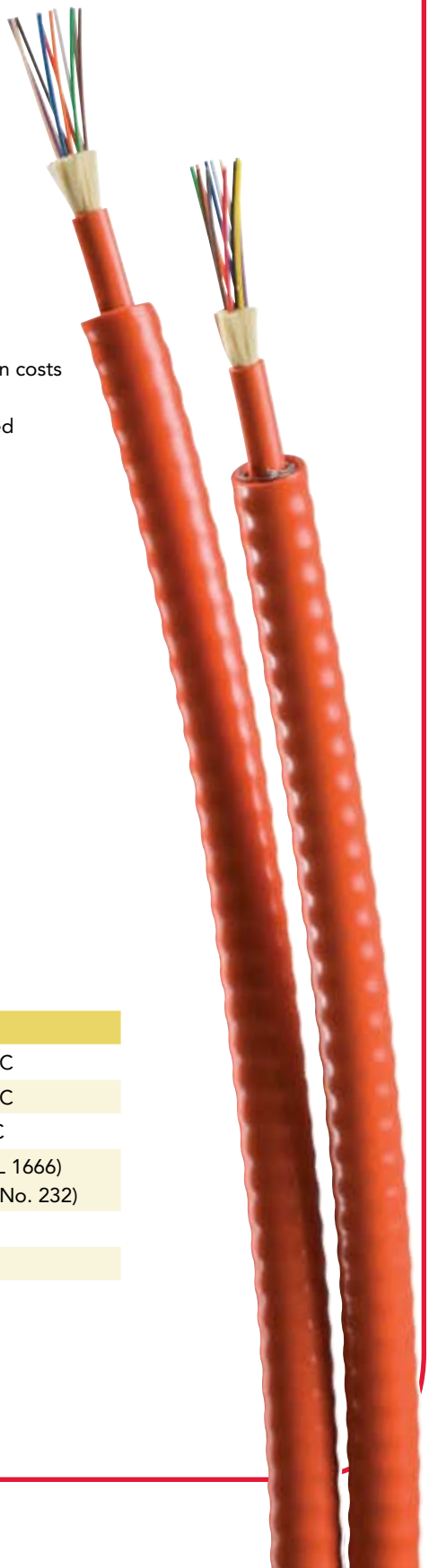
ILA Riser

Applications

- Ideal for industrial and other installations requiring a metallic conduit
- May eliminate the need for innerduct or conduit

Features

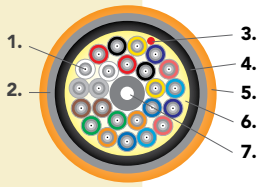
- UL Listed in accordance with NEC section 770.179(b) for use in vertical runs in building risers or from floor to floor
- Aluminum interlocking armor with PVC overjacket
- Interlocking armor can be easily removed leaving an intact inner cable
- Greater flexibility than standard corrugated steel armored (CST) cables
- Ideal for locations that require conduit for cable protection
- Preloaded armor may eliminate the need for conduit, reducing installation costs
- Wide operating temperature of -40°C to +85°C
- Optical Cable Corporation D, B, and G-Series Riser cables can be armored with interlocking armor. Standard fiber counts are:
  - D-Series riser: 2 to 72 fibers
  - G-Series riser: 12 to 48 fibers
  - B-Series riser: 2 to 24 fibers
  - Other fiber counts available

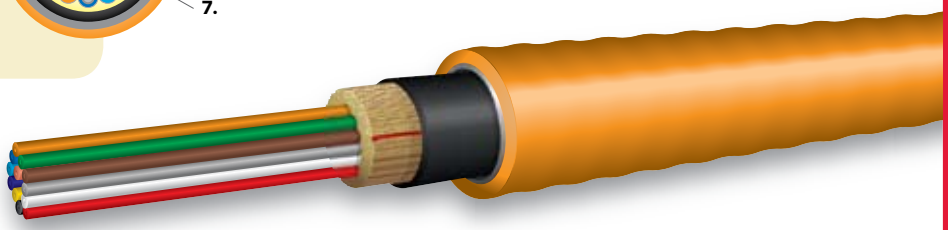


Mechanical and Environmental Performance

	Indoor/Outdoor
Operating Temperature	-40°C to +85°C
Storage Temperature	-40°C to +85°C
Installation Temperature (cable temp.)	0°C to +60°C
Flame Retardancy	UL Listed OFCR (UL 1666) and FT4 (CSA C22.2 No. 232)
Impact Resistance:	20 Impacts
Crush Resistance:	650 N/cm

