

INDUSTRY SOLUTIONS:

INDUSTRIAL



IC 2 | INDUSTRY SOLUTIONS: INDUSTRIAL

Optical Cable Corporation has the reputation for creating innovative designs that produce the most dependable cables for deployment in the most severe duty applications. This reputation has been built since company inception in the early 1980's and is based on unique tight-buffered cables originally designed for demanding military field applications and a wide range of indoor/outdoor fiber optic cable solutions for enterprise cabling systems.

Optical Cable Corporation cables use unique tight-buffer coatings, cable designs, and manufacturing processes to provide the best mechanical and environmental protection for the optical fibers. Our products include many that are particularly suited for tough, demanding industrial applications, some of which are featured in this section of our catalog. For more fiber optic cable choices, see the Fiber Optic Cables section of the catalog.



Thriving in Tough Environments

Industrial Networks must contend with environmental conditions not found in the office areas.

With over 25 years experience supplying military tactical and tight-buffered indoor/outdoor fiber optic cables, Optical Cable Corporation understands the requirements for tight-buffered fiber optic cables to be able to withstand the most severe conditions found in industrial areas.

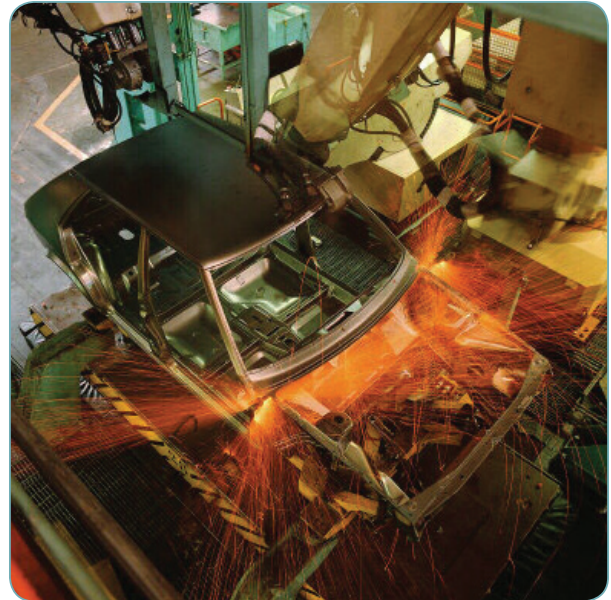
- Chemical Exposure
- Crush
- Dust/Debris
- Electrical Fast Transients (EFT)
- Electromagnetic Interference and Radio Frequency Interference (EMI/RFI)
- Electrostatic Discharge (ESD)
- Fire/Flame Exposure
- Flexing
- Impact
- Moisture/Humidity/Water
- Physical Abuse
- Radiation
- Temperature Extremes
- Tension
- UV Exposure
- Vibration

Core-Locked™

Unlike conventional cable jackets, the special Core-Locked™ jacket featured on many of our fiber optic cables, is extruded under high pressure directly over the cable's core, resulting in the internal surface of the cable jacket having helical cusped ridges that interlock with the subcables. Wire mesh grips can be used directly over the jacket because the cable core cannot slip and move axially within the cable jacket during installation. This eliminates jacket damage that may occur with other cables. The Core-Locked™ jacket contains 25% more material than conventional jackets. This helps keep the cable cross-section circular for better crush and impact protection and improved tear resistance during installation. A ripcord is included for easy outer jacket removal.

The Ultimate in Cable Component Protection

- Permits pulling with direct attachment of wire mesh grip
- Prevents cable from flattening and jacket from wrinkling in tight bends
- Improves crush and tear resistance
- Flame-retardant for use within buildings
- UV-inhibited, fungus and water resistant for use outdoors (duct, aerial lashed, etc)

