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Company Narrative	
Certified Installer/MDIS Information.	
Quality Assurance	4
Warranty Information	4

### 2.0 Solutions

10
10

## 3.0 Fiber Optic Cables



### 3.1 Fiber Product Information 3.1a Laser Ultra-Fox™ Cables and Laser Ultra-Fox™ DE Cables .......12

3.1c	Fiber Buffer Options	15
3.1d	Outer Cable Jacket Materials	16
3.1e	D-Series Distribution Indoor/Outdoor Typical Termination Approach	17
3.1f	G-Series Subgrouping Indoor/Outdoor Typical Termination Approach	18
3.1g	B-Series Breakout Indoor/Outdoor Typical Termination Approach	19
3.1h	Fiber Cable Configurator	20
	OptiReel™ – Fiber Optic Cable Box	22
3.1j	Laser Ultra-Fox™ Fiber Performance	23
2 11	Liltra Fox™ Dius Fiber Perfermance	24



### 3.2

Indo	oor/Outdoor Cables	
3.2a	D-Series Distribution – Riser Rated Cables	26
3.2b	D-Series Distribution – Plenum Rated Cables	28
3.2c	D-Series Distribution – LSZH OFNR-LS and IEC Rated Cables	3′
3.2d	D-Series Distribution – Interlocking Armor (ILA) Riser Rated Cables	33
3.2e	D-Series Distribution – Interlocking Armor (ILA) Plenum Rated Cables	35
3.2f	D-Series Distribution – Corrugated Steel Tape Armored Riser Rated Cables	37
3.2g	D-Series Distribution – Rodent Deterrent (FRP) Riser Rated Cables	39
3.2h	B-Series Breakout – Riser Rated Cables	4′
3.2i	B-Series Breakout – Plenum Rated Cables	44
3.2j	B-Series Breakout – LSZH OFNR-LS and IEC Rated Cables	46
3.2k	B-Series Breakout – Riser Rated Tray Cables	48
3.2l	B-Series Breakout – Interlocking Armor (ILA) Riser Rated Cables	5′
3.2m	B-Series Breakout – Interlocking Armor (ILA) Plenum Rated Cables	53
3.2n	B-Series Breakout – Rodent Deterrent (FRP) Riser Rated Cables	55
3.2o	G-Series Subgrouping – Riser Rated Cables	57
3.2p	G-Series Subgrouping – Plenum Rated Cables	59
3.2q	G-Series Subgrouping – Riser Rated Tray Cables	6′
3.2r	G-Series Subgrouping – Interlocking Armor (ILA) Riser Rated Cables	
3.2s	G-Series Subgrouping – Interlocking Armor (ILA) Plenum Rated Cables	65
3.2t	G-Series Subgrouping – Rodent Deterrent (FRP) Riser Rated Cables	67
3.2u	HC-Series – High-Density Riser Rated Cables	69
3.2v	CX-Series Composite – Copper/Fiber Riser and Plenum Rated Cables	7′













3.3	Assembly and Data Center Cables	
	<ul> <li>3.3a A-Series Assembly – Riser, Plenum and LSZH IEC Rated Cables</li> <li>3.3b A-Series Micro-Assembly – Riser, Plenum and LSZH Cables (2.0mm)</li> <li>3.3c A-Series Micro-Assembly – Riser, Plenum and LSZH Cables (1.6mm)</li> <li>3.3d DP-Series Assembly – Mini-Round Duplex: Riser, Plenum and LSZH Cables</li> <li>3.3e HD-Series – High-Density Plenum Rated Cables</li> <li>3.3f HD-Series – High-Density Riser and LSZH IEC Rated Cables</li> <li>3.3g Furcation Tubing</li> </ul>	76 78 80 82 85
3.4	Outdoor Cables  3.4a A-Series – Special-Purpose Cables	92 96 98 .100 .102 .104 .105
3.5	Military Cables  3.5a D-Series Distribution Mil-Tac Cables  3.5b D-Series Distribution Mil-Tac Rodent Deterrent (FRP) Cables  3.5c DOD QPL-85045 Qualified Products  3.5d Military Tactical Fiber Optic Cables for Extreme Environments  3.5e B-Series Breakout – Mil-Tac Cables  3.5f B-Series Breakout – Mil-Tac Rodent Deterrent (FRP) Cables	.113 .116 .117 .119
3.6	Broadcast Deployable Cables  3.6a D-Series Distribution – Field Broadcast Cables  3.6b D-Series Distribution – Field Broadcast Rodent Deterrent (FRP) Cables  3.6c B-Series Breakout – Field Broadcast Cables  3.6d B-Series Breakout – Field Broadcast Rodent Deterrent (FRP) Cables  3.6e CX-Series – Deployable/Composite Copper/Fiber Cables  3.6f The Case for Helically Stranded Cables	.129 .132 .134 .137
3.7	Mining Cables  3.7a D-Series Distribution – MSHA-Rated Mining Cables	.142 .144 .146 .148





3.8	Ship	Shipboard & Offshore Cables						
		D-Series Distribution – LSZH ABS-Approved Cables	154					
		D-Series Distribution – LSZH Braided-Armor ABS-Approved Cables	156					





### 4.0 Fiber Optic Connectivity

4.1	LANC	components	
	4.1a	RTC Series Enclosures	170
	4.1b	RTS Series Enclosures	171
	4.1c	Specialty Enclosures	172
	4.1d	BHP Series	173
	4.1e	RSC Enclosures	174
	4.1f	R-Series Splice Kits	175
	4.1g	Locking Kits & Brackets	176
	4.1h	WTC Cabinets	178
	4.1i	W-Series Splice Kits	179
	4.1j	Zone Distribution Enclosure	180
4.2	Uncon	trolled Environment Enclosures	
	4.2a	NEMA 3 Enclosures	181
	4.2b	NEMA 4X Enclosures	182
	4.2c	Fibreguard™ Enclosures	183
4.3	Adapt	er Panels	
	4.3a	Adapter Plates	185
	4.3b	Keyed Adapter Plates	188
4.4	Conne	ectors and Tools	
	4.4a	Anaerobic Connectors	189
	4.4b	Xpress Connectors	190
	4.4c	Cleaners and Tools	191
4.5	Acces	sories	
	4.5a	Splice-Trays	192
4.6	Assem		
	4.6a	Fiber Optic Jumpers and Pigtails	193
	4.6b	Keyed LC	
	4.6c	Fiber Optic Pigtails	195
	4.6d	Secure LC	196
4.7	Pre-Te	rminated Enclosures	
	4.7a	Procyon Fiber Panel	
	4.7b	Procyon MTP-MTP Cassette	200
	4.7c	Procyon MTP-LC Cassette	
	4.7d	MT	
	4.7e	RTC	
	4.7f	Loaded Enclosures	.204





5.0	Сор	per	Cables	
	5.1	Categ	gory 6A	
		5.1a	UTP Copper Cables	20
		5.1b	U/FTP Copper Cables	20
	5.2	Categ		
		5.2a	6+ UTP Copper Cables	
		5.2b	UTP Copper Cables	
	5.3		jory 5e	
	5.4	Shield	led Cable Construction and Nomenclature	21
6.0			Connectivity	
	6.1		gory 6A	
			Outlet Jacks	
			Patch Panels	
				22
	6.2	Catego		20
			Jacks Patch Panels	
		6.2c		
			110 Blocks	
	6.3	Categ		
				22
		6.3b	Patch Panels	22
		6.3c	Cable Assemblies	23
		6.3d	110 Blocks	23
	6.4	Voice I	Products	
		6.4a	Jacks	23
			Patch Panels	
	6.5		nedia Panels	23
	6.6		erminated Copper	
		6.6a	Category 5e Pre-Terminated Copper	
		6.6b	Quad Box	
	6.7	6.6c	Procyon Copper System ured Cabling System Protocols	
				24
7.0	Woı	rksta	ation Products	
		KMJ A	Adapters	24
	7.2	UMJ A	Adapters	24
			Inserts	
	7.4		ed Axcess™	
	7.5		Faceplates	
	7.6		Faceplates	
	7.7	Surfac	ce Mount Products	25
8.0			ntial Products	
	8.1		E <sup>™</sup> Enclosures	
	8.2	Modul	les	26







)	9.0	Cak	oinets, Racks & Enclosures	
		9.1	Freestanding Racks & Cabinets	268
		9.2	Wall-Mount Racks, Cabinets & Brackets	
		9.3	Shelving	
		9.4	Cable Management	
,		9.5	Accessories	
١	10.0	Mili	itary/Harsh Environment Connectors	
	10.0	10.1	F-LINK™ Inter-Connect Solution	204
		10.1	OCC Pierside Family	
		10.2	EZ-Mate™ Connectors	
		10.4	Commercial COTS-83526	
)		10.5	R-Jack® Solution	
		10.6	Intelligent Release Inter-Connect System (IRIS™)	
		10.7	MHC® II Fiber Optic Connector	
		10.8	MIL-C-83522 ST and ST Adapters	
		10.9	Military Specified (QPL) M29504/14 and M29504/15	
			Fiber Optic Termini	341
	11.0	Mili	itary/Harsh Environment Deployable Systems	
		11.1	Modular Advanced Reel Systems (MARS) – Features and Benefits	346
		11.2	Modular Advanced Reel Systems (MARS) – Options	
		11.3	Modular Advanced Reel Systems (MARS) – Performance Specifications	
		11.4	Modular Advanced Reel Systems (MARS) – Cartridge System	
′				
	12.0	Wir	eless Systems	
			Cellular Distribution System®	354
			CDS – Dual Band Systems	356
			CDS – 1900 MHz Systems	357

 12.4
 CDS – 850 MHz Systems
 358

 12.5
 CDS – Ordering Information
 359

 12.6
 CDS – Improved In-Building Cell Service
 360







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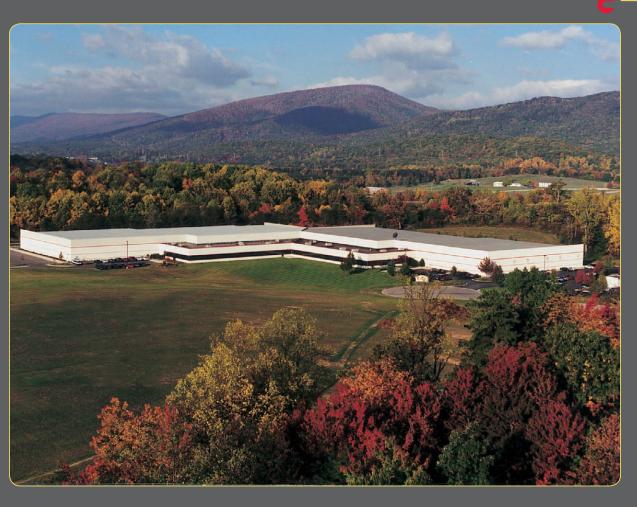


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Join the converstion on Linked-In, or visit http://www.linkedin/groups/optical-cable-corporation



From the development of our first cables through our current product offering, which ranks among the industry's most comprehensive, Optical Cable Corporation (OCC®) is a company that provides uncompromising product quality and performance, with solutions for a multitude of markets and applications.

OCC has earned a reputation as an industry leader, an innovator and a designer of some of the highest-performing cabling and connectivity products available. For years, OCC has been internationally recognized for pioneering the design and production of fiber optic cables. Today, OCC is internationally recognized as a leader in engineering and manufacturing a complete line of top-tier cabling and connectivity solutions, including products and solutions suitable for the most demanding applications.

### **Corporate Overview**

Company Narrative	2
OCC MDIS Program	4
OCC Quality Assurance	4
OCC Warranties	4

## **CORPORATE OVERVIEW**



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Company Narrative

## We started by revolutionizing the design of a cable. We evolved to change the way the world communicates.

Founded in 1983, OCC was among the first companies to realize the potential of fiber optics through designing and manufacturing some of the most reliable, rugged and innovative cable products in the world. The U.S. military needed an extremely strong, lightweight, rugged and survivable fiber optic cable, able to efficiently transmit previously unprecedented volumes of data in the field. OCC and its engineers were at the forefront of the development of the tight-buffered, tight-bound cable technology that met these criteria. The result: cables that were easy to deploy and performed under the harshest of conditions.

OCC's success in the battlefield provided a foundation for the creation of a broad fiber optic cable offering built on the evolution of our technologies, as well as opportunities to expand our product offerings beyond fiber optic cabling.

OCC has evolved into a world-class provider of a complete line of fiber optic and copper cabling and connectivity products to a broad customer base. While our heritage started with the military, our expertise now extends into the enterprise, broadcast, industrial, harsh environment and various specialty markets, and reaches worldwide through our network of distributors with customers in more than 70 countries.

The acquisition of two industry leaders enabled OCC to easily transition from a leading provider of fiber optic cables to a company offering a complete integrated suite of cabling and connectivity solutions.

Located just outside of Asheville, our North Carolina facility manufactures products using innovative and patented technologies, offering our customers a full range of fiber optic and copper data communication connectivity products. OCC engineers at this facility actively develop products not only to enhance

connectivity and networking but also to establish test and measurement standards for the entire communications industry.

Our Dallas, Texas, facility provides OCC with innovative expertise and the capability to manufacture specialty fiber optic connectors and connectivity solutions for military and harsh environment applications. OCC's groundbreaking innovations in hardened connectors have become the standard for field tactical military communications, stadium broadcasts, and critical mining applications.

By expanding our capabilities and product offerings, we have strategically positioned OCC to support our customers' need for increasingly sophisticated communications infrastructure and end-to-end cabling and connectivity solutions. Before being acquired by OCC, each new facility was a world-class technology leader in its own right. Now, together as Optical Cable Corporation, we have become a total cabling and connectivity solutions provider for our customers.

## TODAY – Helping the world communicate faster.

Today OCC products are at work from mission critical data center applications to broadcast cables transmitting on location; consistently meeting the demanding survivability standards for the toughest environmental and mechanical stresses. From extreme temperatures to dust, chemicals and vibration – even in mining applications where installations stretch for miles – OCC products are relied upon time and time again for successful environmental and safety monitoring; equipment control; security; and voice, data and video communications. We are proud that our products provide the conduit that helps business, government, and the military communicate with speed and clarity.

### OCC is:

- listed on the NASDAQ Global Market (ticker symbol: OCC)
- ISO 9001:2008 registered, and its Roanoke and Dallas facilities are MIL-STD-790F certified
- the second largest manufacturer of multimode fiber optic cable for the North American enterprise market
- the premier manufacturer of ground tactical fiber optic cable for the U.S. military and its allies
- the holder of many patents for innovative technologies widely used throughout the industry
- conscious of its carbon footprint and strives to employ "green" manufacturing techniques in all its manufacturing facilities
- a leader in technical support and customer service
- named 2008 Exporter of the Year (Information Technology/Telecommunications) by ThinkGlobal, publisher of Commercial News USA, the official export-promotion magazine of the U.S. Department of Commerce
- the recipient of numerous certifications, recognitions and awards from the U.S. Department of Defense, the U.S. Department of Commerce, the U.S. Patent Office, the Commonwealth of Virginia, Start-it magazine and the Roanoke-Blacksburg Technology Council

#### Company Narrative

OCC's reliable, high quality, warranted products must meet the company's own tough standards – which are often more stringent than industry standards. We utilize customized and proprietary control and automation systems in our manufacturing processes to meet our precise tolerance and performance levels.

OCC is headquartered in Roanoke, Virginia, and each of our three manufacturing facilities is located in the U.S. OCC's quality-management system and manufacturing facilities in Roanoke, Asheville, and Dallas are ISO 9001:2008 registered, and our Roanoke and Dallas facilities are certified by the U.S. Department of Defense as MIL-STD-790F, a reflection of strict compliance with government requirements.

OCC provides resources to educate engineers, network designers, architects and the industry as a whole on the benefits of emerging cabling and connectivity technologies. Because the best way to maintain our record of performance is to help our customers find the right product for their installation and make sure it is installed flawlessly.

With manufacturing facilities located within the U.S., the company is also seen as an industry and community leader. OCC employees are active and take leadership roles in a variety of industry, professional and community service organizations.

## THE FUTURE – It's a new world. OCC is helping it communicate.

The future holds new opportunities, and efficient communication will play a critical role in realizing the promise of a world where connections are more instantaneous, communication is clearer and people are more connected. And OCC will be there.

OCC has pioneered the advent of many innovations that have revolutionized the high-speed data industry.

OCC continues to drive standards for emerging technology such as 10GbE over copper connectivity and cabling, Category 6a cabling standards and Extended Power over Ethernet. Our dedication to designing exceptional fiber optic and copper cable and connectivity components keeps us at the forefront of the telecommunication industry. Gigabit Ethernet, 10 Gigabit Ethernet and emerging technologies, like 40/100 Gigabit Ethernet are placing new stresses on communications systems and presenting new challenges to our industry. OCC is making the most of these opportunities with one of the industry's widest array of structured communications product and solutions. We pledge to stay at the forefront of innovation – keeping pace with the growing demands of an increasingly connected world.



Photo Courtesy of U.S. Army

Products are available for almost every application in commercial, government, industrial, mining and military markets worldwide. OCC's products are widely selected for installation by:

- Industrial/Manufacturing Facilities
- CATV
- Insurance Companies
- Fiber-to-the-Home (FTTH)
- Colleges and Universities
- Military
- Financial Institutions
- Petrochemical/Oil/Gas Facilities
- Governments Federal/State/Local
- Telco
- Hospitals and Healthcare Facilities
- Utilities
- Mining
- Security
- Transportation
- Data Centers
- Office Buildings
- Broadcast

For more information, call our Sales Department at (800) 622-7711 or +1 (540) 265-0690, or visit www.occfiber.com.

## **CORPORATE OVERVIEW**





MDIS Program, Quality Assurance, and Warranties

### **OCC MDIS Program**

Optical Cable Corporation's Multimedia Design and Integration Specialist (MDIS) Program is designed to offer the end user not only the highest quality products, but to also serve as a guarantee that those products are being installed to OCC's rigorous installation standards. To the installer, participating in the MDIS Program offers technical assistance, specification support and various resources for any application or project using OCC cable and connectivity products.

To participate in the MDIS Program, each installer's credentials are reviewed prior to their entering the program. After they are approved, they must attend certification training conducted by an Optical Cable Corporation representative. The certification training incorporates current and proposed standards as well as installation practices and techniques.

The installation portion of this training includes proper installation techniques for both copper and fiber applications.

Upon completion of their initial training, the Installation Company is certified as a Multimedia Design and Integration Specialist (MDIS). By installing OCC cable and/or connectivity components under the stringent guidelines set forth by OCC, and following the accepted and latest methods of the standards reviewed, the OCC MDIS has permission to provide the end user a 25-year extended system warranty, completely backed by Optical Cable Corporation.

## The standards review incorporates:

ANSI/TIA-568 – Commercial Building Telecommunication Cabling Standard

ANSI/TIA-569 – Commercial Building Standard for Telecommunications Pathways and Spaces

ANSI/TIA-606 – Administration Standard for the Telecommunications Infrastructure of Commercial Buildings

**TIA J-STD-607** – Commercial Building Grounding and Bonding Requirements for Telecommunications

To continue being an MDIS-certified contractor/installer, credentials must be reviewed every year. Each year, the installer must demonstrate current knowledge on emerging standards and receive training on any new OCC products and their supported installation procedures in order to maintain their MDIS certification status.

OCC's MDIS Program is geared toward installers who are committed to installing quality structured wiring solutions that provide support and resources to help grow their own business. By using an MDIS contractor/installer, the end user can be assured they are getting a system that is built to exceed expectations and can deliver exceptional performance.

### **OCC Quality Assurance**

Quality is the guiding principle at Optical Cable Corporation. The OCC approach to quality requires each of us, individually and in teams, to understand, anticipate, and surpass the expectations of our customers. Quality demands continuous improvement in all of our processes, products, and services. Our success depends on our ability to learn from experience, to embrace change, and to achieve the full involvement of all of our employees. The Optical Cable Corporation Quality Management System is certified to ISO 9001:2008, the internationally recognized standard for quality management systems. The company's expertise assures that each customer will receive the highest quality of products and service on each and every product. Optical Cable Corporation is a leading manufacturer of fiber optic cable, assemblies, and copper assemblies for voice, data and video worldwide. OCC provides connectivity solutions for some of the largest distributors and OEM accounts in the world. We provide both standard and custom solutions for our customer's specific requirements.

Optical Cable Corporation conducts rigorous inspections to ensure the quality and reliability of all of our products. Extensive environmental and mechanical testing is performed on each product type to verify compliance on a continuing basis. Independent testing and verification laboratories continue to verify our compliance to UL, MSHA, and other applicable product standards. If you are an existing customer, you have experienced our rapid delivery, product knowledge, quality assurance and high level of service. If you are a new customer, give us a call. You will be pleased with our quality.







**REACH** 

# REACH Compliance Statement: REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

As a manufacturer of articles under REACH definitions, Optical Cable Corporation certifies that no substances in these articles are intended to be released from these articles during normal and reasonably foreseeable conditions of use. In addition, Optical Cable Corporation regularly monitors the list of substances of very high concern (SVHC) and candidate SVHC published by the European Chemicals Agency (ECHA) and has contacted suppliers of substances and preparations in articles and packaging for SVHC determination. As new substances are expected to be added to the candidate list in the future, contact the factory for an up-to-date REACH certification.

#### **OCC** Warranties

Network integrity is an essential component to modern building infrastructure. Increasingly, more emphasis is being put on installing datacom components that provide both flawless performance and exceptional reliability. OCC recognizes the importance of a reliable structured communications system and is committed to providing cabling and connectivity solutions that exceed industry standards. By purchasing OCC products, our customers can be assured that they are getting components that are fully warranted by OCC according to the applicable warranty statement. To learn more about OCC's warranty statements, please contact OCC Corporate Headquarters.



### 2.0 Solutions

2.1	Overview 6
2.2	Data Center Solutions
2.3	Enterprise Solutions
2.4	Industrial Solutions
2.5	Broadcast Solutions
2.6	Military Solutions9
2.7	Mining Solutions
2.8	Transportation Solutions

## **SOLUTIONS**



**OCC Solutions** 

### **OCC Solutions Overview**

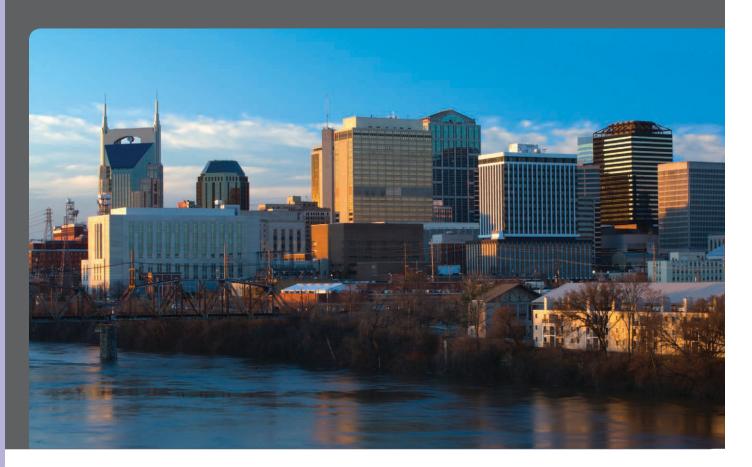
From our beginning as pioneers in the design and production of fiber optic cables to our leadership in driving standards for emerging technologies, Optical Cable Corporation continues to push the boundaries for innovation and advancements in data communications around the globe.

The scope of today's data communications is massive and ever evolving. Modern communication requirements demand versatile cabling and connectivity solutions that can support current needs while anticipating tomorrow's new technologies and applications.

Lightning speed is beyond desirable – it is expected. That's why OCC continues to be at the forefront of emerging technology such as high-density and easily accessible fiber and copper structured cabling systems, fiber and copper cabling and connectivity for the most demanding environments, 10GbE over copper connectivity and cabling, Category 6A cabling standards, and Extended Power over Ethernet. The products we design and manufacture are forever changing the way the world communicates and ensure you are prepared for that ever-changing world.

While our heritage started with the military almost 30 years ago, our expertise now also extends to the enterprise, data center, industrial, broadcast, mining, transportation, and various other markets, and reaches worldwide through a network of distributors with customers in more than 70 countries. Through experience and ingenuity, OCC offers products and solutions to an array of enterprise communication systems, structured cabling networks and market-specific applications. We have seamlessly integrated our distinct products together to provide scalable, unified systems that perform beyond customer expectations and industry standards. We listen to our customers' needs and construct systems that offer our history of durability with engineering innovation.

Whether your requirements are simple or complex and demanding, OCC delivers integrated services and comprehensive cabling and connectivity solutions to address your specific needs.



## **SOLUTIONS**

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OCC Solutions

#### 2.2 Data Center Solutions

Everyone is touting high-density these days. But what good is having high-density if accessing the connections results in more work and headaches?

OCC is taking a different route. Our solutions and products feature more accessible connections – allowing you to work smarter...not harder.

Working alongside IT professionals, data center installers and structured cable professionals, our engineers heard what customers wanted – what works and what doesn't work – from power distribution to cable management to thermal cooling. OCC then put that knowledge to work as we developed a new generation of structured cabling products designed to provide exceptional solutions to your everyday challenges and needs, like:

- High-density in smaller spaces
- Exceptional accessibility and easy installation
- Ability to make adds and changes with little downtime
- Integrated cable management features
- Unfettered access to individual ports
- Improved reliability (from better circulation of air)
- Reduced maintenance costs and downtime (from easier access)
- Greater capacity with an equal or smaller footprint than competitors (greater efficiency and profitability)
- Future proofed (fiber solutions configured for 10G now that are easily upgraded to 40G/100G in the future by replacing one cassette at a time as the need arises)

The solution – OCC's Procyon<sup>™</sup> family of products. OCC's Procyon products are designed to provide a comprehensive system solution that satisfies your structured cabling wants and needs

What's more, Procyon systems are designed for preconfiguration. IT professionals can kit together the components needed for simpler installations. Plug-and-play just got even easier.

When OCC's Procyon products are combined with OCC's full system, performance, functionality, and versatility surpass expectations. Yet, Procyon products also stand on their own to solve a specific need you may have.

The Procyon family of products is a shining addition to our lineup and an example of OCC's commitment to stellar end-to-end solutions. To learn more, visit these sections:

- Assembly & Data Center Fiber Optic Cable HD Cables
- Fiber Optic Connectivity Pre-Terminated Solutions
- Copper Cable
- Copper Connectivity Pre-Terminated Solutions
- Racks, Cabinets and Enclosures Data Center Cabinet

Procyon solutions have been carefully examined and offer a complete system approach that is rarely seen in the industry. We didn't just create a single component. We developed a system that allows a single component to work better when combined with corresponding components, as well as on its own.









**OCC Solutions** 

### 2.3 Enterprise Solutions



High-performance networks are essential to business, manufacturing, transportation, education, media and security. Optical Cable Corporation's products and services ensure your data infrastructure performs flawlessly, whether the enterprise consists of one

building, a campus, or many locations. With flexible solutions for virtually any industry, our products are providing crucial data lifelines in projects as diverse as expansive data center applications, airports, and office parks.

Optical Cable Corporation has the expertise to evaluate your needs and provide technical solutions to even the most complex challenges. We bring a comprehensive customer-centric approach to every project – providing turnkey solutions from one source. We have the enterprise solutions to satisfy today's needs while preparing you for future changes.

For cabling solutions and enterprise applications, OCC offers the most reliable options in the industry. Just because an application is simple does not mean it should not be exceptional. And OCC has built our reputation on creating exceptional backbone and network cabling and connectivity solutions.

To learn more about the innovative products that create OCC's enterprise solution, see the following sections:

- Indoor/Outdoor Fiber Optic Cable
- Assembly & Data Center Fiber Optic Cable
- Fiber Optic Connectivity
- Copper Cable
- Copper Connectivity
- Workstation Products
- Racks, Cabinets and Enclosures



#### 2.4 Industrial Solutions



Industrial networks must contend with harsh physical and environmental conditions not found in office and other enterprise applications. From real-time sensors on the factory floor to office monitoring and control, a properly designed network must deliver

productivity, efficiency, and reliability – day after day. OCC's fiber optic cables and connectivity components withstand the harshest environments, allowing systems to continue to run and data to transfer where other systems can fail. Ultimately, OCC makes your company safer and more productive – both inside or outside the plant environment.

To learn more about the products that make up these solutions, see the following sections:

- Indoor/Outdoor Fiber Optic Cables
- Outdoor Fiber Optic Cables
- Shipboard Fiber Optic Cables
- NEMA 4X Enclosures
- Harsh Environment Connectors
- Deployable Solutions



OCC's experience engineering and manufacturing fiber optic cables, connectors and enclosures designed for the harshest of environments, including military tactical deployment, means our products deliver exceptional performance in the industrial environment. A few examples of OCC's successful deployment of these products include:

- Automotive Manufacturing
- Electronics Manufacturing
- Food & Beverage Processing Facilities
- Chemical Plants
- Metal Production and Fabrication Warehouses
- Nuclear Facilities
- Oil/Gas Drilling, Exploration, Pipeline, Production and Refining Facilities
- Industrial Surveillance & Alarm Systems
- Textile Mills
- Water Treatment Plants

In addition, OCC works with customers that have specific industrial needs to offer solutions that provide the best mechanical, industrial, chemical and environmental performance.

## **SOLUTIONS**

**<u>\$</u>OCC** 

OCC Solutions

#### 2.5 Broadcast Solutions



OCC's broad range of fiber optic broadcast cables, harsh environment connectivity and deployable systems are specifically designed for real-time transmission of high-definition broadcast signals. Our broadcast solutions repeatedly withstand the abuse

associated with the extreme demands in rapid deployment and retrieval applications.

With stadium and arena applications, OCC's products are optimized to withstand the rigors of installation challenges such as difficult cable pulls, high-tensile loading, severe crush occurrences, and extreme deployment situations. In studio, OCC solutions can provide performance beyond expectation with high-definition resolution and elevated bandwidth requirements. The flexibility offered by OCC's broadcast solutions provides customers a variety of system configurations and deployment options.

For more information about the products in OCC's Broadcast solutions, visit these sections:

- Broadcast Fiber
   Optic Cables
- Harsh Environment Connectors
- Deployable Systems



### 2.6 Military Solutions



OCC is the premier manufacturer of military ground tactical fiber optic cable and connectivity solutions for the U.S. military. Our broad product offering for military tactical applications is built on the evolution of fundamental technologies designed to provide

end users with components that are easy to install, provide a high degree of reliability and offer outstanding performance characteristics.

OCC's fiber optic cables and connectors have been qualified to the most demanding military specifications, including:

- MIL-PRF-85045/8A Ground Tactical Fiber Optic Cable (U.S. DoD)
- A3159879 Ground Tactical Fiber Optic Cable (U.S. Army CECOM)
- MIL-PRF-29504 Fiber Optic Connector Termini
- MIL-C-83522 Fiber Optic Connectors
- A3159869 and A3302584 "TFOCA" Ground Tactical Fiber Optic Connectors (U.S. Army CECOM)
- A3159864 and A3302584 Ground Tactical Fiber Optic Cable Assemblies (U.S. Army CECOM)
- Def-Stan 60-1, Part 3 Ground Tactical Fiber Optic Cable (U.K. MOD)
- DoD certified facility for MIL-STD-790G, High-Reliability Manufacturing Requirements for Military Suppliers

Coupled with deployable systems built for easy implementation and retrieval, OCC's military products are designed for the needs of the soldier – rugged and reliable – time and time again.

To learn more about the products used in OCC's Military solutions, see these sections:

- Military Fiber Optic Cables
- Shipboard and DNV Fiber Optic Cables
- Harsh Environment Connectors
- Deployable Systems







**OCC Solutions** 

### 2.7 Mining Solutions



Mining companies are upgrading their infrastructure to improve safety and maximize profitability. Utilizing the capacity and capability of fiber optic cabling systems, mines can operate more cost-effectively and with greater efficiency. OCC cables and connectivity

components help facilitate higher productivity in areas such as:

- Environmental Monitoring
- Security
- Intrinsically Safe Areas
- Automation
- Production Rates and Yields
- Equipment Control and Monitoring
- Voice/Data/Video Communications

OCC's unique cabling and connectivity configurations provide long-term reliability, security and even reusability in mines.

Our fiber optic cables are designed and manufactured to meet high-survivability standards to endure severe mechanical and environmental stress. Exactly the kind of stress you see in harsh, demanding mining operations.

OCC's connectivity products are not only rugged, durable connections, but are also easy to install, providing solutions for the most demanding mining applications.

And of course, OCC offers products that are MSHA approved, including products for intrinsically safe areas.

To learn more about OCC's MSHA-approved cables and connectivity products for the Mining market, visit the sections below:

- Mining Cables
- Fiber Optic Connectivity NEMA 4X Enclosures
- Harsh Environment Connectivity
- Deployable Systems



### 2.8 Transportation Solutions



Emerging technologies in the Intelligent
Transportation Systems (ITS) industry are creating new
opportunities for improved traffic flow, monitoring
and detection. Transportation authorities are
upgrading their communications infrastructures to

accommodate these new technologies. OCC's tight-buffered fiber optic cables and harsh environment connectivity offer some of the most robust solutions on the market for ITS applications.

OCC products have been relied upon for more than 20 years in the traffic and mass-transit industries in systems for:

- Closed Loop Traffic Signal Control
- Electronic Toll Collection (ETC)
- Highway Video Surveillance Cameras
- Traffic Radar and Video Detection
- "Amber Alert" Dynamic Messaging Signs
- Traffic Operation Control Centers
- Railroad Signaling
- Subways
- Lightrails
- SCADA Systems

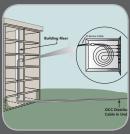
OCC's versatile and rugged design allows installation to be quick and efficient. OCC's Transportation solutions provide ITS and mass-transit systems with increased reliability and exceptional performance. And with the addition of the IRIS™ connector, the value of installing OCC solutions has never been better.

To find out more about OCC's Transportation solutions, turn to the sections below:

- Indoor/Outdoor Cables
- Outdoor Cables
- Harsh Environment Connectors
- Harsh Environment Connectors IRIS







### 3.1 Fiber Product Information



3.1b	OCC Bend-Tolerant Fiber
3.1c	Fiber Buffer Options
3.1d	Outer Cable Jacket Materials
3.1e	D-Series Distribution Indoor/Outdoor Typical Termination Approach
3.1f	G-Series Subgrouping Indoor/Outdoor Typical Termination Approach
3.1g	B-Series Breakout Indoor/Outdoor Typical Termination Approach
3.1h	Fiber Cable Configurator
	OptiReel <sup>™</sup> – Fiber Optic Cable Box
3.1j	Laser Ultra-Fox™ Fiber Performance
3.1k	Ultra-Fox™ Plus Fiber Performance

Example Part Number: Cable Part Number:	KKKKKKKKKKKK
21 25 and 25 and commission of OCD 25 Start Part 25 and commission of OCD 25 Start Part 25 Annual of OCD 25 Start Part 25 Annual of Start 25 Start Part 25 Start Part 25 Start 25 Start	Filter Spin and Performance (Curs. 1-7) Laser Vitta-File Filter Performance Color. Convicta-Spin Dimensio (and 1862 # 2) 5/25 Seed and NEXA # 6) 5/25 Seed and
#School size Millio 20 ion, PSC Blaz 28 npm, 3 mm, Respe 28 mm, Usbernal USD 2.6 npm in Roll with standard radio demonstra ager mine to be submitted print to determining submitted and tools admittable demonstral ESC and internal state of the submitted print to ESC and internal state of the submitted print of the ESC and internal state of the submitted print of the	ALE - 50/125 handed ARE - 50/125 Sundard Bred Televier ALE - 50/125 St. Send Televier
- 'Une Fort' Place the dead raths derivate solver's standed 13 flow edityring - 'Une Fort' Place standed 15 flow edityring no Fort's standed 3 flow edityring	ALT = 50725-000 meter 10-040 ALT = 50725-000 meter 10-040 femil Telespin ALE = 50725-500 meter 10-040 ALE = 50725-500 meter 10-040 femil Telespin
udium" - standard fulliur salapinas us frum - standard fulliur salapinas us frum" - salapinas fullium salapinas us frum" - standard fullium salapinas	SiA = 9/125 Seed-Sident Single-mole SiB = 9/125 Seed-Sident Single-mole Vitra Fee Fee Feet Partemania
after" a standard Villian edigrapp edard 2 from montred outer paths decrease in Facilitation 2 with plantard calles decrease in Head Facilitation from the decrease in Head Facilitation from the decrease Hannance public with decrease of the decrease	Code Cone/Codding Decreter (and MST v. 62 5125/500 AST = 50/125/500 BLB = \$125/500
	Marial Made Feld Diameter at 1210 on + Pain





(3.1a) Laser Ultra-Fox™ Cables and Laser Ultra-Fox™ DE Cables

### Laser Ultra-Fox™ Cables

For the laser-based high-speed networks of today and tomorrow, Optical Cable Corporation's Laser Ultra-Fox multimode fiber optic cables offer the best performance and longest operational distances available.

Laser Ultra-Fox multimode cables are optimized for use with high-speed laser-based systems, such as Gigabit Ethernet. Laser Ultra-Fox multimode cables are also fully compliant with all LED-based standards, making them an excellent choice for any new installation where migration to Gigabit Ethernet is planned. Laser Ultra-Fox cables have controlled differential-mode-delay and refractive-index-profiles that are directly compatible with 850 nm VCSEL lasers, 1310 nm single-mode lasers, and LEDS. Laser Ultra-Fox multimode cables are available in both 62.5µm and 50µm fiber types.

Laser Ultra-Fox OM3 (ALT) and OM4 (ALE) multimode cables are optimized for use with laser-based systems, such as 10-Gigabit Ethernet. Laser Ultra-Fox ALT and ALE cables also achieve extended distance operation with Gigabit Ethernet systems, and are fully compatible with all 50µm LED-based standards, making them the best choice for any new installation that might require operation at 10-Gigabit speeds. Laser Ultra-Fox ALT and ALE cables are fully compliant with TIA 568 and the applicable OM3 or OM4 ISO/IEC 11801 standards.

Laser Ultra-Fox ALT and ALE cables provide extended distance operation beyond the IEEE 802.3z Gigabit Ethernet standard link lengths. Laser Ultra-Fox cables are fully compatible with all 10-155 Mb/s data standards, such as Ethernet, Fast Ethernet, FDDI, ATM, Fiber Channel, and TIA-568. Laser Ultra-Fox cables are laser-ready, eliminating the need for expensive mode conditioning patch cords.

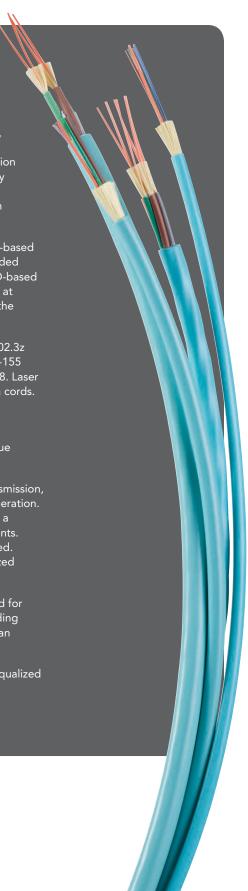
### **Laser Ultra-Fox™ Delay Equalized Cables**

Optical Cable Corporation's Laser Ultra-Fox Delay Equalized fiber optic cables offer the unique combination of true-time-delay equalization and easy termination.

Laser Ultra-Fox Delay Equalized cables are optimized for use in high-speed parallel data transmission, where minimal time skew of data between groups of fibers is important for proper system operation. Installations utilizing keyboard-video-mouse (KVM) access, where the actual computers are in a secure location separate from the KVM controls, often have demanding time skew requirements. With Laser Ultra-Fox Delay Equalized cable, groups of two to six fibers may be delay-equalized. Higher fiber counts can be produced in GX-Series Subgrouping cables by using delay-equalized subunit cables.

Each individual fiber within a Laser Ultra-Fox Delay Equalized cable group is specially selected for equal group refractive index, allowing distance accuracy down to a few inches or less depending on overall cable length. In competing ribbon cable designs, unequal group refractive index can change the relative propagation delay time by as much as 0.4%.

Contact Optical Cable Corporation, and ask for more information on Laser Ultra-Fox Delay Equalized fiber optic cables.





(3.1b) OCC Bend-Tolerant Fiber

### Overview

Bend-Tolerant optical fiber has been developed in order to reduce the bend-induced losses associated with using optic fiber in small bends associated with the use of jumpers in racks and to reduce the size of optical hardware such as cassette modules. These bend-tolerant fibers can also improve the performance of standard cables by reducing optical loss in splice locations, and in the case of B-series cables, these fibers can help reduce the loss of the connectorized subcables as they may be routed in areas of tight bends. Bend-tolerant fibers are generally fully backward compatible with standard fiber types.

### OM4, OM3, OM2+ and OM2

Optical Cable Corporation's ABE (OM4) and ABT (OM3) fibers are bend-tolerant 850nm laser-optimized, graded-index multimode optical fibers with a 50/125µm core and clad diameter. The ABE is designed to support up to 550 meter link lengths for 10 GbE systems and ABT is designed to support up to 300 meter link lengths for 10 GbE systems. Both the ABE and ABT fibers are fully DMD certified for optimal bandwidth performance for EMB and meet and exceed the OM4 and OM3 industry standards. Both the ABE and ABT fibers are fully backward compatible with standard OM4/OM3 fibers.

OCC's ABX (OM2+) and ABS (OM2) fibers are bend-tolerant 850nm graded-index, multimode optical fibers with a 50/125µm core and clad diameter. Both the ABX and ABS fibers are fully backward compatible with standard OM2 fibers.

### Single-Mode SLA

Optical Cable Corporation's bend-tolerant Single-Mode fibers are designed to meet the performance requirements of ITU-T G.657.A1 (SLA) and are available for use in a wide variety of fiber optic cable designs. The SLA fibers are fully backward compatible with ITU-T G.652.D fibers. Other bend-tolerant fibers meeting the performance requirements of ITU-T G.657.A2 are available and can be included in a variety of fiber optic designs upon request.

### **Applications**

- Ideal for use in Local Area Networks (LANs), Storage Area Networks (SANs), data center, 40/100 GbE, and other applications where very small bend radii are needed or required
- For use in small-size optical components where tight bends are needed
- Used in jumpers to minimize loss when exposed to tight bends

### Features & Benefits

- Superior bend performance with negligible dB loss at very small bend radii
- 50/125µm fibers are backward compatible with standard OM4, OM3 or OM2 fibers
- SLA fibers are backward compatible with ITU-T 652.D fibers

### Bend-Tolerant Fiber Macrobend Performance

The following tables provide insight into the expected optical loss of buffered fibers, assembly cables and breakout cable subunits when used in tight bend applications.

OM2/OM2+/OM3/OM4 FIBER (ABS, ABX, ABT, ABE)

Rated Macrobend Loss							
LOOSE COIL	NUMBER OF	INDUCED ATTENUATION (DB)					
RADIUS (MM)	TURNS	850 NM	1300 NM				
37.5	100	≤ 0.05	≤ 0.15				
15	2	≤ 0.01	≤ 0.01				
7.5	2	≤ 0.1	≤ 0.1				

ITU-T G.657.A1 FIBER (SLA) (250μm & 500μm)

OPTICAL CABLE CORPURATION

Rated Macrobend Loss							
LOOSE COIL	NUMBER OF	INDUCED ATTENUATION (DB)					
RADIUS (MM)	TURNS	1550 NM	1625 NM				
15	10	≤ 0.25	≤ 1.0				
10	1	≤ 0.75	≤ 1.5				

00403231





(3.1b) 50µm Bend-Tolerant OM4, OM3, OM2+ & OM2 Fiber

### Characteristics

- Fully supporting 10 Gb/s applications as well as legacy 10 Mb/s applications
- Designed to be used with low-cost LED Overfilled Launch (OFL) transmitters as well as low-cost 850nm VCSEL transmitters
- DMD measurements meeting industry standards for Effective Modal Bandwidth (EMB)

Fiber Specifications						
GEOMETRY PROPERTIES			ABE, ABT, A	ABX, & ABS		
Core diameter		$50 \pm 2.5 \mu m$				
Core noncircularity			≤ .	5%		
Cladding diameter			125 ±	- 1μm		
Cladding noncircularity			≤ 1	.0%		
Coating diameter			245 :	± μm		
Coating-cladding concent	tricity error		≤ 12	.0μm		
Coating noncircularity			≤ 6	.0%		
Core-cladding concentrici	ity error		≤ 1.	0μm		
OPTICAL PROPERTIES						
Numerical aperture			0.200 :	± 0.015		
Attenuation @850nm			≤ 2.3	dB/km		
Attenuation @1300nm		≤ 0.6 dB/km				
		ABE	ABT	ABX	ABS	
OFL bandwidth@850nm		≥ 3500 MHz*km	≥ 1500 MHz*km	≥ 950 MHz*km	≥ 510 MHz*km	
OFL bandwidth@1300nm		≥ 500 MHz*km	≥ 500 MHz*km	≥ 500 MHz*km	≥ 500 MHz*km	
Effective modal mandwid	th @850nm	≥ 4700 MHz*km	≥ 2000 MHz*km	≥ 700 MHz*km	≥ 500 MHz*km	
Effective modal bandwidt	h @1300nm	≥ 500 MHz*km	≥ 500 MHz*km	≥ 500 MHz*km	≥ 500 MHz*km	
Application support distartion 10 Gigabit Ethernet SX	nce @850nm on	550 m	300 m	150 m	82 m	
MECHANICAL PROPERTIES						
Proof Test Level		≥ 100 kpsi				
Coating strip force	Coating strip force Typical average force		1.5 N			
	Peak force	≥ 1.3 N ≤ 8.9 N				
MATERIAL COMPOSITION						
Coating			UV Ad	crylate		

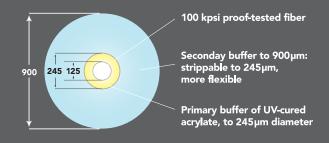


(3.1c) Fiber Buffer Options

Optical Cable Corporation offers three distinct buffering systems, each carefully engineered and manufactured to be the best available for its respective installation/application.

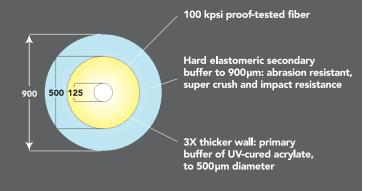
#### Ultra-Fox™

Our Ultra-Fox cable features 100 kpsi proof-tested fiber, a primary coating of UV-cured acrylate material to a diameter of 245µm, and a secondary buffer to 900µm. The composite primary coating and secondary buffer may be mechanically removed to the 125µm 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 245µm primary coating intact. This 245µm buffered fiber is, therefore, available for splicing to similar buffered fibers from loose-tube cables. The 245µm coating may then be further mechanically stripped to the 125µm glass diameter.



### Ultra-Fox™ Plus

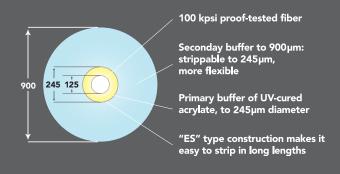
Our Ultra-Fox Plus cable features 100 kpsi proof-tested fiber, a primary buffer of UV-cured acrylate material to a diameter of 500 $\mu$ m and a secondary hard elastomeric buffer to 900 $\mu$ m diameter. This provides the best environmental and mechanical protection and is identical to the buffering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



### Easy-Strip (ES) Buffer Options

Our Easy Strip options permit the easy removal of long lengths (20–30 cm) of the 900 $\mu$ m buffer, leaving the 245 $\mu$ m acrylate coating. This is convenient when the 900 $\mu$ m buffer must be removed to allow for splicing or ribbonizing.

ES2 features a 900 $\mu$ m PVC primary buffer with a release agent placed between the primary buffer and the 245 $\mu$ m acrylate coating.