1. Tight-Buffered Optical Fiber
2. Aluminum Interlocking Armor
3. Ripcord
4. Inner Jacket
5. Outer Jacket
6. Aramid Strength Member
7. Central Strength Member/Filler





Cable Characteristics: Interlocking Armored Cables (using Distribution Series Riser Inner-cable)

Fiber Count †	Diameter mm (in)	Weight (jacketed/armored) kg/km (lbs/1,000')	Installation Tensile Load (armored) N (lbs)	Operational Tensile Load (armored) N (lbs)	Minimum Bend Radius Installation (cm)	Minimum Bend Radius **Long-Term** (cm)
4	13.7 (0.54)	174 (117)	1,350 (304)	396 (89)	27.4 (10.8)	20.6 (8.1)
6	13.7 (0.54)	174 (117)	1,350 (304)	396 (89)	27.4 (10.8)	20.6 (8.1)
12	15.2 (0.60)	195 (131)	1,350 (304)	396 (89)	30.4 (12.0)	22.8 (9.0)
24	16.2 (0.64)	217 (146)	1,350 (304)	396 (89)	32.4 (12.8)	24.3 (9.6)
36	17.5 (0.69)	241 (162)	1,350 (304)	396 (89)	35.0 (13.8)	26.3 (10.4)
48	18.8 (0.74)	384 (258)	1,350 (304)	396 (89)	37.6 (14.8)	28.2 (11.1)

† D-Series Riser inner-cable. Other inner-cable configurations available upon request. Please contact Optical Cable Corporation for specifications and ordering details.

See application engineering note:
Interlocking Armor Cable Pulling Grip Installation Procedure available online at www.occfiber.com.

Laser Ultra-Fox™ Fiber Performance

Fiber Code	Core/Cladding Diameter (µm)	Wavelength (nm)	Industry Standard Designation	Gigabit Ethernet Distance (m)	10-Gigabit Ethernet Distance (m)	Maximum Cabled Attenuation (dB/km)	Minimum Laser Bandwidth (MHz-km)	Minimum LED Bandwidth* (MHz-km)
WLS	62.5/125 Standard	(850/1310)	OM1 ISO/IEC 11801	300/600	33/300^	3.5/1.5	220/500	200/500
WLX	62.5/125 XL	(850/1310)	OM1 ISO/IEC 11801	500/1000	33/300^	3.0/1.0	385/500	200/500
ALS	50/125 Standard	(850/1310)	OM2 ISO/IEC 11801	600/600	82/300^	3.5/1.5	510/500	500/500
ALX	50/125 XL	(850/1310)	OM2 ISO/IEC 11801	750/600	150/300^[2]	3.0/1.0[3]	950/500	700/500
ALT	50/125 (300 meter 10-GbE)	(850/1310)	OM3 ISO/IEC 11801	1000/600	300/300^[2]	3.0/1.0[3]	2000/500	1500/500
ALE	50/125 (550 meter 10-GbE)	(850/1310)	OM3 ISO/IEC 11801	1040/600	550[1]/300^[2]	3.0/1.0[3]	4700/500	3500/500
SLX	9[6]/125 Low Water Peak Single-mode	(1310/1550)	ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—
SLA	9[6]/125 Bend-Insensitive Single-mode	(1310/1550)	ITU-T G.657.A ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—
SLB	9[6]/125 Bend-Insensitive Single-mode	(1310/1550)	ITU-T G.657.A & B ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—