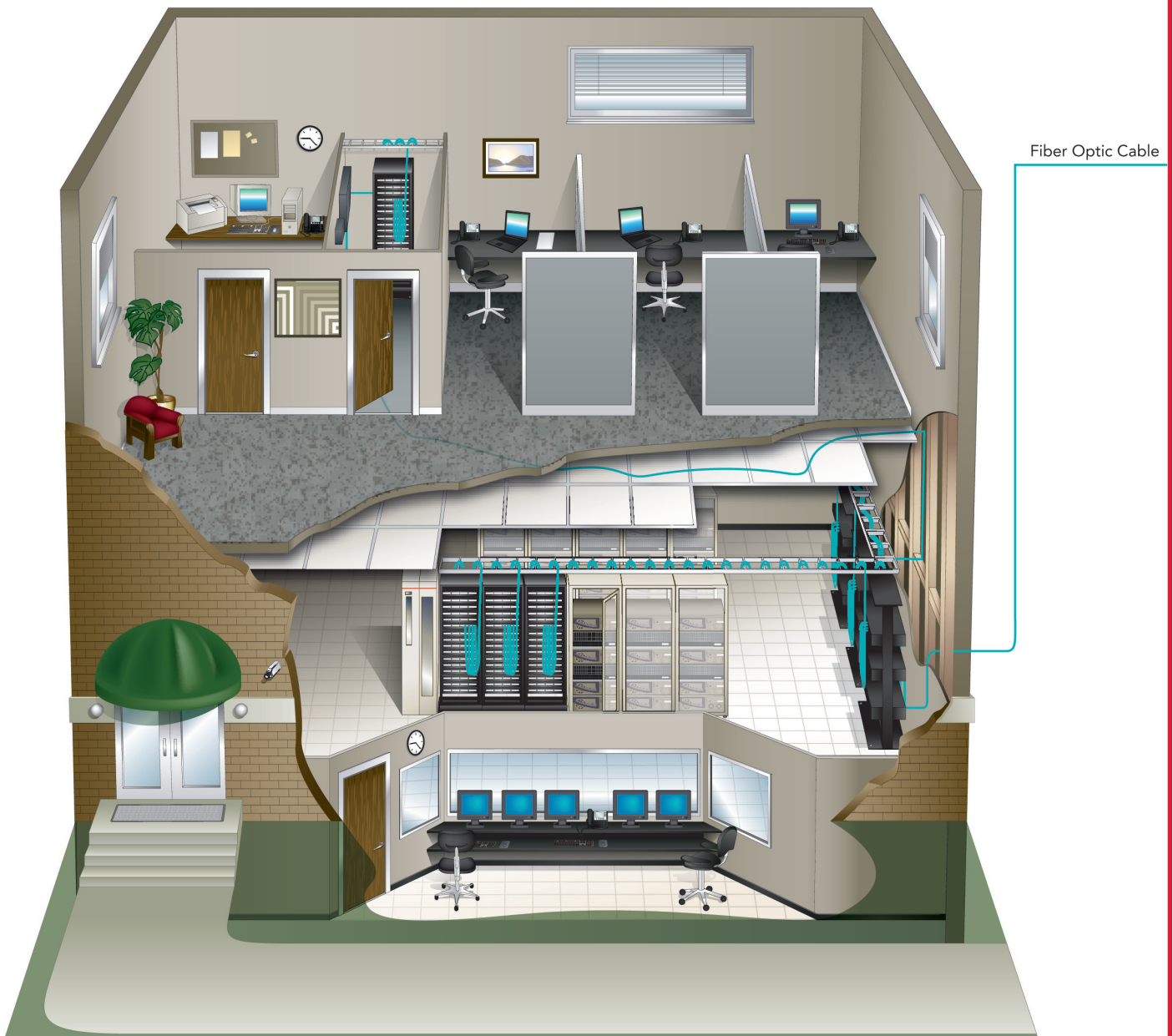


Ordinary Cable Jacket

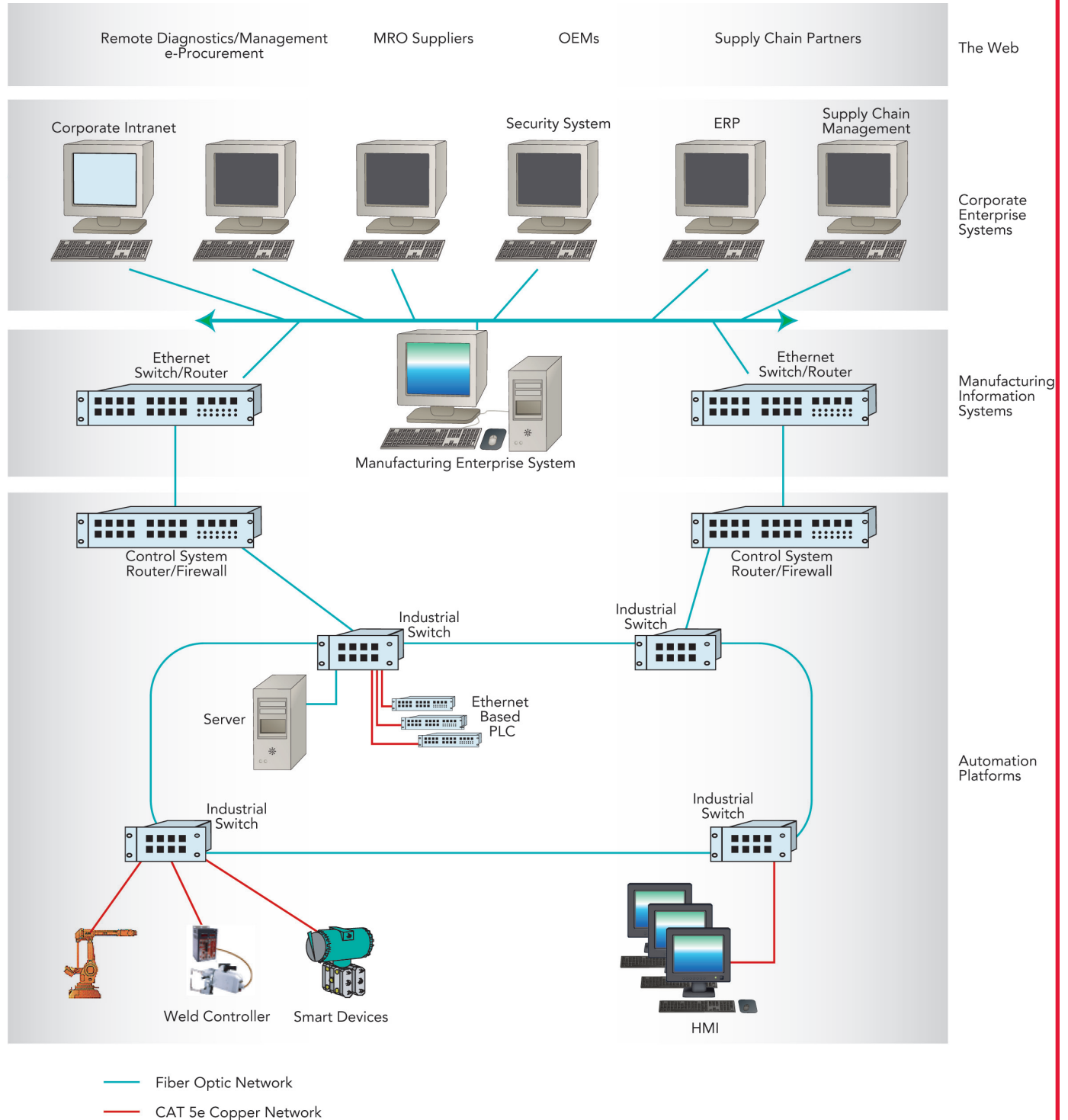


Core-Locked™ jacket: 25% more material, greater protection, and stability.

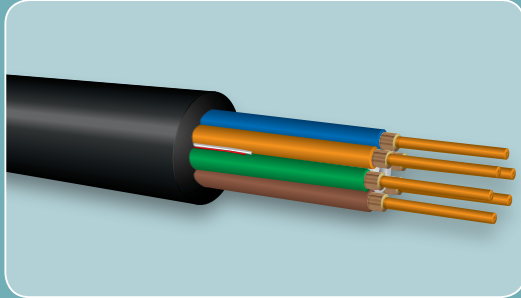
Manufacturing and the Enterprise Network



From real-time sensors on the factory floor to the boardroom monitoring and control, productivity and quality improvements are possible for every industry. The reliability and determinism of legacy networks will be maintained with a properly designed network. Redundant switched Ethernet, industrial-grade switches, and fiber optic cables are built to withstand the toughest environmental conditions, and all play an important role in ensuring critical network performance.

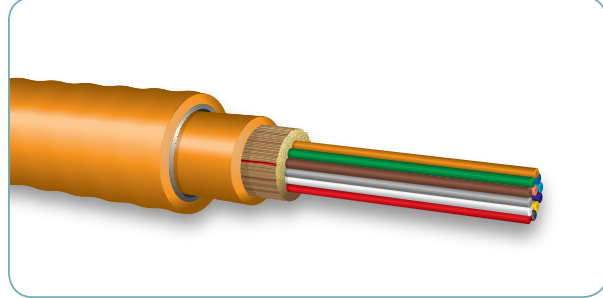


The Ultimate in Cable Protection B-Series Breakout Cables



Optical Cable Corporation's B-Series Breakout Cables provide the ultimate cable toughness at considerable savings. See pages IC 12 and IC 15 for complete details.

Interlocked Armored Cables Also Available



Special metal jackets protect fiber optic cables against mechanical and environmental damage (i.e. cut-through, dirt, etc.). In addition, Fluoropolymer jacketed plenum Interlocked armor fiber optic cables are also available that offer excellent chemical resistance.

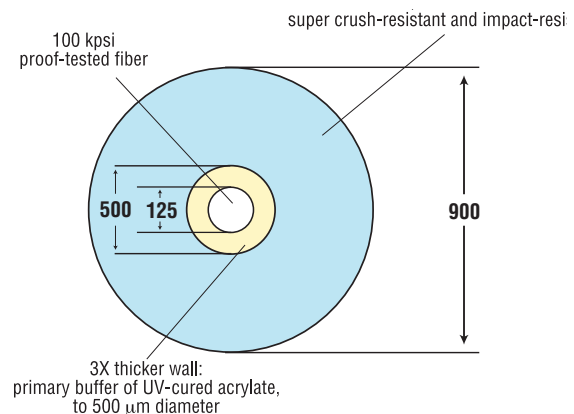
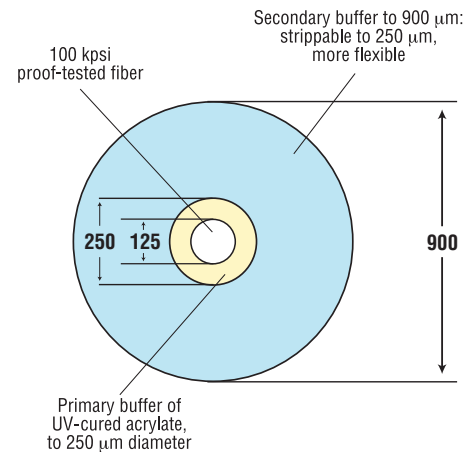
The Ultimate in Fiber Protection

Ultra-Fox™

Our Ultra-Fox™ cable features 100 kpsi proof-tested fiber, a primary coating of UV-cured acrylate material to a diameter of 250 μm , and a secondary buffer to 900 μm . The composite primary coating and secondary buffer may be mechanically removed to the 125 μm glass diameter in one step. This is typically done for direct termination with connectors. The versatile buffer system permits mechanical stripping in short lengths (about 1 cm) to remove the secondary buffer and leave the 250 μm primary coating intact. This 250 μm buffered fiber is, therefore, available for splicing to similar buffered fibers from loose-tube cables. The 250 μm coating may then be further mechanically stripped to the 125 μm glass diameter.