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(3.1d) Outer Cable Jacket Materials

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

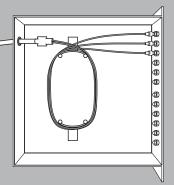
	Indoor/Outdoor			Ind	oor	Outdoor							
	Flame-Retardant PVC	Low-Temperature Oil-Resistant PVC	Fluoropolymer Plenum	Flexible Fluoropolymer Plenum	Low-Smoke Zero-Halogen	Flame-Retardant Plenum	Flexible PVC	Medium-Density Polyethylene	Hard Polyurethane	Polyolefin	Polyurethane	Low-Smoke Zero-Halogen Polyurethane	Flame-Retardant Tactical Polyurethane
Material Code	D	J	K	W	Z	S	N	Α	R	Х	С	G	V
Duct Installation	-	-	-	•	•	•	•	•		-			
Fungus- Resistant	-	•	•	•	•	-	-	•	-	•	-	-	•
UV- Resistant	•	•	•	•	•	•	-	•	•	•	•	•	•
Water- Resistant	-	-	-	-	•		-	•	-	-	-	-	-
Direct Burial	•		•	•	•			•					
Aerial	•	-		-	•			•	-	•	•	•	•
High-Flex Life				-					-	•	•	•	•
Soft, Flexible						•	•				•		•
Tight-Bends		-								•		•	
Low-Friction	•	-	•	-				•	•				
Petrochemical Resistance	•	•	•	-	•			•	-	•	•	•	•
Severe Chemical Environments			•	•				•			•		•



(3.1e) D-Series Distribution Indoor/Outdoor Typical Termination Approach

# In a Typical Installation, OCC Indoor/Outdoor Distribution Series Cables:

- Allow direct termination with connectors
- Reduce installation cost
  - eliminate breakout/fanout kits and tubing, splicing of pigtails
  - reduce material cost
  - reduce labor cost
- Improve link budget -
  - eliminate splice loss
- Can be used both indoors and outdoors -
  - eliminate splices and discontinuities
  - improve reliability
  - reduce cost

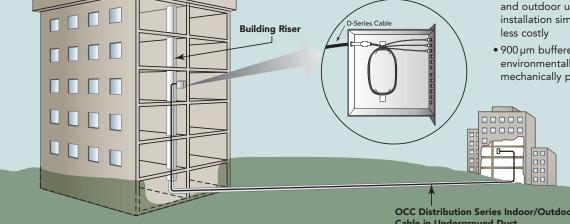




**Simplified Direct Termination into Any OCC Fiber Optic Enclosure** 

OCC Distribution Series Indoor/ Outdoor cables may be directly terminated with connectors in a protective box.

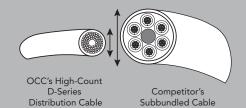
- Suitable for both indoor and outdoor use, making installation simpler and less costly
- 900 µm buffered fiber is environmentally and mechanically protected



**OCC Distribution Series Indoor/Outdoor Cable in Underground Duct** 

OCC Distribution Indoor/Outdoor cables beat outside plant cables by

- By eliminating this complicated step, OCC Distribution Series Indoor/



#### 50% Smaller Diameter Than Competing Cables

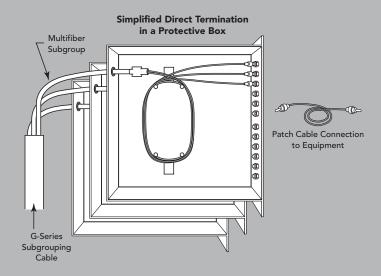
High-density packaging gives OCC Distribution Series cables half the diameter of competing cables. As a result, D-Series cables can deliver high fiber counts through cramped spaces and around tight corners.

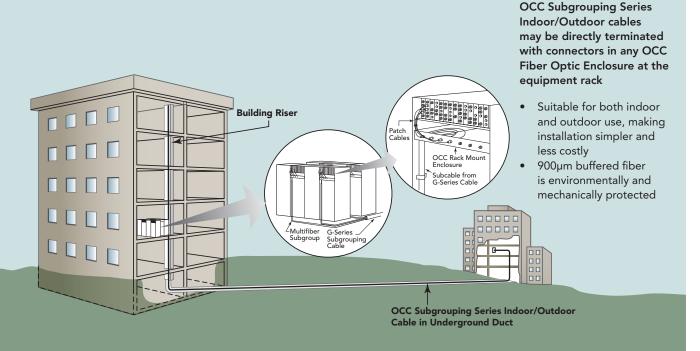


(3.1f) G-Series Subgrouping Indoor/Outdoor Typical Termination Approach

# In a Typical Installation, OCC Subgrouping Indoor/Outdoor Cables:

- Have fully protected fibers contained in color-coded, individually jacketed subcables for distribution to multiple racks or cabinets
- Allow separation and identification of groups of different fibers, such as single-mode and multimode, each in different subgroup cables
- Permit easy installation of high fiber counts, even through tight spaces, due to highly dense cable construction
- Permit direct termination with connectors, reducing material and installation cost
- Can be used both indoors and outdoors
  - eliminate splices and discontinuities
  - improve reliability
  - reduce cost





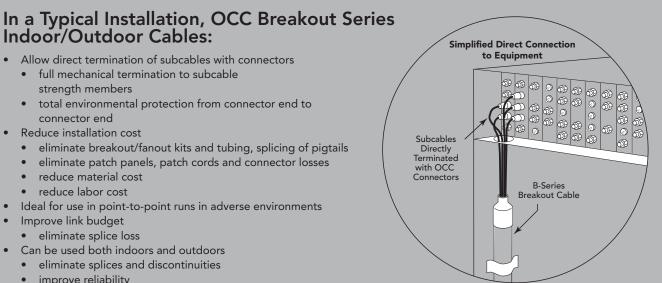
OCC Subgrouping Series Indoor/Outdoor cables beat outside plant cables by eliminating the added step of splicing at the building entrance.

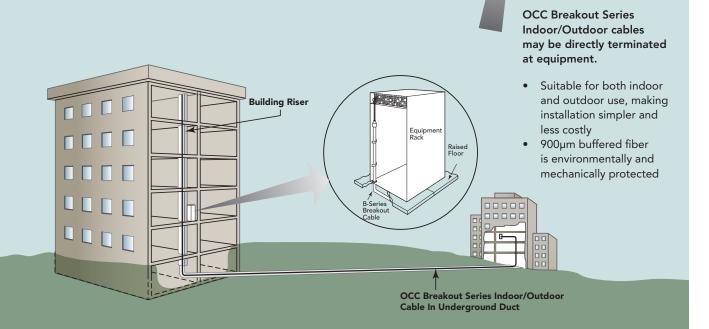
- Outside plant cables must be spliced to indoor flame-retardant cables for extended runs into the buildings
- By eliminating this complicated step, OCC Subgrouping Series Indoor/Outdoor cables reduce labor, equipment and material cost, as well as improve system performance and reliability



(3.1g) B-Series Breakout Indoor/Outdoor Typical Termination Approach

- Allow direct termination of subcables with connectors
  - full mechanical termination to subcable strength members
  - total environmental protection from connector end to connector end
- Reduce installation cost
  - eliminate breakout/fanout kits and tubing, splicing of pigtails
  - eliminate patch panels, patch cords and connector losses
  - reduce material cost
  - reduce labor cost
- Ideal for use in point-to-point runs in adverse environments
- Improve link budget
  - eliminate splice loss
- Can be used both indoors and outdoors
  - eliminate splices and discontinuities
  - improve reliability
  - reduce cost





OCC Breakout Series Indoor/Outdoor cables beat outside plant cables by eliminating the added step of splicing at the building entrance.

- Outside plant cables must be spliced to indoor flame-retardant cables for extended runs into the buildings
- By eliminating this complicated step, OCC Breakout Series Indoor/Outdoor cables reduce labor, equipment and material cost, as well as improve system performance and reliability



(3.1h) Fiber Cable Configurator

CABLE SERIES				
[ Digit 1 ]	[ Digit 2 ]			
A = Assembly Cables	<b>X</b> = Ultra-Fox – 2.9 mm nominal OCD			
	– (dash) = Ultra-Fox Plus – 2.9 mm nominal OCD			
<b>B</b> = Breakout Cables	<b>X</b> = Ultra-Fox 250 Acrylate Fiber			
	<ul> <li>- (dash) = Ultra-Fox Plus 500 Acrylate Fiber</li> <li>Standard subunit sizes: Mil-Tac 2.0 mm, PVC Riser 2.5 mm,</li> <li>LSZH 2.5 mm, Plenum 2.0 mm</li> </ul>			
<b>C</b> = Composite Cables	<b>X</b> = Ultra-Fox with standard cable diameter			
	– (dash) = Ultra-Fox Plus – 2.9 mm nominal OCD			
<b>D</b> = Distribution Cables	<b>X</b> = Ultra-Fox			
	– (dash) = Ultra-Fox Plus			
<b>G</b> = Subgrouping Cables	<b>X</b> = Ultra-Fox – standard 12-fiber subgroup			
	– (dash) = Ultra-Fox Plus – standard 12-fiber subgroup			
<b>H</b> = High-Density Cables	<b>D</b> = Standard construction, <b>Z</b> = Zipcord style			
<b>L</b> = Round Furcation Tubing	<b>X</b> = Standard 2.9 mm nominal outer cable diameter			
<b>M</b> = Messenger Cables	<b>X</b> = Ultra-Fox <sup>™</sup> Figure 8			
	– (dash) = Ultra-Fox™ Plus Figure 8			

FIBER COUNT
[ Digits 3–5 ]
Must be three digits for all cables. Composite Cable fiber count will be defined as:
• Sum of one for each fiber
• one for each individual wire

12-fiber distribution indoor/outdoor riser cable using 62.5µm Ultra-Fox fiber, black jacket CST with Polyethylene jacket –

Example Part Number: DX012DWLS9KAA2 KKKKKKKKKKKKK

Cable Part Number:

UNREINFORCED JACKET MATERIAL [Digit 6] Α Polyethylene – outdoor only C Polyurethane Indoor/Outdoor PVC D K Fluoropolymer Flexible PVC Ν S Flame-Retardant Low-Smoke V Flame-Retardant Tactical Polyurethane W Flexible Fluoropolymer

BUFFER SIZE				
[ Digit 10 ]				
<b>9</b> 250/900				
5	500/900			
2	ES2			

Χ

Z

Polyolefin

Zero-Halogen Low-Smoke



(3.1h) Fiber Cable Configurator

	FIBER TYPE AND PERFORMANCE							
	[ Digits 7–9 ]							
Laser Ult	Laser Ultra-Fox Fiber Performance							
CODE	CORE/CLADDING DIAMETER (µm)							
WLS	<b>WLS</b> 62.5/125 standard							
WLX	62.5/125 XL							
ALS	50/125 standard							
ABS	50/125 standard bend-tolerant							
ALX	50/125 XL							
ABX	50/125 XL bend-tolerant							
ALT	50/125 (300 meter 10-GbE)							
<b>ABT</b> 50/125 (300 meter 10-GbE) bend-to								
<b>ALE</b> 50/125 (550 meter 10-GbE)								
ABE	50/125 (550 meter 10-GbE) bend-tolerant							
SLX	96 /125 low water peak single-mode							
SLA	96 /125 bend-tolerant single-mode							
Ultra-Fo	x Plus Fiber Performance							
CODE	CORE/CLADDING DIAMETER (µm)							
WST	62.5/125/500							
AST	50/125/500							
SLS	9/125/500 <sup>1</sup> single-mode							
SLX	9/125/5001 low water peak single-mode							
SLA	9/125/500¹ bend-tolerant, single-mode							
<sup>1</sup> Typical	mode field diameter at 1310nm = $9\mu m$							

	FIBER TYPE AND PERFORMANCE							
	[ Digits 7–9 ]							
Laser Ul	Laser Ultra-Fox Fiber Performance							
CODE	CORE/CLADDING DIAMETER (µm)							
WLS	62.5/125 standard							
WLX	<b>WLX</b> 62.5/125 XL							
ALS	50/125 standard							
ABS	50/125 standard bend-tolerant							
ALX	50/125 XL							
ABX	50/125 XL bend-tolerant							
ALT	50/125 (300 meter 10-GbE)							
ABT	<b>ABT</b> 50/125 (300 meter 10-GbE) bend-tolerant							
ALE	<b>ALE</b> 50/125 (550 meter 10-GbE)							
ABE	ABE 50/125 (550 meter 10-GbE) bend-tolerant							
SLX	<b>SLX</b> 96 /125 low water peak single-mode							
SLA	<b>SLA</b> 96 /125 bend-tolerant single-mode							
Ultra-Fo	ox Plus Fiber Performance							
CODE	CORE/CLADDING DIAMETER (µm)							
WST	62.5/125/500							
AST	50/125/500							
SLS	9/125/500 <sup>1</sup> single-mode							
SLX	9/125/500¹ low water peak single-mode							
SLA	9/125/500¹ bend-tolerant, single-mode							
<sup>1</sup> Typica	l mode field diameter at 1310nm = 9µm							

	RATING							
[ Digit 12 ]								
CODE	RATING NAME DESCRIPTION							
A	None	No rating						
E	IEC	Meets the requirements of IEC Standards 60332-3-24, 61034-2 and 60754-2						
М	Military	Meets the requirements for a military cable						
P	Plenum	Meets the requirements of ANSI/NFPA 262						
R	Riser	Riser Meets the requirements of UL 1666						
S	MSHA	Meets the requirements of Part 7 Subpart K of Title 30 Code CFR Signal Cables and approved by MSHA						

OUTER JACKET COLOR								
	[ Digits 11 ]							
Q	10-Gigabit Aqua							
K	Black							
В	Blue	Standard Cable Colors						
Z	Brown	Black = All Riser Cables, except AX-Series Assembly Cables						
С	Custom	Black = Military Cables						
G	Green	<b>Black</b> = Outdoor Cables and Zero-Halogen						
Α	Light Blue Aqua	<b>10 Giga Aqua</b> = A-Series, D-Series						
N	Natural	Riser, Plenum, and ILA with 50µm						
0	Orange	10 Gig Fiber						
R	Red	Orange = A-Series, Riser, Plenum, and II A with MM fibers						
S	Rose	Yellow = A-Series, Riser, Plenum and						
Т	Slate	ILA with single-mode fibers						
V	Violet							
w	White							
Υ	Yellow							

REINFORCEMENTS								
	REINFORCEWENTS							
	[ Digits 13–14 ]							
	(Note: Not required for certain cables, including non-reinforced riser and plenum rated cables.)							
<b>A1</b>	CST with PVC Jacket							
A2	CST with Polyethylene Jacket							
A4	A4 CST with Zero Halogen Jacket							
D3	Dielectric Messenger, 4.0mm messenger							
G3	Galvanized Steel Messenger, 1/4" diameter messenger							
I2	Interlocked Aluminum Armor with PVC outer jacket							
14	Interlocked Aluminum Armor with Zero-Halogen outer jacket							
16	Interlocked Aluminum Armor with Indoor/Outdoor Fluoropolymer Plenum outer jacket							
17	Interlocked Aluminum Armor with Indoor-only Plenum outer jacket							



)

(3.1i) OptiReel™

### **Features and Applications**

OptiReel $^{\text{\tiny{IM}}}$  cable box saves installers time.

- Cable reel features adjustable tension control for cable payout adjustments
- Always know remaining cable length with AT-A-GLANCE decreasing cable length markings
- Faster installation for multiple fiber optic cable drops
- Easy cable handling and storage, and excellent protection at job sites
- Available in popular fiber types and up to 12-fiber cables
- Can be stacked with other boxes containing data cables
- Contains optimum performance fiber optic cable

OptiReel is a self-contained payout box to facilitate storage, handling and pulling of the cables. The packaging greatly reduces set-up time for each pull. Therefore, the box is ideally suited for cable pulls through building duct systems, walls and ceilings where multiple cables may be pulled together and many relatively short runs need to be installed.

OptiReel cable boxes can be easily stacked and staged together with other types of data cables for faster installations. The compact boxes contain an internal reel so that cable stands do not have to be used. Cables in the boxes are marked with decreasing length markings, so that the installer always knows the length of the remaining cable in the box.

OptiReel cable packaging is available for Optical Cable Corporation's simplex and duplex A-Series and D-Series types of cables, either riser-rated or plenum-rated, with 62.5/125, 50/125, and single-mode fibers.

Contact your local Optical Cable Corporation representative or distributor to order your next shipment of fiber optic cable in the OptiReel cable box.

### Specifications for OptiReel™

CABLE TYPE	CABLE LENGTH (FT)	TOTAL WEIGHT (LBS)	BOX TYPE	
AX001	3,000	18	12" x12" x12"	
AX002	1,500	19	12" x12" x12"	
DX002	2,000	40	16" x16" x16"	
DX004	1,500	40	16" x16" x16"	
DX006	1,500	42	16" x16" x16"	
DX008	1,000	35	16" x16" x16"	
DX012	1,000	40	16" x16" x16"	





(3.1j) Laser Ultra-Fox™ Fiber Performance

Fiber Code	Core/Cladding Diameter (µm)	Numeric Aperture	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)
WLS	62.5/125 Standard	0.275	(850/1310)	OM1 ISO/IEC 11801	300/600	33/300^	3.5/1.5	220/500	200/500
WLX	62.5/125 XL	0.275	(850/1310)	OM1+ ISO/IEC 11801	500/1000	33/300^	3.5/1.5	385/500	200/500
ALS	50/125 Standard	0.20	(850/1310)	OM2 ISO/IEC 11801	600/600	82/300^	3.5/1.5	510/500	500/500
ALX	50/125 XL	0.20	(850/1310)	OM2+ ISO/IEC 11801	750/600	150/300^2	3.0/1.03	950/500	700/500
ABX	50/125 XL Bend-Tolerant	0.20	(850/1310)	OM2+ ISO/IEC 11801	750/600	150/300^2	3.0/1.03	950/500	700/500
ALT	50/125 (300 meter 10-GbE)	0.20	(850/1310)	OM3 ISO/IEC 11801	1000/600	300/300^2	3.0/1.03	2000/500	1500/500
ABT	50/125 (300 meter 10-GbE) Bend-Tolerant	0.20	(850/1310)	OM3 ISO/IEC 11801	1000/600	300/300^2	3.0/1.03	2000/500	1500/500
ALE	50/125 (550 meter 10-GbE)	0.20	(850/1310)	OM4 ISO/IEC 11801	1040/600	550¹/300^²	3.0/1.03	4700/500	3500/500
ABE	50/125 (550 meter 10-GbE) Bend-Tolerant	0.20	(850/1310)	OM4 ISO/IEC 11801	1040/600	550 <sup>1</sup> /300 <sup>^2</sup>	3.0/1.0 <sup>3</sup>	4700/500	3500/500
SLX	96/125 Low Water Peak Single-Mode	_	(1310/1550)	ITU-T G.652.D	5 km⁴	10 km⁵	0.5/0.5	_	_
SLA	9 <sup>6</sup> /125 Bend-Tolerant Single-Mode	_	(1310/1550)	ITU-T G.657.A1 ITU-T G.652.D	5 km <sup>4</sup>	10 km <sup>5</sup>	0.5/0.5	_	_
SLB	9 <sup>6</sup> /125 Bend-Tolerant Single-Mode	_	(1310/1550)	ITU-T G.657.A2 ITU-T G.652.D	5 km <sup>4</sup>	10 km <sup>5</sup>	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 loss
- <sup>2</sup> Supports 220-meter 10GBASE-LRM distance, or 300-meter 10GBASE-LRM distance with 300-meter capable equipment
- 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
- <sup>6</sup> Typical Mode Field Diameter at 1310 nm

### Other Fiber Types Available Upon Request

OCC continues to offer the widest variety of standard off-the-shelf and nonstandard fiber types to meet the customer's special system requirements. If your system design demands a fiber type not included in above table, call OCC to see if your needs can be met with one of the many fiber types available.







### (3.1k) Ultra-Fox™ Plus Fiber Performance

Fiber Code	Core/Cladding Diameter (µm)	Numeric Aperture	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	0.275	(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	0.275	(850/1310)	OM1 ISO/IEC 11801	300/600	33/300^	3.5/1.5	220/500	200/500
AST	50/125/500	0.20	(850/1310)	OM2 ISO/IEC 11801	550/550	82/300^	3.5/1.5	500/500	500/500
ALS	50/125/500 Laser Grade	0.20	(850/1310)	OM2 ISO/IEC 11801	600/600	82/300^	3.5/1.5	510/500	500/500
ALT	50/125/500 (300 meter, 10Gbe) Laser Grade	0.20	(850/1310)	OM3 ISO/IEC 11801	1000/600	300/300^1	3.5/1.5	2000/500	1500/500
SLS	9²/125/500 Single-Mode	_	(1310/1550)	ITU-T G.652.A	5 km³	10 km⁴	0.5/0.5	-	-
SLX	9²/125/500 Low Water Peak Single-Mode	_	(1310/1550)	ITU-T G.652.D	5 km³	10 km <sup>4</sup>	0.5/0.5	_	_
SLA	9²/125/500 Bend-Tolerant Single-Mode	_	(1310/1550)	ITU-T G.657.A1 ITU-T G.652.D	5 km³	10 km <sup>4</sup>	0.5/0.5	_	_

- \* Minimum Laser Effective Modal Bandwidth (EMB)
- \*\* For backward compatibility to LED-based systems, overfilled launch (OFL)
- ^ 1310nm CWDM lasers (10GBASE-LX4)
- 1 Supports 220-meter 10GBASE-LRM distance or 300-meter 10 GBASE-LRM distance with 300-meter-capable equipment
- <sup>2</sup> Typical Mode Field Diameter at 1310nm = 9 microns
- <sup>3</sup> 10km for 1310nm 1000BASE-LH and 5km for 1310nm 1000BASE-LX
- <sup>4</sup> 10km for 1310 10GBASE-LR and 40km for 1550nm 10GBASE-ER

### Other Fiber Types Available Upon Request

OCC continues to offer the widest variety of standard off-the-shelf and nonstandard fiber types to meet the customer's special system requirements. If your system design demands a fiber type not included in above table, call OCC to see if your needs can be met with one of the many fiber types available.









### 3.2 Indoor/Outdoor Cables

3.2a	D-Series Distribution – Riser Rated Cable	. 26
3.2b	D-Series Distribution – Plenum Rated Cables	. 28
3.2c	D-Series Distribution – LSZH OFNR-LS and IEC Rated Cables	.31
3.2d	D-Series Distribution – Interlocking Armor (ILA) Riser Rated Cables	. 33
3.2e	D-Series Distribution – Interlocking Armor (ILA) Plenum Rated Cables	. 35
3.2f	D-Series Distribution – Corrugated Steel Tape Armored Riser Rated Cables	. 37
3.2g	D-Series Distribution – Rodent Deterrent (FRP) Riser Rated Cables	. 39
3.2h	B-Series Breakout – Riser Rated Cables	. 41
3.2i	B-Series Breakout – Plenum Rated Cables	. 44
3.2j	B-Series Breakout – LSZH OFNR-LS and IEC Rated Cables	. 46
3.2k	B-Series Breakout – Riser Rated Tray Cables	. 48
3.2l	B-Series Breakout – Interlocking Armor (ILA) Riser Rated Cables	. 51
3.2m	B-Series Breakout – Interlocking Armor (ILA) Plenum Rated Cables	. 53
3.2n	B-Series Breakout – Rodent Deterrent (FRP) Riser Rated Cables	. 55
3.2o	G-Series Subgrouping – Riser Rated Cables	. 57
3.2p	G-Series Subgrouping – Plenum Rated Cables	
3.2q	G-Series Subgrouping – Riser Rated Tray Cables	.61
3.2r	G-Series Subgrouping – Interlocking Armor (ILA) Riser Rated Cables	. 63
3.2s	G-Series Subgrouping – Interlocking Armor (ILA) Plenum Rated Cables	. 65
3.2t	G-Series Subgrouping – Rodent Deterrent (FRP) Riser Rated Cables	. 67
3.2u	HC-Series – High-Density Riser Rated Cables	. 69
3.2v	CX-Series Composite – Copper/Fiber Riser and Plenum Rated Cables	.71

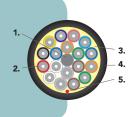
### INDOOR/OUTDOOR CABLES





(3.2a) D-Series Distribution – Riser Rated Cables

- 1. Central Filler/Strength Member
- 2. Tight-Buffer Optical Fiber
- 3. Aramid Strength Member
- 4. Outer Jacket
- **5.** Ripcord





### **Applications**

- Indoor/outdoor 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**

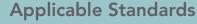
- High-performance components and construction
- Cable materials are indoor/outdoor UL-listed OFNR and UV, water and fungus resistant
- UL listed in accordance with NEC section 770.179(b) for use in vertical runs in building riser shafts or from floor to floor
- Wide operating temperature range of -40°C 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 subgrouped cables, 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

- 900µm buffer eliminates the need for costly and time-consuming installation of fanout kits or pigtail splices because connectors terminate directly to the fiber
- 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 (EIA/TIA-455-25A)		
Crush resistance	1,800 N/cm (TIA/EIA-455-41A)		
Flex resistance	2,000 cycles (TIA/EIA-455-104A)		



OCC 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 Issue 2
- TIA-568
- TIA-598
- UL 1651
- UL 1666



### INDOOR/OUTDOOR CABLES



(3.2a) D-Series Distribution – Riser Rated Cables

### Cable Characteristics: D-Series Distribution Riser Cables

FIRED COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	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)	13.1 (5.2)	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)	12.3 (4.8)	
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)	

### **Ordering Information**

 Digit No:
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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, p. 23)

10 Ultra-Fox fiber with 900 $\mu$ m tight-buffer = **9** 

11 Standard jacket color: Black = **K** 

Optional colors available:

62.5μm multimode (WLS, WLX): Orange = **O** 50μm multimode (ALS, ALX): Orange = **O** 

50μm 10 Gigabit multimode (ALT, ALE): Aqua = **Q** 

Single-mode: Yellow = Y

12 Rating: Riser =  $\mathbf{R}$ 

Example: 12-fiber indoor/outdoor riser cable using 62.5µm Ultra-Fox fiber, black jacket –

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

#### NOTES:

\*-40°C to +70°C

\*\*62.5 $\mu$ m multimode and single-mode fiber

\*\*\*50µm multimode fiber

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

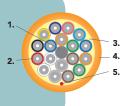
### INDOOR/OUTDOOR CABLES

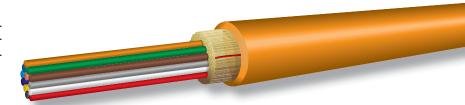




(3.2b) D-Series Distribution – Plenum Rated Cables

- 1. Central Filler/Strength Member
- 2. Tight-Buffer Optical Fiber
- 3. Aramid Strength Member
- 4. Outer Jacket
- 5. Ripcord





### **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
- High-performance tight-buffered coating on each fiber for environmental and mechanical protection
- High crush resistance may eliminate the need for innerduct
- 900µm buffer eliminates the need for costly and time-consuming installation of fanout kits
  or pigtail splices because connectors terminate directly to the fiber
- 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 subcabled 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 subgrouped cables
- Ideal for installation in areas with limited space or tight bends

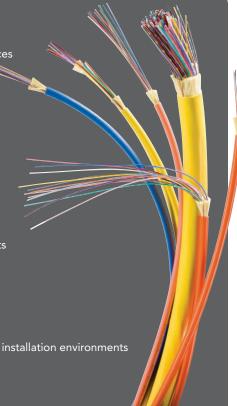
### Indoor ("S" Jacket)

- Indoor-only flexible flame-retardant plenum jacketed cables
- 2 to 12 fibers
- Interlocking armor can be applied to cables as an alternative to conduit installation

### **Applicable Standards**

OCC 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
- UL 1651
- ANSI/NFPA 262





(3.2b) D-Series Distribution – Plenum Rated Cables

### **Mechanical and Environmental Performance**

	INDOOR (S)	INDOOR/OUTDOOR (K)		
Operating temperature	0°C to +70°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	Per ICEA-S-83-596 (EIA/TIA-455-25A)	1,000 impacts (EIA/TIA-455-25A)		
Crush resistance	1,500 N/cm (TIA/EIA-455-41A)	1,500 N/cm (TIA/EIA-455-41A)		
Flex resistance	1,000 cycles (TIA/EIA-455-104A)	1,000 cycles (TIA/EIA-455-104A)		

# Cable Characteristics: D-Series Distribution Plenum Cables (Indoor/Outdoor "K" Jacket)

FIRED COLLAIT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM B	END RADIUS
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	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	8.3 (0.31)	71 (46)	3,000 (670)	1,000 (220)	11.8 (4.6)	11.8 (4.6)
30	8.2 (0.32)	81 (53)	3,000 (670)	1,000 (220)	12.4 (4.9)	12.4 (4.9)
36	8.3 (0.32)	80 (53)	3,000 (670)	1,000 (220)	12.4 (4.9)	12.4 (4.9)
48	9.6 (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	12.6 (0.51)	175 (122)	5,400 (1,200)	1,800 (400)	19.6 (7.7)	19.6 (7.7)

## D-Series Distribution Plenum Cables (Indoor "S" Jacket)

FIBER COUNT	DIAMETER DIAMETER	WEIGHT	TENSIL	E LOAD	МІМІМИМ ВІ	END RADIUS
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2	3.8 (0.15)	15 (10)	660 (150)	180 (40)	5.7 (2.3)	3.8 (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.



(3.2b) D-Series Distribution - Plenum Rated Cables

### **Ordering Information**

	D	X								9		Р
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12
	1 2	Dia	ے نیں جانب	- Ci-	مساللم	Га <i>у</i> —	DV					

1 – 2 Distribution Series Ultra-Fox = **DX** 

3 - 5Fiber count: (Indoor) = **002–012**, (Indoor/Outdoor) = **002–072** 

6 Jacket type:

Indoor/Outdoor Fluoropolymer =  $\mathbf{K}$ 

Indoor Plenum = **S** 

7 – 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)

10 Ultra-Fox fiber with 900 $\mu$ m tight-buffer = **9** 

11 Standard jacket colors:

62.5µm multimode (WLS, WLX): Orange = O

50μm multimode (ALS, ALX): Orange = **O** 

50μm 10 Gigabit multimode (ALT, ALE): Aqua = **Q** 

Single-mode: Yellow =  $\mathbf{Y}$ 

12 Rating: Plenum = P

Example: 12-fiber indoor cable using 62.5µm standard Laser Ultra-Fox fiber, orange jacket –

2 S W

12-fiber indoor/outdoor cable using 62.5µm standard Laser Ultra-Fox fiber, orange jacket –

D Χ 1 2 Κ W S

<sup>\*</sup>Note: Other colors available upon request. Contact your sales rep for part number details.



(3.2c) D-Series Distribution – LSZH OFN-LS and IEC Rated Cables

- 1. Central Filler/Strength Member
- 2. Tight-Buffer Optical Fiber
- 3. Aramid Strength Member
- 4. Outer Jacket
- **5.** Ripcord





## **Applications**

 Indoor/outdoor tight-buffered cable design for use in installations requiring a flame-retardant, low-smoke and zero-halogen cable

#### **Features**

- Zero-halogen construction meets IEC 60754-2
- Meets low-smoke requirements of UL-1685, OFN-LS and IEC 61034-2
- Flame-retardant per the requirements of IEC 60332-3-24 and UL 1685, OFN-LS
- Suitable for indoor or outdoor applications
- Jacket is UV, fungus and moisture resistant
- Round cable construction for easy handling and termination
- Includes ripcord for easy outer jacket removal
- Distribution-style cable with 2 to 24 fibers
- Suitable for indoor/outdoor confined spaces including:
  - Building risers
  - Cable trays
  - Central offices
  - Mass-transit rail systems
  - Nuclear plants
  - Underground subway stations and tunnels



#### Mechanical and Environmental Performance

	INDOOR/OUTDOOR				
Operating temperature	-40°C to +70°C				
Storage temperature	-40°C to +70°C				
Installation temperature (cable temp.)	-20°C to +60°C				
Flame retardancy	UL listed type OFN-LS (UL 1685), FT4 (CSA C22.2 No.232) and IEC 60332-3-24				
Impact resistance	1,500 impacts (EIA/TIA-455-25A)				
Crush resistance	1,800 N/cm (TIA/EIA-455-41A)				
Flex resistance	2,000 cycles (TIA/EIA-455-104A)				

## **Applicable Standards**

- TIA-568
- TIA-598
- IEC 60332-3-24
- IEC 60754-2
- IEC 61034-2
- UL 1685
- UL 1651ICEA-S-104-696



)

(3.2c) D-Series Distribution – LSZH OFN-LS and IEC Rated Cables

### Cable Characteristics: D-Series Distribution OFN-LS and IEC Rated Cables

FIRED COLUNIT	T DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM B	END RADIUS
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2	5.4 (0.21)	30 (20)	1,400 (310)	450 (100)	8.1 (3.2)	5.4 (2.1)
4	5.6 (0.22)	32 (22)	1,400 (310)	450 (100)	8.4 (3.3)	5.6 (2.2)
6	5.9 (0.23)	38 (26)	1,800 (400)	540 (120)	8.9 (3.5)	5.9 (2.3)
8	6.4 (0.25)	47 (32)	1,800 (400)	540 (120)	9.6 (3.8)	6.4 (2.5)
10	6.9 (0.27)	56 (38)	2,500 (560)	750 (165)	10.4 (4.1)	6.9 (2.7)
12	7.6 (0.30)	64 (43)	2,900 (650)	870 (195)	11.4 (4.5)	7.6 (3.0)
18	7.6 (0.30)	61 (41)	2,900 (650)	870 (195)	11.4 (4.5)	7.6 (3.0)
24	9.2 (0.36)	84 (56)	4,700 (1,050)	1,410 (315)	13.8 (5.4)	9.2 (3.6)

Other fiber counts available upon request.

### **Ordering Information**

	D	X				Z				9	K	Е
Diait No:	1	2	3	4	5	6	7	8	9	10	11	12

igit No:

- 1 2 Distribution Series Low-Smoke Zero-Halogen Ultra-Fox = **DX**
- 3-5 Fiber count: (see cable characteristics chart) = **002–024**
- 6 Jacket type: Indoor/Outdoor Zero-Halogen = **Z**
- 7 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)
- 10 Ultra-Fox fiber with 900μm tight-buffer = **9**
- 11 Standard jacket color: Black = **K**
- 12 Rating: Flame-Retardent Zero-Halogen = **E**

Example: 12-fiber LSZH distribution cable using 62.5µm standard laser Ultra-Fox fiber; black jacket –

_	37	_	4	_	-	<b>\</b> \/		_	_	17	_
D	Х	U	1	2	Z	VV	L	5	9	K	E

(3.2d) D-Series Distribution – Interlocking Armor (ILA) Riser Rated Cables

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



## **Applications**

- Ideal for industrial and other installations requiring a metallic conduit
- Interlocking preloaded armor may eliminate the need for conduit, reducing installation costs

#### **Features**

- Inner cable is a fully functional D-Series Distribution Riser Rated Cable
- 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 would otherwise require conduit for cable protection
- Wide operating temperature of -40°C to +85°C

#### 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 OFCR (UL 1666) and FT4 (CSA C22.2 No. 232)				
Impact resistance	20 impacts (EIA/TIA-455-25A)				
Crush resistance	650 N/cm (TIA/EIA-455-41A)				
Flex resistance	25 cycles (TIA/EIA-455-104A)				

## **Applicable Standards**

- UL 1666
- UL 1651
- ICEA-S-83-596





(3.2d) D-Series Distribution – Interlocking Armor (ILA) Riser Rated Cables

# Cable Characteristics: D-Series Distribution Interlocking Armor (ILA) Riser Rated Cables

FIRED COLINIT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM B	END RADIUS
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2	13.1 (0.52)	158 (106)	1,350 (300)	400 (90)	26.2 (10.3)	19.7 (7.8)
4	13.1 (0.52)	158 (106)	1,350 (300)	400 (90)	26.2 (10.3)	19.7 (7.8)
6	13.1 (0.52)	158 (106)	1,350 (300)	400 (90)	26.2 (10.3)	19.7 (7.8)
8	13.6 (0.54)	167 (112)	1,350 (300)	400 (90)	27.2 (10.7)	20.4 (8.0)
12	15.1 (0.59)	201 (135)	1,350 (300)	400 (90)	30.2 (11.9)	22.7 (8.9)
18	15.1 (0.59)	200 (134)	1,350 (300)	400 (90)	30.2 (11.9)	22.7 (8.9)
24	16.7 (0.66)	239 (161)	1,350 (300)	400 (90)	33.4 (13.1)	25.1 (9.9)
30	17.2 (0.68)	255 (171)	1,350 (300)	400 (90)	34.4 (13.5)	25.8 (10.2)
36	17.2 (0.68)	253 (170)	1,350 (300)	400 (90)	34.4 (13.5)	25.8 (10.2)
48	18.2 (0.72)	284 (191)	1,350 (300)	400 (90)	36.4 (14.3)	27.3 (10.7)

### **Ordering Information**

	D	X				D				9		R	Ι	2
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	1 – 2	D.	DX-Series Distribution Ultra-Fox = <b>DX</b>											
	3 – 5	Fi	ber co	ount: (	see ca	able cl	naract	eristic	s char	rt) = <b>0</b>	02-04	18		
	6	Ja	cket t	ype:	Indooi	/Outo	loor P	VC =	D					
	7 – 9	Fi	Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)											
	10	U	Ultra-Fox fiber with 900µm tight-buffer = <b>9</b>											
	11	St	Standard jacket color: (outer armor)											

62.5µm multimode (WLS, WLX): Orange = **O**50µm multimode (ALS, ALX): Orange = **O**50µm 10 Gigabit multimode (ALT, ALE): Aqua = **Q**Single-mode: Yellow = **Y** 

12 Rating: Riser =  $\mathbf{R}$ 

13 – 14 Indoor/Outdoor PVC jacket with Interlocking Armor = 12

**Example:** 12-fiber distribution cable using 62.5µm Laser Ultra-Fox fiber, orange, PVC, printed in feet –

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



(3.2e) D-Series Distribution – Interlocking Armor (ILA) Plenum Rated Cables

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





- Ideal for industrial and other installations requiring a metallic conduit
- Interlocking preloaded armor may eliminate the need for conduit, reducing installation costs

#### **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
- Interlocking armor can be easily removed, leaving an intact inner plenum rated cable for installation into plenums and air-handling spaces
- Wide operating temperature of -40°C to +85°C for indoor/outdoor (K Jacket)

#### Mechanical and Environmental Performance

	INDOOR/OUTDOOR (K)	INDOOR (S)		
	PVDF Plenum	Soft Plenum		
Jacket type	K	S		
Operating temperature	-40°C to +85°C	0°C to +70°C		
Storage temperature	-40°C to +85°C	-40°C to +70°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 (TIA/EIA-455-41A)	20 impacts	20 impacts		
Crush resistance (EIA/TIA-455-25A)	650 N/cm	650 N/cm		
Flex cycles (TIA/EIA-455-104A)	25	25		

# **Applicable Standards**

- ANSI/NFPA 262
- ICEA-S-83-596
- UL 1651





(3.2e) D-Series Distribution – Interlocking Armor (ILA) Plenum Rated Cables

#### Cable Characteristics: D-Series Distribution Interlocking Armor (ILA) Plenum Cables (Indoor/Outdoor "K" Jacket)

FIBER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	13.1 (0.52)	175 (118)	1,350 (300)	400 (90)	26.2 (10.3)	19.7 (7.8)	
4	13.1 (0.52)	175 (118)	1,350 (300)	400 (90)	26.2 (10.3)	19.7 (7.8)	
6	13.1 (0.52)	175 (118)	1,350 (300)	400 (90)	26.2 (10.3)	19.7 (7.8)	
12	14.1 (0.56)	209 (140)	1,350 (300)	400 (90)	28.2 (11.1)	21.2 (8.3)	
24	16.1 (0.63)	264 (177)	1,350 (300)	400 (90)	32.2 (12.7)	24.2 (9.5)	
36	16.1 (0.63)	273 (183)	1,350 (300)	400 (90)	32.2 (12.7)	24.2 (9.5)	
48	17.7 (0.70)	320 (215)	1,350 (300)	400 (90)	35.4 (13.9)	26.6 (10.5)	

## D-Series Distribution Interlocking Armor (ILA) Plenum Cables (Indoor "S" Jacket)

FIRED COLINE	DIAMETER	WEIGHT KG/KM (LBS/1,000')	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)		INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	11.8 (0.46)	123 (83)	1,350 (300)	400 (110)	23.6 (9.3)	17.7 (7.0)	
4	11.8 (0.46)	123 (83)	1,350 (300)	400 (180)	23.6 (9.3)	17.7 (7.0)	
6	11.8 (0.46)	123 (83)	1,350 (300)	400 (370)	23.6 (9.3)	17.7 (7.0)	
8	11.8 (0.46)	137 (92)	1,350 (300)	400 (380)	23.6 (9.3)	17.7 (7.0)	
12	12.8 (0.50)	161 (108)	1,350 (300)	400 (560)	25.6 (10.1)	19.2 (7.6)	

## **Ordering Information**

Digit No:

D	X								9		P		
1	2	3	4	5	6	7	8	9	10	11	12	13	14

- 1 2Distribution Series Ultra-Fox= **DX**
- 3 5Fiber count: (see cable characteristics chart) S Jacket = **002–012** K Jacket = **002–048**
- 6 Jacket type: Indoor/Outdoor Fluoropolymer = K; Indoor Plenum = \$
- 7 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)
- 10 Ultra-Fox fiber with 900 $\mu$ m tight-buffer = **9**
- 11 Standard jacket color:

62.5µm multimode (WLS, WLX) - Orange = O

 $50\mu m$  multimode (ALS, ALX) – Orange =  $\mathbf{O}$ 

50μm 10 Gigabit (ALT, ALE) – Aqua = Q

Single-mode – Yellow =  $\mathbf{Y}$ 

- 12 Rating: Plenum = P
- 13 14 Indoor/Outdoor Interlocking Armor = **I6**; Indoor Interlocking Armor= **I7**

12-fiber distribution cable using 62.5µm standard Laser Ultra-Fox fiber, indoor/outdoor interlocking armor, orange jacket, printed in feet -

> X 0 1 2 K W L S 9 O P



(3.2f) D-Series Distribution – Corrugated Steel Tape Armored Riser Rated Cables

- 1. Central Filler/Strength Member
- 2. Tight-Buffer Optical Fiber
- 3. Aramid Strength Member
- 4. Inner Jacket
- 5. Corrugated Steel Tape Armor
- 6. Outer Jacket
- **7.** Ripcords





## **Applications**

- Ideal for installation where direct burial or rodent protection is required
- OFCR rated to allow entry into riser spaces in unlimited lengths

#### **Features**

- The steel armor is easily removed with an internal ripcord, leaving a fully functional intact riser rated inner cable, with original cable markings for identification
- UL listed in accordance with NEC section 770.179(b) for use in vertical runs in building riser shafts or from floor to floor
- UL listed OFCR cables with riser rated outer armor jacket. This feature eliminates the need to splice the outdoor cable to the indoor cable within 50 feet of the building entrance
- Inner tight-buffered cable is suitable for direct field termination with standard optical connectors



### 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 OFCR (UL 1666) and FT4 (CSA C22.2 No.232)					
Impact resistance (EIA/TIA-455-25A)	per ICEA-S-104-696					
Crush resistance (TIA/EIA-455-41A)	per ICEA-S-104-696					
Flex resistance (TIA/EIA-455-104A)	25 cycles					

## **Applicable Standards**

- TIA-568
- TIA-598
- ICEA-S-104-696
- UL 1666
- UL 1651





(3.2f) D-Series Distribution – Corrugated Steel Tape Armored Riser Rated Cables

#### Cable Characteristics: D-Series Distribution Corrugated Steel Tape Armored Riser Rated Cables

EIDED COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	11.4 (0.45)	131 (88)	1,400 (310)	450 (100)	17.1 (6.7)	11.4 (4.5)	
4	11.4 (0.45)	131 (88)	1,400 (310)	450 (100)	17.1 (6.7)	11.4 (4.5)	
6	11.4 (0.45)	131 (88)	1,400 (310)	450 (100)	17.1 (6.7)	11.4 (4.5)	
8	11.4 (0.45)	137 (92)	1,600 (360)	525 (120)	17.1 (6.7)	11.4 (4.5)	
10	12.3 (0.48)	156 (105)	1,800 (400)	600 (135)	18.5 (7.3)	12.3 (4.8)	
12	13.4 (0.53)	181 (122)	2,700 (600)	900 (200)	20.1 (7.9)	13.4 (5.3)	
18	13.4 (0.53)	181 (122)	2,700 (600)	900 (200)	20.1 (7.9)	13.4 (5.3)	
24	14.9 (0.59)	214 (144)	3,000 (670)	1,000 (220)	22.4 (8.8)	14.9 (5.9)	

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

### **Ordering Information**

	D	X				D				9	K	R	Α	1	
Diait No:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	

Dig

- Distribution Series Laser Ultra-Fox = **DX**
- Fiber count: (see cable characteristics chart) = **002–024**
- 6 Jacket type: Indoor/Outdoor PVC = **D**
- 7 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)
- 10 Laser Ultra-Fox fiber with 900µm tight-buffer = 9
- 11 Standard jacket color: Black = K
- Rating: Riser =  $\mathbf{R}$ 12
- 13 14 Corrugated Steel Tape Armor Indoor/Outdoor PVC Jacket = A1

Example: 12-fiber distribution cable using 62.5µm Laser Ultra-Fox fiber, black jacket, riser rated, corrugated steel tape armored, printed in feet -

D	X	0	1	2	D	W	L	S	9	K	R	A	1
								_					



(3.2g) D-Series Distribution – Rodent Deterrent (FRP) Riser Rated Cables

- 1. Central Filler/Strength Member
- 2. Tight-Buffer Optical Fiber
- 3. Aramid Strength Member
- 4. Inner Jacket
- 5. FRP Layer
- 6. Outer Jacket
- **7.** Ripcords





## **Applications**

• Used in areas that require a riser rating and are susceptible to damage from small non-burrowing rodents

#### **Features**

- Includes a layer of fiberglass yarn that provides an effective deterrent to damage caused by small non-burrowing rodents (not recommended for direct burial applications)
- FRP is ideal for use in surface installations
- 2 to 144 fibers
- Helically stranded cable core for flexibility, survival in difficult pulls, and excellent mechanical protection for the optical fibers
- Cables are suitable for use with single, as well as multichannel connectors
- Water resistant and UV resistant for extreme environments



### 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 (EIA/TIA-455-25A)
Crush resistance	1,800 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)