Ordering Information

	D	**X**				**D**				**9**		**R**	**I**	**2**
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12	13	14

1 – 2 DX-Series Distribution Ultra-Fox™ = **DX**
3 – 5 Fiber count: (See Cable Characteristics Chart) = **004 – 048**
6 Jacket type: PVC = **D**
7 – 9 Fiber type: (See Laser Ultra-Fox™ Fiber Performance Table)
10 250 µm fiber with 900 µm tight buffer = **9**
11 Standard Jacket Color: (outer armor)
62.5 µm multimode (WLS, WLX): Orange = **O**
50 µm multimode (ALS, ALX): Orange = **O**
50 µm Ten-Gigabit multimode (ALT, ALE): Aqua = **Q**
Single-mode: Yellow = **Y**
12 Rating: Riser = **R**
13 – 14 Armor Code: Interlocking Armor = **I2**

Example: 12 fiber interlocking armored distribution cable using 62.5 µm standard laser optimized fiber, orange armor jacket, Riser rated –

D	**X**	**0**	**1**	**2**	**D**	**W**	**L**	**S**	**9**	**O**	**R**	**I**	**2**

* For backward compatibility to LED based systems, overfilled launch (OFL)

^ 1310 nm CWDM lasers (10GBASE-LX4)

[1] Reach assuming 3.0 dB maximum cabled attenuation at 850 nm and 1.3 dB total connection and splice loss

[2] Supports 220 meter 10GBASE-LRM distance, or 300 meter 10GBASE-LRM distance with 300 meter capable equipment

[3] 3.5/1.5 dB/km maximum attenuation applies for DX-Series cables greater than 36 fibers, and for all DX-Series cables with armor (corrugated steel tape or interlocked armor) or any other secondary outer jacketing

[4] 10 km for 1310 nm 1000BASE-LH, and 5 km for 1310 nm 1000BASE-LX

[5] 10 km for 1310 nm 10GBASE-LR, and 40 km for 1550 nm 10GBASE-ER

[6] Nominal Mode Field Diameter at 1310 nm

Note: many other fiber types, fiber bandwidth, and attenuation performances are available.

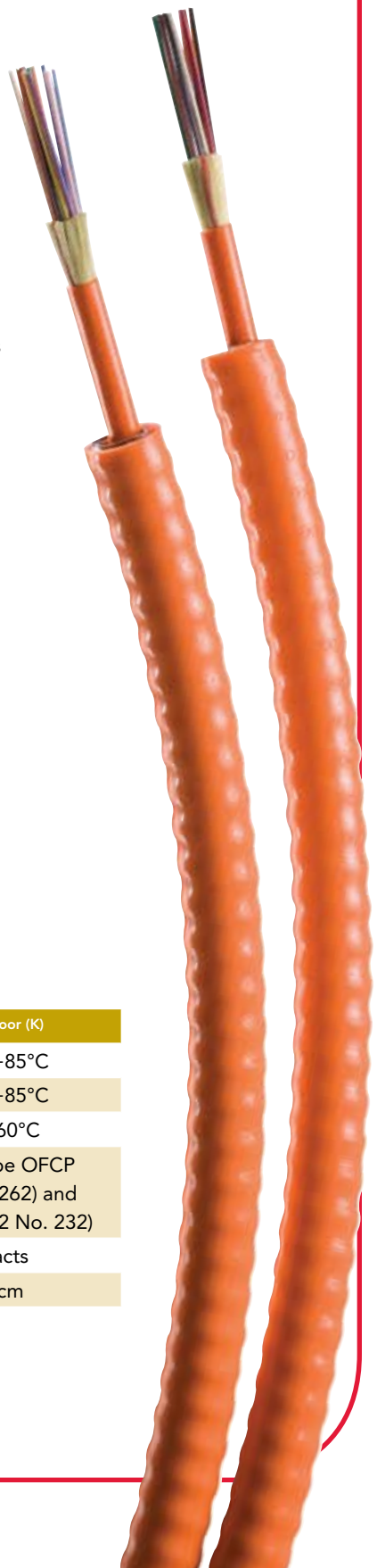
ILA Plenum

Applications

- Ideal for industrial and other installations requiring a metallic armor
- May eliminate the need for conduit