Ultra-Fox™ Plus

Our Ultra-Fox™ Plus cables feature 100 kpsi proof-tested fiber, a primary buffer of UV-cured acrylate material to a diameter of 500 μm and a secondary hard elastomeric buffer to 900 μm diameter. This provides the ultimate environmental and mechanical protection and is identical to the buffering on our military tactical cables. This buffering system can be easily mechanically stripped directly to the glass for termination with connectors or for splicing.





Optical Cable Corporation's fiber optic cables can make an operation safer and more productive inside or outside the plant.

Features

- Industrial Ethernet factory automation using fiber
- "Tray Rated" flame retardant cables are tested to CSA C22.2 No. 230 (tray cables)
- Flame retardant Zero Halogen cables available
- For use in intrinsically safe areas, zone transitions
- Chemical resistant outer jacketed cables available for indoor/outdoor
- Corrugated Steel Tape armor and interlocking armor cables available
- Figure-Eight Messenger Cables and Round Messenger (ADSS) Cables are available
- G-Series Subgrouping Cables are available with individual printing and labeling of the subunits for easy identification of various network segments or enterprise systems (i.e. LAN, security, and plant networks)
- Det Norske Veritas (DNV) certified and American Bureau of Shipping (ABS) approved cables available
- Small outside diameter cable for pulling through occupied conduit or tray

Applications

- Temperature and Stress Monitoring
- HMI Networks
- Leak Production Monitor
- Jetty and Loading Monitor
- Tank Farm Management
- LNG Storage Tank
- CCTV
- Card Key Access
- Motor Control Units
- DCS Systems
- Process Monitoring & Control
- Machinery Vibration Monitoring
- Perimeter Intrusion Detection
- FPSO Linkage Cables
- Ethernet Cameras
- Video Over IP
- KVM Switching and Extending
- Electronic Door Locks/Turnstiles
- SCADA
- Hazardous Environment Connectivity
- Linking Optical Communication Modules
- Optical Link Couplers
- IT Data Center
- Chemical Analyzers
- Power Usage Monitoring
- Gas Flare Monitoring
- Pipeline Security
- Photo I.D. Badging
- PLC's
- OSHA/EPA Monitoring

Certifications

- UL Listings
- Det Norske Veritas (DNV)
- American Bureau of Shipping (ABS)
- MSHA
- IMSA
- ISO 9001:2000

TYPICAL INDUSTRIES SERVED



IC 8 | INDUSTRY SOLUTIONS: INDUSTRIAL

The extensive tactical use of fiber optic cables in the military has provided the technological and economical platform for practical deployment in many other industries.

- Airplane Manufacturing
- Airports (Public, Private, Freight)
- Aluminum Refineries
- Automotive
- Bridges
- Bus Terminals
- Chemical Plants
- Containerized Freight Handling Facilities
- Distribution Pipelines
- Electronics Manufacturing
- Food & Beverage
- Furniture Manufacturing
- Glass Manufacturing
- Metals Production, Fabrication
- Military Sensitive Manufacturing
- Nuclear Facilities
- Oil/Gas Drilling
- Oil/Gas Exploration
- Oil/Gas Pipelines
- Oil/Gas Production
- Oil/Gas Refining
- Pharmaceutical
- Pulp & Paper Mills
- Railroads
- Industrial Surveillance & Alarms
- Small Manufacturing Facilities
- Steel Mills
- Stone Fabrication
- Stone Quarries
- Textile Mills
- Tire Manufacturing
- Utility Substations
- Water Reservoirs
- Water Treatment Plants



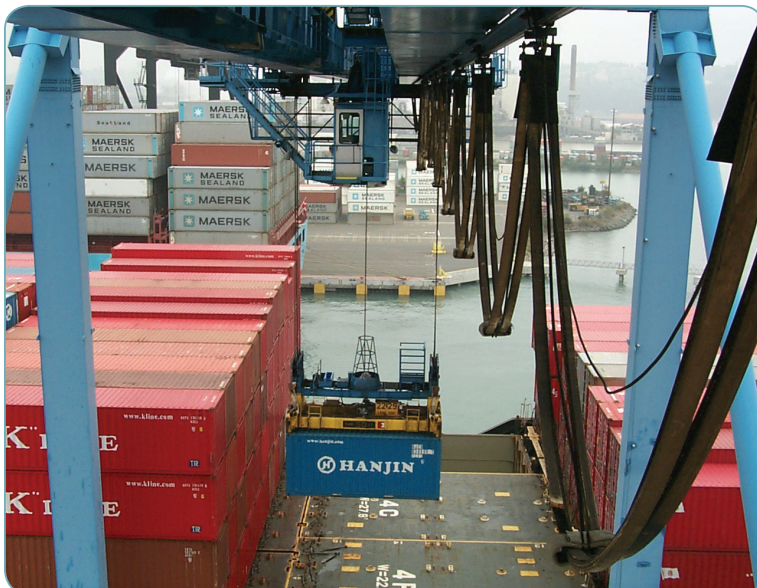
**All equipment downtime is expensive.
But when you operate the largest
container port in the Pacific Northwest,
downtime expense can be staggering.**

At the Port of Tacoma, more than \$25 billion worth of two-way trade from some 1,000 ship calls will pass through this sprawling facility each year. Much of the freight is conveyed in more than 1.5 million TEUs (20-foot equivalent units or containers) which are moved one or two containers at a time by gigantic mobile gantry cranes mounted on rails at the dockside. Equipment downtime can be exorbitant when you move \$3,000,000 worth of cargo every hour, every day, year in and year out, through this Pacific Rim gateway. Fortunately, a meticulous preventative maintenance program contributed to the Port's amazing 99.5% crane reliability in 2002.



Like many other modern industrial control systems, the cranes use fiber optic cable for control functions. These cables run out to the operator's station via long, suspended loops hanging in retractable festoons. The festoons need to be extremely flexible, expanding and retracting hundreds of times every day. Fiber optic cable, with its immunity to EMI and RFI, contributes to both the reliability and safety of these massive machines.

When it came time to replace the original fiber optic control cables for the cranes, the Port of Tacoma turned to Optical Cable Corporation for their exacting needs. Optical Cable Corporation recommended a version of its famous Military Tactical tight-buffered fiber optic cable for the job. Extremely flexible, crush and abrasion resistant, Optical Cable Corporation's fiber optic cables proved so rugged that the Port of Tacoma will eventually configure all of their crane control cables with Optical Cable Corporation's products at half the cost of the original equipment control cables.



Discover for yourself the tight-buffered cable advantage from the authority on industrial tight-buffered fiber optic cables.

Contact Optical Cable Corporation for complete details.



OUTER JACKETS



IC 10 | INDUSTRY SOLUTIONS: INDUSTRIAL

The table below is provided as a general reference guide for the properties and typical applications for the common jacket materials used in certain OCC fiber optic cable products. Please refer to the Product Specifications sections within this catalog for the various cable types and fiber counts available with the various jacket materials, or call OCC Sales to discuss your specific application requirements.