## **Applicable Standards**

- GR-409-CORE ISSUE 2
- ICEA-S-104-696
- ICEA-S-83-596
- TIA-568
- TIA-598
- UL 1666
- UL 1651





(3.2g) D-Series Distribution – Rodent Deterrent (FRP) Riser Rated Cables

#### Cable Characteristics: D-Series Distribution Rodent Deterrent (FRP) Riser Cables

FIRED COLUMN	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM B	END RADIUS
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2	9.7 (0.38)	95 (64)	1,400 (310)	450 (100)	14.6 (5.7)	9.7 (3.8)
4	9.7 (0.38)	95 (64)	1,400 (310)	450 (100)	14.6 (5.7)	9.7 (3.8)
6	9.7 (0.38)	95 (64)	1,400 (310)	450 (100)	14.6 (5.7)	9.7 (3.8)
8	10.0 (0.39)	101 (68)	1,600 (360)	525 (120)	15.0 (5.9)	10.0 (3.9)
10	10.8 (0.43)	119 (80)	2,100 (472)	700 (157)	16.2 (6.4)	10.8 (4.3)
12	11.4 (0.45)	130 (87)	2,700 (600)	600 (135)	17.1 (6.7)	11.4 (4.5)
18	11.4 (0.45)	129 (87)	2,700 (600)	600 (135)	17.1 (6.7)	11.4 (4.5)
24	13.1 (0.52)	159 (107)	3,000 (674)	1,000 (220)	19.7 (7.8)	13.1 (5.2)
30	13.2 (0.52)	167 (112)	3,000 (674)	1,000 (220)	19.8 (7.8)	13.2 (5.2)
36	13.2 (0.52)	163 (110)	3,000 (670)	1,000 (220)	19.8 (7.8)	13.2 (5.2)
48	14.2 (0.56)	188 (126)	4,200 (940)	1,400 (310)	21.3 (8.4)	14.2 (5.6)
60	16.3 (0.64)	250 (168)	4,800 (1080)	1,600 (360)	24.5 (9.6)	16.3 (6.4)
72	18.3 (0.72)	312 (210)	5,400 (1214)	1,800 (405)	27.5 (10.8)	18.3 (7.2)
84	18.9 (0.74)	323 (217)	6,000 (1,350)	2,000 (450)	28.4 (11.2)	18.9 (7.4)
96	19.6 (0.77)	353 (237)	6,000 (1,350)	2,000 (450)	29.4 (11.6)	19.6 (7.7)
108	20.9 (0.82)	401 (269)	6,000 (1,350)	2,000 (450)	31.4 (12.4)	20.9 (8.2)
120	21.8 (0.86)	436 (293)	6,000 (1,350)	2,000 (450)	32.7 (12.9)	21.8 (8.6)
132	22.0 (0.87)	456 (306)	6,000 (1,350)	2,000 (450)	33.0 (13.0)	22.0 (8.7)
144	23.0 (0.91)	496 (333)	6,000 (1,350)	2,000 (450)	34.5 (13.6)	23.0 (9.1)

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

## **Ordering Information**

D 6 5 Digit No:

- 1 2 Distribution Series Laser Ultra-Fox = **DX**
- 3 5 Fiber count: (see cable characteristics chart) = **002–144**
- Jacket type: Indoor/Outdoor PVC = **D** 6
- 7 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)
- 10 Ultra-Fox fiber with 900 $\mu$ m tight-buffer = **9**
- Standard jacket color: Black =  $\mathbf{K}$ 11
- 12 Rating: Riser = **R**
- 13 14 FRP Layer with Indoor/Outdoor PVC Jacket

Example: 12-fiber distribution cable with FRP rodent deterrent layer, riser rated using 62.5µm Laser Ultra-Fox fiber, black jacket –



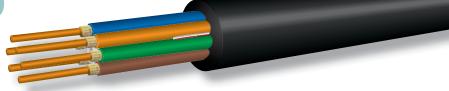
(3.2h) B-Series Breakout - Riser Rated Cables

- 1. Central Filler/Strength Member
- 2. Subcable
- 3. Outer Jacket
- 4. Ripcord

#### Subcable

- 5. Tight-Buffer Optical Fiber
- 6. Aramid Strength Member
- 7. Subcable Jacket





## **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 the subcable to a connector and a direct run to panels and equipment are 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 and long-term, trouble-free service
- Ideal for use in long, vertical installations
- 2.0mm subcables can be direct-terminated with standard connectors (2.5mm 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 900µm 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
- 900µm buffer eliminates the need for costly and time-consuming installation of fanout kits or pigtail splices because connectors terminate directly to the subcable
- High crush resistance may eliminate the need for innerduct



## **Applicable Standards**

- ICEA-S-83-596
- ICEA-S-104-696
- GR-409-CORE ISSUE 2
- TIA-568
- TIA-598
- UL 1651
- UL 1666





(3.2h) B-Series Breakout – Riser Rated Cables

#### 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 (EIA/TIA-455-25A)
Crush resistance	2,200 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)

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

FIRED COLINIT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM B	END RADIUS
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	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	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)
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)

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

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



(3.2h) B-Series Breakout - Riser Rated Cables

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

FIBER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM B	END RADIUS
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2	6.0 (0.24)	37 (25)	800 (180)	200 (40)	9.0 (3.5)	6.0 (2.4)
4	7.0 (0.28)	49 (33)	1,600 (360)	400 (90)	10.5 (4.1)	7.0 (2.8)
6	8.0 (0.31)	63 (42)	2,400 (540)	600 (130)	12.0 (4.7)	8.0 (3.1)
8	9.5 (0.37)	83 (56)	3,200 (720)	800 (180)	14.3 (5.6)	9.5 (3.7)
12	11.0 (0.43)	103 (69)	4,800 (1000)	1,200 (270)	16.5 (6.5)	11.0 (4.3)
18	12.5 (0.49)	148 (99)	6,000 (1,350)	1,500 (340)	18.8 (7.4)	12.5 (4.9)
24	14.7 (0.58)	208 (140)	7,200 (1600)	1,800 (400)	22.1 (8.7)	14.7 (5.8)
36	16.8 (0.66)	253 (170)	9,600 (2100)	2,400 (540)	25.2 (9.9)	16.8 (6.6)
48	20.1 (0.79)	368 (247)	12,000 (2700)	3,000 (680)	30.2 (11.9)	20.1 (7.9)
60	22.7 (0.89)	467 (314)	15,000 (3400)	3,750 (850)	34.1 (13.4)	22.7 (8.9)
72	26.0 (1.02)	623 (419)	16,800 (3800)	4,200 (900)	39.0 (15.4)	26.0 (10.2)

## **Ordering Information**

 B
 D
 D
 P
 R

 Digit No:
 1
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 9
 10
 11
 12

1 – 2 Breakout Series Ultra-Fox 2.0mm Subcables = **BE** 

2.5mm Subcables = **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, p. 23)

10 Ultra-Fox fiber with 900μm tight-buffer = **9** 

11 Standard jacket colors: Black = **K** 

Optional colors available:

62.5μm multimode (WLS, WLX): Orange = **O** 50μm multimode (ALS, ALX): Orange = **O** 

50 $\mu$ m 10 Gigabit multimode (ALT, ALE): Aqua =  $\mathbf{Q}$ 

Single-mode: Yellow =  $\mathbf{Y}$ 

12 Rating: Riser = **R** 

Example: 12-fiber cable using 62.5µm standard Laser Ultra-Fox fiber, black jacket –

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





(3.2i) B-Series Breakout - Plenum Rated Cables

- 1. Central Filler/Strength Member
- 2. Subcable
- 3. Outer Jacket
- 4. Ripcord

#### Subcable

- 5. Tight-Buffer Optical Fiber
- 6. Aramid Strength Member
- 7. Color-Coded Subcable Jacket





### **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 the subcable to a connector and a direct run to panels and equipment are desired

#### **Features**

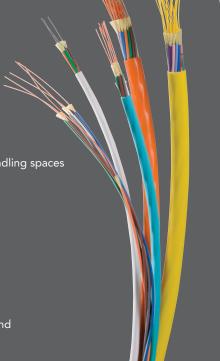
- High-performance components and construction
- UL listed in accordance with NEC sections 770.179(a) for use in ducts, plenums and air-handling spaces
- Most rugged and easy to install cable design for enterprise cabling applications
- Standard 2.0mm subcables can be directly terminated with standard connectors (2.5mm and 2.9mm 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 900µm 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 48 fibers

### **Cost Savings**

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

## **Applicable Standards**

- ICEA-S-83-596
- ICEA-S-104-696
- GR-409-CORE ISSUE 2
- TIA-568
- TIA-598
- UL 1651
- ANSI/NFPA 262





(3.2i) B-Series Breakout - Plenum Rated Cables

#### **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 (EIA/TIA-455-25A)
Crush resistance	2,100 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)

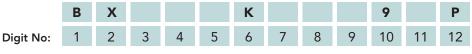
### Cable Characteristics: B-Series Breakout Plenum Cables (with 2.0mm subcables)

FIRED COUNT	FIBER COUNT DIAMETER		TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	6.3 (0.26)	46 (31)	1,600 (360)	400 (90)	9.5 (3.7)	9.5 (3.7)	
4	6.3 (0.26)	46 (31)	1,600 (360)	400 (90)	9.5 (3.7)	9.5 (3.7)	
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)	18.3 (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)	

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.

## **Ordering Information**



1 – 2 Breakout Series Ultra-Fox = **BX** 

3-5 Fiber count: (see cable characteristics chart) = **002–048** 

6 Jacket type: Indoor/Outdoor Fluoropolymer = **K** 

7 – 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)

10 Ultra-Fox fiber with 900μm tight-buffer = **9** 

11 Standard jacket colors:

62.5µm multimode (WLS, WLX): Orange = **O**50µm multimode (ALS, ALX): Orange = **O** 

 $50\mu m$  10 Gigabit multimode (ALT, ALE): Aqua =  $\mathbf{Q}$ 

Single-mode: Yellow =  $\mathbf{Y}$ 

12 Rating: Plenum = **P** 

Example: 12-fiber cable using 62.5µm standard Laser Ultra-Fox fiber, orange jacket –

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



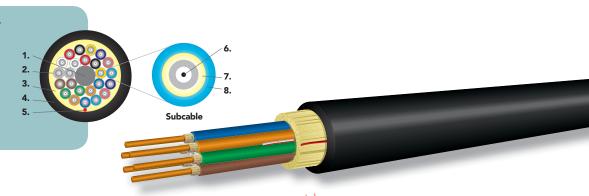


(3.2j) B-Series Breakout – LSZH OFNR-LS and IEC Rated Cables

- 1. Central Filler/Strength Member
- 2. Subcable
- 3. Aramid Strength Member
- 4. Outer Jacket
- **5.** Ripcord

#### Subcable

- 6. Tight-Buffer Optical Fiber
- 7. Aramid Strength Member
- 8. Subcable Jacket



## **Applications**

- Low-smoke and zero-halogen cable suitable for indoor and outdoor applications requiring an extremely rugged cable where maximum mechanical and environmental protection are necessary
- Easiest cable to install where direct termination of the subcable to a connector and a direct run to panels and equipment are desired

#### **Features**

- Zero-halogen construction meets IEC 60754-2
- Meets low-smoke requirements of IEC 61034-2 and UL 1685 OFNR-LS
- Flame-retardant to the requirements of ICE 60332-3-24 and UL 1666 OFNR
- Suitable for indoor or outdoor applications
- Jacket is UV, fungus and moisture resistant
- Round cable construction for easy handling and termination
- Breakout style cable with 2 to 24 fibers
- 2.0mm and 2.5mm subcables (2.9mm also available)
- Suitable for indoor/outdoor confined spaces including:
  - Building risers
  - Cable trays
  - Central offices
  - Mass-transit rail systems
  - Nuclear plants
  - Underground subway stations and tunnels

# Applicable Standards OCC indoor/outdoor tight-buffered

OCC indoor/outdoor tight-buffered LSZH fiber optic cables meet the functional requirements of the following standards:

- TIA-598
- UL 1651
- UL 1666
- UL 1685
- IEC 60332-3-24
- IEC 61034-2
- IEC 60754-2

#### Mechanical and Environmental Performance

	INDOOR/OUTDOOR
Operating temperature	-40°C to +70°C
Storage temperature	-40°C to +70°C
Installation temperature (cable temp.)	-20°C to +60°C
Impact resistance	1,500 impacts
Crush resistance	2200 N/cm
Flex resistance	2,000 cycles



(3.2j) B-Series Breakout – LSZH OFNR-LS and IEC Rated Cables

#### Cable Characteristics: B-Series Breakout LSZH OFNR and IEC Rated Cables (with 2.5mm subcables)

FIRED COLINIT	FIBER COUNT DIAMETER		TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	9.2 (0.36)	59 (40)	2,000 (450)	800 (180)	13.8 (5.4)	9.2 (3.6)	
4	9.2 (0.36)	84 (56)	2,000 (450)	800 (180)	13.8 (5.4)	9.2 (3.6)	
6	10.6 (0.42)	107 (72)	3,000 (670)	1,200 (270)	15.9 (6.3)	10.6 (4.2)	
8	12.4 (0.49)	144 (97)	4,000 (900)	1,700 (380)	18.6 (7.3)	12.4 (4.9)	
12	14.2 (0.56)	171 (115)	6,000 (1,350)	2,500 (560)	21.3 (8.4)	14.2 (5.6)	
18	15.9 (0.63)	225 (151)	8,000 (1,800)	3,500 (790)	23.9 (9.4)	15.9 (6.3)	
24	17.9 (0.70)	290 (195)	10,000 (2,250)	3,800 (850)	26.9 (10.6)	17.9 (7.0)	

### B-Series Breakout LSZH OFNR and IEC Rated Cables (with 2.0mm subcables)

FIRED COLINE	DIAMETER		TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	8.0 (0.31)	66 (44)	1,600 (360)	400 (90)	12.0 (4.7)	8.0 (3.1)	
4	8.0 (0.31)	66 (44)	1,600 (360)	400 (90)	12.0 (4.7)	8.0 (3.1)	
6	9.1 (0.36)	82 (55)	2,400 (540)	600 (130)	13.7 (5.4)	9.1 (3.6)	
8	10.4 (0.41)	108 (73)	3,200 (7,20)	800 (180)	15.6 (6.1)	10.4 (4.1)	
12	11.6 (0.46)	131 (88)	4,800 (1,800)	1,200 (270)	17.4 (6.9)	11.6 (4.6)	
18	12.8 (0.50)	162 (109)	7,200 (1,620)	1,800 (400)	19.2 (7.6)	12.8 (5.0)	
24	14.7 (0.58)	219 (147)	9,600 (2,100)	2,400 (540)	22.1 (8.7)	14.7 (5.8)	

## **Ordering Information**

	В					Z				9	K	E
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12

1 – 2 Breakout Series LSZH Ultra-Fox:

2.0mm Subcables = **BE** 

2.5mm Subcables = **BX** 

2.9mm Subcables = **BP** 

3-5 Fiber count: (see cable characteristics chart) = **002–024** 

6 Jacket type: Indoor/Outdoor Zero-Halogen = **Z** 

7 – 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)

10 Ultra-Fox fiber with 900μm tight-buffer = **9** 

11 Standard jacket color: Black = **K** 

12 Rating: Flame-Retardant Zero-Halogen = **E** 

Example: 12-fiber LSZH breakout cable using 62.5µm standard Laser Ultra-Fox fiber, black jacket –

B X 0 1 2 Z W L S 9 K E





(3.2k) B-Series Breakout - Riser Rated Tray Cables

- 1. Central Filler/Strength Member
- 2. Subcable
- 3. Outer Jacket
- 4. Ripcord

#### Subcable

- 5. Tight-Buffer Optical Fiber
- 6. Aramid Strength Member
- 7. Subcable Jacket



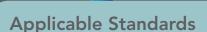


### **Applications**

- Ideal for installations requiring an extremely rugged and reliable cable design where maximum mechanical and environmental protection are necessary
- 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 the subcable to a connector and a 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
- Independently tested to CSA C22.2 No. 230 (tray cables)
- Fibers may be directly terminated at factory devices or central locations using connectors with no further protection required
- L jacket is UV, fungus and moisture resistant
- 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<sup>™</sup> jacket prevents cable from flattening and the 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



- ICEA-S-83-596
- ICEA-S-104-696
- GR-409-CORE ISSUE 2
- TIA-568
- TIA-598
- UL 1666
- CSA C22.2 No. 232
- CSA C22.2 No. 230





(3.2k) B-Series Breakout – Riser Rated Tray Cables

#### Mechanical and Environmental Performance

	INDOOR/OUTDOOR
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	UL listed type OFNR (UL 1666) and FT4 (CSA C22.2 No. 232)
Impact resistance	1,500 impacts (EIA/TIA-455-25A)
Crush resistance	2,200 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)

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

FIBER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM B	END RADIUS
FIBER COON!	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	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)	68 (46)	2,000 (450)	800 (180)	12.2 (4.8)	8.1 (3.2)
6	9.6 (0.38)	88 (59)	3,000 (670)	1,200 (270)	14.4 (5.7)	9.6 (3.8)
8	11.6 (0.46)	133 (89)	4,000 (900)	1,700 (380)	17.4 (6.9)	11.6 (4.6)
12*	13.0 (0.51)	149 (100)	6,000 (1,350)	2,500 (560)	19.5 (7.7)	13.0 (5.1)
18	15.3 (0.60)	226 (152)	8,000 (1,800)	3,500 (790)	23.0 (9.1)	15.3 (6.0)
24	17.6 (0.69)	292 (196)	10,000 (2,250)	3,800 (850)	26.4 (10.4)	17.6 (6.9)
36	20.3 (0.80)	375 (252)	14,000 (3,150)	6,000 (1,350)	30.5 (12.0)	20.3 (8.0)
48	23.6 (0.93)	501 (336)	18,000 (4,050)	7,500 (1,690)	35.4 (13.9)	23.6 (9.3)
60	28.5 (1.12)	773 (519)	22,000 (4,950)	8,800 (1,980)	42.8 (16.8)	28.5 (11.2)
72	28.9 (1.14)	768 (516)	26,000 (5,845)	11,000 (2,470)	43.4 (17.1)	28.9 (11.4)

\*62.5µm 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.





(3.2k) B-Series Breakout – Riser Rated Tray Cables

## Cable Characteristics: Breakout Tray Cables (with 2.0mm subcables)

FIRED COUNT	DIAMETER	WEIGHT	TENSILI	E LOAD	MINIMUM B	END RADIUS
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	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)
36	16.8 (0.66)	266 (179)	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.

### **Ordering Information**

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

1 – 2 Breakout Series Ultra-Fox Tray Cables:

2.0mm Subcables = **BE** 2.5mm Subcables = **BX** 

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, p. 23)

10 Ultra-Fox fiber with 900μm tight-buffer = **9** 

11 Standard jacket color: Black = **K** 

12 Rating: Riser =  $\mathbf{R}$ 

Example: 12-fiber riser rated tray cable using 62.5µm standard Laser Ultra-Fox fiber 2.5mm subcable, black jacket –

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



(3.2l) B-Series Breakout – Interlocking Armor (ILA) Riser Rated Cables

- 1. Central Filler/Strength Member
- 2. Subcable
- 3. Interlocking Armor
- 4. Outer Jacket
- 5. Ripcord

#### Subcable

- 6. Tight-Buffer Optical Fiber
- 7. Aramid Strength Member
- 8. Subcable Jacket





## **Applications**

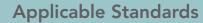
- Ideal for industrial and other installations requiring a metallic conduit
- Interlocking armor may eliminate the need for conduit or innerduct, reducing installation costs

#### **Features**

- Inner cable is a fully functional B-Series Breakout Rise Rated Cable
- 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
- Wide operating temperature of -40°C to +85°C
- 2.0mm and 2.5mm subunits available
- Inner cable is riser rated with PVC jacket

#### Mechanical and Environmental Performance

	INDOOR/OUTDOOR
Operating temperature	-40°C to +85°C
Storage temperature	-40°C to +85°C
Installation temperature	-10°C to +60°C
Flame retardancy	UL listed type OFCR (UL 1666) and FT4 (CSA C22.2No. 232)
Impact resistance	20 impacts (EIA/TIA-455-25A)
Crush resistance	650 N/cm (TIA/EIA-455-41A)
Flex resistance	25 cycles (TIA/EIA-455-104A)



- UL 1666
- ICEA-S-83-596
- UL 1651







(3.2l) B-Series Breakout – Interlocking Armor (ILA) Riser Rated Cables

# Cable Characteristics: B-Series Breakout Interlocking Armor (ILA) Riser Cables (with 2.0mm subcables)

FIRED COLINE	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	14.6 (0.57)	194 (130)	1,350 (300)	400 (90)	29.2 (11.5)	21.9 (8.6)	
4	14.6 (0.57)	194 (130)	1,350 (300)	400 (90)	29.2 (11.5)	21.9 (8.6)	
6	15.6 (0.61)	220 (148)	1,350 (300)	400 (90)	31.2 (12.3)	23.4 (9.2)	
8	17.2 (0.68)	259 (174)	1,350 (300)	400 (90)	34.4 (13.5)	25.8 (10.2)	
12	18.7 (0.74)	297 (200)	1,350 (300)	400 (90)	37.4 (14.7)	28.1 (11.1)	
18	20.7 (0.81)	368 (247)	1,350 (300)	400 (90)	41.4 (16.3)	31.1 (12.2)	
24	22.8 (0.90)	453 (304)	1,350 (300)	400 (90)	45.6 (18.0)	34.2 (13.5)	

## B-Series Breakout Interlocking Armor (ILA) Riser Cables (with 2.5mm subcables)

FIRED COUNT	DIAMETER	WEIGHT	WEIGHT TENSIL		MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	16.1 (0.63)	226 (152)	1,350 (300)	400 (90)	32.2 (12.7)	24.2 (9.5)	
4	16.1 (0.63)	226 (152)	1,350 (300)	400 (90)	32.2 (12.7)	24.2 (9.5)	
6	17.7 (0.7)	263 (177)	1,350 (300)	400 (90)	35.4 (13.9)	26.6 (10.5)	
8	19.7 (0.78)	332 (223)	1,350 (300)	400 (90)	39.4 (15.5)	29.6 (11.7)	
12	22.2 (0.87)	397 (267)	1,350 (300)	400 (90)	44.4 (17.5)	33.3 (13.1)	
18	23.3 (0.92)	452 (304)	1,350 (300)	400 (90)	46.6 (18.3)	35.0 (13.8)	
24	25.8 (1.02)	555 (373)	1,350 (300)	400 (90)	51.6 (20.3)	38.7 (15.2)	

## **Ordering Information**

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1 – 2 Breakout Series Ultra-Fox Cables:

2.0mm Subcables = **BE** 2.5mm Subcables = **BX** 

3-5 Fiber count: (see cable characteristics chart) = **002–024** 

6 Jacket type: Indoor/Outdoor PVC = D

7 – 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)

10 Ultra-Fox fiber with 900µm tight-buffer = **9** 

11 Jacket color:

62.5μm multimode (WLS, WLX) – Orange = **O** 50μm multimode (ALS, ALX) – Orange = **O** 50μm 10 Gigabit (ALT, ALE) – Aqua = **Q** 

Single-mode – Yellow =  $\mathbf{Y}$ Rating: Riser =  $\mathbf{R}$ 

13-14 Indoor/Outdoor PVC jacket over Interlocking armor = **I2** 

Example: 12-fiber breakout cable with 2.0mm subunits, Interlocking Armor using 62.5µm Ultra-Fox fiber, orange jacket-

B E 0 1 2 D W L S 9 O R I 2

12



(3.2m) B-Series Breakout - Interlocking Armor (ILA) Plenum Rated Cables

- 1. Central Filler/Strength Member
- 2. Subcable
- 3. Interlocking Armor
- 4. Outer Jacket
- 5. Ripcord

#### Subcable

- 6. Tight-Buffer Optical Fiber
- 7. Aramid Strength Member
- 8. Subcable Jacket





- Ideal for industrial and other installations requiring a metallic armor
- Interlocking armor may eliminate the need for conduit, reducing installation costs

#### **Features**

- Inner cable is a fully functional B-Series Breakout plenum rated cable
- UL listed in accordance with NEC section 770.179(a) for use in ducts, plenums and air-handling spaces
- Aluminum interlocking armor with plenum fluoropolymer (K) overjacket
- Greater flexibility than standard corrugated steel-armored (CST) cables
- Interlocking armor can be easily removed, leaving an intact inner cable
- 2.0mm subunits are standard
- Wide operating temperature of -40°C to +85°C for (K jacket) cables

### Mechanical and Environmental Performance

	INDOOR/OUTDOOR
Operating temperature	-40°C to +85°C
Storage temperature	-40°C to +85°C
Installation temperature	0°C to +60°C (cable temp.)
Flame retardancy	UL listed type OFCP (ANSI/NFPA 262) and FT6 (CSA C22.2 No. 232
Impact resistance	20 impacts (EIA/TIA-455-25A)
Crush resistance	650 N/cm (TIA/EIA-455-41A)
Flex resistance	25 cycles (TIA/EIA-455-104A)

## **Applicable Standards**

- ANSI/NFPA 262
- UL 1651
- ICEA-S-83-596



(3.2m) B-Series Breakout - Interlocking Armor (ILA) Plenum Rated Cables

# Cable Characteristics: B-Series Breakout Interlocking Armor (ILA) Plenum Cables (with 2.0mm subcables)

FIBER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	13.6 (0.54)	189 (127)	1,350 (300)	400 (90)	27.2 (10.7)	20.4 (8)	
4	13.6 (0.54)	189 (127)	1,350 (300)	400 (90)	27.2 (10.7)	20.4 (8)	
6	14.6 (0.57)	218 (146)	1,350 (300)	400 (90)	29.2 (11.5)	21.9 (8.6)	
8	16.2 (0.64)	263 (177)	1,350 (300)	400 (90)	32.4 (12.8)	24.3 (9.6)	
12	17.7 (0.7)	304 (204)	1,350 (300)	400 (90)	35.4 (13.9)	26.6 (10.5)	
18	19.7 (0.78)	385 (259)	1,350 (300)	400 (90)	39.4 (15.5)	29.6 (11.7)	
24	21.7 (0.85)	468 (314)	1,350 (300)	400 (90)	43.4 (17.1)	32.6 (12.8)	

### **Ordering Information**

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

1 – 2 Breakout Series Ultra-Fox with 2.0mm subunits = **BX** 

3-5 Fiber count: (see cable characteristics chart) = **002–024** 

6 Jacket type: Indoor/Outdoor Fluoropolymer = **K** 

7 – 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)

10 Ultra-Fox fiber with 900μm tight-buffer = **9** 

11 Jacket color:

62.5µm multimode (WLS, WLX) – Orange = **O** 50µm multimode (ALS, ALX) – Orange = **O** 50µm 10 Gigabit (ALT, ALE) – Aqua = **Q** 

Single-mode – Yellow = **Y** 

12 Rating: Plenum = **P** 

13-14 PVDF jacket over Interlocking Armor = **I6** 

Example: 12-fiber breakout cable, Interlocking Armor using 62.5µm Laser Ultra-Fox fiber, orange jacket-

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



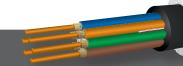
(3.2n) B-Series Breakout - Rodent Deterrent (FRP) Riser Rated Cables

- 1. Central Filler/Strength Member
- 2. Subcable
- 3. FRP Layer
- 4. Outer Jacket
- 5. Ripcord

#### Subcable

- 6. Tight-Buffer Optical Fiber
- 7. Aramid Strength Member
- 8. Subcable Jacket





## **Applications**

- Used in areas that require a riser rating and are susceptible to damage from small non-burrowing rodents
- Easiest cable to install where direct termination of the subcable to a connector and a direct run to panels and equipment are desired

#### **Features**

- Includes a layer of fiberglass yarn that provides an effective deterrent to damage caused by small non-burrowing rodents (not recommended for direct burial applications)
- FRP is ideal for use in surface installations
- UL listed in accordance with NEC section 770.179(b) for use in vertical runs in building risers or from floor to floor
- 2 to 72 fibers with 2.0mm or 2.5mm subcables available
- Helically stranded cable core for flexibility, survival in difficult pulls, and excellent mechanical protection for the optical fibers
- Cables are suitable for use with single, as well as, multichannel connectors
- Water, fungus and UV resistant for extreme environments

### Mechanical and Environmental Performance

	INDOOR/OUTDOOR
Operating temperature	-40°C to +85°C
Storage temperature	-55°C to +85°C
Installation temperature	-10°C to +60°C
Flame retardancy	UL listed type OFNR (UL 1666) and FT4 (CSA C22.2No. 232)
Impact resistance	1,500 impacts (EIA/TIA-455-25A)
Crush resistance	2,200 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)

## **Applicable Standards**

- GR-409-CORE ISSUE 2
- ICEA-S-104-696
- ICEA-S-83-596
- TIA-568
- TIA-598
- UL 1666
- UL 1651





(3.2n) B-Series Breakout - Rodent Deterrent (FRP) Riser Rated Cables

# Cable Characteristics: B-Series Breakout Rodent Deterrent (FRP) Riser Cables (with 2.0mm subcables)

FIBER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM B	END RADIUS
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2	11.1 (0.44)	137 (92)	1,600 (360)	400 (90)	16.7 (6.6)	11.1 (4.4)
4	11.1 (0.44)	127 (85)	1,600 (360)	400 (90)	16.7 (6.6)	11.1 (4.4)
6	12.1 (0.48)	146 (98)	2,400 (540)	600 (130)	18.2 (7.2)	12.1 (4.8)
8	13.4 (0.53)	173 (116)	3,200 (720)	800 (180)	20.1 (7.9)	13.4 (5.3)
12	14.8 (0.58)	201 (135)	6,000 (1,350)	1,500 (340)	22.2 (8.7)	14.8 (5.8)
18	16.6 (0.65)	262 (176)	6,000 (1,350)	1,500 (340)	24.9 (9.8)	16.6 (6.5)
24	18.6 (0.73)	333 (224)	7,200 (1,600)	1,800 (400)	27.9 (11.0)	18.6 (7.3)
36	21.0 (0.83)	410 (276)	9,600 (2,160)	2,400 (540)	31.5 (12.4)	21.0 (8.3)
48	24.2 (0.95)	540 (363)	12,000 (2,700)	3,000 (670)	36.3 (14.3)	24.2 (9.5)

### B-Series Breakout Rodent Deterrent (FRP) Riser Cables (with 2.5mm subcables)

FIRED COLINE	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM B	END RADIUS
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2	12.5 (0.49)	149 (100)	2,000 (450)	800 (180)	18.8 (7.4)	12.5 (4.9)
4	12.5 (0.49)	148 (99)	2,000 (450)	800 (180)	18.8 (7.4)	12.5 (4.9)
6	13.6 (0.54)	172 (116)	3,000 (670)	1,200 (270)	20.4 (8.0)	13.6 (5.4)
8	15.8 (0.62)	235 (158)	4,000 (900)	1,700 (380)	23.7 (9.3)	15.8 (6.2)
12	18.0 (0.71)	280 (188)	6,000 (1,350)	2,500 (560)	27 (10.6)	18.0 (7.1)
18	19.2 (0.76)	331 (222)	8,000 (1,800)	3,500 (790)	28.8 (11.3)	19.2 (7.6)
24	21.8 (0.86)	431 (290)	10,000 (2,250)	3,800 (850)	32.7 (12.9)	21.8 (8.6)
36	25.0 (0.98)	538 (362)	14,000 (3,150)	6,000 (1,350)	37.5 (14.8)	25.0 (9.8)
48	28.2 (1.11)	676 (454)	18,000 (4,050)	7,500 (1,690)	42.3 (16.7)	28.2 (11.1)

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

## **Ordering Information**

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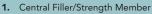
- 1 2 Breakout Series Ultra-Fox with 2.0mm Subunits = **BE**Breakout Series Ultra-Fox with 2.5mm Subunits = **BX**
- 3-5 Fiber count: (see cable characteristics chart) = **002–048**
- 6 Jacket type: Indoor/outdoor PVC = **D**
- 7 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)
- 10 Ultra-Fox fiber with 900 $\mu$ m tight-buffer = **9**
- 11 Jacket color: Black = **K**
- 12 Rating: Riser Rated =  $\mathbf{R}$
- 13 14 FRP Layer with Indoor/Outdoor PVC Jacket = **F1**

Example: 12-fiber breakout cable with FRP rodent deterrent layer, riser rated using 62.5µm Laser Ultra-Fox fiber, black jacket –

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



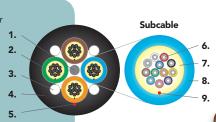
(3.20) G-Series Subgrouping – Riser Rated Cables



- 2. Subcable
- 3. Fillers
- 4. Outer Jacket
- 5. Ripcord

#### Subcable

- 6. Tight-Buffer Optical Fiber
- **7.** Aramid Strength Member
- **8.** Subcable Jacket
- 9. Ripcord



## **Applications**

- Indoor/outdoor 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 multifiber subcables 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
- Subcabling 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) subcables
- Interlocking armor can be applied to cables as an alternative to conduit installation

## **Cost Savings**

- 900µm buffer eliminates the need for costly and time-consuming installation of fanout kits or pigtail splices because connectors terminate directly to the fiber
- 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 (EIA/TIA-455-25A)
Crush resistance	2,100 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)

## **Applicable Standards**

- ICEA-S-83-596
- ICEA-S-104-696
- GR-409-CORE ISSUE2
- TIA-568
- TIA-598
- UL 1651
- UL 1666





(3.20) G-Series Subgrouping – Riser Rated Cables

#### Cable Characteristics: G-Series Subgrouping Riser Cable with 6-Fiber Subcables (4.5mm subcables)

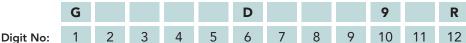
FIRED COLINE	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
12	14.6 (0.57)	207 (139)	3,800 (850)	1,200 (270)	21.9 (8.6)	14.6 (5.7)	
18	14.6 (0.57)	208 (140)	4,700 (1,060)	1,800 (400)	21.9 (8.6)	14.6 (5.7)	
24	14.6 (0.57)	209 (140)	5,600 (1,260)	1,800 (400)	21.9 (8.6)	14.6 (5.7)	
30	15.6 (0.61)	240 (161)	7,500 (1,690)	2,400 (540)	23.4 (9.2)	15.6 (6.1)	
36	16.9 (0.67)	282 (189)	8,900 (2,000)	2,850 (640)	25.4 (10.0)	16.9 (6.7)	

### G-Series Subgrouping Riser Cable with 12-Fiber Subcables (5.5mm subcables)

EIDED COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM B	END RADIUS
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
24	16.6 (0.65)	259 (174)	4,600 (1,030)	1,500 (340)	24.9 (9.8)	16.6 (6.5)
36	16.6 (0.65)	258 (173)	5,900 (1,330)	1,050 (440)	24.9 (9.8)	16.6 (6.5)
48	16.6 (0.65)	257 (173)	7,200 (1,620)	2,400 (540)	24.9 (9.8)	16.6 (6.5)
60	18.4 (0.72)	308 (207)	9,500 (2,140)	3,150 (710)	27.6 (10.9)	18.4 (7.2)
72	20.1 (0.79)	364 (245)	11,300 (2,540)	3,750 (840)	30.2 (11.9)	20.1 (7.9)
84	21.8 (0.86)	425 (286)	13,100 (2,950)	4,350 (980)	32.7 (12.9)	21.8 (8.6)
96	23.6 (0.93)	495 (333)	14,900 (3,350)	4,950 (1,110)	35.4 (13.9)	23.6 (9.3)
108	25.7 (1.01)	587 (394)	18,200 (4,090)	6,000 (1,350)	38.6 (15.2)	25.7 (10.1)
120	27.7 (1.09)	684 (460)	19,500 (4,380)	6,450 (1,450)	41.6 (16.4)	27.7 (10.9)
132	28.1 (1.11)	646 (434)	20,800 (4,680)	6,900 (1,550)	42.2 (16.6)	28.1 (11.1)
144	28.1 (1.11)	645 (433)	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

## **Ordering Information**



- Subgrouping Series Ultra-Fox = G
- 6-fiber subcables = B; 12-fiber subcables = X
- Fiber count: 6-fiber subcables = **012–036**, 12-fiber subcables = **024–144** 3 - 5
- Jacket type: Indoor/Outdoor PVC = **D** 6
- 7 9Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)
- 10 Ultra-Fox fiber with 900µm tight-buffer = 9
- 11 Standard jacket colors: Black = K

Optional colors available:

62.5µm multimode (WLS, WLX): Orange = O

50µm multimode (ALS, ALX): Orange = O

50μm 10 Gigabit multimode (ALT, ALE): Aqua = **Q** 

Single-mode: Yellow =  $\mathbf{Y}$ 

12 Rating: Riser =  $\mathbf{R}$ 

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

G	X	0	4	8	D	W	L	S	9	K	R
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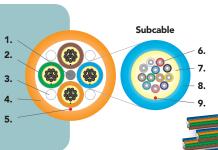
(3.2p) G-Series Subgrouping – Plenum Rated Cables



#### 5. Ripcord

Subcable

- 6. Tight-Buffer Optical Fiber
- 7. Aramid Strength Member
- 8. Subcable Jacket
- 9. Ripcord



## **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) subcables
- 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**

- 900µm buffer eliminates the need for costly and time-consuming installation of fanout kits or pigtail splices because connectors terminate directly to the fiber
- 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 (EIA/TIA-455-25A)
Crush resistance	2,100 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)



- ICEA-S-83-596
- ICEA-S-104-696
- GR-409-CORE ISSUE 2
- TIA-568
- TIA-598
- UL 1651
- UL 1666
- ANSI/NFPA 262





(3.2p) G-Series Subgrouping – Plenum Rated Cables

# Cable Characteristics: G-Series Subgrouping Plenum Cable with 6-Fiber Subcables (4.5mm subcables)

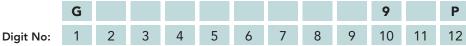
FIBER COUNT DIAMETER		WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
12	14.1 (0.56)	217 (146)	3,800 (850)	1,200 (270)	21.2 (8.3)	21.2 (8.3)	
18	14.1 (0.56)	211 (142)	4,700 (1,060)	1,500 (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)	

## G-Series Subgrouping Plenum Cable with 12-Fiber Subcables (5.5mm subcables)

DIAMETER		WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	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.

## **Ordering Information**



- 1 Subgrouping Series Ultra-Fox = **G** 
  - 6-fiber subcables = B; 12-fiber subcables = X
  - 3 5 Fiber count: 6-fiber subcables = **012–036**, 12-fiber subcables = **024–072**
  - 6 Jacket type: Indoor/Outdoor Fluoropolymer (12–72 fiber) = **K**, (84–144 fiber) = **W**
  - 7 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)
  - 10 Ultra-Fox fiber with 900μm tight-buffer = **9**
  - 11 Standard jacket colors:

62.5µm multimode (WLS, WLX): Orange = O

50μm multimode (ALS, ALX): Orange = **O** 

50 $\mu$ m 10 Gigabit multimode (ALT, ALE): Aqua =  $\mathbf{Q}$ 

Single-mode: Yellow = Y

12 Rating: Plenum = **P** 

Example: 48-fiber cable (12-fiber subcables) using 62.5µm standard Laser Ultra-Fox fiber, orange jacket –

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

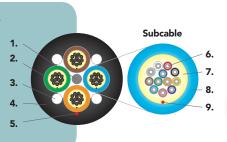


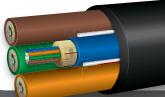
(3.2q) G-Series Subgrouping – Riser Rated Tray Cables

- 1. Central Filler/Strength Member
- 2. Subcable
- 3. Fillers
- 4. Outer Jacket
- 5. Ripcord

#### Subcable

- 6. Tight-Buffer Optical Fiber
- 7. Aramid Strength Member
- 8. Subcable Jacket
- 9. Ripcord





## **Applications**

- Ideal for installations requiring a rugged and reliable cable design where maximum mechanical and environmental protection are necessary
- Typical industrial uses are factory automation, power generation and other utilities, oil and gas refining, and surface mining

#### **Features**

- Best design for multimode and single-mode fiber hybrid/composite cables
- · Design allows multi-fiber subcables to be routed to multiple locations such as wiring racks and closets
- Independently tested to CSA C22.2 No. 230 (tray 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 with 6 or 12 fibers per subcable
- Low-temperature PVC outer jacket (J material) provides excellent performance and flexibility at low temperatures
- Jacket is UV, fungus and moisture resistant
- Wide operating temperature range of -50°C to +85°C
- Core-Locked<sup>™</sup> jacket prevents cable from flattening and the 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 IEEE 383

#### Mechanical and Environmental Performance

	INDOOR/OUTDOOR
Operating temperature	-50°C to + 85°C
Storage temperature	-55°C to + 85°C
Installation temperature (cable temp.)	-30°C to + 60°C
Flame retardancy	UL listed type OFNR (UL 1666) FT4 (CSA C22.2 No. 232)
Impact resistance	1,500 impacts (EIA/TIA-455-25A)
Crush resistance	2,100 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)

## **Applicable Standards**

- ICEA-S-83-596
- ICEA-S-104-696
- GR-409-CORE ISSUE 2
- TIA-568
- TIA-598
- UL 1666
- CSA C22.2 NO. 232
- CSA C22.2 NO. 230





(3.2q) G-Series Subgrouping – Riser Rated Tray Cables

### G-Series Subgrouping Tray Cable with 6-Fiber Subcables (4.5mm subcables)

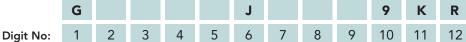
FIRED COUNT	FIBER COUNT DIAMETER		TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	IBER COUNT MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
12	14.6 (0.57)	221 (149)	3,800 (850)	1,200 (270)	21.9 (8.6)	14.6 (5.7)	
18	14.6 (0.57)	222 (149)	4,700 (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)	16.9 (6.7)	

### G-Series Subgrouping Tray Cable with 12-Fiber Subcables (5.5mm subcables)

FIRED COLINIT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)		INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	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	28.1 (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**



- Subgrouping Series Ultra-Fox = **G**
- 2 6-fiber subcables = **B**: 12-fiber subcables = **X**
- Fiber count: 6-fiber subcables = **012–036**, 12-fiber subcables = **024–144** 3 - 5
- Jacket type: Indoor/Outdoor Tray = J 6
- 7 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)
- Ultra-Fox fiber with 900µm tight-buffer = 9 10
- 11 Standard jacket colors: Black = **K** (other jacket colors available upon request)
- 12 Rating: Riser =  $\mathbf{R}$

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

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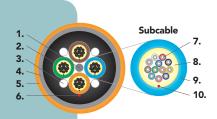


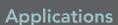
(3.2r) G-Series Subgrouping – Interlocking Armor (ILA) Riser Rated Cables

- 1. Central Filler/Strength Member
- 2. Subcable
- 3. Fillers
- 4. Aluminum Interlocking Armor
- 5. Outer Jacket
- 6. Ripcord

#### Subcable

- 7. Tight-Buffer Optical Fiber
- 8. Aramid Strength Member
- 9. Subcable Jacket
- **10.** Ripcord





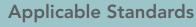
- Ideal for industrial and other installations requiring a metallic conduit
- Interlocking armor may eliminate the need for conduit, reducing installation costs

#### **Features**

- Inner cable is a fully functional G-Series Subgrouping Riser Rated cable
- 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 riser rated inner cable
- Greater flexibility than standard corrugated steel-armored (CST) cables
- Ideal for locations that require conduit for cable protection
- Wide operating temperature of -40°C to +85°C

#### 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 OFCR (UL 1666) and FT4 (CSA C22.2No. 232)
Impact resistance	20 impacts (EIA/TIA-455-25A)
Crush resistance	650 N/cm (TIA/EIA-455-41A)
Flex resistance	25 cycles (TIA/EIA-455-104A)



- UL 1666
- ICEA-S-83-596
- UL 1651







(3.2r) G-Series Subgrouping – Interlocking Armor (ILA) Riser Rated Cables

#### Cable Characteristics: G-Series Subgrouping Interlocking Armor (ILA) Riser (with 6-fiber subcables)

DIAMETER		WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
12	22.8 (0.9)	453 (304)	1,350 (300)	400 (90)	45.6 (18)	34.2 (13.5)	
18	22.8 (0.9)	453 (304)	1,350 (300)	400 (90)	45.6 (18)	34.2 (13.5)	
24	22.8 (0.9)	453 (304)	1,350 (300)	400 (90)	45.6 (18)	34.2 (13.5)	
30	24.9 (0.98)	552 (371)	1,350 (300)	400 (90)	49.8 (19.6)	37.4 (14.7)	
36	25.9 (1.02)	609 (409)	1,350 (300)	400 (90)	51.8 (20.4)	38.9 (15.3)	

## G-Series Subgrouping Interlocking Armor (ILA) Riser (with 12-fiber subcables)

DIAMETER		WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
24	25.9 (1.02)	586 (394)	1,350 (300)	400 (90)	51.8 (20.4)	38.9 (15.3)	
36	25.9 (1.02)	586 (394)	1,350 (300)	400 (90)	51.8 (20.4)	38.9 (15.3)	
48	25.9 (1.02)	586 (394)	1,350 (300)	400 (90)	51.8 (20.4)	38.9 (15.3)	

### **Ordering Information**

Digit No: 4 5

- Subgrouping Series Ultra-Fox = G
- 2 6-fiber subcables = B; 12-fiber subcables = X
- 3 5Fiber count: 6-fiber subcables = **012–036**, 12-fiber subcables = **024–048**
- 6 Jacket type: Indoor/Outdoor PVC = **D**
- 7 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)
- 10 Ultra-Fox fiber with 900 $\mu$ m tight-buffer = **9**
- 11 Jacket color:

62.5µm multimode (WLS, WLX) - Orange = O

 $50\mu m$  multimode (ALS, ALX) – Orange =  $\mathbf{O}$ 

 $50\mu m$  10 Gigabit (ALT, ALE) – Aqua =  $\mathbf{Q}$ 

Single-mode – Yellow =  $\mathbf{Y}$ 

- Rating: Riser =  $\mathbf{R}$ 12
- 13 14 Interlocking Armor with Indoor/Outdoor PVC Jacket = **I2**

Example: 48-fiber subgrouping cable using 12-fiber subcables with 62.5µm Laser Ultra-Fox fiber, interlocking armor, orange jacket, printed in feet -



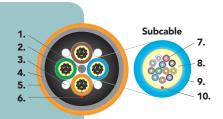
(3.2s) G-Series Subgrouping – Interlocking Armor (ILA) Plenum Rated Cables

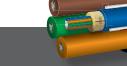


- 2. Subcable
- 3. Fillers
- 4. Aluminum Interlocking Armor
- 5. Outer Jacket
- 6. Ripcord

#### Subcable

- 7. Tight-Buffer Optical Fiber
- 8. Aramid Strength Member
- 9. Subcable Jacket
- **10.** Ripcord



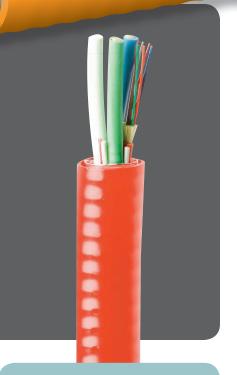


### **Applications**

- Ideal for industrial and other installations requiring a metallic conduit
- Interlocking armor may eliminate the need for conduit, reducing installation costs

#### **Features**

- Inner cable is a fully functional G-Series Subgrouping Plenum Rated cable
- UL listed in accordance with NEC section 770.179(a) for use in ducts, plenums and air-handling spaces
- Aluminum interlocking armor with a fluoropolymer (K) overjacket
- Greater flexibility than standard corrugated steel-armored (CST) cables
- Interlocking armor can be easily removed, leaving an intact plenum rated inner cable
- Wide operating temperature of -40°C to +85°C (K jacket)



#### **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 OFCP (ANSI/NFPA 262) and FT6 (CSA C22.2 No. 232)				
Impact resistance	20 impacts (EIA/TIA-455-25A)				
Crush resistance	650 N/cm (TIA/EIA-455-41A)				
Flex resistance	25 cycles (TIA/EIA-455-104A)				

## **Applicable Standards**

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

- ANSI/NFPA 262
- ICEA-S-83-596
- UL 1651





(3.2s) G-Series Subgrouping – Interlocking Armor (ILA) Plenum Rated Cables

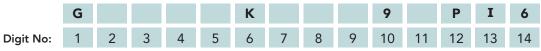
#### Cable Characteristics: G-Series Subgrouping Interlocking Armor (ILA) Plenum Cables (with 6-fiber subcables)

FIBER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
12	22.7 (0.89)	504 (339)	1,350 (300)	400 (90)	45.4 (17.9)	34.1 (13.4)	
18	22.7 (0.89)	502 (337)	1,350 (300)	400 (90)	45.4 (17.9)	34.1 (13.4)	
24	22.7 (0.89)	500 (336)	1,350 (300)	400 (90)	45.4 (17.9)	34.1 (13.4)	
30	23.8 (0.94)	550 (370)	1,350 (300)	400 (90)	47.6 (18.7)	35.7 (14.1)	
36	25.9 (1.02)	538 (362)	1,350 (300)	400 (90)	51.8 (20.4)	38.9 (15.3)	

# G-Series Subgrouping Interlocking Armor (ILA) Plenum Cables (with 12-fiber subcables)

FIBER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
24	23.8 (0.94)	569 (382)	1,350 (300)	400 (90)	47.6 (18.7)	35.7 (14.1)	
36	23.8 (0.94)	565 (380)	1,350 (300)	400 (90)	47.6 (18.7)	35.7 (14.1)	
48	23.8 (0.94)	561 (377)	1,350 (300)	400 (90)	47.6 (18.7)	35.7 (14.1)	

## **Ordering Information**



- 1 Subgrouping Series Ultra-Fox = **G**
- 2 6-fiber subcables = **B**; 12-fiber subcables = **X**
- 3-5 Fiber count: 6-fiber subcables = **012–036**, 12-fiber subcables = **024–048**
- 6 Jacket type: PVDF = **K**
- 7 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)
- 10 Ultra-Fox fiber with 900μm tight-buffer = **9**
- 11 Jacket Color:

62.5µm multimode (WLS, WLX) – Orange = O

50μm multimode (ALS, ALX) – Orange = **O** 

50μm 10 Gigabit (ALT, ALE) – Aqua = Q

Single-mode – Yellow =  $\mathbf{Y}$ 

- 12 Rating: Plenum = **P**
- 13 14 Interlocking armor with Indoor/Outdoor Fluoropolymer jacket = **I6**

Example: 12-fiber subgrouping cable with 6-fiber subcables using 62.5μm Laser Ultra-Fox fiber, interlocking armor, orange, K-jacket, plenum rated, printed in feet –

G B 0 1 2 K W L S 9 O P I 6



(3.2t) G-Series Subgrouping – Rodent Deterrent (FRP) Riser Rated Cables

- 1. Central Filler/Strength Member
- 2. Subcable
- 3. FRP Layer
- 4. Outer Jacket
- 5. Ripcord

#### Subcable

- 6. Tight-Buffer Optical Fiber
- 7. Aramid Strength Member
- 8. Subcable Jacket
- 9. Ripcord





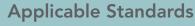
• Used in areas that require a riser rating and are susceptible to damage from small non-burrowing rodents

#### **Features**

- Includes a layer of fiberglass yarn that provides an effective deterrent to damage caused by small non-burrowing rodents (not recommended for direct burial applications)
- FRP is ideal for use in surface installations
- UL listed in accordance with NEC section 770.179(b) for use in vertical runs in building risers or from floor to floor
- 2 to 72 fibers
- Helically stranded cable core for flexibility, survival in difficult pulls, and excellent mechanical protection for the optical fibers
- Water resistant and UV resistant for extreme environments

#### Mechanical and Environmental Performance

	INDOOR/OUTDOOR				
Operating temperature	-40°C to +85°C				
Storage temperature	-55°C to +85°C				
Installation temperature	-10°C to +60°C				
Flame retardancy	UL listed type OFCR (UL 1666) and FT4 (CSA C22.2No. 232)				
Impact resistance	1,500 impacts (EIA/TIA-455-25A)				
Crush resistance	1,800 N/cm (TIA/EIA-455-41A)				
Flex resistance	2,000 cycles (TIA/EIA-455-104A)				



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

- GR-409-CORE ISSUE 2
- ICEA-S-104-696
- ICEA-S-83-596
- TIA-568
- TIA-598
- UL 1666
- UL 1651





(3.2t) G-Series Subgrouping – Rodent Deterrent (FRP) Riser Rated Cables

#### Cable Characteristics: G-Series Subgrouping Rodent Deterrent (FRP) Riser Cables (with 6-fiber subcables)

FIRED COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
12	18.5 (0.73)	332 (223)	3,800 (850)	1,200 (270)	27.8 (10.9)	18.5 (7.3)	
18	18.5 (0.73)	332 (223)	4,700 (1,060)	1,800 (400)	27.8 (10.9)	18.5 (7.3)	
24	18.5 (0.73)	332 (223)	5,600 (1,260)	1,900 (420)	27.8 (10.9)	18.5 (7.3)	
30	19.4 (0.76)	368 (247)	7,500 (1,690)	2,400 (540)	29.1 (11.5)	19.4 (7.6)	
36	21.1 (0.83)	436 (293)	8,900 (2,000)	2,850 (640)	31.7 (12.5)	21.1 (8.3)	

#### G-Series Subgrouping Rodent Deterrent (FRP) Riser Cables (with 12-fiber subcables)

FIRED COLINIT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
24	20.8 (0.82)	410 (276)	4,600 (1,030)	1,500 (340)	31.2 (12.3)	20.8 (8.2)	
36	20.8 (0.82)	410 (276)	5,900 (1,330)	1,050 (440)	31.2 (12.3)	20.8 (8.2)	
48	20.8 (0.82)	410 (276)	7,200 (1,620)	2,400 (540)	31.2 (12.3)	20.8 (8.2)	

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

#### **Ordering Information**

Digit No:

G					D				9	K	R	F	1
1	2	3	4	5	6	7	8	9	10	11	12	13	14

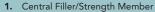
- 1 Subgrouping Series Ultra-Fox = **G**
- 2 6-fiber subcables = **B**; 12-fiber subcables = **X**
- 3 5 Fiber count: 6-fiber subcables = **012–036**, 12-fiber subcables = **024–048**
- 6 Jacket type: Indoor/outdoor PVC = **D**
- 7 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)
- 10 Ultra-Fox fiber with 900μm tight-buffer = **9**
- 11 Jacket color: Black = **K**
- 12 Rating: Riser =  $\mathbf{R}$
- 13 14 FRP Layer with PVC Jacket = **F1**

**Example:** 24-fiber G-series subgrouping cable with 12-fiber subcables, FRP rodent deterrent layer, indoor/outdoor PVC jacket, riser rated using 62.5μm Laser Ultra-Fox fiber, black jacket –

_		_						_					
G	X	O	2	4	ח	W		S	9	K	R	F	1
<b>U</b>		•	_			A A	_		7	1.	1.		