Features

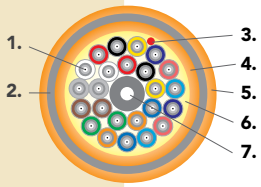
- UL Listed in accordance with NEC section 770.179(a) for use in ducts, plenums and air handling spaces
- Aluminum interlocking armor with flexible plenum (**S**) or fluoropolymer (**K**) overjacket
- Greater flexibility than standard corrugated steel armored (CST) cables
- Preloaded armor may eliminate the need for conduit, reducing installation costs
- Interlocking armor can be easily removed leaving an intact inner cable
- Wide operating temperature of -40°C to +85°C for indoor/outdoor (K Jacket)
- Optical Cable Corporation D, B, and G-Series Plenum cables can be armored with interlocking armor. Standard fiber counts are:
  - D-Series plenum: 2 to 48 fibers (K jacket) , 2 to 24 fibers (S jacket)
  - G-Series plenum: 12 to 48 fibers
  - B-Series plenum: 2 to 48 fibers
  - Other fiber counts available

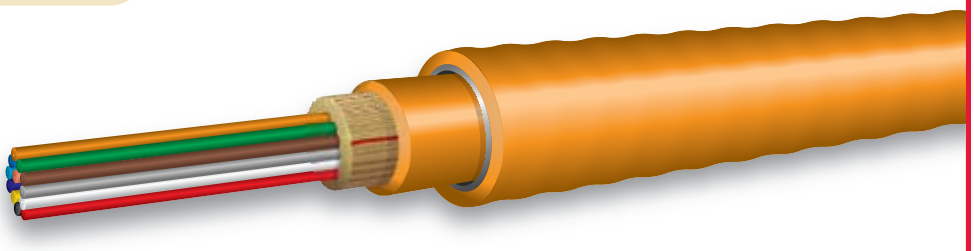


Mechanical and Environmental Performance

	Indoor (S)	Indoor/Outdoor (K)
Operating Temperature	-20°C to +85°C	-40°C to +85°C
Storage Temperature	-40°C to +85°C	-40°C to +85°C
Installation Temperature (cable temp.)	0°C to +60°C	0°C to +60°C
Flame Retardancy	UL Listed Type OFCP (ANSI/NFPA 262) and FT6 (CSA C22.2 No. 232)	UL Listed Type OFCP (ANSI/NFPA 262) and FT6 (CSA C22.2 No. 232)
Impact Resistance:	20 Impacts	20 Impacts
Crush Resistance:	650 N/cm	650 N/cm

1. Tight-Buffered Optical Fiber
2. Aluminum Interlocking Armor
3. Ripcord
4. Inner Jacket
5. Outer Jacket
6. Aramid Strength Member
7. Central Strength Member/Filler





Cable Characteristics: Interlocking Armored Cables (using Distribution Series Plenum Inner-cable K Jacket and S Jacket)

Fiber Count †	Diameter mm (in)	Weight (jacketed/armored) kg/km (lbs/1,000')	Installation Tensile Load (armored) N (lbs)	Operational Tensile Load (armored) N (lbs)	Minimum Bend Radius Installation (cm)	Minimum Bend Radius **Long-Term** (cm)
2	13.9 (0.55)	170 (114)	1,350 (304)	396 (89)	27.8 (10.9)	20.9 (8.2)
4	13.9 (0.55)	170 (114)	1,350 (304)	396 (89)	27.8 (10.9)	20.9 (8.2)
6	13.9 (0.55)	177 (119)	1,350 (304)	396 (89)	27.8 (10.9)	20.9 (8.2)
12	13.9 (0.55)	200 (134)	1,350 (304)	396 (89)	27.8 (10.9)	20.9 (8.2)
24	15.2 (0.60)	227 (153)	1,350 (304)	396 (89)	30.4 (12.0)	22.8 (9.0)
36	16.4 (0.65)	268 (180)	1,350 (304)	396 (89)	32.8 (13.0)	24.6 (9.7)
48	17.8 (0.70)	299 (201)	1,350 (304)	396 (89)	35.6 (14.0)	26.7 (10.5)