Cable Jacket Material Reference Guide

	Indoor/Outdoor					Indoor		Outdoor						
	Flame Retardant PVC	Low Temperature Oil Resistant PVC	Fluoropolymer Plenum	Flexible Fluoropolymer Plenum	Low Smoke Zero Halogen	Flame Retardant Plenum	Flexible PVC	Medium Density Polyethylene	Flame Retardant Polyurethane	Hard Polyurethane	Polyolefin	Polyurethane	Low Smoke Zero Halogen Polyurethane	Flame Retardant Tactical Polyurethane
Material Code	D	J	K	W	Z	S	N	A	E	R	X	C	G	V
Duct Installation	■	■	■	■	■	■	■	■			■			
Fungus Resistant	■	■	■	■	■	■	■	■	■	■	■	■	■	■
UV Resistant	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Water Resistant	■	■	■	■	■		■	■	■	■	■	■	■	■
Direct Burial	■		■	■	■			■						
Aerial	■	■		■	■			■	■	■	■	■	■	■
High Flex Life				■					■	■	■	■	■	■
Soft, Flexible						■	■		■			■		■
Tight Bends	■	■					■		■		■	■	■	■
Low Friction	■	■	■	■				■		■				
Minimum Operating Temp (°C)	-40	-40	-40	-40	-40	-20	-40	-40	-55	-55	-55	-55	-55	-55
Maximum Operating Temp (°C)	+85	+85	+85	+85	+70	+70	+85	+70	+85	+85	+85	+85	+85	+85
Petrochemical Resistance	■	■	■	■	■			■		■	■	■	■	■
Severe Chemical Environments			■	■				■				■		■

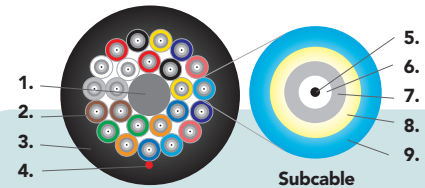
Overview

- Individual fibers and strength members protected in a subcable configuration
- Ideal configuration for reliable multiple termination point locations where subcables provide excellent strength and mechanical protection for connector termination at each device

Features

- Most rugged cable design with individual subcables for routing to diversely located intelligent devices with direct connector termination at each device
- Helically stranded cable core for flexibility, survival in difficult pulls, and excellent mechanical protection for the optical fibers
- High performance tight-buffer coating on each optical fiber for environmental and mechanical protection; Ultra-Fox™ Plus option available for maximum fiber protection
- Fibers may be directly terminated at factory devices or central locations with no further protection required
- Core-Locked™ outer jacket surrounds the subcables for excellent crush resistance, survivability, and use in long vertical installations
- Suitable for indoor and outdoor installations. Flame retardant, UV protected, moisture and fungus resistant
- Cable is ideal for direct pulling with wire mesh grips

INDUSTRIAL BREAKOUT RISER CABLE



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

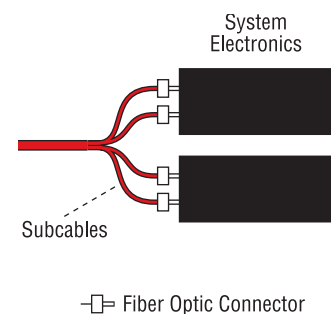
Subcable

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



Mechanical and Environmental Performance

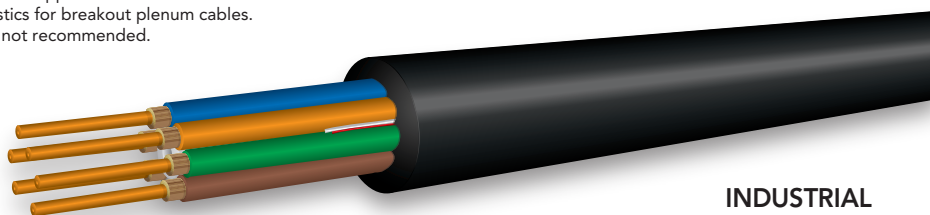
	Riser
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +85°C
Installation Temperature (cable temp.)	-10°C to +60°C
Crush Resistance	2,200 N/cm
Impact Resistance	1,500 impacts
Flex Resistance	2,000 cycles



Cable Characteristics: B-Series Breakout Riser Cables (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	8.3 (0.33)	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	14.1 (0.55)	159 (107)	6,000 (1,350)	2,500 (560)	21.2 (8.3)	14.1 (5.5)
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)
30	20.9 (0.80)	360 (242)	14,000 (3,150)	6,000 (1,350)	31.4 (12.3)	20.9 (8.2)
36	20.9 (0.80)	360 (242)	14,000 (3,150)	6,000 (1,350)	31.4 (12.3)	20.9 (8.2)
48	24.2 (0.95)	483 (325)	18,000 (4,050)	7,500 (1,690)	36.3 (14.3)	24.2 (9.5)
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)

Breakout Plenum Cables are also available for industrial applications.
See OCC's full product catalog for cable characteristics for breakout plenum cables.
Installation loads in excess of 2,700 N (600 lbs.) are not recommended.
Other fiber counts available upon request.



**INDUSTRIAL
BREAKOUT
RISER CABLE**

Ordering Information

	B	X								9		
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: Indoor/Outdoor PVC = D											
7 – 9	Fiber type: (See Laser Ultra-Fox™ Fiber Performance Table - Pg. IC 24)											
10	Ultra-Fox fiber with 900µm tight-buffer = 9											
11	Standard jacket color: Black = K											
	Optional colors available:											
	62.5 µm multimode (WLS, WLX): Orange = O											
	50 µm multimode (ALS, ALX): Orange = O											
	50 µm 10 Gigabit multimode (ALT, ALE): Aqua = A											
	Single-mode: Yellow = Y											
12	Rating: OFNR Riser = R											

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

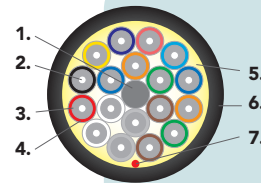
- ICEA -S-83-596
- ICEA-S-104-696
- GR-409-CORE
- TIA-568
- TIA-598

Example: 12-fiber Breakout Riser cable using 62.5 µm standard laser optimized fiber, black jacket

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

Overview

- Multiple individually tight-buffered fibers stranded within a single jacket with common strength members
- Ideal configuration for a single cable termination point requiring multiple fibers



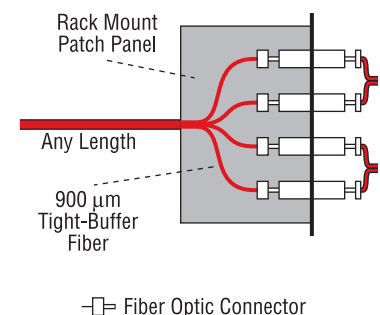
1. Central Filler
2. Optical Fiber
3. Acrylate Fiber Coating
4. Color-Coded 900 μ m Diameter Tight-Buffer
5. Aramid Strength Member
6. Outer Jacket
7. Ripcord

Features

- Compact, lightweight cable design with the highest strength-to-weight ratio
- Helically stranded cable core for flexibility, survival in difficult pulls, and excellent mechanical protection for the optical fibers
- Flexible, rugged, high strength construction for long cable pulls to multiple control devices
- May be directly terminated with connectors with physical protection at automation device termination points
- Lower total installed cost than loose 250 μ m fibers
- High performance tight-buffer coating on each optical fiber for environmental and mechanical protection; Ultra-Fox[™] Plus option available for maximum fiber protection
- Indoor/outdoor Riser (D jacket) and Plenum (K jacket) cables available. Indoor Plenum cable uses a soft plenum jacket (S type) for increased cable flexibility