(3.2u) HC-Series – High-Density Riser Rated Cables



- 2. Tight-Buffer Fiber Unit
- 3. Aramid Strength Member
- 4. Outer Jacket
- **5.** Ripcord

#### **Tight-Buffer Fiber Unit**

- 6. 250µm Acrylate Fiber
- **7.** Fiber Unit
- 8. Tight-Buffer Fiber Unit



# **Applications**

- Designed for installation in an underground duct for data transmission between nodes or hubs
- Cable can also be routed vertically inside buildings

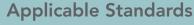
#### **Features**

- Rugged tight-buffer fiber unit construction
- Cable materials are indoor/outdoor: UV, fungus, and water resistant
- The high-density breakout cables offer a >20% reduction in diameter and a >20% reduction in weight relative to conventional loose-tube cables, allowing for greater fiber density and cable packing within a duct
- UL listed in accordance with NEC section 770.179(b) for use in vertical runs in building riser shafts or from floor to floor
- $\bullet \quad \mathsf{Core\text{-}Locked^{\mathsf{TM}}} \ \mathsf{outer} \ \mathsf{jacket} \ \mathsf{design} \ \mathsf{for} \ \mathsf{installation} \ \mathsf{survivability}$
- Helically stranded core for greater flexibility and mechanical protection of the optical fiber units
- Cable offers a cost savings by eliminating the need to splice outdoor cable to indoor cable at building entrance
- Cable can be terminated with 900µm fanout kit for LC connectorization
- Construction options available for direct termination of tight-buffered fiber units to MPO/MTP connectors
- Suitable for direct pulling with wire mesh grips



#### Mechanical and Environmental Performance

	INDOOR/OUTDOOR				
Operating temperature	-40°C to +85°C				
Storage temperature	-55°C to +85°C				
Installation temperature	-20°C to +60°C				
Flame retardancy	UL listed type OFNR (UL 1666)				
Crush resistance	1,800 N/cm				
Flex resistance	2,000 cycles				



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

- ICEA-S-104-696
- ICEA-S-83-596
- TIA-568
- TIA-598
- UL 1666





(3.2u) HC-Series High-Density Riser Rated Cables

#### Cable Characteristics: HC-Series High-Density Riser Cables (with 2.0mm fiber units)

	DIAMETER		TENSIL	E LOAD	MINIMUM B	END RADIUS
FIBER COUNT	MM (IN)	WEIGHT KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
24	7.6 (0.30)	75 (50)	2,700 (600)	600 (135)	11.4 (4.5)	7.6 (3.0)
48	7.6 (0.30)	75 (50)	2,700 (600)	600 (135)	11.4 (4.5)	7.6 (3.0)
72	9.0 (0.35)	97 (65)	2,700 (600)	600 (135)	13.5 (5.3)	9.0 (3.5)
96	10.3 (0.40)	116 (78)	2,700 (600)	600 (135)	15.5 (6.0)	10.3 (4.0)
120	11.4 (0.45)	141 (95)	3,000 (670)**	1,000 (220)	17.1 (6.8)	11.4 (4.5)
144	11.7 (0.46)	152 (102)	3,000 (670)**	1,000 (220)	17.6 (6.9)	11.7 (4.6)
168	11.7 (0.46)	152 (102)	4,800 (1080)**	1,600 (360)	17.6 (6.9)	11.7 (4.6)
192	12.9 (0.51)	179 (120)	4,800 (1080)**	1,600 (360)	19.4 (7.7)	12.9 (5.1)
216	12.9 (0.51)	179 (120)	4,800 (1080)**	1,600 (360)	19.4 (7.7)	12.9 (5.1)
288	15.0 (0.60)	226 (152)	5,400 (1210)**	1,800 (400)	22.8 (9.0)	15.0 (6.0)

<sup>\*\*</sup>Installation loads in excess of 2,700 N (600 lbs.) are not recommended.

#### **Ordering Information**

	Н	С				J				С		R	
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12	
	1 – 2 3 – 5 6 7 – 9 10 11	Fibe Jac Fibe Jac Star	er cour ket typ er type keted f ndard j tional c 62.5 µ 50 µm	t: (see e: Low : (see L iber un acket c olors a um mul n multin	cable of tempe aser Ul it = <b>C</b> color: B vailable timode (node (no	charact rature tra-Fox lack = e: (WLS, ALS, A	eristics oil resi x Fiber <b>K</b> WLX): LX): Or	led fibes chart) stant in Perform  Orang range = T, ALE)	e = O	outdooi Table,	r PVC =		= HC

Single-mode: Yellow = Y

Rating: Riser = **R** 

**Example:** 12-fiber cable with 12-fiber units, 2.0mm in diameter using bend-tolerant single-mode fiber, low temperature oil-resistant indoor/outdoor PVC, black jacket riser rated, printed in feet –

H C 0 1 2 J S L A C K R



(3.2v) CX-Series Composite - Copper/Fiber Riser and Plenum Rated Cables

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





#### **Applications**

- Ideal for data communication and control installations that require fiber and copper under one cable jacket
- Composite fiber/copper cables are intended for use on Class 2 power-limited circuits as described in Article 725 of the National Electrical Code

#### **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 (62.5µm or 50µm) 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 subcabled 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
- Interlocking armor available for riser and plenum composite cables

#### **Cable Characteristics: Composite Cables**

	PLENUM (INDOOR/OUTDOOR)	RISER (INDOOR/OUTDOOR)				
Minimum bend radius: Installation load	20X outside diameter	20X outside diameter				
Minimum bend radius: 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.

# **Applicable Standards**

OCC indoor/outdoor tight-buffered fiber optic cables meet the functional requirements of the following standard:

• UL 13



(3.2v) CX-Series Composite - Copper/Fiber Riser and Plenum Rated Cables

#### Ordering Information: Indoor/Outdoor Riser and Plenum Composite Cables

	С	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: Indoor/Outdoor Fluoropolymer = **K**; Indoor/Outdoor PVC = **D** 

7 – 9 Fiber/Copper type: Contact Optical Cable Corporation for three-digit part number code

10 Ultra-Fox fiber with 900μm tight-buffer = **9** 

11 Standard jacket color:

PVC (all fiber types) – Black = K

Fluoropolymer = 62.5µm multimode (WLS, WLX) – Orange = **O** 

50μm multimode (ALS, ALX) – Orange = **O** 50μm 10 Gigabit (ALT, ALE) – Aqua = **Q** 

Single-mode – Yellow =  $\mathbf{Y}$ 

12 Rating:

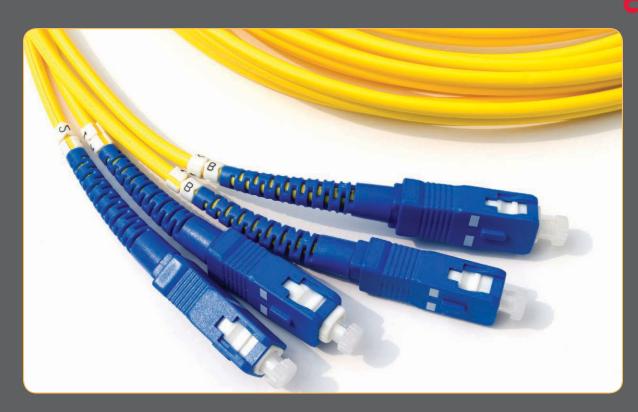
Plenum = P

 $Riser = \mathbf{R}$ 

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

\* Contact OCC for specific part number







# 3.3 Assembly and Data Center Cables

3.3a	A-Series Assembly – Riser, Pienum and LSZH IEC Rated Cables	/4
3.3b	A-Series Micro-Assembly – Riser, Plenum and LSZH Cables (2.0mm)	76
3.3c	A-Series Micro-Assembly – Riser, Plenum and LSZH Cables (1.6mm)	. 78
3.3d	DP-Series Assembly – Mini-Round Duplex: Riser, Plenum and LSZH Cables	80
3.3e	HD-Series – High-Density Plenum Rated Cables	82
3.3f	HD-Series – High-Density Riser and LSZH IEC Rated Cables	85
3.3g	Furcation Tubing	87

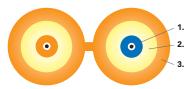




(3.3a) A-Series Assembly – Riser, Plenum and LSZH IEC Rated Cables

- 1. Tight-Buffer Optical Fiber
- 2. Aramid Strength Member
- 3. Outer Jacket







### **Applications**

- Resilient and flexible for jumpers, patch cords, and pigtails
- Suitable for general-purpose indoor use, such as routing connections in patching systems
- Short "patch cord" cables ideal for links between electronic equipment and main fiber optic cables

#### **Features**

- Flame-retardant for indoor installations
- Compatible with all standard fiber optic connectors designed for small form-factor simplex and duplex connectors such as MT-RJ and LC connectors
- High-performance tight-buffered coating on each optical fiber for environmental and mechanical protection
- Custom jacket colors are available to match connectors.
- Private labeling on the cable outer jacket is also available
- 1 (simplex) and 2 (duplex) fibers available
- Available with bend-tolerant single-mode and multimode fibers
- Zero-halogen cables (Z jacket) meet the requirements of IEC 60754-2
- "N" jacket riser rated cable is flexible for use where it is desirable for cables to hang neatly
- "D" jacket riser rated cable provides lower friction and greater stiffness for use in protected interconnect runs



OCC tight-buffered fiber optic assembly cables meet the functional requirements of the following standards:

- ICEA-S-83-596
- TIA-598
- IEC 60754-2
- GR-409-CORE ISSUE 2
- IEC 60332-3-24
- IEC 61034-2
- TIA-568

#### Mechanical and Environmental Performance – A-Series Data 2.9mm

	RISER	PLENUM	ZERO HALOGEN	
Jacket type	N & D	S	Z	
Operating temperature	-40°C to +85°C	0°C to +70°C	-20°C to +70°C	
Storage temperature	-55°C to +85°C	-40°C to +85°C	-40°C to +70°C	
Installation temperature (cable temp.)	-10°C to +60°C	0°C to +60°C	0°C to +60°C	
Flame retardancy	Riser*	Plenum**	IEC 60332-3-24 and Riser*	
Impact resistance (EIA/TIA-455-25A)	1,000 impacts	200 impacts	750 impacts	
Crush resistance (TIA/EIA-455-41A)	750 N/cm	500 N/cm	750 N/cm	
Flex resistance (TIA/EIA-455-104A)	7,500 cycles	2,000 cycles	2,000 cycles	

<sup>\*</sup>UL listed type OFNR (UL 1666) and FT4 (CSA C22.2 No. 232) \*\*UL Listed Type OFNP (ANSI/NFPA 262) and FT6 (CSA C22.2 No. 232)





(3.3a) A-Series Assembly – Riser, Plenum and LSZH IEC Rated Cables

# Cable Characteristics:

A-Series Assembly Riser Rated Cables – 2.9mm (N & D)

		DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIE	BER COUNT	T MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
	1	2.9 (0.11)	8 (5)	500 (110)	300 (70)	5.0 (2.0)	3.0 (1.2)	
	2	2.9 x 5.8 (0.11 x 0.23)	16 (11)	1,000 (220)	500 (110)	5.0 (2.0)	3.0 (1.2)	

### A-Series Assembly Plenum Rated Cables – 2.9mm (S)

FIBER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
	DIAMETER MM (IN)	WEIGHT KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN) 3.0 (1.2)	
1	2.9 (0.11)	9 (6)	500 (110)	300 (70)	5.0 (2.0)	3.0 (1.2)	
2	2.9 x 5.8 (0.11 x 0.23)	18 (12)	1,000 (220)	500 (110)	5.0 (2.0)	3.0 (1.2)	

#### A-Series Assembly LSZH IEC Rated Cables - 2.9mm (Z)

	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
1	2.9 (0.11)	8 (5)	500 (110)	300 (70)	5.0 (2.0)	3.0 (1.2)	
2	2.9 x 5.8 (0.11 x 0.23)	16 (11)	1,000 (220)	500 (110)	5.0 (2.0)	3.0 (1.2)	

### Ordering Information

	Α	X	0	0						9		
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12

- 1 Assembly Series = **A** 
  - 2 Diameter: 2.9mm = X
  - 3-5 Fiber count: Simplex = **001**; Duplex = **002**
  - 6 Jacket type:

Flexible Riser = N

Standard Riser =  $\mathbf{D}$ 

Plenum = **S** 

Flame-Retardant Zero-Halogen =  $\mathbf{Z}$ 

- 7 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)
- 10 Laser Ultra-Fox fiber with 900μm tight-buffer = **9**

Laser Ultra-Fox fiber with 600µm tight-buffer = 6

Laser Ultra-Fox fiber with 900 $\mu$ m ES2 (Easy Strip) = 2

11 Jacket color:

62.5µm multimode (WLS, WLX) - Orange = O

50μm multimode (ALS, ALX) – Orange = **O** 

50 $\mu$ m 10 Gigabit (ALT, ALE) – Aqua =  $\mathbf{Q}$ 

Single-mode (SLX, SLA) – Yellow =  $\mathbf{Y}$ 

12 Rating: Riser = **R**; Plenum = **P**; Flame-Retardant Zero-Halogen = **E** 

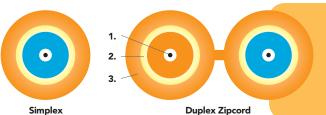
Example: 2-fiber (duplex) 2.9mm assembly cable using 62.5µm standard Laser Ultra-Fox, orange jacket –

A X 0 0 2 N W L S 9 O R





(3.3b) A-Series Micro-Assembly – Riser, Plenum and LSZH Cables (2.0mm)



#### 1. Tight-Buffer Optical Fiber

- 2. Aramid Strength Member
- 3. Outer Jacket

### **Applications**

- Resilient and flexible for jumpers, patch cords, and pigtails
- Suitable for general-purpose indoor use, such as routing connections in patching systems
- Short "patch cord" cables ideal for links between electronic equipment and main fiber optic cables

#### **Features**

- Flame-retardant for indoor installations
- Compatible with all standard fiber optic connectors designed for small form-factor simplex and duplex connectors such as MT-RJ and LC connectors
- High-performance tight-buffered coating on each optical fiber for environmental and mechanical protection
- Custom jacket colors are available to match connectors; private labeling on the cable outer jacket is also available
- 1 (simplex) and 2 (duplex) fibers available
- Micro-assembly cables available in 2.0 or 1.6mm diameters
- Available with bend-tolerant single-mode and multimode fiber
- Zero-halogen cables (Z jacket) meet the requirements of IEC 60754-2

#### Mechanical and Environmental Performance – Micro-Assembly Data 2.0mm

	RISER	PLENUM	ZERO HALOGEN	
Jacket type	D	S	Z	
Operating temperature	-40°C to +85°C	0°C to 70°C	-20°C to +70°C	
Storage temperature	-55°C to +85°C	-40°C to 85°C	-40°C to +70°C	
Installation temperature (cable temp.)	-10°C to +60°C	0°C to 60°C	0°C to +60°C	
Flame retardancy	Riser*	Plenum**	_	
Impact resistance (EIA/TIA-455-25A)	750 impacts	150 impacts	200 impacts	
Crush resistance (TIA/EIA-455-41A)	500 N/cm	500 N/cm	500 N/cm	
Flex resistance (TIA/EIA-455-104A)	2,000 cycles	1,000 cycles	1,000 cycles	

\*UL listed type OFNR (UL 1666) and FT4 (CSA C22.2 No. 232)

<sup>\*\*</sup>UL listed type OFNP (ANSI/NFPA 262) and FT6 (CSA C22.2 No. 232)



(3.3b) A-Series Micro-Assembly Cables: Riser, Plenum and LSZH Cables (2.0mm)

#### Cable Characteristics: A-Series Micro-Assembly Riser Rated Cables – 2.0mm (D)

FIBER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	ND RADIUS  LONG-TERM CM (IN)  2.5 (1.0)  2.5 (1.0)	
1	2.0 (0.08)	4 (3)	300 (67)	160 (36)	3.8 (1.5)	2.5 (1.0)	
2	2.0x4.5 (0.08x0.18)	9 (6)	600 (135)	300 (72)	3.8 (1.5)	2.5 (1.0)	

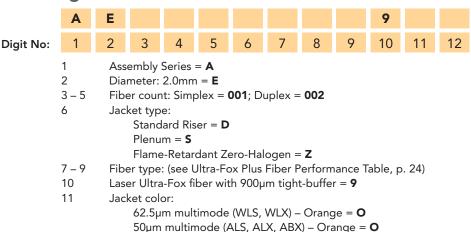
#### A-Series Micro-Assembly Plenum Rated Cables - 2.0mm (S)

FIBER COUNT	DIAMETER	WEIGHT	TENSILI	E LOAD	MINIMUM BEND RADIUS		
	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	ND RADIUS  LONG-TERM CM (IN)  2.5 (1.0)  2.5 (1.0)	
1	2.0 (0.08)	5 (3)	300 (67)	160 (36)	3.8 (1.5)	2.5 (1.0)	
2	2.0x4.5 (0.08x0.18)	10 (6)	600 (135)	300 (72)	3.8 (1.5)	2.5 (1.0)	

# A-Series Micro-Assembly Zero-Halogen Cables – 2.0mm (Z)

	FIBER COUNT	DIAMETER	WEIGHT	TENSILI	E LOAD	MINIMUM BEND RADIUS		
		MM (IN)	WEIGHT KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	2.5 (1.0) 2.5 (1.0)	
	1	2.0 (0.08)	5 (3)	300 (67)	160 (36)	3.8 (1.5)	2.5 (1.0)	
	2	2.0x4.5 (0.08x0.18)	9 (6)	600 (135)	300 (72)	3.8 (1.5)	2.5 (1.0)	

#### **Ordering Information**



Rating: Riser =  $\mathbf{R}$ ; Plenum =  $\mathbf{P}$ ; Flame-Retardant Zero-Halogen =  $\mathbf{Z}$ 

Single-mode (SLX, SLA) – Yellow =  $\mathbf{Y}$ 

 $50\mu m$  10 Gigabit (ALT, ALE, ABT, ABE) – Aqua = **Q** 

Example: 2-fiber (duplex) 2.0mm micro-assembly cable using 62.5µm standard Laser Ultra-Fox fiber, riser rated orange jacket –









(3.3c) A-Series Micro-Assembly: Riser, Plenum and LSZH Cables (1.6mm)

#### Mechanical and Environmental Performance – Micro-Assembly Data 1.6mm

	RISER	PLENUM	ZERO HALOGEN
Jacket type	D	S	Z
Operating temperature	-40°C to +85°C	0°C to 70°C	-20°C to +70°C
Storage temperature	-55°C to +85°C	-40°C to 85°C	-40°C to +70°C
Installation temperature (cable temp.)	-10°C to +60°C	0°C to 60°C	0°C to +60°C
Flame retardancy	Riser*	Plenum**	_
Impact resistance (EIA/TIA-455-25A)	750 impacts	150 impacts	200 impacts
Crush resistance (TIA/EIA-455-41A)	500 N/cm	500 N/cm	500 N/cm
Flex resistance (TIA/EIA-455-104A)	2,000 cycles	1,000 cycles	1,000 cycles

<sup>\*</sup>UL listed type OFNR (UL 1666) and FT4 (CSA C22.2 No. 232)

#### Cable Characteristics: A-Series Micro-Assembly Riser Rated Cables – 1.6mm (D)

	DIAMETER WEIGHT		TENSILE LOAD		MINIMUM BEND RADIUS	
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
1	1.6 (0.06)	2.7 (1.8)	355 (80)	130 (30)	3.8 (1.5)	2.5 (1.0)
2	1.6x3.5 (0.06x0.14)	7 (4.7)	450 (100)	167 (38)	3.8 (1.5)	2.5 (1.0)

### A-Series Micro-Assembly Plenum Rated Cables – 1.6mm (S)

	DIAMETER	DIAMETER WEIGHT		TENSILE LOAD		MINIMUM BEND RADIUS	
FIBER COUNT	MM (IN)	KG/KM (LBS/1 000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
1	1.6 (0.06)	2.7 (1.8)	355 (80)	130 (30)	3.8 (1.5)	2.5 (1.0)	
2	1.6x3.5 (0.06x0.14)	7 (4.7)	450 (100)	167 (38)	3.8 (1.5)	2.5 (1.0)	

#### A-Series Micro-Assembly Zero-Halogen Cables – 1.6mm (Z)

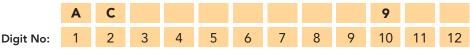
	DIAMETER WEIGHT		TENSILE LOAD		MINIMUM BEND RADIUS	
FIBER COUNT	MM (IN)	KG/KM (LBS/1 000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
1	1.6 (0.06)	2.7 (1.8)	355 (80)	130 (30)	3.8 (1.5)	2.5 (1.0)
2	1.6x3.5 (0.06x0.14)	7 (4.7)	450 (135)	167 (38)	3.8 (1.5)	2.5 (1.0)

<sup>\*\*</sup>UL listed type OFNP (ANSI/NFPA 262) and FT6 (CSA C22.2 No. 232)



(3.3c) A-Series Micro-Assembly: Riser, Plenum and LSZH Cables (1.6mm)

#### **Ordering Information**



- 1 Assembly Series = **A**
- 2 Diameter: 1.6mm = **C**
- 3-5 Fiber count: Simplex = **001**; Duplex = **002**
- 6 Jacket type:

Standard Riser = **D** 

Plenum = **S** 

Flame-Retardant Zero-Halogen = **Z** 

- 7 9 Fiber type: (see Ultra-Fox Plus Fiber Performance Table, p. 24)
- 10 Ultra-Fox fiber with 900μm tight-buffer = **9**
- 11 Jacket color:

62.5µm multimode (WLS, WLX) – Orange = **O** 

50μm multimode (ALS, ALX, ABX) – Orange = **O** 

50μm 10 Gigabit (ALT, ALE, ABT, ABE) – Aqua = **Q** 

Single-mode (SLX, SLA) – Yellow =  $\mathbf{Y}$ 

12 Rating: Riser = **R**; Plenum = **P**; Flame-Retardant Zero-Halogen = **Z** 

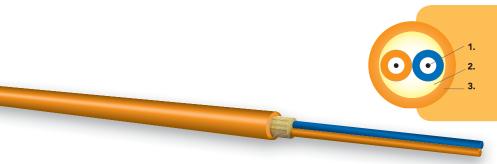
Example: 2-fiber (duplex) 1.6mm micro-assembly cable using 62.5µm standard Laser Ultra-Fox fiber, riser rated, orange jacket –

A C 0 0 2 D W L S 9 O R





(3.3d) DP-Series Assembly – Mini-Round Duplex: Riser, Plenum and LSZH Cables



- 1. Tight-Buffer Optical Cable
- 2. Aramid Strength Member
- 3. Outer Jacket

#### **Applications**

- Flexible, resilient for inter-connect applications
- Small size for dense usage
- For small form-factor duplex connectors, such as MT-RJ

#### **Features**

- 900µm buffer is standard; 600µm buffer is optional for riser rated cables
- Zero-halogen construction available
- 900µm tight-buffer for excellent mechanical and environmental performance

## **Applicable Standards**

OCC tight-buffered fiber optic mini-round cables meet the functional requirements of the following standards:

- ICEA-S-83-596
- GR-409-CORE ISSUE 2

#### Mechanical and Environmental Performance - Mini-Round Duplex

	RISER	PLENUM	ZERO HALOGEN
Jacket type	N	S	Z
Operating temperature	-40°C to +85°C	0°C to +70°C	-40°C to +70°C
Storage temperature	-55°C to +85°C	-40°C to +85°C	-40°C to +70°C
Installation temperature (cable temp.)	-10°C to +60°C	0°C to +60°C	20°C to +60°C
Flame retardancy	Riser*	Plenum**	_
Impact resistance (EIA/TIA-455-25A)	1,000 impacts	200 impacts	1,000 impacts
Crush resistance (TIA/EIA-455-41A)	750 N/cm	500 N/cm	750 N/cm
Flex resistance (TIA/EIA-455-104A)	5,000 cycles	1,000 cycles	1,000 cycles

\*UL listed type OFNR (UL 1666) and FT4 (CSA C22.2 No. 232)

<sup>\*\*</sup>UL listed type OFNP (ANSI/NFPA 262) and FT6 (CSA C22.2 No. 232)



(3.3d) DP-Series Assembly – Mini-Round Duplex: Riser, Plenum and LSZH Cables

#### Cable Characteristics: D-Series Mini-Round Duplex Riser-Assembly Cables (DP)

FIBER COUNT	DIAMETER MM (IN)	WEIGHT KG/KM (ILS/1000')	INSTALLATION TENSILE LOAD N (LBS)	OPERATIONAL TENSILE LOAD N (LBS)	MINIMUM BEND RADIUS INSTALLATION CM (IN)	MINIMUM BEND RADIUS LONG-TERM CM (IN)
2	2.9 (0.11)	8 (5)	500 (110)	300 (70)	5.0 (2.0)	2.9 (1.1)

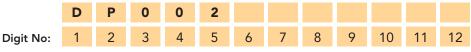
#### D-Series Mini-Round Duplex Plenum-Assembly Cables (DP)

FIBER COUNT	DIAMETER MM (IN)	WEIGHT KG/KM (ILS/1000')	INSTALLATION TENSILE LOAD N (LBS)	OPERATIONAL TENSILE LOAD N (LBS)	MINIMUM BEND RADIUS INSTALLATION CM (IN)	MINIMUM BEND RADIUS LONG-TERM CM (IN)
2	2.9 (0.11)	8 (5)	500 (110)	300 (70)	5.0 (2.0)	2.9 (1.1)

#### D-Series Mini-Round Duplex – Zero-Halogen (DP)

FIBER COUNT	DIAMETER MM (IN)	WEIGHT KG/KM (ILS/1000')	INSTALLATION TENSILE LOAD N (LBS)	OPERATIONAL TENSILE LOAD N (LBS)	MINIMUM BEND RADIUS INSTALLATION CM (IN)	MINIMUM BEND RADIUS LONG-TERM CM (IN)
2	2.9 (0.11)	8 (5)	500 (110)	300 (70)	5.0 (2.0)	2.9 (1.1)

#### **Ordering Information**



1 – 2 D-Series Mini-Round Duplex 2.9mm Ultra-Fox = **DP** 

3 - 5Fiber count = **002** 

Jacket type: Indoor Riser = N; Indoor Plenum = S 6

7 – 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)

10 Ultra-Fox fiber with 900µm tight-buffer = 9

Ultra-Fox fiber with  $600\mu m$  tight-buffer unrated = **6** (riser only)

Ultra-Fox fiber with 900 $\mu$ m ES2 (Easy Strip) = **2** 

11 Jacket color:

> 62.5µm multimode (WLS, WLX) - Orange = O 50μm multimode (ALS, ALX, ABX) – Orange = **O**

50μm 10 Gigabit (ALT, ALE, ABT, ABE) – Aqua = Q

Single-mode (SLX, SLA) – Yellow =  $\mathbf{Y}$ 

12 Rating: Riser = R; Plenum = P; LSZH = Z

Example: 2-fiber, 2.9mm mini-round duplex indoor riser cable using 62.5µm standard Laser Ultra-Fox optimized fiber, orange jacket -





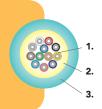




(3.3e) HD-Series – High-Density Plenum Rated Cables

#### 12 Fibers

- 1. 250µm Acrylate Fiber
- 2. Aramid Strength Member
- 3. Flame-Retardant Low-Smoke Plenum Jacket





#### **Applications**

- Ideal for use in trunk, LAN, data center, 40/100 GbE and other high-density applications where small size, lightweight, and very small bend radii are required
- Inventory one cable type to cover the complete range of legacy ST, SC, FC, LC, and advanced MPO style connectivity
- Installations in ducts, plenums, risers, and air-handling spaces
- Space-saving applications where MTP can be directly terminated to the subcables
- Small diameter, which saves space and greatly increases capacity in tray systems, improves cable management and increases cooling power efficiency and cost for under raised floor cabling systems in data centers

#### **Features**

- Smaller and lighter than conventional subgrouped cable
- Ideal for installation in areas with limited space or tight bends
- Easily ribbonized for use with MPO-style connectors
- 8- to 144-fiber premises applications
- UL listed in accordance with NEC sections 770.179(a)
- Cable materials are UV and fungus resistant
- Superior bend performance with negligible dB loss at very small bend radii
- Standard with bend-tolerant fiber: OM3 and OM4 50µm fiber or ITU-T G.657.A1 single-mode fiber
- HZ series is ideal for use with 24-fiber MPO connectors



#### Mechanical and Environmental Performance

	INDOOR/OUTDOOR				
Operating temperature	0°C to +70°C				
Storage temperature	-40°C to +70°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	6 impacts (EIA/TIA-455-25A)				
Crush resistance	35 N/cm (TIA/EIA-455-41A)				
Flex resistance	25 cycles (TIA/EIA-455-104A)				

#### **Applicable Standards**

OCC indoor high-density cables meet the functional requirement of the following standards:

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





(3.3e) HD-Series – High-Density Plenum Rated Cables

#### Cable Characteristics: HD-Series Plenum Cable

	DIAMETER		WEIGHT TENSILE LOAD		MINIMUM BEND RADIUS	
FIBER COUNT	IREP COLINIT	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
8–12	3.0 (0.12)	9.1 (6)	500 (110)	300 (70)	4.5 (1.8)	3.0 (1.2)
13–48	9.1 (0.36)	78 (52)	1,335 (300)	667 (150)	13.7 (5.4)	9.1 (3.6)
49–72	11.1 (0.44)	117 (79)	1,335 (300)	667 (150)	16.7 (6.6)	11.1 (4.4)
73–84	11.9 (0.47)	144 (97)	1,335 (300)	667 (150)	17.9 (7.0)	11.9 (4.7)
85–96	13.1 (0.52)	179 (120)	1,335 (300)	667 (150)	19.7 (7.8)	13.1 (5.2)
97–108	14.1 (0.56)	208 (140)	1,335 (300)	667 (150)	21.2 (8.3)	14.1 (5.6)
109–120	15.0 (0.59)	237 (159)	1,335 (300)	667 (150)	22.5 (8.9)	15.0 (5.9)
121–144	15.6 (0.60)	216 (145)	1,335 (300)	667 (150)	23.0 (9.1)	15.3 (6.0)

#### **HZ-Series Plenum Cable**

	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEI	ND RADIUS
FIBER COUNT	MM (IN)	WEIGHT KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
8–24	3.0 (6.22)	18.2 (12.1)	500 (110)	300 (70)	4.5 (1.8)	3.0 (1.2)

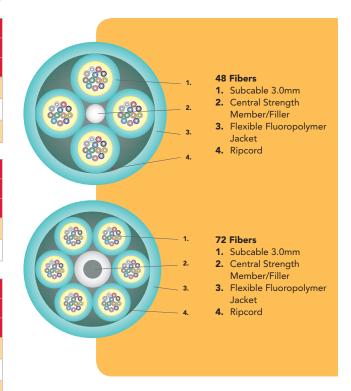
#### Macro-Bend Performance of Subunits or Individual Fibers

- Cable macro-bend performance comparable to competing bend-insensitive rated fibers
- HD bend-tolerant cables available for extremely tight macro-bend performance
- HD bend-tolerant OM3/OM4 has the best multimode macro-bend performance available

RATED MACRO-BEND LOSS HD BEND-TOLERANT OM3 (ABT) / OM4 (ABE) FIBER							
	INDUCED ATTENUATION (DB)						
MANDREL RADIUS (MM)	NO. OF TURNS	850 NM	1,300 NM				
37.5	100	≤ 0.05	≤ 0.05				
15	2	≤ 0.01	≤ 0.01				
7.5	2	≤ 0.1	≤ 0.1				

RATED MACRO-BEND LOSS HD BEND-TOLERANT SINGLE-MODE (SLA) FIBER								
	INDUCED ATTENUATION (DB)							
MANDREL RADIUS (MM)	NO. OF TURNS	1,550 NM	1,625 NM					
15	10	<u>&lt;</u> 0.25	<u>&lt;</u> 1.0					
10	1	<u>&lt;</u> 0.75	<u>&lt;</u> 1.5					

RATED MACRO-BEND LOSS HD BEND-TOLERANT SINGLE-MODE (SLB) FIBER						
		INDUCED ATTENUATION (DB				
MANDREL RADIUS (MM)	NO. OF TURNS	1,550 NM	1,625 NM			
15	10	≤ 0.03	<u>≤</u> 0.1			
10	1	≤ 0.10	≤ 0.2			
7.5	1	≤ 0.50	≤ 1.0			









(3.3e) HD-Series – High-Density Plenum Rated Cables

#### **Ordering Information**

	Н									J		Р
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12

1 – 2 High-density with individual subcables (008–144 fibers) =  ${\bf HD}$ High-density zipcord style (008–024 fibers) =  ${\bf HZ}$ 

3 – 5 Fiber count: **008–144** 

6 Jacket type:

Fluoropolymer = **W** (13–144 fibers) Soft Plenum (Indoor) = **S** (8–12 fibers)

7 – 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)

10  $250 \mu m \text{ fiber} = J$ 

11 Standard jacket color:

50µm 10 Gigabit multimode (ABT, ABE) – Aqua = **Q** 

Single-mode (SLA) – Yellow =  $\mathbf{Y}$ 

12 Rating: Plenum = **P** 

Example: 24-fiber cable using 50µm bend-tolerant OM4 fiber in a zipcord-style –

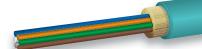
H Z O 2 4 S A B E J Q P



(3.3f) HD-Series – High-Density Riser and LSZH IEC Rated Cables

- 1. 250µm Acrylate Fiber
- 2. Aramid Strength Member
- 3. Flame-Retardant, Low-Smoke Jacket





#### **Applications**

- Ideal for use in trunk, LAN, data center, 40/100 GbE, and other high-density applications where small size, lightweight, and very small bend radii are required
- Inventory one cable type to cover the complete range of legacy ST, SC, FC, LC, and advanced MPO-style connectivity
- Applications where tight bends and flexibility are needed
- Space-saving applications where an MTP can be directly terminated to the cable
- Small diameter, which saves space and greatly increases capacity in tray systems, improves cable management and increases cooling power efficiency and cost for under raised floor cabling systems in data centers

#### **Features**

- Ideal for installation in areas with limited space or tight bends
- Easily ribbonized for use with MPO style connectors
- 8- and 12-fiber premises applications
- UL listed OFNR-LS in accordance with NEC sections 770.179(b) for use in vertical runs in building riser shafts or from floor to floor
- Flame-retardant, low-smoke and zero-halogen to applicable IEC standards: 60332-3-24, 61034-2 and 60754-2
- Cable materials are UV and fungus resistant
- Superior bend performance with negligible dB loss at very small bend radii

#### Mechanical and Environmental Performance

	INDOOR/OUTDOOR		
Operating temperature	0°C to +70°C		
Storage temperature	-40°C to +70°C		
Installation temperature	0°C to+60°C (actual temperature of cable)		
Flame retardancy	UL listed type OFNR-LS (UL 1666 and 1685) and FT4 (CSA C22.2 No. 232)		
Mechanical performance	Meets ICEA-S-83-596 inter-connect cable performance requirements		



## **Applicable Standards**

OCC Indoor high-density cables meet the functional requirement of the following standards:

- ICEA-S-83-596
- **GR-409-CORE ISSUE 2**
- TIA 568
- TIA-598
- UL 1666
- IEC 60332-3-24
- IEC 60754-2
- IEC 61034-2
- UL 1685
- UL 1651









(3.3f) HD-Series - High-Density Riser and LSZH IEC Rated Cables

# Cable Characteristics: Indoor High-Density Bend-Tolerant 8- and 12-fiber LSZH IEC Rated Cables

	DIAMETER	WEIGHT	TENSIL	E LOAD	МІМІМИМ В	END RADIUS
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
8	3.0 (0.12)	8.6 (6)	500 (110)	300 (70)	4.5 (1.8)	3.0 (1.2)
12	3.0 (0.12)	8.6 (6)	500 (110)	300 (70)	4.5 (1.8)	3.0 (1.2)

#### Bend Performance for Bend-Tolerant Fiber

OM3/OM4 FIBER (ABT, ABE, ABX)

Rated Macro-Bend Loss							
LOOSE COIL	NUMBER OF	NUMBER OF INDUCED ATTENUATION (I					
RADIUS (MM)	TURNS	850 NM	1300 NM				
37.5	100	≤ 0.05	≤ 0.05				
15	2	≤ 0.01	≤ 0.01				
7.5	2	≤ 0.1	≤ 0.1				

ITU-T G.657.A1 FIBER (SLA)

Rated Macro-Bend Loss							
LOOSE COIL	NUMBER OF	INDUCED ATTE	NUATION (DB)				
RADIUS (MM)	TURNS	1550 NM	1625 NM				
15	10	≤ 0.25	≤ 1.0				
10	1	≤ 0.75	≤ 1.5				

## **Ordering Information**

	Н	D				Z				J		Е
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12

1-2 High-density = **HD** 

3-5 Fiber count: 8-fiber = **008**; 12-fiber = **012** 

6 Jacket type: LSZH = **Z** 

7 – 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)

10  $250\mu m = J$ 

11 Standard jacket color:

50μm 10 Gigabit multimode (ALT, ALE, ABT, ABE) – Aqua = **Q** 

Single-mode – Yellow =  $\mathbf{Y}$ 

12 Rating: Flame-Retardant Zero-Halogen = **E** 

Example: 12-fiber cable using 50µm bend-tolerant OM4 fiber –

H D 0 1 2 Z A B E J Q E

(3.3g) Furcation Tubing

#### **Applications**

- Ideal for adding protection and strength to 245µm fibers or 900µm tight-buffered fibers for direct termination to connectors
- Can be used to produce fan-out assemblies

#### **Features**

- Aramid yarn included between the inner tube and outer jacket to provide strain relief for the connector
- Inner tube sizes include
  - 470µm ID with a 900µm OD used with 245µm fiber
  - 1,100µm ID with a 1,400µm OD used with 900µm buffered fibers
- Custom colors available
- Outer jacket materials to meet application requirement
- Custom tubing available upon request
- Wide operating temperature range

### **Breakout Tubing**

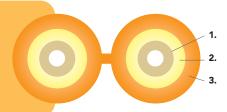
- 1. Hard Elastomeric Tube
- 2. Aramid Strength Member
- 3. Outer Jacket





# **Duplex Assembly Tubing**

- 1. Hard Elastomeric Tube
- 2. Aramid Strength Member
- 3. Outer Jacket









(3.3g) Furcation Tubing Product Specifications

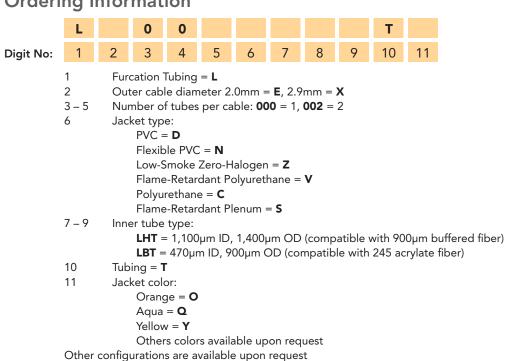
#### **Furcation Tube Specifications**

OUTER JACKET	OUTER DIAMETER (MM)	INNER TUBE DIMENSIONS (ID/OD MICRONS)	NUMBER OF TUBES	TEMPERATURE RANGE
D	2.9	470/900 and 1,100/1,400	1 or 2	-40°C to +85°C
D	2	470/900 and 1,100/1,400	1	-40°C to +85°C
Z	2.9	470/900 and 1,100/1,400	1 or 2	-20°C to +70°C
Z	2	470/900 and 1,100/1,400	1	-20°C to +70°C
V	2.9	470/900 and 1,100/1,400	1 or 2	-40°C to +85°C
V	2	470/900 and 1,100/1,400	1	-40°C to +85°C
N	2.9	470/900 and 1,100/1,400	1	-40°C to +85°C
С	2.9	470/900 and 1,100/1,400	1	-40°C to +85°C
S	2.9	470/900 and 1,100/1,400	1	-10°C to +85°C

#### **Cable Characteristics**

TURE OR	NUMBER OF TURES	TENSILE LOAD			MINIMUM BEND RADIUS		
TUBE OD	NUMBER OF TUBES	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)		
2.9	1	500 (110)	300 (70)	5.0 (2.0)	3.0 (1.2)		
2.9	2	1,000 (225)	500 (110)	5.0 (2.0)	3.0 (1.2)		
2.0	1	300 (70)	160 (36)	4.0 (1.6)	2.5 (1.0)		
2.0	2	600 (135)	300 (70)	4.0 (1.6)	2.5 (1.0)		

#### **Ordering Information**



Example: 2.9mm diameter; PVC jacket; single tube with 470/900µm inner tube, blue jacket





# 3.4 Outdoor Cables

3.4a	A-Series – Special-Purpose Cables	90
3.4b	D-Series Distribution – Outside Plant Cables	92
3.4c	D-Series Distribution – Corrugated Steel Tape (CST) Armored Cables	94
3.4d	D-Series Distribution – Arctic Fox and Arctic Fox Plus Cables	96
3.4e	MX-Series – Figure-8 Messenger Cables (Steel/E-Glass)	98
3.4f	RM-Series – Round Messenger Cables1	00
3.4g	B-Series Breakout – Corrugated Steel Tape (CST) Armored Cables	02
3.4h	B-Series Breakout – Festoon Cables1	04
3.4i	G-Series Subgrouping – Corrugated Steel Tape (CST) Armored Cables1	05
3.4j	CX-Series – Composite Fiber/Copper Deployable Cables1	07
3.4k	Water Tolerance vs. Waterproof1	08

#### **OUTDOOR CABLES**





(3.4a) A-Series – Special-Purpose Cables

- 1. Tight-Buffer Optical Fiber
- 2. Aramid Strength Member
- 3. Outer Jacket



#### **Product Overview**

Optical Cable Corporation has produced many special-purpose military tactical field cable designs to meet particular environmental, mechanical, or system requirements. Some have evolved into standard products, described elsewhere in this catalog. Others are fully developed, have been produced for specific applications, and are readily reproducible. All the specialty cables are based on our extensive and well-proven tight-buffer technology. Generally, for Optical Cable Corporation, they are straightforward implementations of proven designs, or combinations thereof. Your custom cable requirements, though new, can be easily implemented with assurance of success.