† D-Plenum inner-cable. Other inner-cable configurations available upon request. Please contact Optical Cable Corporation for specifications and ordering details.

See application engineering note:
Interlocking Armor Cable Pulling Grip Installation Procedure available at www.occfiber.com.

Laser Ultra-Fox™ Fiber Performance

Fiber Code	Core/Cladding Diameter (µm)	Wavelength (nm)	Industry Standard Designation	Gigabit Ethernet Distance (m)	10-Gigabit Ethernet Distance (m)	Maximum Cabled Attenuation (dB/km)	Minimum Laser Bandwidth (MHz-km)	Minimum LED Bandwidth* (MHz-km)
WLS	62.5/125 Standard	(850/1310)	OM1 ISO/IEC 11801	300/600	33/300^	3.5/1.5	220/500	200/500
WLX	62.5/125 XL	(850/1310)	OM1 ISO/IEC 11801	500/1000	33/300^	3.0/1.0	385/500	200/500
ALS	50/125 Standard	(850/1310)	OM2 ISO/IEC 11801	600/600	82/300^	3.5/1.5	510/500	500/500
ALX	50/125 XL	(850/1310)	OM2 ISO/IEC 11801	750/600	150/300^[2]	3.0/1.0[3]	950/500	700/500
ALT	50/125 (300 meter 10-GbE)	(850/1310)	OM3 ISO/IEC 11801	1000/600	300/300^[2]	3.0/1.0[3]	2000/500	1500/500
ALE	50/125 (550 meter 10-GbE)	(850/1310)	OM3 ISO/IEC 11801	1040/600	550[1]/300^[2]	3.0/1.0[3]	4700/500	3500/500
SLX	9[6]/125 Low Water Peak Single-mode	(1310/1550)	ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—
SLA	9[6]/125 Bend-Insensitive Single-mode	(1310/1550)	ITU-T G.657.A ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—
SLB	9[6]/125 Bend-Insensitive Single-mode	(1310/1550)	ITU-T G.657.A & B ITU-T G.652.D	5 km[4]	10 km[5]	0.5/0.5	—	—

Ordering Information

	D	**X**								**9**		**P**	**I**	**6**
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12	13	14

1 – 2 DX-Series Ultra-Fox™ = **DX**

3 – 5 Fiber count: (See Cable Characteristics Chart)
- Soft Plenum (S jacket) = **002 – 024**
- Fluoropolymer (K jacket) = **002 – 048**

6 Jacket type:
- Soft Plenum (indoor) = **S**
- Fluoropolymer (indoor/outdoor) = **K**

7 – 9 Fiber type: (See Laser Ultra-Fox™ Fiber Performance Table)

10 250 µm fiber with 900 µm tight buffer = **9**

11 Standard Jacket Colors:
- 62.5 µm multimode (WLS, WLX) – Orange = **O**
- 50 µm multimode (ALS, ALX) – Orange = **O**
- 50 µm Ten-gigabit (ALT, ALE) – Aqua = **Q**
- Single-mode – Yellow = **Y**

12 Rating: Plenum = **P**

13-14 Armor Code:
- Soft plenum (S jacket) = **I7**
- Fluoropolymer (K jacket) = **I6**

Example: 12 fiber interlocking armored cable using 62.5 µm standard laser optimized fiber, orange jacket, fluoropolymer overjacket, fluoropolymer jacketed inner D-Series cable –