Mechanical and Environmental Performance

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



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	6.0 (0.24)	34 (23)	1,600 (360)	525 (120)	9.0 (3.5)	6.0 (2.4)
10	6.5 (0.26)	43 (29)	1,800 (400)	600 (135)	9.8 (3.8)	6.5 (2.6)
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	7.3 (0.29)	48 (32)	2,700 (600)	700 (160)	11.0 (4.3)	7.2 (2.9)
24	8.9 (0.35)	67 (45)	3,000 (670)	1,000 (220)	13.4 (5.3)	8.9 (3.5)
30	9.1 (0.36)	75 (50)	3,000 (670)	1,000 (220)	13.7 (5.4)	9.1 (3.6)
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	12.3 (0.48)	135 (91)	4,800 (1,080)	1,600 (360)	18.5 (7.3)	12.4 (4.8)
72	14.0 (0.55)	177 (119)	5,400 (1,210)	1,800 (400)	21.0 (8.3)	14.0 (5.5)

* -40°C to +70°C

**Bend-tolerant 50µm

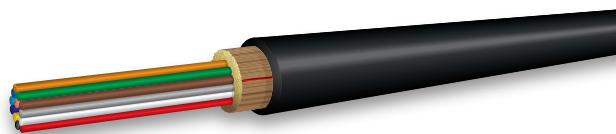
***Other standard fiber types

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

Other fiber counts available upon request.

Distribution Plenum Cables are also available for industrial applications.

See OCC full product catalog for Plenum cable specifications.



**INDUSTRIAL
DISTRIBUTION
RISER CABLE**

Ordering Information

D	X								9		
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Digit No:	1	2	3	4	5	6	7	8	9	10	11	12
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- 1 – 2 Distribution Series Ultra-Fox™ = **DX**
- 3 – 5 Fiber count: (See cable characteristics chart) = **002 - 144**
- 6 Jacket type: Indoor/Outdoor PVC = **D**
- 7 – 9 Fiber type: (See Laser Ultra-Fox™ Fiber Performance Table - Pg. IC 24)
- 10 Ultra-Fox fiber with 900µm tight-buffer = **9**
- 11 Standard jacket color: Black = **K**
- Optional colors available:
 - 62.5 µm multimode (WLS, WLX): Orange = **O**
 - 50 µm multimode (ALS, ALX): Orange = **O**
 - 50 µm 10 Gigabit multimode (ALT, ALE): Aqua = **Q**
 - Single-mode: Yellow = **Y**
- 12 Rating: OFNR Riser = **R**

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

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

Example: 12-fiber distribution riser cable using 62.5µm standard laser optimized fiber, black jacket

D	X	0	1	2	D	W	L	S	9	K	R
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Optical Cable Corporation reserves the right to change this specification without prior notification.

BREAKOUT TRAY CABLES FOR INDUSTRIAL SOLUTIONS

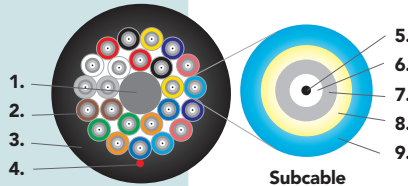


INDUSTRY SOLUTIONS: INDUSTRIAL | IC 15

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

Subcable

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



Overview

- Ideal for installations requiring an extremely rugged and reliable cable design where maximum mechanical and environmental protection are necessary
- Independently tested to CSA C22.2 No. 230 (tray cables)
- Typical industrial uses are factory automation, power generation and other utilities, oil and gas refining, and surface mining
- Easiest cable to install where direct termination of connectors to subcables and direct run to panels and equipment are desired
- Ideal for locations requiring low temperature performance along with a flame rating

Features

- Individual fibers and strength members protected in a subcable configuration
- Most rugged cable design with individual subcables for routing to diverse intelligent devices with direct connector termination at each device
- Fibers may be directly terminated at factory devices or central locations using connectors with no further protection required
- Designed for indoor/outdoor installations, including cable trays
- 2 to 72 fiber counts are available with 2.0mm or 2.5mm subcables
- Low temperature PVC outer jacket (J material) provides excellent performance and flexibility at low temperatures
- Wide operating temperature range of -50°C to +75°C
- Core-Locked™ jacket prevents cable from flattening and jacket from wrinkling in tight bends
 - Permits pulling with direct attachment of wire mesh grip; no need to access inner aramid strength members
 - Improves crush and tear resistance
 - Contains 25% more material than conventional jackets
- High crush and tensile load ratings compared to similar tray service fiber optic cables
- Oil resistant for use in industrial applications
- UL listed in accordance with NEC section 770.179(b) for use in vertical runs in building riser shafts or from floor to floor
- Designed to exceed the flammability requirements of Chapter 8 of IEEE 383

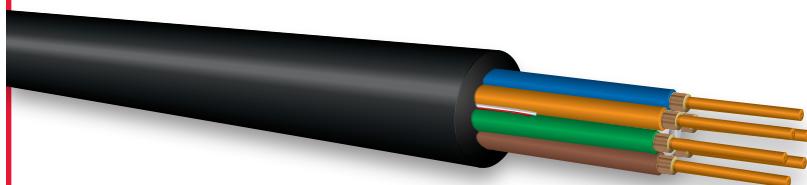
Mechanical and Environmental Performance

	Breakout Tray Cables
Operating Temperature	-50°C to + 75°C
Storage Temperature	-55°C to + 85°C
Installation Temperature (cable temp.)	-30°C to + 60°C
Flame Retardancy - Riser	OFNR (UL 1666) FT4 (CSA C22.2 No. 232)
Crush Resistance	2,200 N/cm
Impact Resistance	1,500 impacts
Flex Resistance	2,000 cycles

BREAKOUT TRAY CABLES FOR INDUSTRIAL SOLUTIONS



IC 16 | INDUSTRY SOLUTIONS: INDUSTRIAL



INDUSTRIAL BREAKOUT RISER TRAY CABLE

Optical Cable Corporation indoor/outdoor tight buffered fiber optic tray 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: Breakout Tray Cables (with 2.0mm subcables)

Fiber Count	Diameter mm (in)	Weight kg/km (lbs/1,000')	Short-Term Tensile Load N (lbs)	Long-Term Tensile Load N (lbs)	Minimum Bend Radius Installation cm (in)	Minimum Bend Radius Long Term cm (in)
2	6.0 (0.24)	40 (27)	800 (180)	200 (40)	9.0 (3.5)	6.0 (2.4)
4	6.9 (0.27)	52 (35)	1,600 (360)	400 (90)	10.4 (4.1)	6.9 (2.7)
6	8.1 (0.32)	67 (45)	2,400 (540)	600 (130)	12.2 (4.8)	8.1 (3.2)
8	9.4 (0.37)	88 (59)	3,200 (720)	800 (180)	14.1 (5.6)	9.4 (3.7)
12	10.9 (0.43)	108 (73)	4,800 (1,000)	1,200 (270)	16.4 (6.5)	10.9 (4.3)
18	12.6 (0.50)	156 (105)	6,000 (1,350)	1,500 (340)	18.9 (7.4)	12.6 (5.0)
24	14.7 (0.58)	218 (146)	7,200 (1,600)	1,800 (400)	22.1 (8.7)	14.7 (5.8)
30	16.8 (0.66)	268 (180)	9,600 (2,100)	2,400 (540)	25.2 (9.9)	16.8 (6.6)
36	16.8 (0.66)	268 (180)	9,600 (2,100)	2,400 (540)	25.2 (9.9)	16.8 (6.6)
48	20.1 (0.79)	387 (260)	12,000 (2,700)	3,000 (680)	30.2 (11.9)	20.1 (7.9)
60	22.7 (0.89)	489 (329)	15,000 (3,400)	3,750 (850)	34.1 (13.4)	22.7 (8.9)
72	26.0 (1.02)	652 (438)	16,800 (3,800)	4,200 (900)	39.0 (15.4)	26.0 (10.2)