Below are some of our most popular specialty Military Tactical Field cables. Please contact our sales department about your particular requirements for an assessment or a quotation.

#### Payout Cables

#### **APPLICATIONS**

- Payout from precision coil packs
- Detailed design is based on the environment, payout speed, cable length, and cable physical properties

#### **FEATURES**

- Precise outer jacket diameter tolerances
- Relatively stiff and hard jacket materials to reduce friction and avoid kinking after payout
- As strong, crush-proof and survivable as their small size allows
- 500µm primary acrylate buffer
- Some include a secondary 900µm buffer
- Can use 200 kpsi fiber

#### Land and Air Rapid Payout Cables

#### **APPLICATIONS**

- High-speed land or air-deployed cable
- Land deployments up to 60 mph (100 kph)
- Air deployment up to 130 mph (210 kph)

#### **FEATURES**

- Hard elastomeric pressure-extruded outer jacket to ensure mechanical integrity under stress
- Designed to withstand crush and impact after deployment
- Land-deployable cables are commonly 2.5mm and 2.0mm
- Long continuous lengths

# Simplex Military Tactical Cables

#### **APPLICATIONS**

• Temporarily deployed cables that can be retrieved for repeated use

#### **FEATURES**

- Wide temperature range (typically -55°C to 85°C)
- 500µm primary acrylate buffer with 900µm secondary hard elastomeric buffer (Ultra-Fox Plus)
- Excellent crush and impact resistance due to their polyurethane Core-Locked™ outer jacket
- Strong, lightweight and extremely durable cable
- 2.5, 2.9, 4.0 and 4.5mm cable designs available depending on the application



(3.4a) A-Series – Special-Purpose Cables

#### **Cable Characteristics**

DIAMETER MM (IN)	JACKET MATERIAL	RATING	WEIGHT (KG/KM) LBS/1,000'	BREAKING STRENGTH N (LBS)	SPECIFIC GRAVITY	APPLICATION
4.5 (0.18)	С	М	19 (13)	2,300 (520)	1.15	TFC
4.0 (0.16)	С	М	15 (10)	1,700 (380)	1.15	TFC
2.9 (0.12)	С	М	8.4 (6)	1,700 (380)	1.15	LBD
2.5 (0.10)	С	М	5.8 (4)	1,300 (290)	1.15	LBD
2.5 (0.10)	R	М	6.0 (4)	1,000 (220)	1.18	HAD/LBD
2.0 (0.08)	R	М	3.7 (2)	1,000 (220)	1.18	HAD/LBD

TFC = Tactical field cable for ground-based deployment

LBD = Land-based deployment for communications or remote vehicle control

HAD = High-speed air-deployable from coil packs

#### **Ordering Information**

 A
 0
 0
 1
 5

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

1 Assembly Series = A

2 Diameter:

2.0mm = **E** 

2.5mm = **J** 

2.9mm = - (for Ultra-Fox Plus Fiber)

4.0mm = **U** 

4.5mm = **V** 

3-5 Fiber count: = **001** 

6 Jacket material: As defined above

7 – 9 Fiber type: (see Ultra-Fox Plus Fiber Performance Table, p. 24)

10 Ultra-Fox Plus fiber with 900µm tight-buffer = **5** 

11 Jacket color: Black = **K** 

12 Rating: Military = **M** 

Example: 1-fiber 4.0mm assembly cable for tactical field cable for ground-based deployment using 62.5µm fiber –

A U 0 0 1 C W S T 5 K M

# **OUTDOOR CABLES**





(3.4b) D-Series Distribution – Outside Plant Cables

- 1. Central Filler/Strength Member
- 2. Tight-Buffer Optical Fiber
- 3. Aramid Strength Member
- 4. Outer Jacket
- **5.** Ripcord





## **Applications**

 Outdoor distribution cable for duct or aerial lash installations along utility poles for cable television, telecom or other outside plant campus backbone applications

#### **Features**

- Tight-buffered construction for easy, direct connector termination or splicing
- Polyethylene outer cable jacket for excellent UV and weather resistance
- High-performance tight-buffer on the optical fibers for excellent environmental and mechanical protection
- Wide operating temperature of -40°C to +85°C
- 900µm buffer eliminates the need for costly and time-consuming installation of fan-out kits or pigtail splices because connectors terminate directly to the fiber
- All-dielectric design does not require grounding or bonding



#### Mechanical and Environmental Performance

	OUTDOOR			
Operating temperature	-40°C to +85°C			
Storage temperature	-55°C to +85°C			
Installation temperature (cable temp.)	-30°C to +60°C			
Impact resistance	1,000 impacts (EIA/TIA-455-25A)			
Crush resistance	1,500 N/cm (TIA/EIA-455-41A)			
Flex resistance	1,000 cycles (TIA/EIA-455-104A)			

# **Applicable Standards**

OCC outside plant tight-buffered fiber optic cables meet the functional requirements of the following standards:

- ICEA S-87-640
- TIA-568
- TIA-598



(3.4b) D-Series Distribution – Outside Plant Cables

#### Cable Characteristics: D-Series Outside Plant Cables

FIBER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM B	END RADIUS
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2	6.3 (0.25)	29 (20)	2,670 (600)	890 (200)	12.6 (5.0)	6.3 (2.5)
4	6.3 (0.25)	29 (20)	2,670 (600)	890 (200)	12.6 (5.0)	6.3 (2.5)
6	6.3 (0.25)	29 (20)	2,670 (600)	890 (200)	12.6 (5.0)	6.3 (2.5)
8	6.9 (0.27)	39 (26)	2,800 (630)	900 (202)	13.8 (5.4)	6.9 (2.7)
12	7.9 (0.31)	53 (36)	2,800 (630)	900 (202)	15.8 (6.2)	7.9 (3.1)
18	7.9 (0.31)	57 (38)	2,800 (630)	900 (202)	15.8 (6.2)	7.9 (3.1)
24	9.5 (0.37)	77 (52)	3,000 (670)	1,000 (220)	19.0 (7.5)	9.5 (3.7)
36	9.7 (0.38)	71 (48)	3,000 (670)	1,000 (220)	19.4 (7.6)	9.7 (3.8)
48	10.8 (0.43)	91 (61)	4,200 (942)	1,400 (313)	21.5 (8.5)	10.8 (4.3)

Installation loads in excess of 2,700 N (600 lbs.) are not recommended. Ideal for harsh chemical environments including petrochemical. Other fiber counts available upon request.

#### **Ordering Information**

	D	X				Α				9	K	A
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12

- 1 2 Aerial Distribution Series Ultra-Fox= **DX**
- 3-5 Fiber count: (see cable characteristics chart) = **002–048**
- 6 Jacket type: Polyethylene = A
- 7 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)
- 10 Ultra-Fox fiber with 900μm tight-buffer = **9**
- 11 Jacket color: Black = **K**
- 12 Rating: None/outdoor = A

 $\textbf{Example:} \quad \textbf{12-fiber cable using 62.5} \mu \textbf{m standard laser optimized fiber, black jacket} - \\$ 

D	X	0	1	2	Α	W	L	S	9	K	Α
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# **OUTDOOR CABLES**





(3.4c) D-Series Distribution – Corrugated Steel Tape (CST) Armored Cables

- 1. Central Filler/Strength Member
- 2. Tight-Buffer Optical Fiber
- 3. Aramid Strength Member
- 4. Inner Jacket
- 5. Corrugated Steel Tape Armor
- 6. Outer Jacket
- **7.** Ripcords





# **Applications**

• Ideal for installation where direct burial or rodent protection is required

#### **Features**

- The steel-armor is easily removed with an internal ripcord, leaving a fully functional intact riser-rated inner cable, with original cable markings for identification
- Armored jacket is an add-on option that can be applied to most outdoor and indoor/outdoor riser-rated cables
- Inner tight-buffered cable is suitable for direct field termination with standard optical connectors



#### Mechanical and Environmental Performance

	OUTDOOR
Operating temperature	-40°C to +85°C
Storage temperature	-55°C to +85°C
Installation temperature (cable temp.)	-10°C to +60°C
Impact resistance	20 impacts (EIA/TIA-455-25A)
Crush resistance	440 N/cm (TIA/EIA-455-41A)
Flex resistance	25 cycles (TIA/EIA-455-104A)

# **Applicable Standards**

OCC CST armored tight-buffered fiber optic cables meet the functional requirements of the following standards:

- TIA-568
- TIA-598
- ICEA S-104-696





(3.4c) D-Series Distribution – Corrugated Steel Tape (CST) Armored Cables

#### Cable Characteristics: CST Armored Cables (Using Distribution Series Riser Inner-Cable)

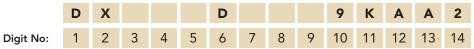
FIRED COUNT	FIRE COUNT DIAMETER		TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	11.4 (0.45)	118 (79)	1,400 (310)	450 (100)	17.1 (6.7)	11.4 (4.5)	
4	11.4 (0.45)	118 (79)	1,400 (310)	450 (100)	17.1 (6.7)	11.4 (4.5)	
6	11.4 (0.45)	118 (79)	1,400 (310)	450 (100)	17.1 (6.7)	11.4 (4.5)	
8	11.4 (0.45)	121 (81)	1,600 (360)	525 (120)	17.1 (6.7)	11.4 (4.5)	
10	12.3 (0.48)	138 (93)	1,800 (400)	600 (135)	18.5 (7.3)	12.3 (4.8)	
12	13.4 (0.53)	160 (108)	2,700 (600)	900 (200)	20.1 (7.9)	13.4 (5.3)	
18	13.4 (0.53)	160 (108)	2,700 (600)	900 (200)	20.1 (7.9)	13.4 (5.3)	
24	14.9 (0.59)	190 (128)	3,000 (670)	1,000 (220)	22.4 (8.8)	14.9 (5.9)	
30	15.5 (0.61)	207 (139)	3,000 (670)	1,000 (220)	23.3 (9.2)	15.5 (6.1)	
36	15.5 (0.61)	205 (138)	3,000 (670)	1,000 (220)	23.3 (9.2)	15.5 (6.1)	
48	16.5 (0.65)	233 (157)	4,200 (940)	1,400 (310)	24.8 (9.8)	16.5 (6.5)	
60	18.9 (0.77)	292 (196)	4,800 (1,080)	1,600 (360)	28.4 (11.2)	18.9 (7.4)	
72	20.9 (0.82)	358 (241)	5,400 (1,210)	1,800 (400)	31.4 (12.4)	20.9 (8.2)	
84	21.4 (0.84)	382 (257)	6,000 (1,350)	2,000 (450)	32.1 (12.6)	21.4 (8.4)	
96	22.4 (0.88)	410 (276)	6,000 (1,350)	2,000 (450)	33.6 (13.2)	22.4 (8.8)	
108	23.5 (0.93)	453 (304)	6,000 (1,350)	2,000 (450)	35.3 (13.9)	23.5 (9.3)	
120	24.5 (0.96)	484 (325)	6,000 (1,350)	2,000 (450)	36.8 (14.5)	24.5 (9.6)	
132	25.0 (0.98)	502 (337)	6,000 (1,350)	2,000 (450)	37.5 (14.8)	25.0 (9.8)	
144	26.3 (1.04)	556 (374)	6,000 (1,350)	2,000 (450)	39.5 (15.6)	26.3 (10.4)	

 $<sup>^{\</sup>star}62.5\mu m$  multimode fiber. Mechanical specifications vary by fiber type. Installation loads in excess of 2,700 N (600 lbs.) are not recommended. Other fiber counts available upon request.

#### See application engineering note:

Interlocking Armor Cable Pulling Grip Installation Procedure available online at www.occfiber.com.

## **Ordering Information**



- 1 2 Distribution Series Laser 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, p. 23)
- 10 Ultra-Fox fiber with 900μm tight-buffer = **9**
- 11 Jacket color: Black = **K**
- 12 Rating: None/outdoor = **A**
- 13 14 Corrugated Steel Tape Armor with Polyethylene Jacket = A2

Example: 12-fiber CST armored distribution cable using 62.5µm standard Laser Ultra-Fox fiber, black jacket –



# **OUTDOOR CABLES**





(3.4d) D-Series Distribution – Arctic Fox™ and Arctic Fox™ Plus Cables

- 1. Central Filler/Strength Member
- 2. Tight-Buffer Optical Fiber
- 3. Aramid Strength Member
- 4. Outer Jacket
- **5.** Ripcord



## **Applications:**

 Ideal for extreme low-temperature where crush due to ice and jacket flexibility are a concern, while maintaining excellent attenuation performance

#### **Features**

- Optimized for use in extreme low temperature applications
- Better attenuation performance than other commercially available cables
- Better jacket flexibility performance than other commercially available cables
- Excellent ice-crush performance
- Can be installed in duct
- Can have CST Armor applied for direct buried applications

# **Applicable Standards**

OCC D-Series Arctic Fox and Arctic Fox Plus Distribution Cables meet the functional requirements of the following standards:

- ANSI/ICEA AND 87-640
- ANSI/ICEA AND 87-640 ANNEX C

#### Mechanical and Environmental Performance



<sup>\*\*</sup>Meets or exceeds the functional requirements of ANSI/ICEA and 87-640-1999 ANNEX C requirements for very-low temperature applications.





(3.4d) D-Series Distribution – Arctic Fox™ and Arctic Fox™ Plus Cables

#### Cable Characteristics: D-Series Arctic Fox Cables

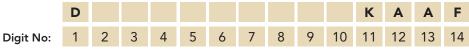
FIRED COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM B	END RADIUS
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2	6.3 (0.25)	29 (19)	2,700 (600)	900 (200)	25.2 (9.9)	12.6 (5.0)
4	6.3 (0.25)	29 (19)	2,700 (600)	900 (200)	25.2 (9.9)	12.6 (5.0)
6	6.3 (0.25)	29 (19)	2,700 (600)	900 (200)	25.2 (9.9)	12.6 (5.0)
8	6.9 (0.27)	35 (24)	2,700 (600)	900 (200)	27.6 (10.9)	13.8 (5.4)
10	7.1 (0.28)	40 (27)	2,700 (600)	900 (200)	28.4 (11.2)	14.2 (5.6)
12	7.9 (0.31)	47 (32)	2,700 (600)	900 (200)	31.6 (12.4)	15.8 (6.2)
18	7.9 (0.31)	47 (32)	2,700 (600)	900 (200)	31.6 (12.4)	15.8 (6.2)
24	9.5 (0.37)	65 (44)	2,700 (600)	900 (200)	38.0 (15.0)	19.0 (7.5)
36	9.7 (0.38)	71 (48)	2,700 (600)	900 (200)	38.8 (15.3)	19.4 (7.6)
48	10.7 (0.42)	91 (61)	2,700 (600)	900 (200)	42.8 (16.9)	21.4 (8.4)

#### **Arctic Fox Plus Cables**

FIBER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM B	END RADIUS
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2	6.3 (0.25)	26 (17)	3,000 (670)	1,000 (220)	25.2 (9.9)	12.6 (5.0)
4	6.3 (0.25)	26 (17)	3,000 (670)	1,000 (220)	25.2 (9.9)	12.6 (5.0)
6	6.3 (0.25)	26 (17)	3,000 (670)	1,000 (220)	25.2 (9.9)	12.6 (5.0)
8	6.9 (0.27)	39 (26)	3,000 (670)	1,000 (220)	27.6 (10.9)	13.8 (5.4)
10	7.1 (0.28)	45 (30)	3,000 (670)	1,000 (220)	28.4 (11.2)	14.2 (5.6)
12	7.9 (0.31)	53 (36)	3,000 (670)	1,000 (220)	31.6 (12.4)	15.8 (6.2)
18	7.9 (0.31)	57 (38)	3,000 (670)	1,000 (220)	31.6 (12.4)	15.8 (6.2)
24	9.5 (0.37)	77 (52)	3,000 (670)	1,000 (220)	38.0 (15.0)	19.0 (7.5)

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

# **Ordering Information**



1 – 2 Distribution Series Laser Ultra-Fox Arctic Fox = **DX**Distribution Series Laser Ultra-Fox Arctic Fox Plus = **D**-

3 – 5 Fiber count: (see characteristics chart)

Jacket type: Arctic Fox =  $\mathbf{X}$ , Arctic Fox Plus =  $\mathbf{A}$ 

7 – 9 Fiber type: Arctic Fox (see Laser Ultra-Fox Fiber Performance Table, p. 23)
Arctic Fox Plus (see Ultra-Fox Plus Fiber Performance Table, p. 24)

10 Laser Ultra-Fox fiber with 900μm tight-buffer (Arctic Fox) = **9** 

Ultra-Fox Plus fiber with 900 $\mu$ m tight-buffer (required for Arctic Fox Plus) = 5

11 Jacket color: Black = **K** 

12 Rating: None = A

13 – 14 **AF** 

Example: 12-fiber Arctic Fox distribution cable using 62.5µm Laser Ultra-Fox fiber, black jacket, printed in feet –



# **OUTDOOR CABLES**

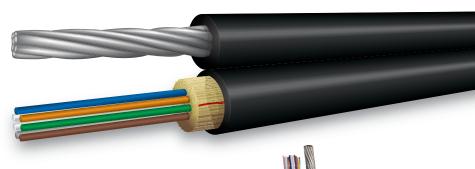




(3.4e) MX-Series – Figure-8 Messenger Cables (Steel/E-Glass)

- 1. Messenger
- 2. Central Filler
- 3. Tight-Buffer Optical Fiber
- 4. Aramid Strength Member
- 5. Outer Jacket
- 6. Ripcord





#### **Applications**

• Outdoor aerial installations along utility poles for cable television, telecom or other outside plant campus backbone applications without the need for cable lashing

#### **Features**

- Figure-eight construction for use with standard messenger clamping and support hardware
- Ideal for new installations; the figure-eight messenger cable reduces installation time and cost
  by approximately 50% compared to separate installation of a messenger wire and the lashing of
  the cable to the messenger
- Wide operating temperature range of -40°C to +85°C
- 1/4-inch galvanized messenger standard
- Polyethylene outer cable jacket for excellent UV and weather resistance
- Designed to the NESC requirements for light, medium and heavy storm loads (see cable characteristics table for maximum span lengths)

#### Mechanical and Environmental Performance

	OUTDOOR		
Operating temperature	-40°C to +85°C		
Storage temperature	-55°C to +85°C		
Installation temperature (cable temp.)	-30°C to +60°C		
Impact resistance	1,500 impacts		
Crush resistance	1,800 N/cm		

# **Applicable Standards**

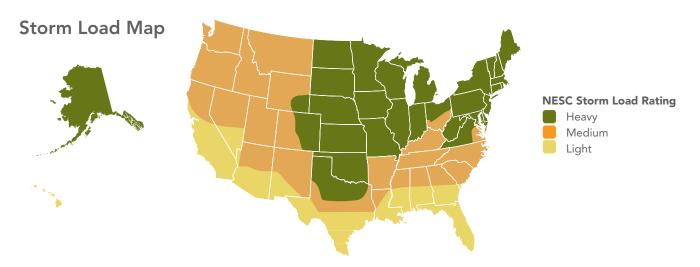
OCC figure-eight tight-buffered fiber optic cables meet the functional requirements of the following standards:

- TIA-568
- TIA-598
- ICEA-S-87-640

<sup>\*</sup>All-dielectric messenger available upon request.



(3.4e) MX-Series – Figure-8 Messenger Cables (Steel/E-Glass)

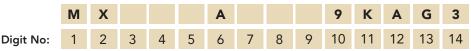


### Cable Characteristics: MX-Series Figure-8 Cable with 1/4-inch Steel Messenger

FIBER COUNT	WEIGHT KG/KM (LBS/1,000')	NESC SPAN LENGTH (M) † SEE STORM LOAD MAP (HEAVY/MEDIUM/LIGHT)
2	245 (164)	120/200/270
4	245 (164)	120/200/270
6	249 (167)	120/200/270
8	254 (170)	120/200/265
12	261 (175)	120/190/250
18	264 (177)	120/190/250
24	273 (183)	110/180/230
36	290 (195)	105/180/220
48	307 (206)	95/175/220

† Span lengths based on 1% installation sag. Other size messengers available. Contact Optical Cable Corporation for specifications.

### **Ordering Information**



1 – 2 Messenger Series Ultra-Fox= **MX** 

3-5 Fiber count: (see cable characteristics chart) = **002–048** 

6 Jacket type: Polyethylene = **A** 

7 – 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)

10 Ultra-Fox fiber with 900μm tight-buffer = **9** 

11 Jacket color: Black = **K** 

12 Rating: None/Outdoor = **A** 

13 – 14 Messenger Code: 1/4-inch Galvanized Steel = G3

Example: 12-fiber messenger cable using 62.5µm standard Laser Ultra-Fox fiber, 1/4-inch messenger, black jacket –



# **OUTDOOR CABLES**





(3.4f) RM-Series – Round Messenger Cables

- 1. Central Filler/Strength Member
- 2. Tight-Buffer Optical Fiber
- 3. Aramid Strength Member
- 4. Outer Jacket
- **5.** Ripcord





 Outdoor aerial installations along utility poles for cable television, telecom or other outside plant campus backbone applications without the need for cable lashing or grounding

#### **Features**

- Lightweight, all-dielectric self-supporting (ADSS) construction is ideal for use near electrical power lines and in areas of frequent lightning
- No messenger or lashing is required
- Round cable construction for minimum wind drag and ice buildup
- Aramid strength members reduce weight for longer span lengths
- Wide operating temperature range of -55°C to +85°C
- 900µm tight-buffer eliminates the need for costly and time-consuming installation of fan-out kits or pigtail splices because connectors terminate directly to the fiber
- Standard with Ultra-Fox Plus fiber (500µm)

#### **Environmental Performance**

	OUTDOOR
Operating temperature	-55°C to +85°C
Storage temperature	-70°C to +85°C
Installation temperature (cable temp.)	-30°C to +60°C
Impact resistance	1,500 impacts (EIA/TIA-455-25A)
Crush resistance	1,800 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)

# **Applicable Standards**

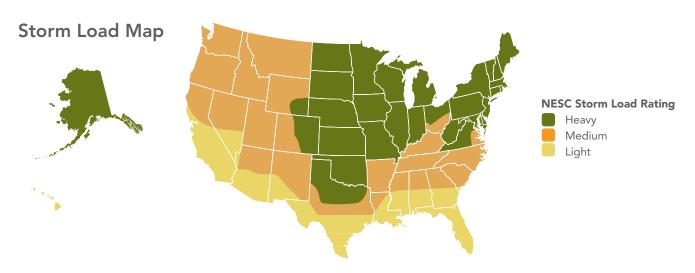
OCC Round Messenger tight-buffered fiber optic cables meet the functional requirements of the following standards:

- TIA-568
- TIA-598
- ICEA S-87-640
- IEEE 1222





(3.4f) RM-Series – Round Messenger Cables



### Cable Characteristics: RM-Series Round Messenger Cables

				MAXIMUM SPAN LENGTH BASED ON 1% INSTALLATION SAG					
FIBER COUNT	DIAMETER	WEIGHT	MAX RATED	NESC HEAVY		NESC MEDIUM		NESC LIGHT	
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	CABLE TENSION N (LBS)	METERS	FEET	METERS	FEET	METERS	FEET
2	8.5 (0.33)	52 (35)	12,800 (2,880)	69	225	127	415	230	755
4	8.5 (0.33)	52 (35)	12,800 (2,880)	69	225	127	415	230	755
6	8.7 (0.34)	55 (37)	12,800 (2,880)	69	225	125	410	226	740
8	9.2 (0.36)	64 (43)	12,800 (2,880)	67	220	122	400	210	690
12	9.8 (0.38)	70 (47)	12,800 (2,880)	66	215	119	390	204	670
18	9.6 (0.38)	69 (46)	12,800 (2,880)	66	215	120	395	204	670
24	10.1 (0.40)	79 (53)	12,800 (2,880)	64	210	117	385	194	635
36	10.6 (0.42)	88 (59)	12,800 (2,880)	63	205	114	375	18	600
48	11.6 (0.46)	108 (72)	12,800 (2,880)	61	200	108	355	168	550

<sup>\*</sup>Please contact Optical Cable Corporation with span lengths, storm load rating and sag requirements.

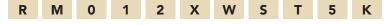
### **Ordering Information**

	R	M				X				5	K
Digit No:	1	2	3	4	5	6	7	8	9	10	11
	1 – 2 3 – 5 6 7 – 9	Fibe Jacl	er coun ket type er type 62.5µ	t: (see e: Poly : (see l m Mult	er Serie: cable colefin = Jltra-Fo timode =	charact • <b>X</b> •x Plus •= <b>W\$1</b>	eristics Fiber P	chart)	= 002-		. 24)

Single-mode = **SLS** 10 Ultra-Fox Plus fiber with  $900\mu m$  tight-buffer = 5

Jacket color – Black =  $\mathbf{K}$ 11

Example: 12-fiber round messenger cable using 62.5µm Ultra-Fox Plus fiber, black jacket –



### **OUTDOOR CABLES**





(3.4g) B-Series Breakout - Corrugated Steel Tape (CST) Armored Cables

- 1. Central Filler/Strength Member
- 2. Subcable
- 3. Corrugated Steel Tape Armor
- 4. Outer Jacket
- 5. Ripcord

#### Subcable

- 6. Tight-Buffer Optical Fiber
- 7. Aramid Strength Member
- 8. Subcable Jacket



#### **Applications:**

- Ideal for installations where direct burial or rodent protection is required
- 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 subunits and direct run to panels and equipment is desired

#### **Features:**

- Inner cable is a fully functional B-Series Breakout riser-rated cable
- High-performance components and construction
- Most rugged and easy to install cable design for enterprise cabling applications
- 2.5mm subcables and 2.0mm subcables can be direct-terminated with standard connectors (2.9mm subcables also available)
- The steel-armor is easily removed with an internal ripcord, leaving a fully functional intact riser-rated inner cable with original cable marking for identification
- Polyethylene (A) outer jacket for excellent UV and weathering resistance
- 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
- Cable materials are indoor/outdoor UV, water and fungus resistant
- Wide operating temperature range of -40°C to +85°C
- High-performance 900µm tight-buffered coating on each optical fiber for environmental and mechanical protection
- 2 to 36 fibers

	OUTDOOR
Operating temperature	-40°C to +85°C
Storage temperature	-55°C to +85°C
Installation temperature (cable temp.)	-10°C to +60°C
Impact resistance	20 impacts (EIA/TIA-455-25A)
Crush resistance	440 N/cm (TIA/EIA-455-41A)
Flex resistance	25 cycles (TIA/EIA-455-104A)



(3.4g) B-Series Breakout - Corrugated Steel Tape (CST) Armored Cables

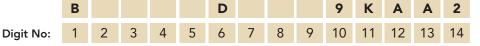
#### Cable Characteristics: B-Series Breakout CST Armored Cables (with 2.0mm subcables)

FIRED COUNT	DIAMETER	WEIGHT	TENSILE LOAD		MINIMUM BEND RADIUS	
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2	12.9 (0.51)	152 (102)	1,600 (360)	400 (90)	19.4 (7.6)	12.9 (5.1)
4	12.9 (0.51)	152 (102)	1,600 (360)	400 (90)	19.4 (7.6)	12.9 (5.1)
6	14.4 (0.57)	182 (122)	2,400 (540)	600 (130)	21.6 (8.5)	14.4 (5.7)
8	15.5 (0.61)	211 (142)	3,200 (720)	800 (180)	23.3 (9.2)	15.5 (6.1)
12	17.5 (0.69)	249 (167)	4,800 (1080)	1,200 (270)	26.3 (10.4)	17.5 (6.9)
18	18.9 (0.74)	301 (202)	6,000 (1350)	1,500 (340)	28.4 (11.2)	18.9 (7.4)
24	21.4 (0.84)	391 (263)	7,200 (1600)	1,800 (400)	32.1 (12.6)	21.4 (8.4)
36	23.5 (0.93)	455 (306)	9,600 (2100)	2,400 (540)	35.3 (13.9)	23.5 (9.3)

#### B-Series Breakout CST Armored Cables (with 2.5mm subcables)

FIBER COUNT	DIAMETER	WEIGHT	TENSILE LOAD		MINIMUM BEND RADIUS	
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2	14.4 (0.57)	183 (123)	1,200 (270)	500 (110)	21.6 (8.5)	14.4 (5.7)
4	14.4 (0.57)	183 (123)	2,000 (450)	800 (180)	21.6 (8.5)	14.4 (5.7)
6	16.0 (0.63)	211 (142)	3,000 (670)	1,200 (370)	24.0 (9.4)	16.0 (6.3)
8	18.4 (0.72)	275 (185)	4,000 (900)	1,700 (380)	27.6 (10.9)	18.4 (7.2)
12	20.9 (0.82)	330 (222)	6,000 (1,350)	2,500 (560)	31.4 (12.4)	20.9 (8.2)
18	21.9 (0.86)	386 (259)	8,000 (1,800)	3,500 (790)	32.9 (13.0)	21.9 (8.6)
24	24.5 (0.96)	478 (321)	10,000 (2,250)	3,800 (850)	36.8 (14.5)	24.5 (9.6)
36	28.3 (1.11)	607 (408)	14,000 (3,150)	6,000 (1350)	42.5 (16.7)	28.3 (11.1)

### **Ordering Information**



1 – 2 Breakout Series Ultra-Fox

2.0mm Subcables = **BE** 

2.5mm Subcables = **BX** 

Fiber count: (see cable characteristics chart) = **002–036** 3 - 5

Jacket type: Indoor/Outdoor PVC = **D** 6

7 – 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)

10 Ultra-Fox fiber with 900 $\mu$ m tight-buffer = **9** 

Jacket color: Black = K 11

Rating: Unrated =  $\mathbf{A}$ 12

13 – 14 Corrugated Steel Tape Armor Indoor/Outdoor Polyethylene jacket = A2

Example: 12-fiber B-series breakout corrugated steel tape armored cable with 2.5mm subcables using 62.5µm Laser Ultra-Fox fiber, black jacket -

# **OUTDOOR CABLES**





(3.4h) B-Series Breakout – Festoon Cables

### **Applications**

- 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
- For use in overhead cranes, hoists and other industrial applications

#### **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 utilize OCC's Ultra-Fox Plus fiber for the ultimate in environmental and mechanical protection

#### Mechanical and Environmental Performance

	OUTDOOR
Operating temperature	-55°C to +85°C
Storage temperature	-70°C to +85°C
Impact resistance	200 impacts (TIA/EIA-455-24 mil. requirement)
Crush resistance	440 N/cm (TIA/EIA-455-41 mil. requirement)
Flex resistance	2,000 cycles (TIA/EIA-455-104)

#### B-Series Breakout Festoon Cables (with 2.5mm Subcables)

FIRED COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
4	16 (0.63)	203 (136)	1,600 (360)	400 (90)	24 (9.4)	16 (6.3)	
6	16 (0.63)	206 (138)	1,600 (360)	400 (90)	24 (9.4)	16 (6.3)	
8	16 (0.63)	209 (140)	2,400 (540)	600 (130)	24 (9.4)	16 (6.3)	
10	18 (0.71)	272 (183)	3,200 (720)	800 (180)	27 (10.6)	18 (7.1)	
12	18 (0.71)	254 (171)	6,000 (1350)	1,500 (340)	27 (10.6)	18 (7.1)	
18	18 (0.71)	249 (167)	6,000 (1350)	1,500 (340)	27 (10.6)	18 (7.1)	
24	18 (0.71)	237 (159)	7,200 (1600)	1,800 (400)	27 (10.6)	18 (7.1)	

### **Ordering Information**

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



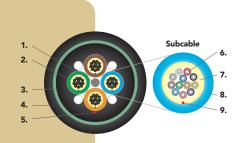


(3.4i) G-Series Subgrouping – Corrugated Steel Tape (CST) Armored Cable

- 1. Central Filler/Strength Member
- 2. Subcable
- 3. Corrugated Steel Tape Armor
- 4. Outer Jacket
- 5. Ripcord

#### Subcable

- 6. Tight-Buffer Optical Fiber
- 7. Aramid Strength Member
- 8. Color-Coded Subcable Cable Jacket
- 9. Ripcord





- Ideal for installations where direct burial or rodent protection is required
- Design allows subcables to be routed to multiple locations such as wiring racks and closets
- Ideal for installations requiring an extremely rugged and reliable cable design where maximum mechanical and environmental protection are necessary
- Easiest cable to install where routing of cables to multiple locations is desired

#### Features:

- Inner cable is a fully functional G-Series Subgrouping riser-rated cable
- High-performance components and construction
- 6-fiber or 12-fiber subgroups are available
- · The steel-armor is easily removed with an internal ripcord, leaving a fully functional intact riser-rated inner cable with original cable marking for identification
- 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
- Subgrouping cable design permits mid-span access
- Polyethylene (A) outer jacket for excellent UV and weathering resistance
- Ideal for use in point-to-point runs in adverse environments
- Wide operating temperature range of -40°C to +85°C
- High-performance 900µm tight-buffered coating on each optical fiber for environmental and mechanical protection
- Best design for multimode and single-mode fiber hybrid cables
- Available with 6-fiber (4.5mm) or 12-fiber (5.5mm) subgroups
- 2 to 48 fibers

	OUTDOOR
Operating temperature	-40°C to +85°C
Storage temperature	-55°C to +85°C
Installation temperature (cable temp.)	-10°C to +60°C (cable temp.)
Impact resistance	20 impacts (EIA/TIA-455-25A)
Crush resistance	440 N/cm (TIA/EIA-455-41A)
Flex resistance	25 cycles (TIA/EIA-455-104A)

# **OUTDOOR CABLES**





(3.4i) G-Series Subgrouping – Corrugated Steel Tape (CST) Armored Cable

#### Cable Characteristics: G-Series CST Armored Cables (with 6-fiber subcables)

FIRED COUNT	DIAMETER		TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)		INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
12	21.4 (0.84)	392 (263)	2,700 (600)	600 (135)	32.1 (12.6)	21.4 (8.4)	
18	21.4 (0.84)	392 (263)	2,700 (600)	600 (135)	32.1 (12.6)	21.4 (8.4)	
24	21.4 (0.84)	392 (263)	2,700 (600)	600 (135)	32.1 (12.6)	21.4 (8.4)	
30	22.4 (0.88)	427 (287)	2,700 (600)	600 (135)	33.6 (13.2)	22.4 (8.8)	
36	24.0 (0.94)	486 (327)	2,700 (600)	600 (135)	35.3 (13.9)	23.5 (9.3)	

#### G-Series CST Armored Cables (with 12-fiber subcables)

FIBER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
24	23.5 (0.93)	460 (309)	2,700 (600)	600 (135)	35.3 (13.9)	23.5 (9.3)	
36	23.5 (0.93)	460 (309)	2,700 (600)	600 (135)	35.3 (13.9)	23.5 (9.3)	
48	23.5 (0.93)	460 (309)	2,700 (600)	600 (135)	35.3 (13.9)	23.5 (9.3)	
60	25.5 (1.0)	528 (355)	2,700 (600)	600 (135)	38.3 (15.1)	25.5 (10.0)	
72	27.3 (1.07)	601 (404)	2,700 (600)	600 (135)	41 (16.1)	27.3 (10.7)	

### **Ordering Information**

 G
 D
 P
 K
 A
 A
 A

 Digit No:
 1
 2
 3
 4
 5
 6
 7
 8
 9
 10
 11
 12
 13
 14

- 1 Subgrouping Series Ultra-Fox = **G**
- 2 6-fiber subcables = **B**; 12-fiber subcables = **X**
- 3-5 Fiber count: 6-fiber subcables = **012-036**, 12-fiber subcables = **024-072**
- 6 Inner jacket material = **D**
- 7 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)
- 10 Laser Ultra-Fox fiber with 900μm tight-buffer = **9**
- 11 Jacket color: Black = **K**
- 12 Rating: Unrated =  $\mathbf{A}$
- 13-14 Corrugated Steel Tape Armor Indoor/Outdoor Polyethylene jacket = A2

**Example:** 36-fiber G-series subgrouping corrugated steel tape armored using 62.5μm Laser Ultra-Fox fiber, 12-fiber subcables, black jacket –

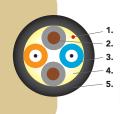
G X 0 3 6 D W L S 9 K A A 2



(3.4j) CX-Series Composite - Fiber/Copper Deployable Cables



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





#### **Applications:**

- Used in outdoor applications that require both optical fiber and copper wire elements for communication and power
- Copper wire can power remote electronics used in fiber optic communications
- Copper wire can also be used for low data rate data transmission
- Deployable cables have been used in network and private broadcast applications around the world
- Cables can be designed for your custom applications
- Designed for use with United States National Electric Code (NEC) Class 2 power sources

#### **Features**

- Includes both fiber optic subunits and copper, individually jacketed wire
- Fiber optic subunits both protect the optical fiber and provide aramid yarn to strain relieve the optical fiber when individual connectors are used
- The individual copper wire is rated to 600V
- Up to 4 copper wires are standard
- Standard copper wire used includes high-strand-count wire for greater cable flexibility
- Standard wire gauges range from 18 to 12 AWG
- Additional aramid yarn included around the cable core for strain-relief in multielement connectors such as F-LINK
- Polyurethane jacket materials provide a rugged jacket and provide flexibility to the cable
- C, V and G jacket materials are available for use
- Polyurethane jackets are chemical resistant
- Water, fungus and UV resistant for extreme environments
- The customer is responsible for ensuring the compliance with all local and national safety and electrical code during use
- Appropriate electrical safety protection is required whenever the copper wire is energized

#### Cable Characteristics: **CX-Series Composite Fiber/Copper Deployable Cables**

• Due to the wide range of constructions possible, call for construction details

### **Ordering Information**

Call for part numbers





#### **OUTDOOR CABLES**



)

(3.4k) Water Tolerance vs. Waterproof

### Water Tolerance vs. Waterproof

The tight-buffered, tight-bound indoor/outdoor cables manufactured by Optical Cable Corporation utilize an entirely different design approach to deal with the moisture issue. Rather than attempting to be "waterproof," they are designed to be water tolerant.

Recognizing the porosity of plastic materials and the inherent impossibility of waterproofing a cable, the moisture protection is concentrated at the fiber surface where it is most needed.

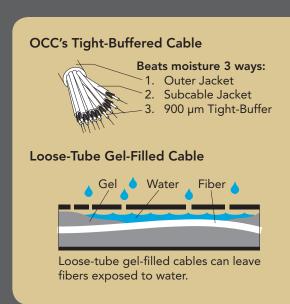
OCC's tight-buffer systems consist of extremely low-moisture absorption coefficient materials at the fiber coating. This provides a buffer system thickness of 387µm over the glass, more than six times as thick as the 62.5µm coating found in the loose-tube gel-filled cables.

Buffer materials are low-porosity plastics with excellent moisture resistance. This construction very effectively minimizes the water molecule and OH-ion concentration level at the glass surface and virtually eliminates the stress corrosion phenomenon. The tight-buffered design also has the great advantage of being a solid, non-flowing, nonmoving structure. The same level of protection remains in place all along the fiber, regardless of installation conditions, environment, or time.

The balance of the tight-buffered, tight-bound cable designs is such that it minimizes the open spaces available in the cable structure in which water can reside. Even if an outer cable jacket is cut, or water otherwise enters the cable structure, only a very small percentage of the cross-sectional area is open to water. This eliminates the other water-related failure mechanism, freezing, and expansion in the cable structure, causing stress on the fiber, which could lead to failure. OCC's tight-buffered, tight-bound cables have been deliberately pumped full of water and frozen in a temperature chamber, and they show no damage and virtually no change in attenuation.

OCC's excellent tight-buffered, tight-bound cable construction results from extensive developmental efforts funded by the U.S. government in the late 1970s and early 1980s. These efforts led to the highly successful military tactical fiber optic cable products offered by OCC. These cables have been subjected to complete military qualification testing for outdoor field use. The same design approach, and many of the same materials, is used in our indoor/outdoor cables offered for commercial use. In 1978, the same technology was used for the first telephone installation field trial in central Pennsylvania. Twenty-two miles of tight-buffered fiber optic cable was installed outdoors, half aerially and half directly buried. This cable system was in continuous use for more than 20 years without cable degradation or failures. This system was finally retired when their multimode electro-optics became obsolete.

The technology and construction of OCC's tight-buffered, tight-bound indoor/outdoor fiber optic cables offer a truly exceptional design for protection against moisture and for long-term survivability in outside-plant-type applications.







# 3.5 Military Cables



3.5a	D-Series Distribution Mil-Tac Cables	110
3.5b	D-Series Distribution Mil-Tac Rodent Deterrent (FRP) Cables	113
3.5c	DOD QPL-85045 Qualified Products	116
3.5d	Military Tactical Fiber Optic Cables for Extreme Environments	117
3.5e	B-Series Breakout – Mil-Tac Cables	119
3.5f	B-Series Breakout – Mil-Tac Rodent Deterrent (FRP) Cables	122

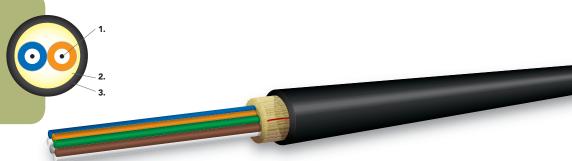






(3.5a) D-Series Distribution Mil-Tac Cables

- 1. Tight-Buffer Optical Fiber
- 2. Aramid Strength Member
- 3. Outer Jacket



### **Applications**

• Ground-tactical cable that is ideal for use in harsh environments where deployment and retrieval for reuse are required

#### **Features**

- Extremely strong, lightweight, rugged, survivable tight-buffered cables designed for military tactical field use and commercial applications
- Compact, round cable design for ease of transportation and deployment
- Designed for use in adverse environments where reduced size and weight are important
- Helically stranded cable core for flexibility, deployment survivability and exceptional mechanical protection for the optical fibers
- Cables have been tested and are in use in military data communications applications worldwide
- Can be used outdoors for temporary deployment directly on the ground in all terrains, including severe environments
- Suitable for industrial, mining and petrochemical environments
- Crush resistant and resilient with a thick layer of aramid strength members
- Polyurethane jacketed for abrasion, cut and chemical resistance
- Most commonly used with ruggedized multiway military tactical field connectors, for maximum connector retention (400 lbs.)
- Tactical Polyurethane (C) outer jacket material is standard; Flame-retardant Tactical (V) and Low-Smoke Zero-Halogen (G) outer jacket materials are available
- Ultra-Fox Plus Fiber (500μm) used for environmental and mechanical protection

#### OCC Provided Options

- Mil-Tac cables prespooled on deployable reels for a ready-to-use product
- Mil-Tac cables can be pre-terminated with single fiber or ruggedized multichannel connectors upon request



	(TESTED TO MIL PRF 85045 METHODS)
Operating temperature	-55°C to +85°C
Storage temperature	-70°C to +85°C
Impact resistance	200 impacts (EIA/TIA-455-25A military requirements)
Crush resistance	440 N/cm (TIA/EIA-455-41A military requirements)
Flex resistance	2,000 cycles (TIA/EIA-455-104A military requirements)





(3.5a) D-Series Distribution Mil-Tac Cables

#### Cable Characteristics: D-Series Mil-Tac Cables (C Jacket)

FIRED COUNT	DIAMETER		TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	5.0 (0.20)	21 (14)	1,800 (400)	600 (130)	5.0 (2.0)	2.5 (1.0)	
4	5.5 (0.22)	27 (18)	1,800 (400)	600 (130)	5.5 (2.2)	2.8 (1.1)	
6	6.0 (0.24)	32 (22)	1,800 (400)	600 (130)	6.0 (2.4)	3.0 (1.2)	
8	6.5 (0.26)	37 (25)	1,800 (400)	600 (130)	6.5 (2.6)	3.3 (1.3)	
10	6.5 (0.26)	38 (26)	2,100 (470)	700 (160)	6.5 (2.6)	3.3 (1.3)	
12	6.5 (0.26)	41 (28)	2,100 (470)	700 (160)	6.5 (2.6)	3.3 (1.3)	
18	7.5 (0.30)	48 (32)	2,400 (540)	800 (180)	7.5 (3.0)	3.8 (1.5)	
24	8.5 (0.33)	60 (40)	3,000 (670)	1,000 (220)	8.5 (3.3)	4.3 (1.7)	

#### D-Series Mil-Tac Cables (V Jacket)

FIRED COLINE	FIBER COUNT DIAMETER		TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	5.0 (0.20)	24 (16)	1,800 (400)	600 (130)	5.0 (2.0)	2.5 (1.0)	
4	5.5 (0.22)	29 (19)	1,800 (400)	600 (130)	5.5 (2.2)	2.8 (1.1)	
6	6.0 (0.24)	34 (23)	1,800 (400)	600 (130)	6.0 (2.4)	3.0 (1.2)	
8	6.5 (0.26)	39 (26)	1,800 (400)	600 (130)	6.5 (2.6)	3.3 (1.3)	
10	6.5 (0.26)	40 (27)	2,100 (470)	700 (160)	6.5 (2.6)	3.3 (1.3)	
12	6.5 (0.26)	43 (29)	2,100 (470)	700 (160)	6.5 (2.6)	3.3 (1.3)	
18	7.5 (0.30)	51 (34)	2,400 (540)	800 (180)	7.5 (3.0)	3.8 (1.5)	
24	8.5 (0.33)	63 (42)	3,000 (670)	1,000 (220)	8.5 (3.3)	4.3 (1.7)	

### **D-Series Mil-Tac Cables (G Jacket)**

FIRED COLINIT	FIBER COUNT DIAMETER		TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	5.0 (0.20)	22 (15)	1,800 (400)	600 (130)	5.0 (2.0)	2.5 (1.0)	
4	5.5 (0.22)	28 (19)	1,800 (400)	600 (130)	5.5 (2.2)	2.8 (1.1)	
6	6.0 (0.24)	33 (22)	1,800 (400)	600 (130)	6.0 (2.4)	3.0 (1.2)	
8	6.5 (0.26)	38 (26)	1,800 (400)	600 (130)	6.5 (2.6)	3.3 (1.3)	
10	6.5 (0.26)	39 (26)	2,100 (470)	700 (160)	6.5 (2.6)	3.3 (1.3)	
12	6.5 (0.26)	42 (28)	2,100 (470)	700 (160)	6.5 (2.6)	3.3 (1.3)	
18	7.5 (0.30)	49 (33)	2,400 (540)	800 (180)	7.5 (3.0)	3.8 (1.5)	
24	8.5 (0.33)	62 (42)	3,000 (670)	1,000 (220)	8.5 (3.3)	4.3 (1.7)	



)

(3.5a) D-Series Distribution Mil-Tac Cables

# **Ordering Information**

 D S K M

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

1 – 2 Mil-Tac Distribution Series Ultra-Fox Plus= **D**–

3 – 5 Fiber count: (See Cable Characteristics Chart) = **002–024** 

6 Jacket type:

Tactical Polyurethane = C

 $Low-Smoke\ Zero-Halogen\ Polyurethane = \textbf{G}$ 

Tactical Flame-Retardant Polyurethane = V

7 – 9 Fiber type: (see Ultra-Fox Plus Fiber Performance Table, p.24)

10 Ultra-Fox Plus Fiber with 900μm tight-buffer = **5** 

11 Jacket color: Black = **K** 

12 Rating: Mil-Tac Cable Rating = M

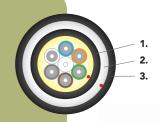
Example: 12-fiber Mil-Tac distribution cable using 62.5µm fiber, black jacket –

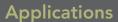
D - 0 1 2 C W S T 5 K M



(3.5b) D-Series Distribution - Mil-Tac Rodent Deterrent (FRP) Cables

- 1. Inner Cable
- 2. Fiberglass Yarns
- 3. Outer Jacket





- Ground-tactical cable that is ideal for use in harsh environments where deployment and retrieval for reuse are required
- Used in areas susceptible to damage from small non-burrowing rodents

#### **Features**

- Standard OCC D-Series Mil-Tac inner cable with an added layer of fiberglass yarn that provides an effective deterrent to damage caused by small, non-burrowing rodents (not recommended for direct burial applications)
- FRP is ideal for use for surface installations (not recommended for direct buried applications)
- Mil-Tac cable can be made in a variety of colors for easy identification or to blend in to the environment
- Helically stranded cable core for flexibility, deployment survivability, and excellent mechanical protection for the optical fibers
- Cables are suitable for use with single, as well as multichannel, connectors
- Excellent crush resistance to withstand crowd and vehicle traffic
- High tensile load rating for quick deployment and retrieval
- Water, fungus and UV resistant for extreme environments
- Outdoor, field-proven cables are easily deployed and retrieved for temporary or long-term data communications in harsh environments
- Standard Polyurethane (C), Flame-Retardant Tactical Polyurethane (V) and Low-Smoke Zero-Halogen (G) jackets are available

#### **OCC Provided Options**

- Mil-Tac cables prespooled on deployable reels for a ready-to-use product
- Mil-Tac cables can be pre-terminated with single-fiber or ruggedized multichannel connectors upon request

	(TESTED TO MIL PRF 85045 METHODS)
Operating temperature	-55°C to +85°C
Storage temperature	-70°C to +85°C
Impact resistance	200 impacts (EIA/TIA-455-25A military requirements)
Crush resistance	440 N/cm (TIA/EIA-455-41A military requirements)
Flex resistance	2,000 cycles (TIA/EIA-455-104A military requirements)







(3.5b) D-Series Distribution - Mil-Tac Rodent Deterrent (FRP) Cables

# Cable Characteristics: D-Series Mil-Tac Rodent Deterrent FRP Cables (C Jacket)

FIBER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	10.7 (0.42)	104 (70)	1,800 (400)	600 (130)	16.1 (6.3)	10.7 (4.2)	
4	10.7 (0.42)	104 (70)	1,800 (400)	600 (130)	16.1 (6.3)	10.7 (4.2)	
6	10.7 (0.42)	104 (70)	1,800 (400)	600 (130)	16.1 (6.3)	10.7 (4.2)	
8	11.6 (0.46)	123 (83)	1,800 (400)	600 (130)	17.4 (6.9)	11.6 (4.6)	
10	11.6 (0.46)	125 (84)	2,100 (470)	700 (160)	17.4 (6.9)	11.6 (4.6)	
12	12.7 (0.50)	145 (97)	2,100 (470)	700 (160)	19.1 (7.5)	12.7 (5.0)	
18	12.4 (0.49)	139 (93)	2,400 (540)	800 (180)	18.6 (7.3)	12.4 (4.9)	
24	13.2 (0.52)	156 (105)	3,000 (670)	1,000 (220)	19.8 (7.8)	13.2 (5.2)	

#### **D-Series Mil-Tac Rodent Deterrent FRP Cables (V Jacket)**

EIDED COUNT	DIAMETER DIAMETER		TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	10 (0.39)	101 (68)	1,800 (400)	600 (130)	15.0 (5.9)	10.0 (3.9)	
4	10 (0.39)	101 (68)	1,800 (400)	600 (130)	15.0 (5.9)	10.0 (3.9)	
6	10 (0.39)	101 (68)	1,800 (400)	600 (130)	15.0 (5.9)	10.0 (3.9)	
8	10.8 (0.43)	118 (79)	1,800 (400)	600 (130)	16.2 (6.4)	10.8 (4.3)	
10	10.8 (0.43)	119 (80)	2,100 (470)	700 (160)	16.2 (6.4)	10.8 (4.3)	
12	11.9 (0.47)	140 (94)	2,100 (470)	700 (160)	17.9 (7.0)	11.9 (4.7)	
18	11.6 (0.46)	138 (93)	2,400 (540)	800 (180)	17.4 (6.9)	11.6 (4.6)	
24	12.5 (0.49)	159 (107)	3,000 (670)	1,000 (220)	18.8 (7.4)	12.5 (4.9)	

### D-Series Mil-Tac Rodent Deterrent FRP Cables (G Jacket)

EIDED COUNT	DIAMETER		TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	10 (0.39)	98 (66)	1,800 (400)	600 (130)	15.0 (5.9)	10.0 (3.9)	
4	10 (0.39)	98 (66)	1,800 (400)	600 (130)	15.0 (5.9)	10.0 (3.9)	
6	10 (0.39)	98 (66)	1,800 (400)	600 (130)	15.0 (5.9)	10.0 (3.9)	
8	10.8 (0.43)	115 (77)	1,800 (400)	600 (130)	16.2 (6.4)	10.8 (4.3)	
10	10.8 (0.43)	117 (79)	2,100 (470)	700 (160)	16.2 (6.4)	10.8 (4.3)	
12	11.9 (0.47)	137 (92)	2,100 (470)	700 (160)	17.9 (7.0)	11.9 (4.7)	
18	11.6 (0.46)	135 (91)	2,400 (540)	800 (180)	17.4 (6.9)	11.6 (4.6)	
24	12.5 (0.49)	155 (104)	3,000 (670)	1,000 (220)	18.8 (7.4)	12.5 (4.9)	

"Mil-Tac" designated and tested cables available to 24 fibers.