D	**X**	**0**	**1**	**2**	**K**	**W**	**L**	**S**	**9**	**O**	**P**	**I**	**6**

* For backward compatibility to LED based systems, overfilled launch (OFL)

^ 1310 nm CWDM lasers (10GBASE-LX4)

[1] Reach assuming 3.0 dB maximum cabled attenuation at 850 nm and 1.3 dB total connection and splice loss

[2] Supports 220 meter 10GBASE-LRM distance, or 300 meter 10GBASE-LRM distance with 300 meter capable equipment

[3] 3.5/1.5 dB/km maximum attenuation applies for DX-Series cables greater than 36 fibers, and for all DX-Series cables with armor (corrugated steel tape or interlocked armor) or any other secondary outer jacketing

[4] 10 km for 1310 nm 1000BASE-LH, and 5 km for 1310 nm 1000BASE-LX

[5] 10 km for 1310 nm 10GBASE-LR, and 40 km for 1550 nm 10GBASE-ER

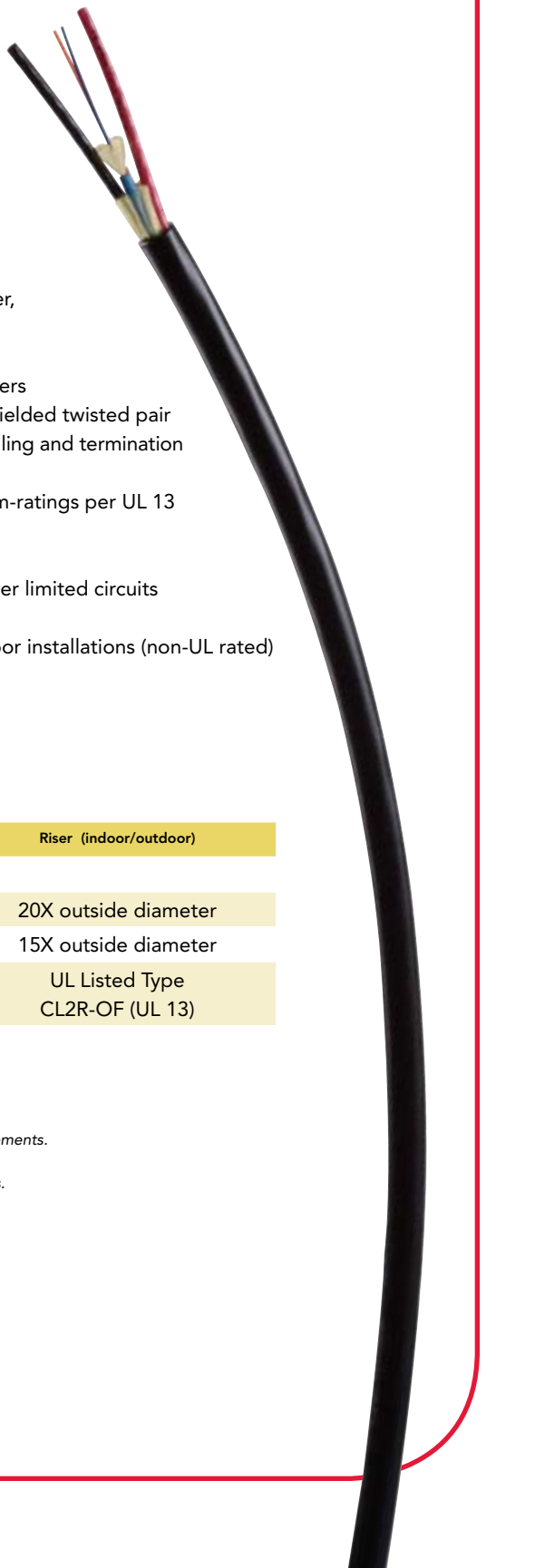
[6] Nominal Mode Field Diameter at 1310 nm

Note: many other fiber types, fiber bandwidth, and attenuation performances are available.