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

Ordering Information

	B	E				J				9	K	R
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12

- 1 – 2 Breakout Series Ultra-Fox™ 2.0mm Subcables = **BE**
 3 – 5 Fiber count: (See cable characteristics chart) = **002 - 072**
 6 Jacket type: Indoor/Outdoor Tray = **J**
 7 – 9 Fiber type: (See Laser Ultra-Fox™ Fiber Performance Table - Pg. IC 24)
 10 Ultra-Fox fiber with 900µm tight-buffer = **9**
 11 Standard Jacket Color: Black = **K**
 12 Rating: Riser = **R**

Example: 12-fiber riser rated tray cable using 62.5µm standard Laser Ultra-Fox fiber, 2.0mm subcable, black jacket

B	E	0	1	2	J	W	L	S	9	K	R
---	---	---	---	---	---	---	---	---	---	---	---

Optical Cable Corporation reserves the right to change this specification without prior notification.

SUBGROUPING TRAY CABLES FOR INDUSTRIAL SOLUTIONS



INDUSTRY SOLUTIONS: INDUSTRIAL | IC 17

Overview

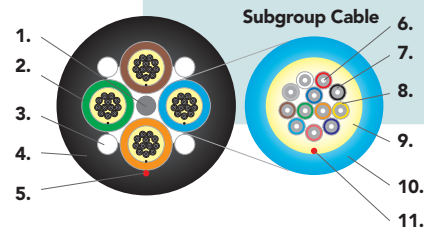
- Ideal for installations requiring a rugged and reliable cable design where maximum mechanical and environmental protection are necessary
- Design allows multi-fiber subcables to be routed to multiple locations such as wiring racks and closets
- Typical industrial uses are factory automation, power generation and other utilities, oil and gas refining, and surface mining
- Independently tested to CSA C22.2 No. 230 (tray cables)

Features

- Best design for multimode and single-mode fiber hybrid/composite cables
- Color-coded subcables are easy to identify for improved cable management in routing and termination
- Designed for indoor/outdoor installations, including cable trays
- 12- to 144-fiber configurations are available
- Low Temperature PVC outer jacket (J material) provides excellent performance and flexibility at low temperatures
- Wide operating temperature range of -50°C to +75°C
- Core-Locked™ jacket prevents cable from flattening and jacket from wrinkling in tight bends
 - Permits pulling with direct attachment of wire mesh grip; no need to access inner aramid strength members
 - Improves crush and tear resistance
 - Contains 25% more material than conventional jackets
- High crush and tensile load ratings compared to similar tray service fiber optic cables
- Oil resistant for use in industrial applications
- UL Listed in accordance with NEC section 770.179(b) for use in vertical runs in building riser shafts or from floor to floor
- Designed to exceed the flammability requirements of OFN IEEE 383



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



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

- ICEA -S-83-596
- ICEA-S-104-696
- GR-409-CORE ISSUE 2
- TIA-568
- TIA-598

Mechanical and Environmental Performance

	Subgrouping Tray Cables
Operating Temperature	-50°C to + 75°C
Storage Temperature	-55°C to + 85°C
Installation Temperature (cable temp.)	-30°C to + 60°C
Flame Retardancy - Riser	OFNR (UL 1666) FT4 (CSA C22.2 No. 232)
Crush Resistance	2,100 N/cm
Impact Resistance	1,500 impacts
Flex Resistance	2,000 cycles

SUBGROUPING TRAY CABLES FOR INDUSTRIAL SOLUTIONS



IC 18 | INDUSTRY SOLUTIONS: INDUSTRIAL

Cable Characteristics: 6-Fiber Subcables (4.5mm subcables)

Fiber Count	Diameter mm (in)	Weight kg/km (lbs/1,000')	Short-Term Tensile Load N (lbs)	Long-Term Tensile Load N (lbs)	Minimum Bend Radius Installation cm (in)	Minimum Bend Radius Long Term cm (in)
12	14.6 (0.57)	221 (149)	3,800 (850)	1,200 (270)	21.9 (8.6)	14.6 (5.7)
18	14.6 (0.57)	222 (149)	4,700 (1,060)	1,800 (400)	21.9 (8.6)	14.6 (5.7)
24	14.6 (0.57)	223 (150)	5,600 (1,260)	1,800 (400)	21.9 (8.6)	14.6 (5.7)
30	15.6 (0.61)	254 (171)	7,500 (1,690)	2,400 (540)	23.4 (9.2)	15.6 (6.1)
36	16.9 (0.67)	297 (200)	8,900 (2,000)	2,850 (640)	25.4 (10.0)	16.9 (6.7)

Cable Characteristics: 12-Fiber Subcables (5.5mm subcables)

Fiber Count	Diameter mm (in)	Weight kg/km (lbs/1,000')	Short-Term Tensile Load N (lbs)	Long-Term Tensile Load N (lbs)	Minimum Bend Radius Installation cm (in)	Minimum Bend Radius Long Term cm (in)
24	16.6 (0.65)	274 (184)	4,600 (1,030)	1,500 (340)	24.9 (9.8)	16.6 (6.5)
36	16.6 (0.65)	272 (183)	5,900 (1,330)	1,050 (440)	24.9 (9.8)	16.6 (6.5)
48	16.6 (0.65)	270 (181)	7,200 (1,620)	2,400 (540)	24.9 (9.8)	16.6 (6.5)
60	18.4 (0.72)	323 (217)	9,500 (2,140)	3,150 (710)	27.6 (10.9)	18.4 (7.2)
72	20.1 (0.79)	380 (255)	11,300 (2,540)	3,750 (840)	30.2 (11.9)	20.1 (7.9)
84	21.8 (0.86)	443 (298)	13,100 (2,950)	4,350 (980)	32.7 (12.9)	21.8 (8.6)
96	23.6 (0.93)	513 (345)	14,900 (3,350)	4,950 (1,110)	35.4 (13.9)	23.6 (9.3)
108	25.7 (1.01)	608 (409)	18,200 (4,090)	6,000 (1,350)	38.6 (15.2)	25.7 (10.1)
120	27.7 (1.09)	707 (475)	19,500 (4,380)	6,450 (1,450)	41.6 (16.4)	27.7 (10.9)
132	28.1 (1.11)	669 (450)	20,800 (4,680)	6,900 (1,550)	42.2 (16.6)	28.1 (11.1)
144	28.2 (1.11)	668 (449)	22,100 (4,970)	7,350 (1,650)	42.2 (16.6)	28.1 (11.1)

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

Ordering Information

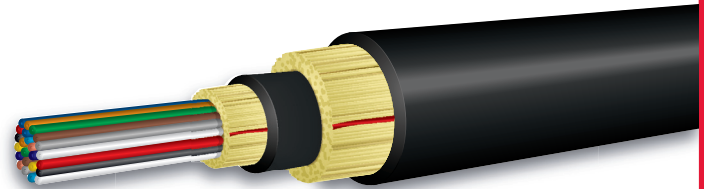
	G					J				9	K	R
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12
1	Subgrouping Series Ultra-Fox™ = G											
2	6-fiber subgroups = B ; 12-fiber subgroups = X											
3 – 5	Fiber count: 6-fiber subcables = 012-036 ; 12-fiber subcables = 024-144											
6	Jacket type: Indoor/Outdoor Tray = J											
7 – 9	Fiber type (See Laser Ultra-Fox™ Fiber Performance Table - Pg. IC 24)											
10	Ultra-Fox fiber with 900µm tight-buffer = 9											
11	Standard jacket colors: Black = K (other jacket colors available upon request)											
12	Rating: Riser = R											