Other fiber counts available with polyurethane outer jacket
Installation loads in excess of 2,700N (600lbs.) are not recommended.

(3.5b) D-Series Distribution - Mil-Tac Rodent Deterrent (FRP) Cables

#### **Ordering Information**

	D	-								5	K	M	F	
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12	13	14

- 1 2 Mil-Tac Distribution Series Ultra-Fox Plus= D -
- 3 5Fiber count: (See Cable Characteristics Chart) = 002-024
- 6 Jacket type:

Tactical Polyurethane = C

Low-Smoke Zero-Halogen Polyurethane = G

Tactical Flame-Retardant Polyurethane = V

- 7 9 Fiber type: (see Ultra-Fox Plus Fiber Performance Table, p.24)
- 10 Ultra-Fox Plus fiber with  $900\mu m$  tight-buffer = **5**
- 11 Jacket color: Black = K
- 12 Rating: Mil-Tac Cable Rating = M
- 13 FRP Layer = **F**
- Outer jacket 14
  - C jacket = 9

  - G jacket = B
  - V jacket = 8

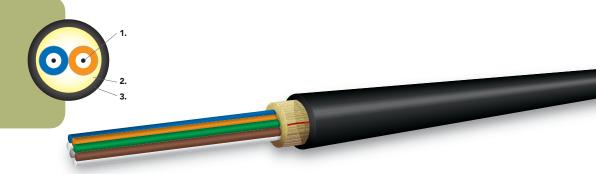
Example: 12-fiber Mil-Tac distribution cable with C jacket using 62.5µm Ultra-Fox Plus, black jacket with FRP-

D	_	0	1	2	С	W	S	Т	5	K	M	F	9	
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(3.5c) DOD QPL-85045 Qualified Products

- Tight-Buffer Optical Fiber
   Aramid Strength Member
- 3. Outer Jacket



#### **Applications**

- Used when contracts demand qualified products included on the QPL-85045 Qualified Products List for cable qualified to MIL-PRF-8504<u>5/8A</u>
- Specifically designed and qualified for use in extreme environmental conditions as defined by MIL-PRF-85045/8A

#### **Features**

- United States Defense Logistics Agency certified manufacturer per MIL-STD-790F
- Rugged, tight-buffered fiber optic cable construction for the highest possible survivability in severe crush, impact, vehicle runover, deployment and retrieval conditions
- Tested to the most demanding military tactical cable qualification
- High tensile load capability for excellent termination strength with military tactical connectors
- 100% compatible with 2- and 4-fiber TFOCA connectors
- Based on more than 25 years of Optical Cable Corporation's military tactical fiber optic cable production



#### Cable Characteristics: DOD QPL-85045 Qualified Cables

FIBER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	5.8 (0.23)	31 (21)	1,800N (400)	600N (135)	9.3 (3.7)	4.6 (1.8)	
4	5.8 (0.23)	31 (21)	1,800N (400)	600N (135)	9.3 (3.7)	4.6 (1.8)	

### Ordering Information: Base Part Number = OC040522

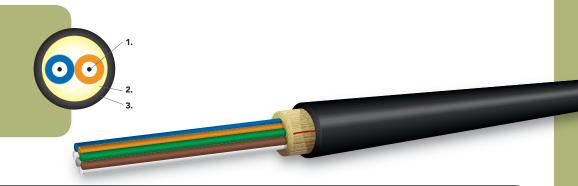
FIBER TYPE	MINIMUM LED BAN	IDWIDTH (MHZ-KM)	MINIMUM LASER BA	NDWIDTH (MHZ-KM)	FIBER COUNT		
FIDER TIFE	850 NM	1,300 NM	850 NM	1,300 NM	2	4	
62.5/125	500	500	510	500	-04	-06	

**Example:** 4-fiber 62.5 – OC040522-06



(3.5d) Military Tactical Fiber Optic Cables for Extreme Environments

- 1. Tight-Buffer Optical Fiber
- 2. Aramid Strength Member
- 3. Outer Jacket



### **Applications**

- Designed specifically for tactical/harsh environment connectors such as MIL-C-28876, MIL-C-38899 and other standard commercial connectors
- Specifically designed for extreme environmental conditions temperature, humidity, ice, fungus, and fluid immersion
- Cables are used in DOD and MOD projects domestically and worldwide

#### **Features**

- Rugged, tight-buffered fiber optic cable construction for the highest possible survivability in severe crush, impact, vehicle runover, deployment and retrieval conditions
- Tested to the most demanding military tactical cable qualification standards
- High tensile load capability for excellent termination strength with military tactical connectors
- Available with radiation hardened or non-radiation hardened
- Based on more than 20 years of Optical Cable Corporation's military tactical fiber optic cable production



U.S. Army Sgt. Tracy J. Smith

### MIL-PRF-85045 Compliance Summary

SPECIFICATION	TEST	REQUIREMENT
MIL-PRF-85045 (EIA/TIA-455-42)	Crosstalk	< -60 dB
MIL-PRF-85045 (EIA/TIA-455-71)	Thermal shock	-57°C to +85°
MIL-PRF-85045 (EIA/TIA-455-190)	Barometric pressure (Altitude)	3,000 meters (op), 12,2000 meters (non-op)
MIL-PRF-85045 (EIA/TIA-455-12	Fluid immersion	Diameter change ≤ 10%
MIL-PRF-85045 (EIA/TIA-455-3)	Temperature cycling	-46°C to +71°C
MIL-PRF-85045 Sec 4.7.6.4	Storage temperature	-57°C to +85°C
MIL-PRF-85045 (EIA/TIA-455-5)	Temperature/humidity	95%
MIL-PRF-85045 (EIA/TIA-455-4)	Life aging	240 hrs. at +110°C
MIL-PRF-85045 Sec 4.7.6.12.1	flammability	60° angle
MIL-PRF-85045 (EIA/TIA-455-88)	Corner bend	500N test load
MIL-PRF-85045 (EIA/TIA-455-87)	Knot force (mandrel, non-mandrel)	500N test load
MIL-PRF-85045 (EIA/TIA-455-25)	Impact (1.5kg hammer)	100 impacts @ 25°C 50 impacts @ -46°C and +71°C





(3.5d) Military Tactical Fiber Optic Cables for Extreme Environments

#### MIL-PRF-85045 Compliance Summary – cont.

	_	
SPECIFICATION	TEST	REQUIREMENT
MIL-PRF-85045 (EIA/TIA-455-104)	Cyclic flexing	2,000 cycles @ -46°C, +25° and +71°C
MIL-PRF-85045 (EIA/TIA-455-41)	Crush	2,000 N/cm for 3 minutes
MIL-PRF-85045 (EIA/TIA-455-91)	Cable twist testing	100N test load 2,000 cycles @ -46°C, +25° and +71°C
MIL-PRF-85045 (EIA/TIA-455-33)	Tensile loading and elongation	≤ 0.5dB multimode, ≤ 0.2dB single-mode
MIL-PRF-85045 (EIA/TIA-455-33)	Operational tensile	290N , 72 hours
MIL-PRF-85045 (EIA/TIA-455-98)	Ice crush	No degradation after exposure
MIL-PRF-85045 (EIA/TIA-455-37)	Low-temperature, flexibility (cold bend)	-46°C 10kg mass
MIL-PRF-85045 (EIA/TIA-455-56)	Fungus resistance	No degradation after exposure

#### Cable Characteristics: Military Tactical Fiber Optic Cables for Extreme Environments

DIAMETER		DIAMETER WEIGHT		E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	FIBER COUNT MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	5.8 (0.23)	31 (21)	1,800N (400)	600N (135)	8.7 (3.4)	5.8 (2.3)	
4	5.8 (0.23)	31 (21)	1,800N (400)	600N (135)	8.7 (3.4)	5.8 (2.3)	

### Ordering Information: Base Part Number = RK981104

FIRED TVDF	BANDWIDT	TH (MHZ-KM)	FIBER (	COUNT
FIBER TYPE	850 NM	850 NM 1,300 NM		4
Radiation Hardened (RH)				
62.5/125 Rad Hard	160	500	-06	-09
	220	800	-06-A	-09-A
50/125 Rad Hard	500	500	-07	-10
	600	1,000	-07-A	-10-A
Single-Mode Rad Hard	-	-	-08	-11
Non-Radiation Hardened				
62.5/125	160	500	(none)	-01
	220	800	-A	-01-A
50/125	500	500	-02	-03
	600	1,000	-02-A	-03-A
Single-Mode	-	-	-04	-05

Example: 4-fiber 62.5 RH 220/800 bandwidth – RK981104-09-A

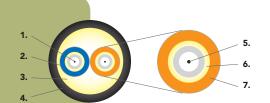


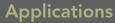
#### (3.5e) B-Series Breakout - Mil-Tac Cables

- 1. Tight-Buffer Optical Fiber
- 2. Subcable
- 3. Aramid Strength Member
- 4. Outer Jacket

#### Subcable

- 5. Tight-Buffer Optical Fiber
- 6. Aramid Strength Member
- 7. Subcable Jacket





- Ground-tactical cable that is ideal for use in harsh environments where deployment and retrieval for reuse are required
- Ideal for applications that require termination of the subcables to a connector

#### **Features**

- Extremely strong, lightweight, rugged, survivable tight-buffered cables designed for military tactical field use and commercial applications
- Polyurethane jacketed for abrasion, cut and chemical resistance
- Breakout cable design with individual color-coded subcables protecting each optical fiber
- Crush resistant and resilient, with two separate layers of aramid strength members in the subcables for individual single-fiber connector and termination pin, and overall for termination to multiway connector backshells or other housings
- · Helically stranded cable core for flexibility, deployment survivability and exceptional mechanical protection for the optical fibers
- Cables have been tested and are in use in military data communications applications worldwide
- Can be used outdoors for temporary deployment directly on the ground, in all terrains, including severe environments
- Suitable for industrial, mining and petrochemical environments; chemical resistant
- Round cable design for easy installation and survivability
- Often used with multiway military tactical connectors for maximum connector retention (400 lbs.)
- Ideally suited for use with MIL-C-38999 style military connectors; subcables terminate to individual pins, and overall aramid strength member terminates to backshell
- 2.0 mm subcables standard
- Tactical Polyurethane (C) outer jacket material is standard; Flame-Retardant Tactical (V) and Low-Smoke Zero-Halogen (G) outer jacket materials are available
- Ultra-Fox Plus fiber used for the ultimate environmental and mechanical protection

### **OCC Provided Options**

- Mil-Tac cables prespooled on deployable reels for a ready-to-use product
- Mil-Tac cables can be pre-terminated with single-fiber or ruggedized multichannel connectors upon request

	(TESTED TO MIL PRF 85045 METHODS)
Operating temperature	-55°C to +85°C
Storage temperature	-70°C to +85°C
Impact resistance	200 impacts (EIA/TIA-455-25A military requirements)
Crush resistance	440 N/cm (TIA/EIA-455-41A military requirements)
Flex resistance	2,000 cycles (TIA/EIA-455-104A military requirements)





(3.5e) B-Series Breakout – Mil-Tac Cables

#### Cable Characteristics: B-Series Breakout Mil-Tac Cables (C Jacket)

FIBER COUNT	DIAMETER	DIAMETER WEIGHT		E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	6.5 (0.26)	36 (24)	2,200 (490)	550 (120)	6.5 (2.6)	3.3 (1.3)	
4	7.5 (0.30)	47 (32)	2,200 (490)	550 (120)	7.5 (3.0)	3.8 (1.5)	
6	8.5 (0.33)	55 (37)	2,400 (540)	600 (130)	8.5 (3.3)	4.3 (1.7)	
8	10.0 (0.39)	76 (51)	3,200 (720)	800 (180)	10.0 (3.9)	5.0 (2.0)	
10	11.5 (0.45)	99 (67)	4,000 (900)	1,000 (220)	11.5 (4.5)	5.8 (2.3)	
12	11.0 (0.43)	86 (58)	4,800 (1080)	1,200 (270)	11.0 (4.3)	5.5 (2.2)	
18	13.5 (0.53)	135 (91)	7,200 (1620)	1,800 (400)	13.5 (5.3)	6.8 (2.7)	
24	14.5 (0.57)	150 (101)	9,600 (2160)	2,400 (540)	14.5 (5.7)	7.3 (2.9)	

### **B-Series Breakout Mil-Tac Cables (V Jacket)**

FIBER COUNT	FIRE COUNT DIAMETER		TENSILE LOAD		MINIMUM BEND RADIUS	
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2	6.5 (0.26)	39 (26)	2,200 (490)	550 (120)	6.5 (2.6)	3.3 (1.3)
4	7.5 (0.30)	49 (33)	2,200 (490)	550 (120)	7.5 (3.0)	3.8 (1.5)
6	8.5 (0.33)	57 (38)	2,400 (540)	600 (130)	8.5 (3.3)	4.3 (1.7)
8	10.0 (0.39)	79 (53)	3,200 (720)	800 (180)	10.0 (3.9)	5.0 (2.0)
10	11.5 (0.45)	104 (70)	4,000 (900)	1,000 (220)	11.5 (4.5)	5.8 (2.3)
12	11.0 (0.43)	90 (60)	4,800 (1080)	1,200 (270)	11.0 (4.3)	5.5 (2.2)
18	13.5 (0.53)	141 (95)	7,200 (1620)	1,800 (400)	13.5 (5.3)	6.8 (2.7)
24	14.5 (0.57)	155 (104)	9,600 (2160)	2,400 (540)	14.5 (5.7)	7.3 (2.9)

## B-Series Breakout Mil-Tac Cables (G Jacket)

FIBER COUNT	DIAMETER	DIAMETER WEIGHT		E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	6.5 (0.26)	38 (26)	2,200 (490)	550 (120)	6.5 (2.6)	3.3 (1.3)	
4	7.5 (0.30)	48 (32)	2,200 (490)	550 (120)	7.5 (3.0)	3.8 (1.5)	
6	8.5 (0.33)	56 (38)	2,400 (540)	600 (130)	8.5 (3.3)	4.3 (1.7)	
8	10.0 (0.39)	78 (52)	3,200 (720)	800 (180)	10.0 (3.9)	5.0 (2.0)	
10	11.5 (0.45)	102 (69)	4,000 (900)	1,000 (220)	11.5 (4.5)	5.8 (2.3)	
12	11.0 (0.43)	89 (60)	4,800 (1080)	1,200 (270)	11.0 (4.3)	5.5 (2.2)	
18	13.5 (0.53)	138 (93)	7,200 (1620)	1,800 (400)	13.5 (5.3)	6.8 (2.7)	
24	14.5 (0.57)	153 (103)	9,600 (2160)	2,400 (540)	14.5 (5.7)	7.3 (2.9)	

"Mil-Tac" designated and tested cables available to 24 fibers. Other fiber counts available with polyurethane outer jacket. Installation loads in excess of 2,700 N (600 lbs.) are not recommended. (3.5e) B-Series Breakout – Mil-Tac Cables

### **Ordering Information**

	В	_								5	K	M
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12

- 1 2 Mil-Tac Breakout Series Ultra-Fox Plus= B-
- 3 5Fiber count: (See Cable Characteristics Chart) = 002-024
- 6 Jacket type:

Tactical Polyurethane = C

Low-Smoke Zero-Halogen Polyurethane = G

Flame-Retardant Tactical Polyurethane = V

7 – 9 Fiber type: (see Ultra-Fox Plus Fiber Performance Table, p.24)

62.5µm multimode = WST

 $50\mu m$  multimode = **AST** 

Single-mode = **SLS** 

- 10 Ultra-Fox Plus fiber with 900µm tight-buffer = 5
- Jacket color: Black = K 11
- 12 Rating: Mil-Tac Cable Rating = M

Example: 12-fiber Mil-Tac breakout cable using 62.5µm Ultra-Fox Plus fiber, black jacket –



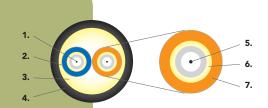


(3.5f) B-Series Breakout - Mil-Tac Rodent Deterrent (FRP) Cables

- 1. Tight-Buffer Optical Fiber
- 2. Subcable
- 3. Aramid Strength Member
- 4. Outer Jacket

#### Subcable

- 5. Tight-Buffer Optical Fiber
- 6. Aramid Strength Member
- 7. Subcable Jacket





### **Applications**

- · Mil-Tac cable that is ideal for use in harsh environments where deployment and retrieval for reuse are required
- Used in areas susceptible to damage from small non-burrowing rodents

#### **Features**

- Standard OCC B-Series Mil-Tac inner cable with an added layer of fiberglass yarn that provides an effective deterrent to damage caused by small non-burrowing rodents
- Most rugged, high-strength cable design incorporating subcables for direct termination
- Includes a layer of fiberglass yarn that provides an effective deterrent to damage caused by small non-burrowing rodents
- FRP is ideal for use for surface installations (not recommended for direct buried applications)
- Polyurethane jacketed for abrasion, cut and chemical resistance
- · Mil-Tac cables can be made in a variety of colors for easy identification or to blend in to the environment
- 2 to 24 fibers
- Helically stranded cable core for flexibility, deployment survivability, and excellent mechanical protection for the optical fibers
- Mil-Tac is suitable for use with single, as well as multichannel, connectors
- Excellent crush resistance to withstand crowd and vehicle traffic
- High tensile load rating for quick deployment and retrieval
- Water, fungus and UV resistant for extreme environments
- Outdoor, field-proven cables are easily deployed and retrieved for temporary or long-term military data communication in harsh environments
- Ideally suited for use with MIL-C-38999 style military connectors; subcables terminate to individual pins, and overall aramid strength member terminates to backshell
- 2.0 mm subcables standard
- Standard Polyurethane (C), Flame-Retardant Tactical Polyurethane (V) and Low-Smoke Zero-Halogen (G) jackets are available

### **OCC Provided Options:**

- Mil-Tac cables prespooled on deployable reels for a ready-to-use product
- Mil-Tac cables can be pre-terminated with single-fiber or ruggedized multichannel connectors upon request

	(TESTED TO MIL PRF 85045 METHODS)
Operating temperature	-55°C to +85°C
Storage temperature	-70°C to +85°C
Impact resistance	200 impacts (EIA/TIA-455-25A military requirements)
Crush resistance	440 N/cm (TIA/EIA-455-41A military requirements)
Flex resistance	2,000 cycles (TIA/EIA-455-104A military requirements)





(3.5f) B-Series Breakout – Mil-Tac Rodent Deterrent (FRP) Cables

#### Cable Characteristics: B-Series Mil-Tac Rodent Deterrent (FRP) Cables (C Jacket)

FIRED COUNT	DIAMETER WEIGHT		TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	12.4 (0.49)	137 (92)	2,200 (490)	550 (120)	18.6 (7.3)	12.4 (4.9)	
4	12.4 (0.49)	138 (93)	2,200 (490)	550 (120)	18.6 (7.3)	12.4 (4.9)	
6	13.2 (0.52)	150 (101)	2,400 (540)	600 (130)	19.8 (7.8)	13.2 (5.2)	
8	14.7 (0.58)	180 (121)	3,200 (720)	800 (180)	22.1 (8.7)	14.7 (5.8)	
10	16.4 (0.65)	222 (149)	4,000 (900)	1,000 (220)	24.6 (9.7)	16.4 (6.5)	
12	15.6 (0.61)	196 (132)	4,800 (1,080)	1,200 (270)	23.4 (9.2)	15.6 (6.1)	
18	18.2 (0.72)	267 (179)	7,200 (1,620)	1,800 (400)	27.3 (10.7)	18.2 (7.2)	
24	19.2 (0.76)	290 (195)	9,600 (2,160)	2,400 (540)	28.8 (11.3)	19.2 (7.6)	

#### B-Series Mil-Tac Rodent Deterrent (FRP) Cables (V Jacket)

FIBER COUNT	IRED COLINIT DIAMETER		TENSILE LOAD		MINIMUM BEND RADIUS	
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2	11.6 (0.46)	128 (86)	2,200 (490)	550 (120)	17.4 (6.9)	11.6 (4.6)
4	11.6 (0.46)	130 (87)	2,200 (490)	550 (120)	17.4 (6.9)	11.6 (4.6)
6	12.5 (0.49)	144 (97)	2,400 (540)	600 (130)	18.8 (7.4)	12.5 (4.9)
8	12.9 (0.51)	173 (116)	3,200 (720)	800 (180)	19.4 (7.6)	12.9 (5.1)
10	15.4 (0.61)	213 (143)	4,000 (900)	1,000 (220)	23.1 (9.1)	15.4 (6.1)
12	14.7 (0.58)	191 (128)	4,800 (1,080)	1,200 (270)	22.1 (8.7)	14.7 (5.8)
18	17.2 (0.68)	263 (177)	7,200 (1,620)	1,800 (400)	25.8 (10.2)	17.2 (6.8)
24	18.2 (0.72)	287 (193)	9,600 (2,160)	2,400 (540)	27.3 (10.7)	18.2 (7.2)

### B-Series Mil-Tac Rodent Deterrent (FRP) Cables (G Jacket)

FIBER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM B	END RADIUS
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2	11.6 (0.46)	125 (84)	2,200 (490)	550 (120)	17.4 (6.9)	11.6 (4.6)
4	11.6 (0.46)	127 (85)	2,200 (490)	550 (120)	17.4 (6.9)	11.6 (4.6)
6	12.5 (0.49)	141 (95)	2,400 (540)	600 (130)	18.8 (7.4)	12.5 (4.9)
8	12.9 (0.51)	145 (97)	3,200 (720)	800 (180)	19.4 (7.6)	12.9 (5.1)
10	15.4 (0.61)	209 (140)	4,000 (900)	1,000 (220)	23.1 (9.1)	15.4 (6.1)
12	14.7 (0.58)	187 (126)	4,800 (1,080)	1,200 (270)	22.1 (8.7)	14.7 (5.8)
18	17.2 (0.68)	258 (173)	7,200 (1,620)	1,800 (400)	25.8 (10.2)	17.2 (6.8)
24	18.2 (0.72)	282 (189)	9,600 (2,160)	2,400 (540)	27.3 (10.7)	18.2 (7.2)

"Mil-Tac" designated and tested cables available to 24 fibers. Other fiber counts available with polyurethane outer jacket Installation loads in excess of 2,700N (600lbs.) are not recommended



(3.5f) B-Series Breakout - Mil-Tac Rodent Deterrent (FRP) Cables

#### **Ordering Information**

 B
 L
 S
 K
 M
 F

 Digit No:
 1
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 14

1 – 2 Mil-Tac Breakout Series Ultra-Fox Plus= **B**–

3 – 5 Fiber count: (See Cable Characteristics Chart) = **002–024** 

6 Jacket type:

Tactical Polyurethane = C

Low-Smoke Zero-Halogen Polyurethane = G

Flame-Retardant Tactical Polyurethane = V

7 – 9 Fiber type: (see Ultra-Fox Plus Fiber Performance Table, p.24)

10 Ultra-Fox Plus fiber with 900μm tight-buffer = **5** 

11 Jacket color: Black = **K** 

12 Rating: Mil Tac Cable Rating = M

13 FRP Layer =  $\mathbf{F}$ 

14 Outer jacket:

C jacket = 9

G jacket = B

V jacket = 8

Example: 12-fiber Mil-Tac Breakout cable with C jacket using 62.5µm Ultra-Fox Plus fiber, black jacket with FRP-

B - 0 1 2 C W S T 5 K M F 9





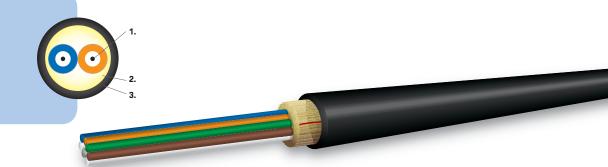


# 3.6 Broadcast Deployable Cables

3.6a	D-Series Distribution – Field Broadcast Cables126
3.6b	D-Series Distribution – Field Broadcast Rodent Deterrent (FRP) Cables 129
3.6c	B-Series Breakout – Field Broadcast Cables132
3.6d	B-Series Breakout – Field Broadcast Rodent Deterrent (FRP) Cables 134
3.6e	CX-Series – Deployable/Composite Copper/Fiber Cables137
3.6f	The Case for Helically Stranded Cables



- **3**
- (3.6a) D-Series Distribution Field Broadcast Cables
- 1. Tight-Buffer Optical Fiber
- 2. Aramid Strength Member
- 3. Outer Jacket



#### **Applications**

• Deployable cable that is ideal for use in harsh environments where deployment and retrieval for reuse are required

#### **Features**

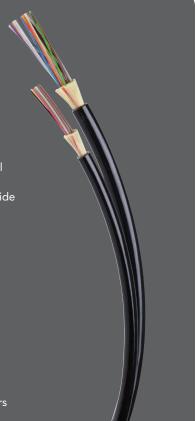
- Extremely strong, lightweight, rugged, survivable tight-buffered cables designed for broadcast field use and commercial applications
- Compact, round cable design for ease of transportation and deployment
- Designed for use in adverse environments where reduced size and weight are important
- Helically stranded cable core for flexibility, deployment survivability and exceptional mechanical protection for the optical fibers
- Cables have been tested and are in use in broadcast data communications applications worldwide
- Can be used outdoors for temporary deployment directly on the ground in all terrains, including severe environments
- Suitable for industrial, mining and petrochemical environments; chemical resistant
- Crush resistant and resilient with a thick layer of aramid strength members
- Polyurethane jacketed for abrasion, cut and chemical resistance
- Most commonly used with ruggedized multiway military tactical field connectors, for maximum connector retention (400lbs.)
- Tactical Polyurethane (C) outer jacket material is standard; Flame-Retardant Tactical (V) and Low-Smoke Zero-Halogen (G) outer jacket materials are available
- Ultra-Fox Plus Fiber (500µm)

#### **OCC Provided Options**

- Broadcast cables pre-spooled on deployable reels for a ready-to-use product
- Broadcast cables can be pre-terminated with single-fiber or ruggedized multichannel connectors upon request



	(TESTED TO MIL PRF 85045 METHODS)
Operating temperature	-40°C to +85°C
Storage temperature	-70°C to +85°C
Impact resistance	1,500 impacts (EIA/TIA-455-25A)
Crush resistance	1,800 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)





(3.6a) D-Series Distribution – Field Broadcast Cables

#### Cable Characteristics: D-Series Distribution Field Broadcast Cables (C Jacket)

FIBER COUNT	DIAMETER			MINIMUM BEND RADIUS	MINIMUM BEND RADIUS LONG-TERM	
	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	CM (IN)	CM (IN)
2	5.0 (0.20)	21 (14)	1,800 (400)	600 (130)	5.0 (2.0)	2.5 (1.0)
4	5.5 (0.22)	27 (18)	1,800 (400)	600 (130)	5.5 (2.2)	2.8 (1.1)
6	6.0 (0.24)	32 (22)	1,800 (400)	600 (130)	6.0 (2.4)	3.0 (1.2)
8	6.5 (0.26)	37 (25)	1,800 (400)	600 (130)	6.5 (2.6)	3.3 (1.3)
10	6.5 (0.26)	38 (26)	2,100 (470)	700 (160)	6.5 (2.6)	3.3 (1.3)
12	6.5 (0.26)	41 (28)	2,100 (470)	700 (160)	6.5 (2.6)	3.3 (1.3)
18	7.5 (0.30)	48 (32)	2,400 (540)	800 (180)	7.5 (3.0)	3.8 (1.5)
24	8.5 (0.33)	60 (40)	3,000 (670)	1,000 (220)	8.5 (3.3)	4.3 (1.7)

#### **D-Series Distribution Field Broadcast Cables (V Jacket)**

FIBER COUNT	DIAMETER			MINIMUM BEND RADIUS INSTALLATION	MINIMUM BEND RADIUS LONG-TERM	
	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	CM (IN)	CM (IN)
2	5.0 (0.20)	24 (16)	1,800 (400)	600 (130)	5.0 (2.0)	2.5 (1.0)
4	5.5 (0.22)	29 (19)	1,800 (400)	600 (130)	5.5 (2.2)	2.8 (1.1)
6	6.0 (0.24)	34 (23)	1,800 (400)	600 (130)	6.0 (2.4)	3.0 (1.2)
8	6.5 (0.26)	39 (26)	1,800 (400)	600 (130)	6.5 (2.6)	3.3 (1.3)
10	6.5 (0.26)	40 (27)	2,100 (470)	700 (160)	6.5 (2.6)	3.3 (1.3)
12	6.5 (0.26)	43 (29)	2,100 (470)	700 (160)	6.5 (2.6)	3.3 (1.3)
18	7.5 (0.30)	51 (34)	2,400 (540)	800 (180)	7.5 (3.0)	3.8 (1.5)
24	8.5 (0.33)	63 (42)	3,000 (670)	1,000 (220)	8.5 (3.3)	4.3 (1.7)

### **D-Series Distribution Field Broadcast Cables (G Jacket)**

FIBER COUNT	DIAMETER			MINIMUM BEND RADIUS	MINIMUM BEND RADIUS LONG-TERM	
	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	CM (IN)	CM (IN)
2	5.0 (0.20)	22 (15)	1,800 (400)	600 (130)	5.0 (2.0)	2.5 (1.0)
4	5.5 (0.22)	28 (19)	1,800 (400)	600 (130)	5.5 (2.2)	2.8 (1.1)
6	6.0 (0.24)	33 (22)	1,800 (400)	600 (130)	6.0 (2.4)	3.0 (1.2)
8	6.5 (0.26)	38 (26)	1,800 (400)	600 (130)	6.5 (2.6)	3.3 (1.3)
10	6.5 (0.26)	39 (26)	2,100 (470)	700 (160)	6.5 (2.6)	3.3 (1.3)
12	6.5 (0.26)	42 (28)	2,100 (470)	700 (160)	6.5 (2.6)	3.3 (1.3)
18	7.5 (0.30)	49 (33)	2,400 (540)	800 (180)	7.5 (3.0)	3.8 (1.5)
24	8.5 (0.33)	62 (42)	3,000 (670)	1,000 (220)	8.5 (3.3)	4.3 (1.7)





(3.6a) D-Series Distribution – Field Broadcast Cables

# **Ordering Information**

 D Igit No:
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- 1 2 Mil-Tac Distribution Series Ultra-Fox Plus= **DX**
- 3-5 Fiber count: (see cable characteristics chart) = **002–024**
- 6 Jacket type:

Tactical Polyurethane = C

 $Low-Smoke\ Zero-Halogen\ Polyurethane = \textbf{G}$ 

Flame-Retardant Tactical Polyurethane = V

- 7 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)
- 10 Ultra-Fox Fiber with 900µm tight buffer = **9**
- 11 Jacket color: Black = **K**
- 12 Rating: Field Broadcast Cable = **B**

Example: 12-fiber distribution cable using 62.5µm Laser Ultra Fox fiber, black jacket –

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



(3.6b) D-Series Distribution – Field Broadcast Rodent Deterrent (FRP) Cables

- 1. Central Filler/Strength Member
- 2. Tight-Buffer Optical Fiber
- 3. Aramid Strength Member
- 4. Inner Jacket
- 5. FRP Layer 6. Outer Jacket
- 7. Ripcords





- Deployable cable that is ideal for use in harsh environments where deployment and retrieval for reuse are required for temporary broadcast networks
- Used in areas susceptible to damage from small non-burrowing rodents

#### **Features**

- · Includes a layer of fiberglass yarn that provides an effective deterrent to damage caused by small non-burrowing rodents
- FRP is ideal for use for surface installations (not recommended for direct burial
- Broadcast cables made in a variety of colors for easy identification or to blend in to the environment
- 2 to 24 fibers, higher fiber counts are available on request
- Helically stranded cable core for flexibility, deployment survivability, and excellent mechanical protection for the optical fibers
- Cables are suitable for use with single, as well as multichannel, connectors
- Excellent crush resistance to withstand crowd and vehicle traffic
- High tensile load rating for quick deployment and retrieval
- Water, fungus and UV resistant for extreme environments
- Outdoor, field-proven cables are easily deployed and retrieved for remote news gatherings and sporting events
- Standard Polyurethane (**C**), Flame-Retardant Tactical Polyurethane (**V**) and Low-Smoke Zero-Halogen (G) jackets are available

#### **OCC Provided Options**

- Broadcast cables pre-spooled on deployable reels for a ready-to-use product
- Broadcast cables can be pre-terminated with single fiber or ruggedized multi-channel connectors upon request

	BASED ON INNER CABLE PERFORMANCE
Operating temperature	-40°C to +85°C
Storage temperature	-70°C to +85°C
Impact resistance	1,500 impacts (EIA/TIA-455-25A)
Crush resistance	1,800 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)







(3.6b) D-Series Distribution – Field Broadcast Rodent Deterrent (FRP) Cables

# Cable Characteristics: D-Series Field Broadcast Rodent Deterrent (FRP) Cables (C Jacket)

FIBER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM B	END RADIUS
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2	10.7 (0.42)	104 (70)	1,800 (400)	600 (130)	16.1 (6.3)	10.7 (4.2)
4	10.7 (0.42)	104 (70)	1,800 (400)	600 (130)	16.1 (6.3)	10.7 (4.2)
6	10.7 (0.42)	104 (70)	1,800 (400)	600 (130)	16.1 (6.3)	10.7 (4.2)
8	11.6 (0.46)	123 (83)	1,800 (400)	600 (130)	17.4 (6.9)	11.6 (4.6)
10	11.6 (0.46)	125 (84)	2,100 (470)	700 (160)	17.4 (6.9)	11.6 (4.6)
12	12.7 (0.50)	145 (97)	2,100 (470)	700 (160)	19.1 (7.5)	12.7 (5.0)
18	12.4 (0.49)	139 (93)	2,400 (540)	800 (180)	18.6 (7.3)	12.4 (4.9)
24	13.2 (0.52)	156 (105)	3,000 (670)	1,000 (220)	19.8 (7.8)	13.2 (5.2)

#### D-Series Field Broadcast Rodent Deterrent (FRP) Cables (V Jacket)

FIBER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM B	END RADIUS
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2	10 (0.39)	101 (68)	1,800 (400)	600 (130)	15.0 (5.9)	10.0 (3.9)
4	10 (0.39)	101 (68)	1,800 (400)	600 (130)	15.0 (5.9)	10.0 (3.9)
6	10 (0.39)	101 (68)	1,800 (400)	600 (130)	15.0 (5.9)	10.0 (3.9)
8	10.8 (0.43)	118 (79)	1,800 (400)	600 (130)	16.2 (6.4)	10.8 (4.3)
10	10.8 (0.43)	119 (80)	2,100 (470)	700 (160)	16.2 (6.4)	10.8 (4.3)
12	11.9 (0.47)	140 (94)	2,100 (470)	700 (160)	17.9 (7.0)	11.9 (4.7)
18	11.6 (0.46)	138 (93)	2,400 (540)	800 (180)	17.4 (6.9)	11.6 (4.6)
24	12.5 (0.49)	159 (107)	3,000 (670)	1,000 (220)	18.8 (7.4)	12.5 (4.9)

### D-Series Field Broadcast Rodent Deterrent (FRP) Cables (G Jacket)

EIRER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM B	END RADIUS
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2	10 (0.39)	98 (66)	1,800 (400)	600 (130)	15.0 (5.9)	10.0 (3.9)
4	10 (0.39)	98 (66)	1,800 (400)	600 (130)	15.0 (5.9)	10.0 (3.9)
6	10 (0.39)	98 (66)	1,800 (400)	600 (130)	15.0 (5.9)	10.0 (3.9)
8	10.8 (0.43)	115 (77)	1,800 (400)	600 (130)	16.2 (6.4)	10.8 (4.3)
10	10.8 (0.43)	117 (79)	2,100 (470)	700 (160)	16.2 (6.4)	10.8 (4.3)
12	11.9 (0.47)	137 (92)	2,100 (470)	700 (160)	17.9 (7.0)	11.9 (4.7)
18	11.6 (0.46)	135 (91)	2,400 (540)	800 (180)	17.4 (6.9)	11.6 (4.6)
24	12.5 (0.49)	155 (104)	3,000 (670)	1,000 (220)	18.8 (7.4)	12.5 (4.9)

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



(3.6b) D-Series Distribution – Field Broadcast Rodent Deterrent (FRP) Cables

### **Ordering Information**

	D	X								9	K	В	F	
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12	13	14

- 1 2 Distribution Series Ultra-Fox= **DX**
- 3-5 Fiber count: (see cable characteristics chart) = **002–024**
- 6 Inner jacket type:

Tactical Polyurethane = C

Low-Smoke Zero-Halogen Polyurethane = **G** Flame-Retardant Tactical Polyurethane = **V** 

- 7 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)
- 10 Ultra-Fox fiber with 900μm tight buffer = **9**
- 11 Jacket color: Black = **K**
- 12 Rating: Field Broadcast Cable Rating = **B**
- 13 FRP Layer =  $\mathbf{F}$
- 14 Outer jacket:

C jacket = 9

G jacket = **B** 

V jacket = 8

Example: 12-fiber field broadcast distribution cable with C jacket using 62.5μm Laser Ultra-Fox fiber, black jacket, FRP rodent deterrence –

D X 0 1 2 C W L S 9 K B F 9

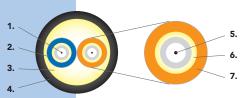


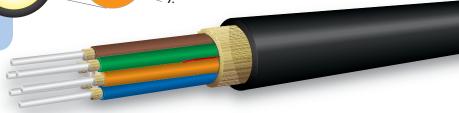
(3.6c) B-Series Breakout - Field Broadcast Cables

- 1. Tight-Buffer Optical Fiber
- 2. Subcable
- 3. Aramid Strength Member
- 5. Outer Jacket

#### Subcable

- 6. Tight-Buffer Optical Fiber
- 7. Aramid Strength Member
- 8. Subcable Jacket





#### **Application**

• Deployable cable that is ideal for use in harsh environments where deployment and retrieval for reuse are required for temporary broadcast networks

#### Features

- Extremely strong, lightweight, rugged, survivable tight-buffered cables designed for broadcast field use and commercial applications
- Polyurethane jacketed for abrasion, cut and chemical resistance
- Breakout cable design with individual color-coded subcables protecting each optical fiber
- Crush resistant and resilient, with two separate layers of aramid strength members
  in the subcables for individual single-fiber connector and termination pin, and overall for termination
  to multiway connector backshells or other housings
- Helically stranded cable core for flexibility, deployment survivability and exceptional mechanical protection for the optical fibers
- Cables have been tested and are in use in field broadcast data communications applications worldwide
- Can be used outdoors for temporary deployment directly on the ground, in all terrains, including severe environments
- Suitable for industrial, mining and petrochemical environments; chemical resistant
- Round cable design for easy installation and survivability
- Often used with multiway military tactical connectors for maximum connector retention (400lbs.)
- Ideally suited for use with MIL-C-38999 style military connectors; subcables terminate to individual pins, and overall aramid strength member terminates to backshell
- 2.0mm subcables standard
- Tactical Polyurethane (C) outer jacket material is standard. Flame-Retardant Tactical (V) and Low-Smoke Zero-Halogen (G) outer jacket materials are available

	(TESTED TO MIL PRF 85045 METHODS)
Operating temperature	-40°C to +85°C
Storage temperature	-70°C to +85°C
Impact resistance	1,500 impacts (EIA/TIA-455-25A)
Crush resistance	2,100 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)



(3.6c) B-Series Breakout - Field Broadcast Cables

#### Cable Characteristics: B-Series Breakout Field Broadcast Cables

FIRED COLINE	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	6.5 (0.26)	36 (24)	2,200 (490)	550 (120)	10.4 (4.1)	5.2 (2.0)	
4	7.5 (0.30)	47 (32)	2,200 (490)	550 (120)	12.0 (4.7)	6.0 (2.4)	
6	8.5 (0.33)	56 (37)	2,400 (540)	600 (130)	13.6 (5.4)	6.8 (2.7)	
8	10.0 (0.39)	75 (51)	3,200 (720)	800 (180)	16.0 (6.3)	8.0 (3.1)	
10	11.5 (0.45)	100 (67)	4,000 (900)	1,000 (220)	18.4 (7.2)	9.2 (3.6)	
12	11.0 (0.43)	88 (59)	4,800 (1,080)	1,200 (270)	17.6 (6.9)	8.8 (3.5)	
18	13.5 (0.53)	138 (93)	7,200 (1,620)	1,800 (400)	21.6 (8.5)	10.8 (4.3)	
24	14.5 (0.57)	150 (101)	9,600 (2,160)	2,400 (540)	23.2 (9.1)	11.6 (4.6)	

Other fiber counts available with polyurethane outer jacket. Installation loads in excess of 2,700 N (600 lbs.) are not recommended.