Composite Fiber/Copper Cables

Applications

- Data communication and control installations that require fiber and copper under one cable jacket



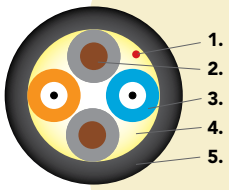
Features

- Various combinations of copper conductors and optical fibers in a single composite cable
- Chemical-resistant outer jacket available for harsh industrial or outdoor environments
- 12, 14, 16, 18 gauge single stranded copper wire available for power, communication, control sensor, signal, and video
- Multimode (62.5 µm or 50 µm) and single-mode fiber available – contact Optical Cable Corporation for specifications and part numbers
- Larger gauge wires overcome powering distance limitations of unshielded twisted pair
- Copper and fiber individually sub-cabled for ease of separation, handling and termination
- Round cable design for easy installation and survivability
- Many combinations available with CL2R riser-ratings or CL2P plenum-ratings per UL 13
- MSHA rated composite cables available
- Interlocking armor available for riser and plenum composite cables
- Composite fiber/copper cables are intended for use on Class 2 power limited circuits as described in Article 725 of the National Electrical Code
- Also available with field-deployable flexible jacket for rugged outdoor installations (non-UL rated)

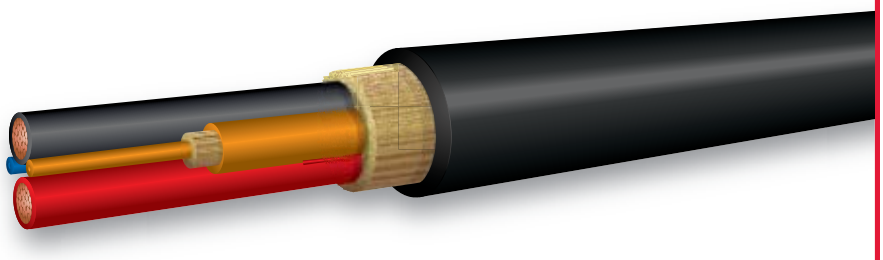
Cable Characteristics: Composite Cables

	Plenum (indoor/outdoor)	Riser (indoor/outdoor)
Minimum bend radius:		
Installation load	20X outside diameter	20X outside diameter
Long-term load	15X outside diameter	15X outside diameter
Flame Retardancy	UL Listed Type CL2P-OF (UL 13)	UL Listed Type CL2R-OF (UL 13)

**Many combinations of optical fibers and wires can be manufactured to your specific requirements. Please contact Optical Cable Corporation for a price quotation and specifications for the Composite Fiber/Copper Cable design that meets all your special application requirements.*



1. Ripcord
2. 2-AWG14 Stranded Copper Wire
3. Optical Fiber Subcable
4. Aramid Strength Member
5. Outer Jacket



Ordering Information: Indoor/Outdoor Riser and Plenum Composite Cables

	C	**X**								**9**		
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12

1 – 2 Composite Series Ultra-Fox™ = **CX**
3 – 5 Fiber count: Number of fibers **(002 – 036)** + Copper Conductors **(002 – 004)**
Example: 2-fiber/2-copper = **004**
6 Jacket type: Fluoropolymer indoor/outdoor plenum = **K**; PVC indoor/outdoor = **D**
7 – 9 Fiber/Copper type: Contact Optical Cable Corporation for 3 digit part number code
10 250 µm fiber with 900 µm tight buffer = **9**
11 Standard Jacket Color:
PVC (all fiber types) – Black = **K**
Fluoropolymer = 62.5 µm multimode (WLS, WLX) – Orange = **O**
50 µm multimode (ALS, ALX) – Orange = **O**
50 µm Ten-gigabit (ALT, ALE) – Aqua = **Q**
Single-mode – Yellow = **Y**
12 Rating: Plenum = **P**; Riser = **R**

Example: 2-fiber/2AWG-18 copper cable using 62.5 µm standard laser optimized fiber, orange jacket –

C	**X**	**0**	**0**	**4**	**K**	•	•	•	**9**	**O**	**P**