Example: 48-fiber riser rated tray cable (12-fiber subgroups) using 62.5µm Laser Ultra-Fox fiber, black jacket –

G X 0 4 8 J W L S 9 K R

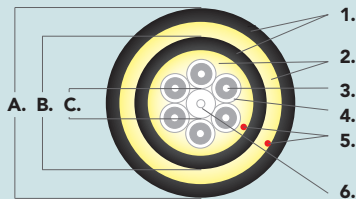
Features

- Low-Smoke Zero Halogen (LSZH) cable
- Rugged cable for deck applications
- Flame retardant
- 2- to 6-fiber double jacketed D-Series Distribution cable constructions are available
- Optical fiber types includes 62.5/125, 50/125, and single-mode
- Available with 500µm primary acrylate coated fiber for maximum mechanical and environmental protection of the optical fiber
- DNV Certified
- Meets IEC Standards for flame spread, smoke density and halogen content



Used in signaling, communication, and data transmission for fixed and temporary networks for fiber optic applications for speed ships, light craft, petrochemical offshore drilling structures such as Mobile Offshore Drilling Units (MODU's), Floating Production Storage and Offloading (FPSO) vessels, Tension Leg Platforms (TLP), Liquefied Natural Gas (LNG) terminals and ships, workboats, floatels, drillships, etc.

1. LSZH Indoor/Outdoor Flame Retardant Jackets
 2. Water Blocking Aramid Yarns
 3. Multimode or Single-mode Fibers (see matrix for configurations)
 4. Color Coded 900 µm Hard Elastometric Tight-Buffer
 5. Ripcords (2 - 1 per jacket)
 6. Central Filler
- A. 9.5 (±0.5)
B. 5.5 (±0.3)
C. 0.9 (±0.05)



Mechanical and Environmental Performance

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	IEC 60332-1, 60332-3
Crush resistance	IEC 60794-1-2-E3 Cat. A
Impact resistance	IEC 60794-1-2-E4 Cat. A



General Cable and Fiber Specifications

Spec	Test
IEC 60794-1-2-E1	Tensile Strength
IEC 60794-1-2-E3	Crush
IEC 60794-1-2-E4	Impact
IEC 60794-1-2-E6	Repeated Bending
IEC 60794-1-2-E7	Torsion
IEC 60794-1-2-E10	Kink
IEC 60794-1-2-E11	Cable Bend
IEC 60794-1-2-E11	Cold Bend Test
IEC 60794-2-F5	Water Penetration
IEC 60794-1-2-F1	Temperature Cycling
IEC 60332-1	Flame-Retardant
IEC 60332-3	Test on Bunched Wires or Cables, Cat. A

Spec	Test
IEC 60754-1	Halogen-Free Test
IEC 60754-2	Determination of Degree of Acidity of Gases
IEC 61034-2	Smoke Density
IEC 60811-1-1 Clause 9	Mechanical Characteristics Without Aging
IEC 60811-1-2 Subclause 8.1	Mechanical Characteristics After Aging in Air Oven
IEC 60811-3-1 Subclause 8.2	Maximum Permissible Deformation
IEC 60811-3-1	Heat Shock Test
IEC 60811-1-4	Elongation Test
IEC 60811-1-4 Subclause 8.5	Cold Impact Test

Cable Characteristics: DNV Certified Shipboard and Deck Cables

Fiber Count	Diameter mm (in)	Weight kg/km (lbs/1,000')	Short-Term Tensile Load N (lbs)	Long-Term Tensile Load N (lbs)	Minimum Bend Radius Installation cm (in)	Minimum Bend Radius Long Term cm (in)
2-6	9.5 (0.37)	95 (64)	1,200 (270)	400 (90)	14.3 (3.2)	9.5 (2.1)

Ordering Information

Base cable part number is OCO31016. The suffix indicated in the table below is added to complete the part number based on the fiber type needed.

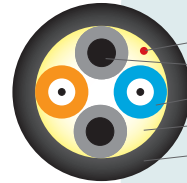
Example: 4-fiber DNV-Certified cable with WLS fiber = **OC031016-01**

Fiber Count	Fiber Type	Fiber Buffer	Suffix (XX)
2	WLS	Ultra-Fox	-13
2	WST	Ultra-Fox Plus	-14
2	ALS	Ultra-Fox	-15
2	AST	Ultra-Fox Plus	-16
2	SLX	Ultra-Fox	-17
2	SLS	Ultra-Fox Plus	-18
4	WLS	Ultra-Fox	-01
4	WST	Ultra-Fox Plus	-02
4	ALS	Ultra-Fox	-03

Fiber Count	Fiber Type	Fiber Buffer	Suffix (XX)
4	AST	Ultra-Fox Plus	-04
4	SLX	Ultra-Fox	-05
4	SLS	Ultra-Fox Plus	-06
6	WLS	Ultra-Fox	-07
6	WST	Ultra-Fox Plus	-08
6	ALS	Ultra-Fox	-09
6	AST	Ultra-Fox Plus	-10
6	SLX	Ultra-Fox	-11
6	SLS	Ultra-Fox Plus	-12

Overview

- Various combinations of copper conductors and optical fibers in a single composite cable
- Hundreds of combinations possible – contact Optical Cable Corporation for a cable design to match your electro-optical system requirements



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

Features

- 12, 14, 16, 18 gauge single-stranded copper wire available to power plant communications, control sensors, SCADA, and video components
- Other data and voice grade, or power conductors are available
- Composite fiber/copper cables are intended for use on Class 2 power circuits as described in Article 725 of the National Electrical Code
- Larger gauge wires overcome powering distance limitations of Unshielded Twisted Pair
- Copper and fiber individually subcabled for ease of separation, handling, and termination
- Round cable design for easy installation and survivability
- Many combinations available with Riser ratings or Plenum ratings
- Various fiber types can be specified
- Chemical resistant outer cable jacket for indoor/outdoor plant environments (K jacket)



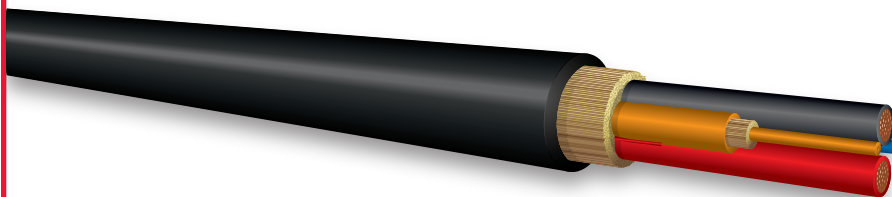
Cable Characteristics

	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	CL2P-OF (UL 13)	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 for the Composite Fiber/Copper Cable design that meets your special application requirements.*

Optical Cable Corporation composite tight buffered fiber optic and copper cables meet the functional requirements of the following standards:

- UL 13
- MSHA rated available



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 – 012**) + Copper Conductors (**002 – 004**)
Example: 2-fiber/2-copper = **004**
- 6 Jacket type: Fluoropolymer indoor/outdoor plenum = **K**; PVC indoor/outdoor riser = **D**
- 7 – 9 Fiber/Copper type: Contact Optical Cable Corporation for 3 digit part number code
- 10 Ultra-Fox fiber with 900µm 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 10 Gigabit (ALT, ALE): Aqua = **Q**
Single-mode: Yellow = **Y**
- 12 Rating: Plenum = **P**; Riser = **R**