#### **Ordering Information**

Digit No: 1 – 2 Field Broadcast Breakout Series Ultra-Fox Plus= **BX** 3 - 5

Fiber count: (see cable characteristics chart) = **002–024** Jacket type:

Tactical Polyurethane = C

Low-Smoke Zero-Halogen Polyurethane =  $\mathbf{G}$ Tactical Flame-Retardant Polyurethane = V

7 – 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)

10 Ultra-Fox fiber with 900 $\mu$ m tight buffer = **9** 

11 Jacket color: Black = K

12 Rating: Field Broadcast Cable= B

Example: 12-fiber field broadcast breakout cable using 62.5µm Laser Ultra-Fox fiber, black jacket –





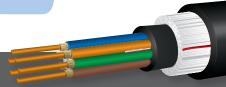
(3.6d) B-Series Breakout - Field Broadcast Rodent Deterrent (FRP) Cables

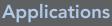
- 1. Central Filler/Strength Member
- 2. Subcable
- 3. FRP Layer
- 4. Outer Jacket
- 5. Ripcord

#### Subcable

- 6. Tight-Buffer Optical Fiber
- 7. Aramid Strength Member
- 8. Subcable Jacket







- Deployable cable that is ideal for use in harsh environments where deployment and retrieval are required for temporary broadcast networks
- Used in areas susceptible to damage from small non-burrowing rodents

#### **Features**

- Includes a layer of fiberglass yarn that provides an effective deterrent to damage caused by small non-burrowing rodents
- FRP is ideal for use in surface installations (not recommended for direct burial applications)
- · Broadcast cables made in a variety of colors for easy identification or to blend in to the environment
- Breakout cable design with individual color-coded subcables protecting each optical fiber
- 2.0mm subcables are standard
- 2 to 24 fibers, higher fiber counts are available on request
- Compact, round cable design for ease of transportation and deployment
- Helically stranded cable core for flexibility, deployment survivability, and excellent mechanical protection for the optical fibers
- Cables are suitable for use with single, as well as multichannel, connectors
- Excellent crush resistance to withstand crowd and vehicle traffic
- High tensile load rating for quick deployment and retrieval
- Water, fungus and UV resistant for extreme environments
- Outdoor, field-proven cables are easily deployed and retrieved for remote news gatherings and sporting events
- Standard Polyurethane (C), Flame-Retardant Tactical Polyurethane (V) and Low-Smoke Zero-Halogen (G) jackets are available

#### **OCC Provided Options**

- Broadcast cables pre-spooled on deployable reels for a ready-to-use product
- Broadcast cables can be pre-terminated with single-fiber or ruggedized multichannel connectors upon request

	BASED ON INNER CABLE PERFORMANCE
Operating temperature	-40°C to +85°C
Storage temperature	-55°C to +85°C
Impact resistance	1,500 impacts (EIA/TIA-455-25A)
Crush resistance	2,100 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)







(3.6d) B-Series Breakout – Field Broadcast Rodent Deterrent (FRP) Cables

#### Cable Characteristics: B-Series Field Broadcast Rodent Deterrent (FRP) Cables (C Jacket)

FIRED COLINIT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	12.4 (0.49)	137 (92)	2,200 (490)	550 (120)	18.6 (7.3)	12.4 (4.9)	
4	12.4 (0.49)	138 (93)	2,200 (490)	550 (120)	18.6 (7.3)	12.4 (4.9)	
6	13.2 (0.52)	150 (101)	2,400 (540)	600 (130)	19.8 (7.8)	13.2 (5.2)	
8	14.7 (0.58)	180 (121)	3,200 (720)	800 (180)	22.1 (8.7)	14.7 (5.8)	
10	16.4 (0.65)	222 (149)	4,000 (900)	1,000 (220)	24.6 (9.7)	16.4 (6.5)	
12	15.6 (0.61)	196 (132)	4,800 (1080)	1,200 (270)	23.4 (9.2)	15.6 (6.1)	
18	18.2 (0.72)	267 (179)	7,200 (1,620)	1,800 (400)	27.3 (10.7)	18.2 (7.2)	
24	19.2 (0.76)	290 (195)	9,600 (2,160)	2,400 (540)	28.8 (11.3)	19.2 (7.6)	

#### B-Series Field Broadcast Rodent Deterrent (FRP) Cables (V Jacket)

FIBER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	11.6 (0.46)	128 (86)	2,200 (490)	550 (120)	17.4 (6.9)	11.6 (4.6)	
4	11.6 (0.46)	130 (87)	2,200 (490)	550 (120)	17.4 (6.9)	11.6 (4.6)	
6	12.5 (0.49)	144 (97)	2,400 (540)	600 (130)	18.8 (7.4)	12.5 (4.9)	
8	12.9 (0.51)	173 (116)	3,200 (720)	800 (180)	19.4 (7.6)	12.9 (5.1)	
10	15.4 (0.61)	213 (143)	4,000 (900)	1,000 (220)	23.1 (9.1)	15.4 (6.1)	
12	14.7 (0.58)	191 (128)	4,800 (1080)	1,200 (270)	22.1 (8.7)	14.7 (5.8)	
18	17.2 (0.68)	263 (177)	7,200 (1,620)	1,800 (400)	25.8 (10.2)	17.2 (6.8)	
24	18.2 (0.72)	287 (193)	9,600 (2,160)	2,400 (540)	27.3 (10.7)	18.2 (7.2)	

#### B-Series Field Broadcast Rodent Deterrent (FRP) Cables (G Jacket)

FIBER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	11.6 (0.46)	125 (84)	2,200 (490)	550 (120)	17.4 (6.9)	11.6 (4.6)	
4	11.6 (0.46)	127 (85)	2,200 (490)	550 (120)	17.4 (6.9)	11.6 (4.6)	
6	12.5 (0.49)	141 (95)	2,400 (540)	600 (130)	18.8 (7.4)	12.5 (4.9)	
8	12.9 (0.51)	145 (97)	3,200 (720)	800 (180)	19.4 (7.6)	12.9 (5.1)	
10	15.4 (0.61)	209 (140)	4,000 (900)	1,000 (220)	23.1 (9.1)	15.4 (6.1)	
12	14.7 (0.58)	187 (126)	4,800 (1080)	1,200 (270)	22.1 (8.7)	14.7 (5.8)	
18	17.2 (0.68)	258 (173)	7,200 (1,620)	1,800 (400)	25.8 (10.2)	17.2 (6.8)	
24	18.2 (0.72)	282 (189)	9,600 (2,160)	2,400 (540)	27.3 (10.7)	18.2 (7.2)	

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





(3.6d) B-Series Breakout - Field Broadcast Rodent Deterrent (FRP) Cables

#### **Ordering Information**

	В	X								9	K	В	F	
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12	13	14

- 1 2 Breakout Series Ultra-Fox = **BX**
- 3-5 Fiber count: (see cable characteristics chart) = **002–024**
- 6 Inner jacket material:

Tactical Polyurethane = C

Low-Smoke Zero-Halogen Polyurethane = **G** 

Tactical Flame-Retardant Polyurethane = V

- 7 9 Fiber type: (see Ultra-Fox Plus Fiber Performance Table, p. 24)
- 10 250 $\mu$ m fiber with 900 $\mu$ m tight buffer = **9**
- 11 Jacket color: Black = **K**
- 12 Rating: Field Broadcast Cable Rating = **B**
- 13 FRP Layer =  $\mathbf{F}$
- 14 Outer jacket:
  - C jacket = 9
  - G jacket = **B**
  - V jacket = 8

Example: 12-fiber field broadcast breakout cable with C jacket using 62.5µm Laser Ultra-Fox fiber, black jacket with FRP rodent deterrence –



## BROADCAST DEPLOYABLE CABLES



(3.6e) CX-Series – Deployable/Composite Copper/Fiber Cables

### **Applications**

- Used in outdoor applications that require both optical fiber and copper wire elements for communication and power
- Copper wire can power remote electronics used in fiber optic communications
- Copper wire can also be used for low data rate data transmission
- Deployable cables have been used in network and private broadcast applications around the world
- Cables can be designed for your custom applications
- Cable is designed for use with United States National Electrical Code (NEC) class 2 power sources

#### **Features**

- Includes both fiber optic subunits and copper individually jacketed wire
- Fiber optic subunits both protect the optical fiber and provide aramid yarn to strain relieve the optical fiber when individual connectors are used
- The individual copper wire is rated to 600V
- Up to 4 copper wires are standard
- Standard copper wire used includes high strand count wire for greater cable flexibility
- Standard wire gauges range from 18 to 12 AWG
- Additional aramid yarn included around the cable core for strain-relief in multielement connectors such as F-LINK
- Polyurethane jacket materials provide a rugged jacket and provide flexibility to the cable
- C, V and G jacket materials are available for use
- Polyurethane jackets are chemical resistant
- Water, fungus and UV resistant for extreme environments
- The customer is responsible for ensuring the compliance with all local and national safety and electrical code during use
- · Appropriate electrical safety protection is required whenever the copper wire is energized

### **OCC Provided Options**

- Broadcast composite deployable cables pre-spooled on reels for a ready-to-use product
- Broadcast cables can be pre-terminated with single-fiber or ruggedized multichannel connectors upon request

### **Cable Characteristics: CX-Series Composite Fiber/Copper Deployable Cables**

• Due to the wide range of constructions possible, call for construction details

## **Ordering Information**

Call for part numbers





## **BROADCAST DEPLOYABLE CABLES**





(3.6f) The Case for Helically Stranded Cables

## What Is Helically Stranded?

If you were a mountain climber using a rope to get up the sheer face of a cliff, would you rather have a nice, round rope in your hands, or would you rather be hanging on to hundreds of straight filaments, each independent, and hopefully each bearing part of your weight?

If you had to choose one of these designs on which to hang the survival of your communication network, which design would it be?



Figure 2: Straight Lay Construction

The term "helically stranded" comes from the fact that each element of such a twisted-together cable forms a helix. The "lay length" is the length along the cable required for one element to go all the way around a cable — from the top, around to the bottom, and back up to the top.

### Why Helically Stranded?

The helically stranded design is not a quirk, but a tried and time-tested design and construction for cables of all kinds that has proven to offer many benefits, such as:

- All the many elements of the cable form a structure with a round cross section.
- A round cross section offers the least surface area for the enclosed volume. Therefore, when a rope slides across another object, there is less surface contact, friction, and wear for any given diameter or strength of the rope or cable.
- The cable elements are kept together despite bending and turning of the cable, because each helical element is always pulled toward the center of the cable. This helps maintain a round cross section despite radial forces (perpendicular to the length of the cable) on the cable.
- Since the helical elements are always pulled toward the center of the cable, and toward each other, there is increased friction among the elements so that load on any one element is shared with its adjacent elements, and in a short distance, among all the elements in the cable.
- · Stresses on each element of the cable are averaged out and distributed among all the elements.
- As a cable is bent, each cable element rotates around the bend so that it is on the inside of the bend for a part of its length and on the outside for the next part. The tensile and compressive forces on the cable element average out within the "lay length."

## Fiber Optic Cables

Helical stranding is of particular importance in the construction of fiber optic cables. Typically, fiber optic cables contain multiple optical fibers and a number of aramid yarns serving as strength members, all surrounded by a plastic jacket. All the mechanical factors relevant to the physical characteristics and performance of any cable apply. In addition, the glass fibers are sensitive to bending in two ways not found in elements of other cables.

- 1. Excessive fiber bends or numerous "microbends" may cause significant signal loss that can degrade or prohibit system performance.
- 2. Bends place the outer surface of the glass fibers under stress, leading to the growth of any surface imperfections or microcracks. This growth of microflaws is known as "fatigue" and leads to "fatigue failure," which is fiber breakage.

**Specification:** If there is a specification associated with the purchase or submitted with the offer or quotation, insist that it include a statement, "All cable elements shall be helically stranded, with a lay length not to exceed 30 times the finished cable diameter." Note: Relatively small cable diameters up to 3/8 inch (9.5mm) with lay lengths of greater than 8 to 10 inches offer little advantage.





# 3.7 Mining Cables



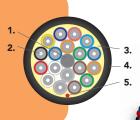
3.7a	D-Series Distribution – MSHA-Rated Mining Cables	.140
3.7b	D-Series Distribution – MSHA-Rated Deployable Cables	.142
	B-Series Breakout – MSHA-Rated Mining Cables	.144
3.7d	B-Series Breakout – MSHA-Rated Deployable Cables	.146
3.7e	G-Series Subgrouping – MSHA-Rated Mining Cables	.148
3.7f	CX-Series Composite – MSHA-Rated Signal Cables	.150
3.7a	OCC Mining Cables – History	.152

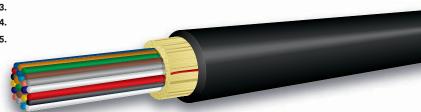


## **MINING CABLES**



- **3**
- (3.7a) D-Series Distribution MSHA-Rated Mining Cables
- 1. Central Filler/Strength Member
- 2. Tight-Buffer Optical Fiber
- 3. Aramid Strength Member
- 4. Outer Jacket
- **5.** Ripcord



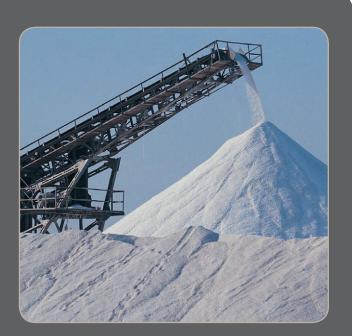


### **Applications**

- Can be installed in locations that require compliance with MSHA's Part 7, Subpart K of Title 30 of the Code of Federal Regulations (CFR) signal cables
- Suitable for permanent installations

#### **Features**

- Multiple tight-buffered fibers stranded within a single jacket with common strength members
- Ideal configuration for a single cable termination point requiring multiple fibers
- Flame-retardant MSHA-approved to Part 7, Subpart K of Title 30 Code of Federal Regulations (CFR)
- Compact, lightweight cable design with the highest strength-to-weight ratio
- Flexible, rugged, high-strength construction for long cable pulls
- May be directly terminated with connectors with physical protection at termination points
- Lower total installed costs
- Helically stranded cable core for flexibility, deployment survivability, and mechanical protection for the optical fibers
- High-performance tight-buffered coating on each optical fiber for environmental and mechanical protection



### Mechanical and Environmental Performance

	DISTRIBUTION MINING CABLES
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	Part 7, Subpart K of Title 30 Code of Federal Regulations (CFR)
Impact resistance	1,800 impacts (EIA/TIA-455-25A)
Crush resistance	1,500 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)

## **Applicable Standards**

OCC indoor/outdoor tight-buffered MSHA-rated mining cables meet the functional requirements of the following standards:

- ICEA -S-83-596
- ICEA-S-104-696
- GR-409-CORE
- TIA-568
- TIA-598
- Part 7, Subpart K of Title 30 Code of Federal Regulations (CFR)



(3.7a) D-Series Distribution – MSHA-Rated Mining Cables

## Cable Characteristics: D-Series MSHA-Rated Mining Cables

FIRED COUNT	EIRER COLINIT DIAMETER WEIG		TENSIL	E LOAD	MINIMUM BEND RADIUS	
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2*	4.8 (0.19)	22 (14)	660 (150)	180 (40)	7.3 (2.9)	4.9 (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)	5.8 (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)	7.1 (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)	43 (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)

<sup>\*-40°</sup>C to +70°C

## **Ordering Information**

4 5 6 Digit No: 10



- 1 2 Distribution Series Ultra-Fox = **DX**
- 3 5Fiber count: (see cable characteristics chart) = **002–048**
- Jacket type: Indoor/Outdoor PVC = **D** 6
- 7 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)
- 10 Ultra-Fox fiber with 900 $\mu$ m tight-buffer = **9**
- 11 Standard jacket color: Black = **K** (other jacket colors available upon request)
- 12 Rating: MSHA = **S**

Example: 12-fiber Ultra-Fox MHSA-approved distribution cable using 62.5µm Ultra-Fox fiber, black jacket –

W S

<sup>\*\*62.5</sup> $\mu$ m multimode and single-mode fiber. Specifications vary by fiber type. \*\*\* 50µm multimode fiber

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



- )
- (3.7b) D-Series Distribution MSHA-Rated Deployable Cables
- 1. Optical Fiber
- 2. Acrylate Fiber Coating
- 3. Color-Coded 900µm Diameter Hard Elastomeric Tight-Buffer
- **4.** Aramid Strength Member
- **5.** Core-Locked<sup>™</sup> Flame-Retardant Tactical Polyurethane Jacket





## **Applications**

- Can be installed in locations that require compliance with MSHA's Part 7, Subpart K of Title 30 of the Code of Federal Regulations (CFR) signal cables
- Suitable for temporary deployment and retrieval applications

#### **Features**

- Most rugged, high-strength cable design
- Excellent for use in deployment/retrieval applications
- Designed for use in adverse environments
- Helically stranded cable core for flexibility, deployment survivability, and mechanical protection for the optical fibers
- Crush resistant and resilient with additional strength members
- Exceptional crush and impact resistance, flexibility, deployment/ retrieval, twist temperature, chemical resistance from the cable jacket, strength members, and fiber buffer coatings
- UV resistant, water and fungus resistant
- Multiple 900µm tight-buffered fibers stranded with common strength members within a tight-bound outer jacket
- Ideal distribution cable configuration for most demanding applications — crush, impact, twist, bend, flex continuous movement, deployment/retrieval, etc.
- Flame-retardant MSHA-approved to Part 7, Subpart K of Title 30 Code of Federal Regulations (CFR)

## OCC Provided Options

- Mil-Tac Style MSHA cables can be prespooled on deployable reels for a ready-to-use product
- Mil-Tac Style MSHA cables can be pre-terminated with single-fiber or ruggedized with multichannel connectors upon request



## **Applicable Standards**

OCC D-Series Distribution MSHA-rated deployable cables meet the functional requirements of the following standards:

- TIA-568
- TIA-598
- Part 7, Subpart K of Title 30 Code of Federal Regulations (CFR)



(3.7b) D-Series Distribution – MSHA-Rated Deployable Cables

#### Mechanical and Environmental Performance

	MIL-TAC STYLE MINING CABLES
Operating temperature	-40 C to +85° C
Storage temperature	-70° C to +85° C
Flame retardancy	Part 7, Subpart K of Title 30 Code of Federal Regulations (CFR)
Impact resistance	1,800 impacts (EIA/TIA-455-25A)
Crush resistance	1,500 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)

## Cable Characteristics: D-Series MSHA-Rated Deployable Cables

FIBER COUNT	D COUNT DIAMETER		TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	5.0 (0.20)	24 (16)	1,800 (400)	600 (130)	5.0 (2.0)	2.5 (1.0)	
4	5.5 (0.22)	29 (19)	1,800 (400)	600 (130)	5.5 (2.2)	2.8 (1.1)	
6	6.0 (0.24)	34 (23)	1,800 (400)	600 (130)	6.0 (2.4)	3.0 (1.2)	
8	6.5 (0.26)	39 (26)	1,800 (400)	600 (130)	6.5 (2.6)	3.3 (1.3)	
10	6.5 (0.26)	40 (27)	2,100 (470)	700 (160)	6.5 (2.6)	3.3 (1.3)	
12	6.5 (0.26)	43 (29)	2,100 (470)	700 (160)	6.5 (2.6)	3.3 (1.3)	
18	7.5 (0.30)	51 (34)	2,400 (540)	800 (180)	7.5 (3.0)	3.8 (1.5)	
24	8.5 (0.33)	63 (42)	3,000 (670)	1,000 (220)	8.5 (3.3)	4.3 (1.7)	

\*62.5µm 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.

## **Ordering Information**

Digit No:

D	X				V				9	K	S
1	2	3	4	5	6	7	8	9	10	11	12

Distribution Series Ultra-Fox= DX 1 - 2

Fiber count: (see cable characteristics chart) = **002-024** 3 - 5Jacket type: Flame-Retardant Tactical Polyurethane = V 6

7 – 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)

10 Ultra-Fox fiber with 900 $\mu$ m tight-buffer = **9** 

Jacket color: Black = K 11

12 Rating: MSHA = **S** 





Example: 12-fiber Mil-Tac style MSHA-approved distribution cable using 62.5µm Laser Ultra-Fox fiber, black jacket –

## **MINING CABLES**



## **3**

#### (3.7c) B-Series Breakout - MSHA-Rated Mining Cables

- 1. Central Filler/Strength Member
- 2. Subcable
- 3. Outer Jacket
- 4. Ripcord

#### Subcable

- 5. Tight-Buffer Optical Fiber
- 6. Aramid Strength Member
- 7. Subcable Jacket





#### **Applications**

- Can be installed in locations that require compliance with MSHA's Part 7, Subpart K of Title 30 of the Code of Federal Regulations (CFR) signal cables
- Suitable for permanent installations
- Ideal for applications that require individual connectors added to subcables

#### **Features**

- Most rugged cable design with individual subcables for routing and direct connector termination
- Helically stranded cable core for flexibility, deployment survivability, and mechanical protection for the optical fibers
- High-performance tight-buffered coating on each optical fiber for environmental and mechanical protection
- Fibers may be directly terminated using connectors, with no further protection required
- UV resistant, water and fungus resistant
- Core-Locked™ outer jacket surrounds the subcables for exceptional crush resistance, survivability, and use in long, vertical installations
- Designed for direct lashing, "J" hook applications, and vertical installations in mines
- Cable is ideal for direct pulling with wire mesh grips
- Individual fibers and strength members protected in a subcable configuration
- Ideal configuration for multiple termination point locations where subcables provide excellent strength and mechanical protection for connector termination
- Flame-retardant MSHA-approved to Part 7, Subpart K of Title 30 Code of Federal Regulations (CFR)



#### Mechanical and Environmental Performance

	BREAKOUT MINING CABLES
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	Part 7, Subpart K of Title 30 Code of Federal Regulations (CFR)
Impact resistance	1,500 impacts (EIA/TIA-455-25A)
Crush resistance	2,200 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)

### **Applicable Standards**

OCC B-Series MSHA-rated cables meet the functional requirements of the following standards:

- ICEA-S-83-596
- ICEA-S-104-696
- GR-409-CORE
- TIA-568
- TIA-598
- Part 7, Subpart K of Title 30 Code of Federal Regulations (CFR)



(3.7c) B-Series Breakout – MSHA-Rated Mining Cables

### Cable Characteristics: B-Series MSHA-Rated Mining Cables

FIBER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM B	END RADIUS
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	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 (14.0)	23.6 (9.3)

## **Ordering Information**

Digit No: 3 4 5



- 1 2 Breakout Series Ultra-Fox = **BX**
- 3 5Fiber count: (see cable characteristics chart) = **002–048**
- 6 Jacket type: Indoor/Outdoor PVC = **D**
- 7 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)
- 10 Ultra-Fox fiber with 900 $\mu$ m tight-buffer = **9**
- 11 Standard jacket color: Black =  $\mathbf{K}$  (other jacket colors available upon request)
- 12 Rating: MHSA = **S**

Example: 12-fiber MSHA breakout cable using 62.5µm standard Laser Ultra-Fox fiber, black jacket –

В	X	0	1	2	D	W	L	S	9	K	S

## **MINING CABLES**

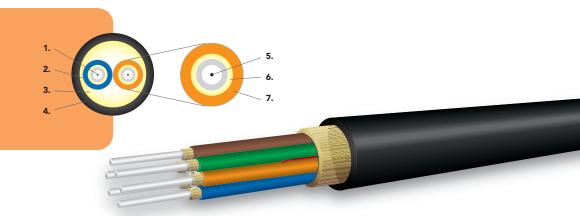


(3.7d) B-Series Breakout – MSHA-Rated Deployable Cables

- 1. Tight-Buffer Optical Fiber
- 2. Subcable
- 3. Aramid Strength Member
- 4. Outer Jacket

#### Subcable

- 5. Tight-Buffer Optical Fiber
- 6. Aramid Strength Member
- 7. Subcable Jacket



## **Applications**

- Used in mining applications where cables may need to be temporarily deployed or where a rugged jacket is required
- Deployable cable that is ideal for use in harsh environments where deployment and retrieval for reuse are required
- Ideal for applications that require termination of the subcable to a connector and a direct run to panels and equipment

#### **Features**

- Most rugged, high-strength cable design incorporating subcables for direct termination
- Polyurethane jacketed for abrasion, cut and chemical resistance
- Breakout cable design with individual color-coded subcables protecting each optical fiber
- Crush resistant and resilient, with two separate layers of aramid strength members in the subcables for individual single-fiber connector and termination pin, and overall for termination to multiway connector backshells or other housings
- Helically stranded cable core for flexibility, deployment survivability and exceptional mechanical protection for the optical fibers
- Can be used outdoors for temporary deployment directly on the ground, in all terrains, including severe environments
- Suitable for industrial, mining and petrochemical environments; chemical resistant
- Round cable design for easy installation and survivability
- Often used with multiway military tactical connectors for maximum connector retention (400 lbs)
- Ideally suited for use with MIL-C-38999 style military connectors; subcables terminate to individual pins, and overall aramid strength member terminates to backshell
- 2.0mm subcables standard
- Flame-retardant and MSHA-approved to Part 7, Subpart K of Title 30 Code of Federal Regulations (CFR)

## OCC Provided Options

- MSHA-rated deployable cables prespooled on deployable reels for a ready-to-use product
- MSHA-rated deployable cables can be pre-terminated with single-fiber or ruggedized multichannel connectors upon request



(3.7d) B-Series Breakout – MSHA-Rated Deployable Cables

### Mechanical and Environmental Performance

	BREAKOUT MINING CABLES
Operating temperature	-40°C to +85°C
Storage temperature	-70°C to +85°C
Flame retardancy	MSHA-approved 30FR 7.408
Impact resistance	1,500 impacts (EIA/TIA-455-25A)
Crush resistance	2,100 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)

## **Applicable Standards**

OCC B-Series Breakout MSHA Rated Deployable cables meet the functional requirements of the following standards:

- TIA-568
- TIA-598
- MSHA 30CFR Signal Cables

## Cable Characteristics: B-Series MSHA-Rated Deployable Cables

FIRED COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS		
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	6.5 (0.26)	42 (28)	2,200 (490)	550 (120)	6.5 (2.6)	3.3 (1.3)	
4	7.5 (0.30)	54 (36)	2,200 (490)	550 (120)	7.5 (3.0)	3.8 (1.5)	
6	8.5 (0.33)	65 (44)	2,400 (540)	600 (130)	8.5 (3.3)	4.3 (1.7)	
8	10.0 (0.39)	90 (60)	3,200 (720)	800 (180)	10.0 (3.9)	5.0 (2.0)	
10	11.5 (0.45)	119 (80)	4,000 (900)	1,000 (220)	11.5 (4.5)	5.8 (2.3)	
12	11.0 (0.43)	102 (69)	4,800 (1080)	1,200 (270)	11.0 (4.3)	5.5 (2.2)	

## **Ordering Information**

S 10 12 Digit No:

> 1 – 2 Breakout Series Ultra-Fox= BX

Fiber count: (see cable characteristics chart) = **002–012** 3 - 56 Jacket type: Flame-Retardant Tactical Polyurethane =  $\mathbf{V}$ 

7 – 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)

10 Ultra-Fox fiber with 900 $\mu$ m tight-buffer = **9** 

11 Jacket color: Black = K

12 Rating: MSHA = **S** 

Example: 12-fiber MSHA breakout cable using 62.5µm Laser Ultra-Fox fiber, black jacket –



## **MINING CABLES**

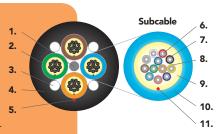


(3.7e) G-Series Subgrouping – MSHA-Rated Mining Cables

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

#### Subcable

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





## **Applications**

- Ideal separation and identification of single-mode and multimode fibers in a single cable
- Design allows subcables to be routed to multiple locations such as wiring racks and closets

#### **Features**

- Tight-buffered multifiber cable design allows subcables to be routed to multiple locations
- Ideal for midspan access applications
- Core-Locked<sup>™</sup> outer jacket surrounds the subcables for superior crush resistance, survivability, and use in long, vertical installations
- UV resistant, water and fungus resistant
- Helically stranded cable core for flexibility, deployment survivability, and mechanical protection for the optical fibers
- High-performance tight-buffered coating on each optical fiber for environmental and mechanical protection
- Designed for direct lashing, "J" hook applications, and vertical installations in mines
- Multiple distribution style subcables within a common jacket with each subcable having its own flexible aramid strength member
- Flame-retardant MSHA-approved to Part 7, Subpart K of Title 30 Code of Federal Regulations (CFR)



### Mechanical and Environmental Performance

	SUBGROUPING MINING CABLES
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	Part 7, Subpart K of Title 30 Code of Federal Regulations (CFR)
Impact resistance	1,500 impacts (EIA/TIA-455-25A)
Crush resistance	2,100 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)

## **Applicable Standards**

OCC 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
- Part 7, Subpart K of Title 30 Code of Federal Regulations (CFR)

(3.7e) G-Series Subgrouping – MSHA-Rated Mining Cables

### Cable Characteristics: G-Series MSHA-Rated Mining Cables 6-Fiber Subcables (4.5mm subcables)

FIRED COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS			
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)		
12	14.6 (0.57)	207 (139)	3,800 (850)	1,200 (270)	21.9 (8.6)	14.6 (5.7)		
18	14.6 (0.57)	208 (140)	4,700 (1,060)	1,800 (400)	21.9 (8.6)	14.6 (5.7)		
24	14.6 (0.57)	209 (140)	5,600 (1,260)	1,800 (400)	21.9 (8.6)	14.6 (5.7)		
30	15.6 (0.61)	240 (161)	7,500 (1,690)	2,400 (540)	23.4 (9.2)	15.6 (6.1)		
36	16.9 (0.67)	282 (189)	8,900 (2,000)	2,850 (640)	25.4 (10.0)	16.9 (6.7)		

## G-Series MSHA-Rated Mining Cables 12-Fiber Subcables (5.5mm subcables)

FIRED COLINE	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS			
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	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)		

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

### **Ordering Information**

S 5 Digit No: 4 10 12



- Subgrouping Series Ultra-Fox = G
- 12-fiber subcables = X6-fiber subcables = **B**
- 3 5Fiber count: (see cable characteristics chart) = **012–072**
- Jacket type: Indoor/Outdoor PVC = **D** 6
- Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23) 7 – 9
- 10 Ultra-Fox fiber with 900µm tight-buffer = 9
- 11 Standard jacket colors: Black =  $\mathbf{K}$  (other jacket colors available upon request)
- 12 Rating: MSHA = **S**

Example: 24-fiber MSHA subgrouping cable using 62.5µm standard Laser Ultra-Fox optimized fiber, black jacket –

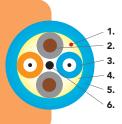
## **MINING CABLES**



**3** 

(3.7f) CX-Series Composite - MSHA-Rated Signal Cables

- 1. Ripcord
- 2. 2-Stranded Copper Wire
- **3.** Optical Fiber Subcable
- 4. Aramid Strength Member
- 5. Outer Jacket
- 6. Central Filler



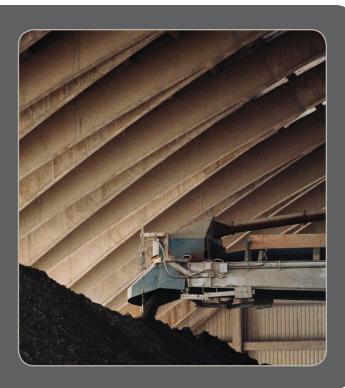


## **Applications**

• Various combinations of copper wire and fiber for electro-optical applications

#### **Features**

- Chemical-resistant outer jacket for indoor/outdoor plant environments; 12-, 14-, 16-, 18-gauge single-stranded copper wire available for low-power, communication, control sensor, signal, and video
- Multimode (62.5µm or 50µm) and single-mode fiber available contact Optical Cable Corporation for specifications and part numbers
- UV resistant, water and fungus resistant
- Available with PVC (**D**) or Fluoroplymer (**K**) jackets
- Hundreds of combinations of wire and fiber possible contact
   OCC for a cable design to match your requirements
- Flame-retardant MSHA-approved to Part 7, Subpart K of Title 30 Code of Federal Regulations (CFR)



### **Mechanical and Environmental Performance**

	COMPOSITE MINING SIGNAL CABLES
Minimum bend radius:	
Installation load	20X outside diameter
Operational load	15X outside diameter
Flame retardancy	Part 7, Subpart K of Title 30 Code of Federal Regulations (CFR)

## **Applicable Standards**

OCC composite tight-buffered fiber optic and copper cables meet the functional requirements of the following standards:

- UL 13
- Part 7, Subpart K of Title 30 Code of Federal Regulations (CFR)

## **MINING CABLES**



(3.7f) CX-Series Composite – MSHA-Rated Signal Cables

## **Ordering Information**



1 – 2 Composite Series Ultra-Fox = CX

Fiber count: Number of fibers (002-036) + Copper Conductors (002-004) 3 - 5Example: 2-fiber/2-copper = **004** 

Jacket type: 6

Indoor/Outdoor Fluoropolymer =  $\mathbf{K}$ 

Indoor/Outdoor PVC = **D** 

7 – 9 Fiber/Copper type: Contact OCC for code 10 Ultra-Fox fiber with 900 $\mu$ m tight-buffer = 9

Standard jacket color: Black = **K** (other colors available) 11

12 Rating: MSHA = **S** 



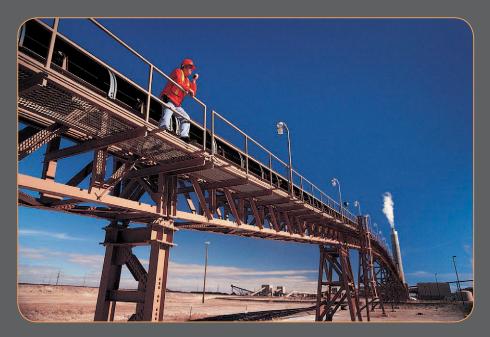


Example: 2-fiber/2AWG-18 copper cable using 62.5µm Ultra-Fox fiber, K jacket, black –

S



(3.7g) OCC Mining Cables – History

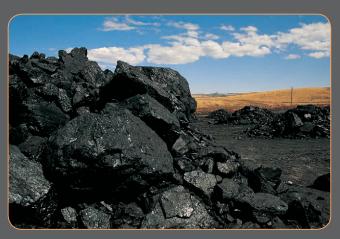


Optical Cable Corporation is built on a tradition of innovation and dependability.

In the early 1980s, OCC was a pioneer in the design and production of special tight-buffered cables for demanding military field applications. Today, OCC builds on this technology at its ISO 9001:2000 registered facility in Roanoke, Virginia, where a broad range of fiber optic cables are manufactured for high bandwidth transmission of data, video, and audio communications.

Fiber optic cable solutions for mining by OCC provide a comprehensive and versatile set of products to address the mining industry's voice, data, and video cabling requirements, including fiber optic cables that are MSHA-rated for underground use.





#### **Overview**

The leading mining industry companies are upgrading their infrastructures to improve safety and maximize profitability. Companies seeking general cost reductions are leveraging the capacity and capability of fiber optic cable to provide these services more cost-effectively.

Areas of improvement include:

- Security
- Intrinsically Safe Areas (Combustibles)
- Environmental Monitoring
- Voice/Data/Video Communications
- Automation
- Production Rates and Yields
- Equipment Control and Monitoring
- ERP

The unique cable designs and configurations from OCC provide long-term reliability as well as safe and secure transmission of critical data and communications. OCC's unique Core-Locked™ technology, in combination with other design features, provides the most rugged fiber optic cable in the industry.







# 3.8 Shipboard & Offshore Cables

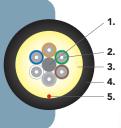
D-Series Distribution – LSZH ABS-Approved Cables	54
D-Series Distribution – LSZH Braided-Armor ABS-Approved Cables1	56
DNV-Certified Shipboard Cables1	58
B-Series Breakout – PVC Jacketed, ABS-Approved Cables1	60
B-Series Breakout – LSZH ABS-Approved Cables1	63
B-Series Breakout – LSZH Braided-Armor ABS-Approved Cables	65
Pierside1	67

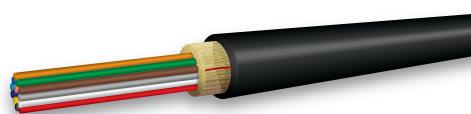


**3** 

(3.8a) D-Series Distribution LSZH ABS-Approved Cables

- 1. Central Filler/Strength Member
- 2. Tight-Buffer Optical Fiber
- 3. Aramid Strength Member
- 4. Outer Jacket
- **5.** Ripcord





### **Applications**

- Marine and offshore tight-buffered cable design for use in installations requiring a flame-retardant, low-smoke and zero-halogen cable intended for single point terminations.
- Can be used in applications requiring ABS-approved fiber optic cables

#### **Features**

- Zero-halogen construction meets IEC 60754-2
- Meets low-smoke requirements of UL 1685 and IEC 61034-2
- Flame-retardant per the requirements of IEC 60332-3-24
- UL listed OFN-LS
- ABS-approved for 2007 Steel Vessels Rules 1-1-4/7.7, 4-8-3/9.13
- ABS-approved for 2006 MODU Rules 4-3-4/13.1.6
- Suitable for indoor or outdoor applications
- Jacket is UV, fungus and moisture resistant
- Round cable construction for easy handling and termination
- Includes ripcord for easy outer jacket removal
- Rugged distribution-style cable with 2 to 24 for deck applications
- Optical fiber types include 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



U.S. Navy photo by Mass Communication Specialist 2nd Class James R. Evans

## **Applicable Standards**

OCC D-Series Distribution Low-Smoke Zero-Halogen ABS-Approved Cable meet the functional requirements of the following standards:

- IEC 60332-3-24
- IEC 60754-2
- IEC 61034-2
- UL 1685
- ICEA-S-104-696
- MIL-C-24643
- TIA-568
- TIA-598
- ABS Steel Vessels and MODU Rules

### Mechanical and Environmental Performance

Operating temperature	-40°C to +70°C
Storage temperature	-40°C to +70°C
Installation temperature (cable temp.)	-20°C to +60°C
Flame retardancy	IEC 60332-3-24; UL listed OFN-LS (UL 1685)
Zero-halogen	IEC 60754-2
Smoke generation	IEC 61034-2
Impact resistance	1,000 impacts (EIA/TIA-455-25A)
Crush resistance	1,800 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)



(3.8a) D-Series Distribution LSZH ABS-Approved Cables

### Cable Characteristics: D-Series Distribution LSZH ABS-Approved Cables

FIBER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS			
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)		
2	5.4 (0.21)	30 (20)	1,400 (310)	450 (100)	8.1 (3.2)	5.4 (2.1)		
4	5.6 (0.22)	32 (22)	1,400 (310)	450 (100)	8.4 (3.3)	5.6 (2.2)		
6	5.9 (0.23)	37 (25)	1,400 (310)	450 (100)	8.9 (3.5)	5.9 (2.3)		
8	6.4 (0.25)	43 (29)	1,600 (360)	525 (120)	9.6 (3.8)	6.4 (2.5)		
12	7.6 (0.30)	61 (41)	2,700 (600)	600 (135)	11.4 (4.5)	7.6 (3.0)		
18	7.5 (0.30)	59 (40)	2,700 (600)	700 (160)	11.3 (4.4)	7.5 (3.0)		
24	9.1 (0.36)	92 (62)	3,000 (670)	1,000 (220)	13.7 (5.4)	9.1 (3.6)		

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

## **Ordering Information**

	D					Z				9	K	E	_		A	В	S
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	1	Dic	tributio	n Sorio	.c – D												

Distribution Series = **D** 

2 Ultra-Fox = X

Ultra-Fox Plus Fiber = -

3 – 5 Fiber count: **002-024** 

Jacket type: Low-Smoke Zero-Halogen Jacket = **Z** 6

7 – 9 Fiber type: (see Laser Ultra-Fox or Ultra-Fox Plus Fiber Performance Table, p. 23–24)

10 Ultra-Fox fiber with 900µm tight-buffer = 9; Ultra-Fox Plus 900µm tight-buffer = 5

Jacket color: Black = K 11

12 Rating: Flame-Retardant, Low-Smoke Zero-Halogen = E

14 Print in feet marks = F; Print in meter marks = M

15 - 17 ABS-approved version = **ABS** 

Example: 12-fiber ABS-approved low-smoke zero-halogen, distribution cable using 62.5µm Ultra-Fox fiber, black jacket printed in feet –

S



(3.8b) D-Series Distribution LSZH Braided Armor ABS-Approved Cables

- 1. Central Filler/Strength Member
- 2. Tight-Buffer Optical Filler
- 3. Braid
- 4. Outer Jacket
- **5.** Ripcord



### **Applications**

 Marine and offshore tight-buffered cable design for use in installations requiring a flame-retardant, low-smoke and zero-halogen cable

#### **Features**

- Zero-halogen construction meets IEC 60754-2
- Meets low-smoke requirements of UL 1685
- Flame-retardant per the requirements of UL 1685 OFC-LS
- UL listed OFC-LS
- Suitable for indoor or outdoor applications
- Jacket is UV, fungus and moisture resistant
- Bronze braid armor adds a degree of durability to limit damage due to abrasion
- Round cable construction for easy handling and termination
- Includes ripcord for easy outer jacket removal
- Distribution-style cable with 2 to 24 fibers
- ABS-approved for 2007 Steel Vessels Rules 1-1-4/7.7, 4-8-3/9.13
- ABS-approved for 2006 MODU Rules 4-3-4/13.1.6
- Optical fiber types include 62.5/125, 50/125, and single-mode
- $\bullet$  Available with 500µm primary acrylate-coated fiber for maximum mechanical and environmental protection of the optical fiber
- Braid applied per IEEE 1580



U.S. Navy photo by Mass Communication Specialist 3rd Class Luis E. Ramirez

## **Applicable Standards**

OCC D-Series Distribution Low-Smoke Zero-Halogen Braided-Armor ABS-Approved Cables meet the functional requirements of the following standards:

- IEC 60754-2
- UL 1685 OFC-LS
- ICEA-S-104-696
- MIL-C-24643
- TIA-568
- TIA-598
- IEEE 1580 (Braid Application)

## Mechanical and Environmental Performance

Operating temperature	-40°C to +70°C
Storage temperature	-40°C to +70°C
Installation temperature (cable temp.)	-20°C to +60°C
Flame retardancy	OFC-LS
Impact resistance	1,500 impacts (EIA/TIA-455-25A)
Crush resistance	1,800 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)



(3.8b) D-Series Distribution LSZH Braided Armor ABS-Approved Cable

### Cable Characteristics: D-Series Distribution LSZH ABS-Approved Cables

FIRED COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM BEND RADIUS			
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)		
2	9.3 (0.37)	126 (85)	1,400 (310)	450 (100)	14 (5.5)	9.3 (3.7)		
4	9.5 (0.37)	132 (89)	1,400 (310)	450 (100)	14.3 (5.6)	9.5 (3.7)		
6	9.9 (0.39)	144 (97)	1,400 (310)	450 (100)	14.9 (5.9)	9.9 (3.9)		
8	10.4 (0.41)	158 (106)	1,600 (360)	525 (120)	15.6 (6.1)	10.4 (4.1)		
12	11.5 (0.45)	193 (130)	2,700 (600)	600 (135)	17.3 (6.8)	11.5 (4.5)		
18	11.5 (0.45)	190 (128)	2,700 (600)	700 (160)	17.3 (6.8)	11.5 (4.5)		
24	13.1 (0.52)	237 (159)	3,000 (670)	1,000 (220)	19.7 (7.8)	13.1 (5.2)		

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

### **Ordering Information**

	D	X				Z					K	A	В	2	-		A	В	S
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

- 1 Distribution Series = **D**
- 2 Ultra-Fox = XUltra-Fox Plus Fiber = -
- 3 5Fiber count: (see cable characteristics chart) = 002-024
- Jacket type: Low-Smoke Zero-Halogen Jacket = Z
- 7 9 Fiber type: (see Laser Ultra-Fox or Ultra-Fox Plus Fiber Performance Table, p. 23-24)
- Ultra-Fox fiber with 900µm tight-buffer = 9 10
- Ultra-Fox Plus fiber with 900µm tight-buffer = 5
- 11 Jacket color: Black = K
- Rating: OFC-LS = A 12
- 13 14 Braided cable with Z jacket = **B2**
- Print in feet marks = F; Print in meter marks = M
- 17 19 For ABS-approved cable = **ABS**

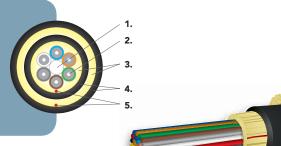
Example: 12-fiber low-smoke zero-halogen, distribution cable using 62.5µm Ultra-Fox fiber, black jacket printed in feet, braided and ABS-approved -

D	X	0	1	2	Z	W	L	S	9	K	A	В	2	_	F	A	В	S
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---



(3.8c) DNV-Certified Shipboard Cables

- 1. Central Filler/Strength Member
- 2. Tight-Buffer Optical Fiber
- 3. Outer Jacket
- 4. Water Blocking Aramid Strength Member
- **5.** Ripcords (2 1 per jacket)



## **Applications**

 Signaling, communication, and data transmission for fixed and deployable networks on board ships and offshore structures with applications including; Mobile Offshore Drilling Units (MODUs), Floating Production Storage and Offloading (FPSO), Tension Leg Platforms (TLP), Liquefied Natural Gas (LNG)

#### **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 include 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



U.S. Navy photo by Mass Communication Specialist 3rd Class Nicholas Hall

#### 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

## Cable Characteristics: DNV Certified Shipboard Cables

FIBER COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM B	END RADIUS
MM (IN) KG/KM (LBS/1,0	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2–6	9.5 (.37)	95 (64)	1,200 (270)	400 (90)	14.3 (3.2)	9.5 (2.1)



(3.8c) DNV-Certified Shipboard Cables

## **General Cable and Fiber Specifications**

SPECIFICATION	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		

SPECIFICATION	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 Sub clause 8.5	Cold Impact Test

### **Ordering Information**

Base cable part number is OC031016. The suffix indicated in the table is added to complete the part number based on the fiber type needed.