Example: 2-fiber/2AWG-18 copper cable using 62.5µm standard Laser Ultra-Fox fiber, orange jacket –

C	X	0	0	4	K	.	.	.	9	O	P
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* Contact OCC for specific part number



Overview

- Flexible, rugged, polyurethane outer cable jacket
- Each fiber has military grade hard elastomeric 900µm buffer, aramid strength members and 2.5mm subcable jacket for excellent fiber protection
- Resistant to oils and gases
- Wide operating and storage temperature range
- UV protected, fungus and water resistant

Features

- Minimum operating bend radius of 10 times the cable outside diameter
- Capable of withstanding 100 mph side-wind loading
- Tight-buffered cable design - no gel to migrate down the cable due to vibration or vertical installation and no axial migration of fibers
- Capable of vertical distances greater than 1,000 meters – still meets and maintains performance requirements
- Helically stranded subunits ensure flexibility and increased mechanical strength
- Core-Locked™ outer jacket for excellent crush and impact protection and improved tear resistance

Festoon Cables Product Specifications

Fiber Count	Single-Mode Ultra-Fox Plus	Ultra-Fox Plus 62.5/125 Multimode	Ultra-Fox Plus 50/125 Multimode
6	OCO20912-01	OCO20912-11	OCO20912-21
8	OCO20912-02	OCO20912-12	OCO20912-22
10	OCO20912-03	OCO20912-13	OCO20912-23
12	OCO20912-04	OCO20912-14	OCO20912-24
18	OCO20912-05	OCO20912-15	OCO20912-25

Mechanical and Environmental Performance

	Festoon Cables
Operating Temperature	-55°C to +85°C
Storage Temperature	-70°C to +85°C
Crush Resistance	440 N/cm (EIA/TIA-455-41 mil. requirement)
Impact Resistance	200 impacts (TIA/EIA-455-25 mil. requirement)
Flex Resistance	2000 cycles (TIA/EIA-455-104)

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
ABS	50/125 Standard Bend-Tolerant	850/1310	OM2 ISO/IEC 11801	600/600	82/300 [^]	3.5/1.5 ³	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
ABX	50/125 Bend-Tolerant	850/1310	OM2+ ISO/IEC 11801	750/600	300/300 ^{^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
ABT	50/125 (550 meter 10-GbE) Bend-Tolerant	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	OM4 ISO/IEC 11801	1040/600	550 ¹ /300 ^{^2}	3.0/1.0 ³	4700/500	3500/500
ABE	50/125 (550 meter 10-GbE) Bend-Tolerant	850/1310	OM4 ISO/IEC	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-Tolerant Single-mode	1310/1550	ITU-T G.657.A1 ITU-T G.652.D	5 km ⁴	10 km ⁵	0.5/0.5	—	—

* Minimum Laser Effective Modal Bandwidth (EMB)

** 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 loss² Supports 220 meter 10GBASE-LRM distance, or 300 meter 10GBASE-LRM distance with 300 meter capable equipment³ 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 jacketing⁴ 10 km for 1310 nm 1000BASE-LH, and 5 km for 1310 nm 1000BASE-LX⁵ 10 km for 1310 nm 10GBASE-LR, and 40 km for 1550 nm 10GBASE-ER⁶ Typical Mode Field Diameter at 1310 nm**Note:** Many other fiber types, fiber bandwidth, and attenuation performances are available.

Ultra-Fox™ Plus 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 EMB Bandwidth* (MHz-km)	Minimum OFL LED Bandwidth** (MHz-km)
WST	62.5/125/500	850/1310	OM1 ISO/IEC 11801	275/550	33/300 [^]	3.5/1.5	200/500	200/500
WLS	62.5/125/500 Laser Grade	850/1310	OM1 ISO/IEC 11801	300/600	33/300 [^]	3.5/1.5	220/500	200/500
AST	50/125/500	850/1310	OM2 ISO/IEC 11801	550/550	82/300 [^]	3.5/1.5	500/500	500/500
ALS	50/125/500 LaserGrade	850/1310	OM2 ISO/IEC 11801	600/600	82/300 [^]	3.5/1.5	510/500	500/500
ALT	50/125/1500 (300 meter, 10-GbE) Laser Grade	850/1310	OM3 ISO/IEC11801	1000/600	300/300 ^{^1}	3.5/1.5	2000/500	1500/500
SLS	9 ² /125/500 Single-mode	1310/1550	ITU-T G.652.A	5 km ³	10 km ⁴	0.5/0.5	—	—
SLX	9 ² /125/500 Low Water Peak Single-mode	1310/1550	ITU-T G.652.D	5 km ³	10 km ⁴	0.5/0.5	—	—
SLA	9 ² /125/500 Bend Tolerant Single-mode	1310/1550	ITU-T G.657.A1 ITU-T G.652.D	5 km ³	10 km ⁴	0.5/0.5	—	—

Custom Cables

Optical Cable Corporation offers extreme flexibility in providing customers with customized tight-buffered fiber optic cables for their special requirements— not just standard off-the-shelf items. If you need a custom cable, please call Optical Cable Corporation at 1-800-622-7711 or (540) 265-0690.

* Minimum Laser Effective Modal Bandwidth (EMB)

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

[^] 1310 nm CWDM lasers (10GBASE-LX4)

¹ Typical Mode Field Diameter at 1310 nm = 9 microns

² 10 km for 1310 nm 1000BASE-LH, and 5 km for 1310 nm 1000BASE-LR

³ 10 km for 1310 nm 10GBASE-LR, and 40 km for 1550 nm 10GBASE-ER

Note: Other fiber bandwidth, and attenuation performances are available. Laser optimized fiber types available as special order. Contact Optical Cable Corporation for details.

SEAMLESS INTEGRATION

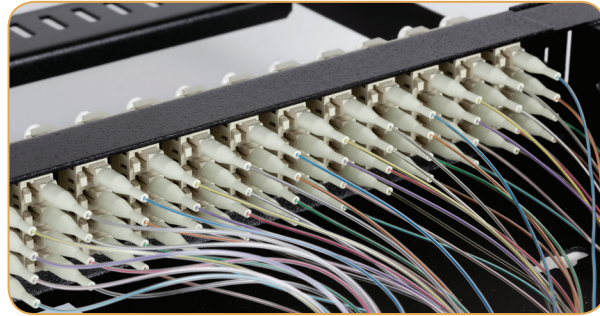
The first prerequisite for seamless integration is the melding of like products to work together.

In May 2008, Optical Cable Corporation acquired SMP Data Communications, a company internationally recognized for its role in establishing data communication connectivity standards, through its innovative and patented technologies, and offering a full range of fiber optic and copper data communication connectivity products.



SMP Data Communications, headquartered near Asheville, North Carolina is a wholly owned subsidiary of Optical Cable Corporation (NASDAQ GM: OCCF).

The uncompromising principles that led to the development of the first OCC products remain a constant influence on the design, production and service at Optical Cable Corporation. End-users benefit from fiber optic cables and connectivity products that are easy and economical to install, provide a high degree of reliability and deliver exceptional performance.



Optical Cable Corporation is committed to building on the spirit of innovation while staying focused on meeting the changing needs of customers worldwide.

Turn to pages FC 2-FC 22 to see the complete suite of connectivity solutions now offered through the leader in copper and fiber optic connectivity.