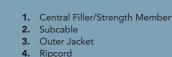
Example: 4-fiber DNV-Certified cable with WLS fiber = OC031016-01

FIBER COUNT	FIBER TYPE	FIBER BUFFER	SUFFIX
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
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



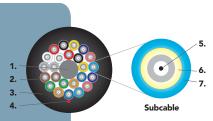


(3.8d) B-Series Breakout - PVC Jacketed, ABS-Approved Cables



#### Subcable

- 5. Tight-Buffer Optical Fiber
- 6. Aramid Strength Member
- **7.** Subcable Jacket





## **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 the subcable to a connector and a 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
- ABS-approved for 2005 Steel Vessels Rules 1-1-4/7.7, 4-8-3/9.1
- ABS-approved for 2001 MODU Rules 4-3-4/13.1.6
- Suitable for indoor or outdoor applications
- Core-Locked™ outer jacket design for installation survivability; long-term, trouble-free service
- Ideal for use in long, vertical installations
- 2.0mm and 2.5mm subcables can be direct-terminated with standard connectors (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 900µm tight-buffered coating on each optical fiber for environmental and mechanical protection
- 2- to 72-fibers

### **Cost Savings**

- · Direct termination to subcable may eliminate the need for patch panels and patch cords, and reduces connector loss
- 900µm buffer eliminates the need for costly and time-consuming installation of fan-out kits or pigtail splices because connectors terminate directly to the fiber
- High crush resistance may eliminate the need for inner duct



(3.8d) B-Series Breakout – PVC Jacketed, ABS-Approved Cables

### 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
Flame retardancy	UL listed type OFNR (UL 1666) and FT4 (CSA C22.2 No. 232)
Impact resistance	1,500 impacts (EIA/TIA-455-25A)
Crush resistance	2,200 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)

# Applicable Standards

OCC indoor/outdoor tight-buffered fiber optic cables meet the functional requirement of the following standards:

- GR-409-CORE
- ICEA-S-104-696
- ICEA-S-83-596
- TIA-568
- TIA-598
- ABS Steel Vessels Rules
- ABS MODU

### Cable Characteristics: B-Series Breakout PVC Jacketed, ABS-Approved Cables (with 2.0mm subcables)

FIBER COUNT	DIAMETER			TENSILE LOAD		MINIMUM BEND RADIUS	
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	6.0 (0.24)	37 (25)	800 (180)	200 (40)	9.0 (3.5)	6.0 (2.4)	
4	7.0 (0.28)	49 (33)	1,600 (360)	400 (90)	10.5 (4.1)	7.0 (2.8)	
6	8.0 (0.31)	63 (42)	2,400 (540)	600 (130)	12.0 (4.7)	8.0 (3.1)	
8	9.5 (0.37)	83 (56)	3,200 (720)	800 (180)	14.3 (5.6)	9.5 (3.7)	
12	1.01 (0.43)	103 (69)	4,800 (1,000)	1,200 (270)	16.5 (6.5)	11.0 (4.3)	
18	12.5 (0.49)	148 (99)	6,000 (1,350)	1,500 (340)	18.8 (7.4)	12.5 (4.9)	
24	14.7 (0.58)	208 (140)	7,200 (1,600)	1,800 (400)	22.1 (8.7)	14.7 (5.8)	
36	16.8 (0.66)	253 (170)	9,600 (2,100)	2,400 (540)	25.2 (9.9)	16.8 (6.6)	
48	20.1 (0.79)	368 (247)	12,000 (2,700)	3,000 (680)	30.2 (11.9)	20.1 (7.9)	
60	22.7 (0.89)	467 (314)	15,000 (3,400)	3,750 (850)	34.1 (13.4)	22.7 (8.9)	
72	26.0 (1.02)	623 (419)	16,800 (3,800)	4,200 (900)	39.0 (15.4)	26.0 (10.2)	

## B-Series Breakout PVC Jacketed, ABS-Approved Cables (with 2.5mm subcables)

FIRED COLINIT	FIBER COUNT DIAMETER WEIGHT		WEIGHT TENSILE LOAD		MINIMUM BEND RADIUS	
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2	7.0 (0.28)	41.0 (28.0)	1,200 (270)	500 (110)	10.5 (4.1)	7.0 (2.8)
4	8.1 (0.32)	65.0 (44.0)	2,000 (450)	800 (180)	12.2 (4.8)	8.1 (3.2)
6	9.6 (0.38)	84.0 (56.0)	3,000 (670)	1,200 (270)	14.4 (5.7)	9.6 (3.8)
8	11.6 (0.46)	126.0 (85.0)	4,000 (900)	1,700 (380)	17.5 (6.9)	11.6 (4.6)
12*	13.0 (0.51)	142.0 (95.0)	6,000 (1,350)	2,500 (560)	19.5 (7.7)	13.0 (5.1)
18	15.3 (0.60)	216.0 (145.0)	8,000 (1,800)	3,500 (790)	23.1 (9.1)	15.3 (6.0)
24	17.6 (0.69)	279.0 (188.0)	10,000 (2,250)	3,800 (850)	26.5 (10.4)	17.6 (6.9)
36	20.3 (0.80)	360.0 (242.0)	14,000 (3,150)	6,000 (1,350)	30.6 (12.0)	20.3 (8.0)
48	23.6 (0.93)	483.0 (325.0)	18,000 (4,050)	7,500 (1,690)	35.5 (14.0)	23.6 (9.3)
60	28.5 (1.12)	744.0 (500.0)	22,000 (4,950)	8,800 (1,980)	42.7 (16.8)	28.5 (11.2)
72	28.9 (1.14)	738.0 (496.0)	26,000 (5,845)	11,000 (2,470)	43.4 (17.1)	28.9 (11.4)

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





(3.8d) B-Series Breakout – PVC Jacketed, ABS-Approved Cables

### **Ordering Information**

 B
 Colored
 Colored
 D
 Colored
 Colored
 P
 Colored
 Colored</t

- 1 Breakout Series = **B**
- 2 Ultra-Fox with 2.5mm subunits = **X**Ultra-Fox with 2.0mm subunits = **E**
- 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, p. 23)
- 10 Ultra-Fox fiber with 900μm tight-buffer = **9**
- 11 Jacket color: Standard = Black = **K**
- 12 Rating: Riser =  $\mathbf{R}$
- 13–14 For print in feet =  $\mathbf{F}$ , for print in meters =  $\mathbf{M}$
- 15–17 ABS-approved cable = **ABS**

Example: 12-fiber B-series breakout with 2.0mm subunits using 62.5µm Laser Ultra-Fox fiber, black jacket ABS-approved –

B E 0 1 2 D W L S 9 K R - F A B S

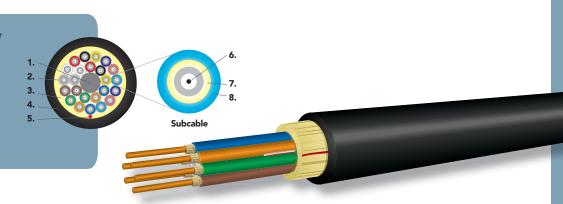


(3.8e) B-Series Breakout LSZH ABS-Approved Cables

- 1. Central Filler/Strength Member
- 2. Subcable
- 3. Aramid Strength Member
- 4. Outer Jacket
- **5.** Ripcord

#### Subcable

- 6. Tight-Buffer Optical Fiber
- 7. Aramid Strength Member
- 8. Subcable Jacket



### **Applications**

• Marine and offshore tight-buffered cable design for use in installations requiring a flame-retardant, low-smoke and zero-halogen cable incorporating individual subcables for direct termination

#### **Features**

- Zero-halogen construction meets IEC 60754-2
- Meets low-smoke requirements of UL 1685 and IEC 61034-2
- Flame-retardant per the requirements of IEC 60332-3-24 and UL 1666
- UL listed in accordance with NEC sections 770.179(b) for use in vertical runs in building riser shafts or from floor to floor
- ABS-approved for 2010 Steel Vessels Rules 1-1-4/7.7. 1-1 Appendix 3, 4-8-3/9.1, 4-8-3/9.5 (I & II), 4-8-3/9.13
- ABS-approved for 2008 MODU Rules 4-3-3/5.1, 4-3-3/5.21, 4-3-4/13.1.6
- Suitable for indoor or outdoor applications
- Jacket is UV, fungus and moisture resistant
- Round cable construction for easy handling and termination
- Includes ripcord for easy outer jacket removal
- Rugged cable for deck applications
- Breakout style cable with 2 to 24 fibers
- Optical fiber types include 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



**Applicable Standards** 

OCC B-Series Breakout Low-Smoke

Zero-Halogen ABS-Approved Cables

meet the functional requirements of

#### IEC 60332-3-24

the following standards:

- IEC 60754-2
- IFC 61034-2
- UL 1666 OFNR
- **UL 1685 OFN-LS**
- ICEA-S-104-696
- MIL-C-24643
- TIA-568
- TIA-598
- **ABS Steel Vessels Rules**
- **ABS MODU Rules**

### Mechanical and Environmental Performance

Operating temperature	-40°C to +70°C
Storage temperature	-40°C to +70°C
Installation temperature (cable temp.)	-20°C to +60°C
Flame retardancy	IEC 60332-3-24 UL listed OFNR-LS (UL 1666 & 1685)
Smoke generation	IEC 61034-2
Zero-halogen	IEC 60754-2
Impact resistance	1,500 impacts (EIA/TIA-455-25A)
Crush resistance	2,200 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)





(3.8e) B-Series Breakout LSZH ABS-Approved Cables

## Cable Characteristics:

### B-Series Breakout LSZH ABS-Approved Cables (with 2.0mm subcables)

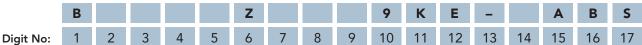
DIAMETER WEI		WEIGHT	WEIGHT TENSILE LOAD		MINIMUM BEND RADIUS	
FIBER COUNT	MM (IN) KG/KM (LE	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2	7.8 (0.31)	66 (44)	1,600 (360)	400 (90)	11.7 (4.6)	7.8 (3.1)
4	7.8 (0.31)	66 (44)	1,600 (360)	400 (90)	11.7 (4.6)	7.8 (3.1)
6	9.1 (0.36)	82 (55)	2,400 (540)	600 (130)	13.7 (5.4)	9.1 (3.6)
8	10.4 (0.41)	108 (73)	3,200 (720)	800 (180)	15.6 (6.1)	10.4 (4.1)
12	11.6 (0.46)	131 (88)	4,800 (1,800)	1,200 (270)	17.4 (6.9)	11.6 (4.6)
18	12.8 (0.50)	162 (109)	7,200 (1,620)	1,800 (400)	19.2 (7.6)	12.8 (5.0)
24	14.7 (0.58)	219 (147)	9,600 (2,100)	2,400 (540)	22.1 (8.7)	14.7 (5.8)

### B-Series Breakout LSZH ABS-Approved Cables (with 2.5mm subcables)

FIRED COLINE	FIRED COUNT DIAMETER WEIGHT		TENSILE LOAD		MINIMUM BEND RADIUS	
FIBER COUNT	MM (IN) KG/KM (LBS/1	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2	9.2 (0.36)	84 (56)	2,000 (450)	800 (180)	13.8 (5.4)	9.2 (3.6)
4	9.2 (0.36)	84 (56)	2,000 (450)	800 (180)	13.8 (5.4)	9.2 (3.6)
6	10.6 (0.42)	107 (72)	3,000 (670)	1,200 (270)	15.9 (6.3)	10.6 (4.2)
8	12.4 (0.49)	144 (97)	4,000 (900)	1,700 (3,800)	18.6 (7.3)	12.4 (4.9)
12	14.2 (0.56)	171 (115)	6,000 (1,350)	2,500 (560)	21.3 (8.4)	14.2 (5.6)
18	15.9 (0.63)	225 (151)	8,000 (1,800)	3,500 (790)	23.9 (9.4)	15.9 (6.3)
24	17.9 (0.70)	290 (195)	10,000 (2,250)	3,800 (850)	26.9 (10.6)	17.9 (7.0)

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

## **Ordering Information**



- - 2 Ultra-Fox with 2.5mm subunits = X

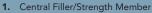
Breakout Series = B

- Ultra-Fox with 2.0mm subunits = E
- 3 5Fiber count: (see cable characteristics chart) = **002–024**
- Jacket type: Low-Smoke Zero-Halogen Jacket = **Z** 6
- 7 9 Fiber type: (see Laser Ultra-Fox or Ultra-Fox Plus Fiber Performance Table, p. 23-24)
- 10 Ultra-Fox fiber with 900µm tight-buffer = 9;
  - Ultra-Fox Plus fiber with 900µm tight-buffer = 5
- Jacket color: Black = K
- Rating: Flame-Retardant Low-Smoke and Zero-Halogen = E
- For print in feet marks =  $\mathbf{F}$ ; and for print in meter marks =  $\mathbf{M}$
- 15 17 ABS-approved version = **ABS**

Example: 12-fiber ABS-approved, low-smoke zero-halogen, breakout cable using 62.5µm Laser Ultra-Fox fiber, black jacket printed in feet -



(3.8f) B-Series Breakout LSZH Braided Armor ABS-Approved Cables



- 2. Subcable
- 3. Braid
- 4. Outer Jacket
- **5.** Ripcord

#### Subcable

- 6. Tight-Buffer Optical Fiber
- 7. Aramid Strength Member
- 8. Subcable Jacket

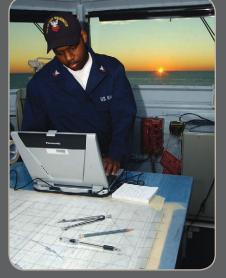


## **Applications**

• Marine and offshore tight-buffered cable design for use in installations requiring a flame-retardant, low-smoke and zero-halogen cable incorporating individual subcables for direct termination

#### **Features**

- Zero-halogen construction meets IEC 60754-2
- Meets low-smoke requirements of UL 1685
- UL listed OFCR-LS
- ABS-Approved for 2010 Steel Vessels Rules 1-1-4/7.7. 1-1 Appendix 3, 4-8-3/9.1, 4-8-3/9.5 (I & II), 4-8-3/9.13
- ABS-Approved for 2008 MODU Rules 4-3-3/5.1, 4-3-3/5.21, 4-3-4/13.1.6
- Bronze braid armor adds a degree of durability to limit damage due to abrasion
- Suitable for indoor or outdoor applications
- Jacket is UV, fungus and moisture resistant
- Round cable construction for easy handling and termination
- Includes ripcord for easy outer jacket removal
- Rugged breakout-style cable for deck applications with 2 to 24 fibers
- Optical fiber types include 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
- Braid layer applied per IEEE 1580
- 2.0mm and 2.5mm subcables available



U.S. Navy photo by Photographer's Mate Airman Sheryl Campbell

#### Mechanical and Environmental Performance

	ZERO-HALOGEN
Operating temperature	-40°C to +70°C
Storage temperature	-40°C to +70°C
Flame retardancy	UL 1666 OFCR UL 1685 OFCR-LS
	IEC 60332-3-24 UL listed OFNR-LS (UL 1666 & 1685)
Installation temperature (cable temp.)	-20°C to +60°C
Impact resistance	1,500 impacts (EIA/TIA-455-25A)
Crush resistance	2,200 N/cm (TIA/EIA-455-41A)

## **Applicable Standards**

OCC B-Series Breakout Low-Smoke Zero-Halogen Braided Armor ABS-Approved Cables meet the functional requirements of the following standards:

- IEC 60754-2
- UL 1666 OFCR
- UL 1685 OFCR-LS
- ICEA-S-104-696
- MIL-C-24643 TIA-568
- TIA-598





(3.8f) B-Series Breakout LSZH Braided-Armor ABS-Approved Cables

## **Cable Characteristics:**

## B-Series Breakout LSZH Braided-Armor ABS-Approved Cables (with 2.0mm subcables)

FIBER COUNT	DIAMETER WEIGHT		TENSIL	TENSILE LOAD		MINIMUM BEND RADIUS	
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)	
2	11.7 (0.46)	198 (133)	1,600 (360)	400 (90)	17.6 (6.9)	11.7 (4.6)	
4	11.7 (0.46)	198 (133)	1,600 (360)	400 (90)	17.6 (6.9)	11.7 (4.6)	
6	13.0 (0.51)	233 (157)	2,400 (540)	600 (130)	19.5 (7.7)	13.0 (5.1)	
8	14.3 (0.56)	278 (187)	3,200 (720)	800 (180)	21.5 (8.5)	14.3 (5.6)	
12	15.5 (0.61)	319 (214)	4,800 (1,800)	1,200 (270)	23.3 (9.2)	15.5 (6.1)	
18	16.7 (0.66)	368 (247)	7,200 (1,620)	1,800 (400)	25.1 (9.9)	16.7 (6.6)	
24	18.6 (0.73)	454 (305)	9,600 (2,100)	2,400 (540)	27.9 (11.0)	18.6 (7.3)	

### B-Series Breakout LSZH Braided-Armor ABS-Approved Cables (with 2.5mm subcables)

FIRED COUNT	DIAMETER	WEIGHT	TENSIL	E LOAD	MINIMUM B	END RADIUS
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
2	13.2 (0.52)	238 (160)	2,000 (450)	800 (180)	26.4 (10.4)	19.8 (7.8)
4	13.2 (0.52)	238 (160)	2,000 (450)	800 (180)	26.4 (10.4)	19.8 (7.8)
6	14.5 (0.57)	280 (188)	3,000 (670)	1,200 (270)	29.0 (11.4)	21.8 (8.6)
8	16.3 (0.64)	344 (231)	4,000 (900)	1,700 (3,800)	32.6 (12.8)	24.5 (9.6)
12	18.1 (0.71)	400 (269)	6,000 (1,350)	2,500 (560)	36.2 (14.3)	27.2 (10.7)
18	19.8 (0.78)	477 (321)	8,000 (1,800)	3,500 (790)	39.6 (15.6)	29.7 (11.7)
24	21.8 (0.86)	572 (384)	10,000 (2,250)	3,800 (850)	43.6 (17.2)	32.7 (12.9)

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

## **Ordering Information**

	В					Z				9	K	R	В	2	-		A	В	S
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

- 1 Breakout Series = **B** 
  - 2 Ultra-Fox with 2.5mm subunits = **X**Ultra-Fox with 2.0mm subunits = **E**
  - 3-5 Fiber count: (see cable characteristics chart) = **002–024**
  - 6 Jacket type: Low-Smoke Zero-Halogen Jacket = **Z**
  - 7 9 Fiber type: (see Laser Ultra-Fox Fiber Performance Table, p. 23)
  - 10 Ultra-Fox fiber with 900μm tight-buffer = **9**Ultra-Fox Plus fiber with 900μm tight-buffer = **5**
  - 11 Jacket color: Black = **K**
  - 12 Rating: Riser =  $\mathbf{R}$
  - 13 14 Braid Option: Zero-Halogen Braid = **B2**
  - 16 Print in feet marks = **F**; Print in meter marks = **M**
  - 17 19 For ABS-approved cable = **ABS**

Example: 12-fiber low-smoke zero-halogen, distribution cable using 62.5μm Laser Ultra-Fox fiber, black jacket printed in feet, braided and ABS-approved –

B X 0 1 2 Z W L S 9 K R B 2 - F A B S



(3.8g) Pierside

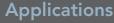


- 2. Subcable
- 3. Core-Locked® Inner Jacket
- 4. Aramid Strength Member
- 5. Outer Jacket
- **6.** Ripcord

#### Subcable

- 7. Tight-Buffer Optical Fiber
- 8. Aramid Strength Member
- 9. Subcable Jacket





- Ship-to-shore communications in a fiber optic cable meeting the requirements of NAVSEA Specification 7379173
- Cables designed to incorporate connectors per the NAVSEA 7379171 specification

#### **Features**

- Designed to NAVSEA 7379173 specification and is compatible with NAVSEA 7379171 connectors
- Polyurethane jacket provides durability in harsh environments encountered on ships and docks
- Second layer of aramid yarns provides the necessary strain-relief for multichannel hermaphroditic connectors
- Extremely strong, lightweight, rugged, survivable tight-buffered design
- Polyurethane jacketed for abrasion, cut, crush, impact, and chemical resistance
- Breakout cable design utilizes individual color-coded subcables that protect each individual fiber
- · Special jacket colors available to distinguish (at a glance) from other pier-side cables and utilities
- Triple thickness fiber acrylate coating, three layers of aramid yarn, and three individual cable jackets provide the ultimate in fiber protection
- Suitable for daisy chain over-the-deck and through-the-ship nested ship deployments
- Helically stranded cable core for flexibility, deployment survivability and exceptional mechanical protection for the optical fibers
- Made with the same design features as OCC Breakout-Series Mil-Tac Cables
- Excellent for use in deployment/retrieval applications
- 2.0mm subcables standard

#### Mechanical and Environmental Performance

Operating temperature	-55°C to +85°C
Storage temperature	-70°C to +85°C
Impact resistance	200 impacts (TIA/EIA-455-25A)
Crush resistance	440 N/cm (TIA/EIA-455-41A)
Flex resistance	2,000 cycles (TIA/EIA-455-104A)







(3.8g) Pierside

#### **Pierside**

FIBER COUNT	DIAMETER	WEIGHT	TENSILE LOAD		MINIMUM B	END RADIUS
FIBER COUNT	MM (IN)	KG/KM (LBS/1,000')	INSTALLATION N (LBS)	OPERATIONAL N (LBS)	INSTALLATION CM (IN)	LONG-TERM CM (IN)
12	14.5 (0.57)	168 (113)	6,400 (1,500)	1,200 (270)	21.8 (8.6)	14.5 (5.7)

#### Note:

Single and double jacket products available for pier-side applications Multimode, single-mode and hybrid designs available

## **Ordering Information**

	В	-				C				5	K	M	P	S
Digit No:	1	2	3	4	5	6	7	8	9	10	11	12	13	14

1 – 2 Breakout Series Ultra-Fox Plus = **B** –

3-5 Fiber count: (see cable characteristics chart) = **012** 

6 Jacket type: Polyurethane = **C** 

7 – 9 Fiber type:

Standard is 8 WST and 4 SLS = **ZBK** 

10 Ultra-Fox Plus fiber with 900 $\mu$ m tight-buffer = **5** 

11 Jacket color: Black = **K** 

12 Rating: Military Cable Rating = M

13 – 14 Pierside Cable Construction = **PS** 

Example: 12-fiber Pierside cable with C jacket, 4 SLS and 8 WST Ultra-Fox Plus fibers, black jacket –

B - 0 1 2 C Z B K 5 K M P S











4.0 Fiber Optic Connectivity	4.0	Fiber	Optic	Connec	ctivity
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4.1 LAN Components

	4.1a	RTC Series Enclosures	170
	4.1b	RTS Series Enclosures	171
	4.1c	Specialty Enclosures	172
	4.1d	BHP Series	173
	4.1e	RSC Enclosures	174
	4.1f	R-Series Splice Kits	175
	4.1g	Locking Kits & Brackets	176
	4.1h	WTC Cabinets	178
	4.1i	W-Series Splice Kits	179
	4.1j	Zone Distribution Enclosure	180
4.2	Unco	ntrolled Environment Enclosures	
	4.2a	NEMA 3 Enclosures	181
	4.2b	NEMA 4X Enclosures	182
	4.2c	Fibreguard™ Enclosures	183
4.3	Adap <sup>.</sup>	ter Panels	
	4.3a	Adapter Plates	185
	4.3b	Keyed Adapter Plates	188
4.4	Conn	ectors and Tools	
	4.4a	Anaerobic Connectors	189
	4.4b	Xpress Connectors	190
	4.4c	Cleaners and Tools	191
4.5	Acces	ssories	
	4.5a	Splice-Trays	192
4.6	Assen	mblies mblies	
	4.6a	Fiber Optic Jumpers and Pigtails	193
	4.6b	Keyed LC	194
	4.6c	Fiber Optic Pigtails	195
	4.6d	Secure LC	196
4.7	Pre-Te	erminated Enclosures	
	4.7a	Procyon Fiber Panel	198
	4.7b	Procyon MTP-MTP Cassette	200
	4.7c	Procyon MTP-LC Cassette	201
	4.7d	MT	202
	4.7e	RTC	203
	4.7f	Loaded Enclosures	204

## FIBER OPTIC CONNECTIVITY





(4.1a) LAN Components – RTC Series Enclosures

### **RTC Series Enclosures**

Optical Cable Corporation's Rack-Mount Cabinets (RTC) apply integrated fiber management into a convenient rack-mountable solution. Whether ordering empty or loaded for a customized application, the RTC series enclosures deliver rugged durability with the convenience of one-source distribution. Each RTC may be mounted to either a 19" or 23" rack or cabinet, and can easily accommodate all cross-connect functions including splicing and termination.

- Constructed of 16-gauge steel with durable powder-coat finish
- Accommodates OCC snap-in adapter plates and cassette modules
- High-density patch and splice
- Front and rear locking options available
- Two-tier fiber storage hoops designed to maintain orderly fiber management included
- Full rubber grommets offer dust protection for all cable entry and exit points
- Removable rear access panel
- Port identification sheets are included
- Mounting hardware included for 19" or 23" rack-mounting
- Available in Almond or Black











## RTC Enclosures (Empty)

CATALOG NUMBER	RACK UNITS	PORT CAPACITY*	ADAPTER PLATES	SPLICE CAPACITY	SPLICE-TRAYS/KITS
RTC18x	2	18	3	24	R24S
RTC36x	2	36	6	48	R48S
RTC72x	3	72	12	72	R72S
RTC72Sx – (with storage bay)	4	72	12	72	R72S
RTC144x	7	144	24	144	R144S
"x" denotes cabinet color; replace with $\mathbf{A} = Almon$	nd or <b>B</b> = Black.				

<sup>\*</sup>Port capacity based on standard six-pack adapter plates.



(4.1b) LAN Components - RTS Series Enclosures

### **RTS Series Enclosures**

For applications that mandate quick rear coupler access, OCC designed the RTS series rack-mount enclosures. With 18- to 48-port capabilities, the RTS rack-mount cabinet is ideal for easy contractor installations and quick terminations. Each cabinet is built to be a strong, durable, high-density, patch and splice solution for fiber optic networking.

- Constructed of 16-gauge steel with a durable black powder coat finish
- High-density patch and splice
- Open-top access and removable front door
- Sliding tray for easy installations
- Rear locking feature for access control of fiber terminations
- 19" and 23" mounting
- Accommodates any OCC snap-in adapter plate or MT Cassette Module
- May be ordered empty or loaded to meet exact specifications
- Includes:
  - Port identification sheet
  - Cable management clips
  - Mounting hardware



## RTS Enclosures (Empty)

CATALOG NUMBER	DESCRIPTION				
RTS18x	Rack-mount cabinet, sliding tray, 18-port, 1RU, black				
RTS24B Rack-mount cabinet, sliding tray, Plexiglas® cover, 24-port, 2RU, black					
"x" denotes cabinet color; replace with $\mathbf{A} = Almond$ or $\mathbf{B} = Black$ .					

<sup>\*</sup>Port capacity is based on standard 6-port coupler plates; higher density may be achieved through 8- and 12-pack coupler plates.

(Plexiglas® is a registered trademark of Rohm & Haas)

## FIBER OPTIC CONNECTIVITY



**3** 

(4.1c) LAN Components - Specialty Enclosures

#### RTC1UB

Optical Cable Corporation's RTC1UB series fiber optic cabinets offer a quick solution for easy high-density connectivity. Whether ordering empty for field installations or completely pre-terminated for easy plug-and-play installations, the RTC1UB rack-mount enclosures are a versatile and flexible option for fiber optic structured cabling systems.

- Constructed of 16-gauge steel with a black powder-coat finish
- High-density patch and splice in a 1RU rack space
- Left and right rear cable entry
- Removable top access panel
- Cable management hoops included
- Accommodates any OCC snap-in adapter plate or cassette module
- May be ordered pre-terminated for plug-and-play operability
- Splice-tray compatible using R24S1UB kit



#### **RTC1UB Series Enclosures**

CATALOG NUMBER	DESCRIPTION
RTC1UB	Rack-mount cabinet, with cover and fiber management, 18-port, 1RU, black, empty

### RTR12B

When higher density applications are required, OCC RTR12B enclosures offer a compact solution. This rack-mountable cabinet offers rugged durability and complete application flexibility, and is ideal for small racks and closets. The RTR not only offers high-density capabilities but also left and right rear cable entry and a removable top access panel.

- Constructed of 16-gauge steel with a black powder-coat finish
- High-density patch and splice in a 1RU rack space
- Left and right rear cable entry
- Removable top access panel
- Recessed feature for small rack form factor
- Includes eight bridge lances and one rear metal quarter-turn bail lock
- Accommodates any OCC snap-in adapter plate or cassette module and R12S splicing kit



#### **RTR12B Enclosures**

CATALOG NUMBER	DESCRIPTION				
RTR12B	Rack-mount cabinet, recessed, high-density, 12-port, 1RU, black				
12-port capacity based on standard 6-port coupler plates; higher density may be achieved through 8- and 12-pack coupler plates.					

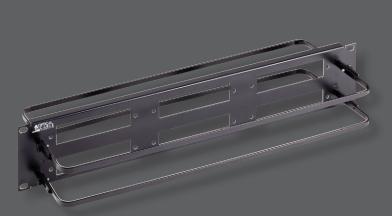


(4.1d) LAN Components - BHP Series

#### **BHP Series**

For multimedia applications, OCC offers a universal rackmount patch panel for termination and cable management only. The BHP panel system is well suited for multiapplication cabling environments, and with OCC's snap-in adapter plates and cassette modules, these panels can be installed in a variety of combinations.

- Constructed of 16-gauge steel with a black powder-coat finish
- Strain-relief bar offers enhanced cable management
- Tie wraps included for controlled cable
- Accommodates any OCC snap-in adapter plate or cassette module







# **Universal Fiber Patch Panels (Empty)**

CATALOG NUMBER	RACK UNITS	PORT CAPACITY*	ADAPTER PLATES			
BHP3 – Panel	1	18	3			
BHP6 – Panel	2	36	6			
BHP72 – Plate	3	72	12			
BHP144 – Plate 6 144 24						
*Port capacity based on standard six-pack adapter plates.						



(4.1e) LAN Components – RSC Enclosures

# RSC Rack-Mount Splice Enclosures Constructed of 16-gauge steel with durable powder-coat finish High-density patch and splice Front and rear locking options available Two-tier fiber storage hoops designed to maintain orderly fiber management included Full rubber grommets offer dust protection for all cable entry and exit points Removable front and rear access panel Mounting hardware included for 19" or 23" rack-mounting Available in Almond or Black

# **RSC Rack-Mount Splice Enclosures**

•					
CATALOG NUMBER	RACK UNITS	SPLICE CAPACITY	SPLICE-TRAYS/KITS		
RSC-1UB	1	48	RxxTS		
RSC-X (no splice-trays installed)	4	144	RxxTS		
RSC-72x (includes R72TS kit)	4	72	RxxTS		
RSC-144x (includes R144TS kit)	4	144	RxxTS		
"x" denotes cabinet color; replace with <b>A</b> = Almond or <b>B</b> = Black					

"x" denotes cabinet color; replace with  $\mathbf{A} = \text{Almond or } \mathbf{B} = \text{Black}$  Replace "xx" with fiber-splice count from next page.



(4.1f) LAN Components - R-Series Splice Kits

# **R-Series Splice Kits**

Optical Cable Corporation offers user friendly rack-mount splice kits for all applications. All OCC splice kits are injection-molded and have hinged, clear plastic covers for fiber visibility and maximum protection. Tabs along the tray's side allow for easy fiber routing, and all OCC splice kits are available for smaller fiber capacities.

- All kits include transition trays for cable management and
- Accessories included for adapting the trays into the cabinets
- Felt strips and cable ties included for securing and strain relieving buffered fibers



# **Rack-Mount Splice Kits**

CATALOG NUMBER	DESCRIPTION
R12S	Rack-mount splice kit for 12-fiber splices for use with RTR12B
R24S1UB	Rack-mount splice kit for 24-fiber splices, for use with RTC1UB
R24S	Rack-mount splice kit for 24-fiber splices, for use with RTC1UB & RTS18B
R24TS	Rack-mount splice kit, thin tray, for 24-fiber splices
R24RS	Rack-mount splice kit, ribbon tray, for 24-fiber splices
R36TS	Rack-mount splice kit, thin tray, for 36-fiber splices
R48S	Rack-mount splice kit, for 48-fiber splices
R48TS	Rack-mount splice kit, thin tray, for 48-fiber splices
R48RS	Rack-mount splice kit, ribbon tray, for 48-fiber splices
R72S	Rack-mount splice kit for 72-fiber splices
R72TS	Rack-mount splice kit, thin tray, for 72-fiber splices
R72RS	Rack-mount splice kit, ribbon tray, for 72-fiber splices
R96S	Rack-mount splice kit for 96-fiber splices
R96TS	Rack-mount splice kit, thin tray, for 96-fiber splices
R96RS	Rack-mount splice kit, ribbon tray, for 96-fiber splices
R144S	Rack-mount splice kit for 144-fiber splices
R144TS	Rack-mount splice kit, thin tray, for 144-fiber splices
R144RS	Rack-mount splice kit, ribbon tray, for 144-fiber splices
R288RS	Rack-mount splice kit, ribbon tray, for 288-fiber splices



**3** 

(4.1g) LAN Components - Locking Kits & Brackets



#### **Retro-Fit Rack-Mount Cabinet Locking Kits**

CATALOG NUMBER	DESCRIPTION		
RTCLK18/36x	Rack-mount cabinet, 18- or 36-port, with retro-fit lock kit		
RTCLK72x	Rack-mount cabinet, 72-port, with retro-fit lock kit		
RTCLK72Sx	Rack-mount cabinet, 72-port, with storage, with retro-fit lock kit		
RTCLK144x Rack-mount cabinet, 144-port, with retro-fit lock kit			
"x" denotes cabinet color; replace with <b>A</b> = Almond or <b>B</b> = Black			

#### Retro-Fit Rack-Mount Cabinet Locking Kits with Metal Doors

CATALOG NUMBER	DESCRIPTION		
RTCLKM18/36x	Rack-mount cabinet, 18- or 36-port, with retro-fit lock kit, metal door		
RTCLKM72x	Rack-mount cabinet, 72-port, with retro-fit lock kit, metal door		
RTCLKM72Sx	Rack-mount cabinet, 72-port with storage, with retro-fit lock kit, metal door		
RTCLKM144x Rack-mount cabinet, 144-port with storage, with retro-fit lock kit, metal door			
"x" denotes cabinet color; replace with <b>A</b> = Almond or <b>B</b> = Black			

# Rack-Mount Cabinets with Factory-Installed Locking Kits

CATALOG NUMBER	DESCRIPTION		
RTCL18x	Rack-mount cabinet, 18-port, with factory-installed lock kit		
RTCL36x	Rack-mount cabinet, 36-port, with factory-installed lock kit		
RTCL72x	Rack-mount cabinet, 72-port, with factory-installed lock kit		
RTCL72Sx	Rack-mount cabinet, 72-port, with storage, with factory-installed lock kit		
RTCL144x	Rack-mount cabinet, 144-port, with factory-installed lock kit		
"x" denotes cabinet color; replace with $\mathbf{A} = \text{Almond or } \mathbf{B} = \text{Black}$ .			



(4.1g) LAN Components - Locking Kits & Brackets

#### **Rack-Mount Recess Brackets**

Optical Cable Corporation's recess brackets allow RTC series cabinets to easily mount into any enclosure with a front door. By using OCC's recess brackets, the cabinet will be flush with the rack's mounting rails, allowing sufficient room between the cabinet and the door.



# Recess Brackets for Rack-Mount Cabinets (19" Mounting)

CATALOG NUMBER	DESCRIPTION		
BKTR1836x	Recess bracket for 18- or 36-port cabinet, 19" mounting		
BKTR72x	Recess bracket for 72-port cabinet, 19" mounting		
BKTR144x	Recess bracket for 144-port cabinet, 19" mounting		
"x" denotes cabinet color; replace with $\mathbf{A}$ = Almond or $\mathbf{B}$ = Black.			

#### Recess Brackets for Rack-Mount Cabinets (23" Mounting)

CATALOG NUMBER	DESCRIPTION	
BKTR23/1836x	Recess bracket for 18- or 36-port cabinet, 23" mounting	
BKTR23/72x	Recess bracket for 72-port cabinet, 23" mounting	
Recess bracket for 144-port cabinet, 23" mounting		
"x" denotes cabinet color; replace with $\mathbf{A} = \text{Almond or } \mathbf{B} = \text{Black}$ .		



**3** 

(4.1h) LAN Components - WTC Cabinets

#### **WTC Cabinets**

Optical Cable Corporation's Wall-Mount Cabinets (WTC) provide a solid foundation for any fiber optic application with features like integrated fiber management and easy cable distribution. Each cabinet may be ordered empty or loaded to meet exact specifications. Every WTC cabinet easily accommodates all cross-connect functions including splicing, termination and inter-connects for outside plant backbone and building cables. The WTC series cabinets are scalable, modular and constructed for durability, and with OCC's variety of adapter plates, cassette modules and splicing features, the application options are endless.



- Constructed of 16-gauge steel with durable powder-coat finish
- Accommodates any OCC snap-in adapter plates and cassette modules
- Removable hinged door provides easy front access and lockable hasp
- Two-tier fiber storage hoops designed to maintain orderly fiber management
- Top and bottom accesses have cable tie-downs/strain-relief and full grommets
- Lockable inner door is removable and can be used as a work surface by inserting the tabs into slots provided at the bottom frame of the cabinet
- Port identification sheets are included
- All WTC Series enclosures meet NEMA 12 rated requirements
- Mounting hardware included
- Available in Almond or Black







# Wall-Mount Cabinets (Empty)

CATALOG NUMBER	PORT CAPACITY	ADAPTER PLATES	SPLICE CAPACITY	SPLICE-TRAYS/ KITS	BOX DIMENSIONS
WMC12A (available in Almond only)	12	2	_	-	11 x 7 x 3
WTC12/24x (2 blank plates included for 12-port applications)	24	4	24	_	13 x 12 x 3.5
WTC48x	48	8	48	W48S	13 x 5 x 17 x 5.5
WTC72x	72	12	72	W72S	17 x 12 x 11
WTC144x	144	24	144	W144S	23 x 17 x 11

<sup>&</sup>quot;x" denotes cabinet color; replace with  $\bf A$  = Almond or  $\bf B$  = Black. Port capacity based on standard 6-pack adapter plates.

#### Wall-Mount Splice Cabinets (Empty)

PORT CAPACITY	ADAPTER PLATES	SPLICE CAPACITY	SPLICE-TRAYS/KITS	BOX DIMENSIONS
-	-	72	W72S	17 x 8.14 x 4
-	-	288	W144S & W288S	23 x 17 x 11
	-	PORT CAPACITY PLATES	PORT CAPACITY PLATES CAPACITY 72	PORT CAPACITY PLATES CAPACITY SPLICE-TRAYS/KITS  72 W72S



(4.1i) LAN Components – W-Series Splice Kits

# W-Series Splice Kits

Optical Cable Corporation offers user-friendly wall-mount splice kits for all applications. All OCC splice kits are injection-molded and have hinged, clear plastic covers for fiber visibility and maximum protection. Tabs along the tray's side allow for easy fiber routing and all OCC splice kits are available for smaller fiber capacities.

- All kits include transition trays for cable management and radius control
- Accessories are included for adapting the trays into the cabinets
- Felt strips and cable ties included for securing and strain relieving buffered fibers



#### **Wall-Mount Splice Kits**

CATALOG NUMBER	DESCRIPTION
10419901	Splice-tray for 12-fiber splices
10376701	Splice-tray for 24-fiber splices
W12RT	Wall-mount splice kit for WTC12/24x cabinet, 12-fiber splice-tray
W24PT	Wall-mount splice kit for WTC12/24x cabinet, 24-fiber splice-tray
W48S	Wall-mount splice kit for 48-fiber splices
W48RS	Wall-mount splice kit, ribbon tray, for 48-fiber splices
W48TS	Wall-mount splice kit, thin tray, for 48-fiber splices
W72S	Wall-mount splice kit for 72-fiber splices
W72RS	Wall-mount splice kit, ribbon tray, for 72-fiber splices
W72TS	Wall-mount splice kit, thin tray, for 72-fiber splices
W144S	Wall-mount splice kit for 144-fiber splices
W144RS	Wall-mount splice kit, ribbon tray, for 144-fiber splices
W144TS	Wall-mount splice kit, thin tray, for 144-fiber splices
W288S	Wall-mount splice kit for 288-fiber splices





(4.1j) LAN Components - Zone Distribution Enclosure

#### **Zone Distribution Enclosure ZDMB6B**

OCC's new ZDMB6B offers a compact and reliable patch and splice fiber optic enclosure ideal for:

- Telecommunication rooms, enclosures and cabinets
- Traffic control and industrial cabinets
- Indoor wall-mount applications
- Zone distribution applications
- Any small space where real estate for cross-connect applications is a premium

This small enclosure accepts all OCC fiber optic adapter plates and provides splicing options for up to 12 fibers. The ZDMB6B is an affordable solution that provides easy installations and customizable configurations.

#### Features & Benefits

- Cost-effective for small fiber optic applications
- Can be used for both splicing and patching applications
- Cable entry grommets help protect fiber optic cable from dust and debris
- Fiber management clips are included for fiber storage
- MTP compatible for zone applications
- Lockable for secure access
- Low-profile design is less than 2", including the plunger and lock tab
- Accepts one OCC fiber optic adapter plate



#### **Zone Distribution Enclosure**

PART NO.	DESCRIPTION	DIMENSIONS
ZDMB6B	Zone distribution enclosure, 6-port (empty)	7"W x 6"H x 1.92"D
ZDMB-SB	Zone distribution enclosure, splice only, 1 blank adapter plate	7"W x 6"H x 1.92"D



(4.2a) Uncontrolled Environment Enclosures - NEMA 3 Enclosures

#### **NEMA 3 Enclosures**

OCC's NEMA 3 Wall-mount Enclosures offer the same modular features of the WTC series with the added outdoor durability for outside plant functionality. The NEMA 3 series, like all OCC wallmount cabinets can be ordered empty or can be easily customized to fit any exact specification. Ideal for smaller OSP and inside premise applications, the OCO6N and OCO12N are a perfect fit with the additional benefit of being NEMA Type 3 compliant.

- Accommodates any OCC snap-in adapter plate or cassette module
- Lockable clasp ideal for any padlock
- Fiber storage hoops designed to maintain orderly fiber management included
- Port identification sheets are included
- Mounting hardware included



# **Outside Wall-Mount Cabinets (Empty)**

CATALOG NUMBER	PORT CAPACITY	ADAPTER PLATES	SPLICE CAPACITY	SPLICE-TRAYS/KITS	BOX DIMENSIONS
OCO6N	6	1	-	-	10.3 x 7.7 x 3.1
OCO6NS	6	1	6	Splice Block	10.3 x 7.7 x 3.1
OCO12N	12	2	-	-	10.3 x 7.7 x 3.1
OCO12NS	12	2	12	Splice Block	10.3 x 7.7 x 3.1

#### OCO6N Accessories

CATALOG NUMBER	DESCRIPTIONS
10801301	.75" conduit adapter for OCO6N
10801201	1" conduit adapter for OCO6N





(4.2b) Uncontrolled Environment Enclosures - NEMA 4X Enclosures

#### **NEMA 4X Enclosures**

For indoor or outdoor applications where protection of components from dirt, dust, oil, or water is mandatory, OCC offers the NEMA 4X Fiber Optic Enclosures. These enclosures are designed to protect fiber optic networking components against environments where corrosive materials, caustic cleaners, and hazardous materials are used. Available in four sizes, the OCC NEMA 4X Enclosures are indoor/outdoor-rated cabinets for patching and/or splicing 12- to 96-fiber ports. Constructed of molded fiberglass-reinforced polyester material, these enclosures are well suited for high and low temperature environments as well.

#### Features & Benefits

- Adheres to the rigorous NEMA 4X standard for indoor or outdoor use, including extreme environments
- Protects against windblown dust, rain, sleet, snow, splashing water, and hose-directed water
- Corrosion resistant
- Constructed of strong, molded fiberglass-reinforced polyester material with matching flat cover
- Gasket made of closed-cell neoprene cord encased in a continuous channel
- Continuous stainless-steel hinge
- Splice only and patch/splice boxes include splice block or splice-tray(s)
- Accepts any standard OCC fiber adapter plate
- Includes tie wraps and kurl locks for cable management and security
- Pole-mounting options are available with a quick assembly and release feature
- Temperature range -40°F- to 266°F







OCO48



00096



#### **NEMA 4X Enclosure Ordering**

PART NO.	DIMENSIONS	DESCRIPTION
OCO12NX	10 x 8 x 4	NEMA 4X Enclosure, 12-port, holds 2 adapter plates
OCO12NXSB	10 x 8 x 4	NEMA 4X Enclosure, 12-port patch/splice block
OCO12NXS	10 x 8 x 4	NEMA 4X Enclosure, 12-fiber splice only
OCO48NX	16.5 x 14.5 x 8.1	NEMA 4X Enclosure, patch and splice
OCO48NXS	16.5 x 14.5 x 8.1	NEMA 4X Enclosure, patch and splice, includes 1-W48S Kit (2–24 fiber splice-trays, transition trays, mounting hardware, cable management, and port identification)
OCO72NX	24 x 24 x 9.8	NEMA 4X Enclosure, 72-port, holds 12 adapter plates
OCO72NXS	24 x 24 x 9.8	NEMA 4X Enclosure, patch and splice, includes 1-W72S Kit (3–24 fiber splice-trays, transition trays, mounting hardware, cable management, and port identification)
OCO96NX	24 x 24 x 9.8	NEMA 4X Enclosure, 96-port, holds 16 adapter plates
OCO96NXS	24 x 24 x 9.8	NEMA 4X Enclosure, patch and splice, includes 1-W96S Kit (4–24 fiber splice-trays, transition trays, mounting hardware, cable management, and port identification)

#### Pole-Mounting Hardware Ordering

PART NO.	DESCRIPTION
OCC-PM12	Pole-mount kit for OCO12
OCC-PM48	Pole-mount kit for OCO48
OCC-PM72	Pole-mount kit for OCO72/96



(4.2c) Uncontrolled Environment Enclosures – Fibreguard™ Enclosures

# Fibreguard Enclosure

Ideal for campus LANs, data centers and entrance facilities, the Fibreguard Enclosure from OCC is a complete and fully accessible closure solution. The Fibrequard Enclosure was engineered with the contractor in mind by providing an express cable port design and an innovative end plate design with segmented sections that allow for individual access to each cable without disruption to surrounding cables. Additionally, a full line of multi-hole grommets ensure the ultimate level of flexibility.

Reentry is quick and requires no special tools or kits. Moreover, the Fibreguard enclosure provides a connectivity solution that was specifically designed for an ever-evolving telecommunications network.

- No special tools required
- Easy future drop cable installation
- No gas equipment cost
- Mechanical cable and closure sealing system
- Expandable split grommets
- Multi-drop ability from one port
- Wide-opening express cable ports
- Extensive size of cable ranges accepted
- Proven "O" ring sealing system from dome to end plate
- Flash testing to prove closure integrity
- Minimal cable preparation required
- Cost-effective





# Fibreguard™ Enclosures

CATALOG NUMBER	DESCRIPTION	EXPRESS PORTS	DROP PORTS	FIBER TRAYS INCLUDED	GROMMETS INCLUDED
FG5-1S	Fibreguard 500 Series	2	2	(1) 12-fiber	A (2 pcs.)
FG5-2S	Fibreguard 500 Series	2	2	(2) 12-fiber	A (2 pcs.)
FG5-3S	Fibreguard 500 Series	2	2	(3) 12-fiber	A (2 pcs.)
FG5-4S	Fibreguard 500 Series	2	2	(4) 12-fiber	A (2 pcs.)
FG6-1S	Fibreguard 650 Series	2	3	(1) 24-fiber	A, B & C (2 each)
FG6-2S	Fibreguard 650 Series	2	3	(2) 24-fiber	A, B & C (2 each)
FG6-3S	Fibreguard 650 Series	2	3	(3) 24-fiber	A, B & C (2 each)
FG6-4S	Fibreguard 650 Series	2	3	(4) 24-fiber	A, B & C (2 each)
FG8-1S	Fibreguard 800 Series	2	5	(1) 24-fiber	A, B & C (2 each)
FG8-2S	Fibreguard 800 Series	2	5	(2) 24-fiber	A, B & C (2 each)
FG8-3S	Fibreguard 800 Series	2	5	(3) 24-fiber	A, B & C (2 each)
FG8-4S	Fibreguard 800 Series	2	5	(4) 24-fiber	A, B & C (2 each)
FG8-5S	Fibreguard 800 Series	2	5	(5) 24-fiber	A, B & C (2 each)
FG8-6S	Fibreguard 800 Series	2	5	(6) 24-fiber	A, B & C (2 each)
FG8-7S	Fibreguard 800 Series	2	5	(7) 24-fiber	A, B & C (2 each)
FG8-8S	Fibreguard 800 Series	2	5	(8) 24-fiber	A, B & C (2 each)
FG8-1S48	Fibreguard 800 Series	2	5	(1) 48-fiber	A, B & C (2 each)





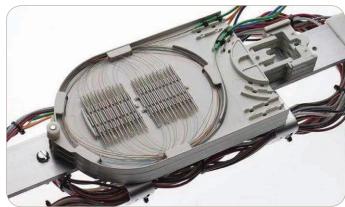
(4.2c) Uncontrolled Environment Enclosures – Fibreguard™ Enclosures

# Fibreguard Enclosure Information

CLOSURE DESIGNATION ON	EXPRESS PORT SIZES MM (INCHES)	DROP PORT SIZES MM (INCHES)	NO. OF DROP PORTS	CLOSURE LENGTH MM (INCHES)	CLOSURE DIAMETER MM (INCHES)	MAX. NO. OF SPLICE-TRAYS	SPLICE CAPACITY PER ENCLOSURE
500 Series	2 x 10 -25 (.39 -1.00)	2 x 3 -25 (.11 -1.00)	2	515 (20-25)	130 (5)	4	48
650 Series	2 x 10 -25 (.39 -1.00)	3 x 3 -25 (.11 -1.00)	3	600 (24.5)	165 (6.5)	4	96
800 Series	2 x 10 -25 (.39 -1.00)	2 x 3 -25 (.11 -1.00)	5	700 (28.5)	203 (8.0)	8	192

Note: Splice capacity per enclosure based on 12-fiber tray for FG5 and 24-fiber tray for FG6 & FG8.





# **Fibreguard Grommets**

CATALOG NUMBER	DESCRIPTION
FGD-1H	Includes A, B, and C grommets
FGD-2H	(1) 2-hole grommet
FGD-4H	(1) 4-hole grommet

# Fibreguard Splice-Trays

CATALOG NUMBER	DESCRIPTION
FG5003	12-fiber slide-n-lock tray, fusion splice
FGT-24S	24-fiber slide-n-lock tray, fusion splice
FGT-48S	48-fiber slide-n-lock tray, fusion splice

# Fibreguard Grommet Drop Port Combinations

CLOSURE DESIGNATION	CABLE RANGE MM (INCHES)	NUMBER OF ENTRIES
А	10–15 (0.39–0.59)	1
В	15–21 (0.59–0.82)	1
С	21–25 (0.82-1.00)	1
2H	7–12 (0.27–0.47)	2
4H	3–7 (0.11–0.27)	4

(4.3a) Adapter Panels – Adapter Plates

# **Fiber Optic Adapter Plates**

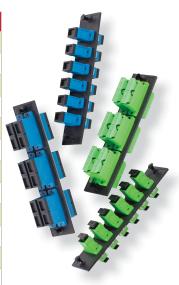
To accompany all OCC fiber optic enclosures, Optical Cable Corporation developed snap-in fiber adapter plates that are versatile enough to meet any fiber application and durable enough to withstand field installations. All Optical Cable Corporation fiber adapter plates guarantee performance parameters for the application specified and can be preloaded into OCC fiber cabinets for easy plug-and-play operability.

- Available in 6-, 8-, and 12-port fiber configurations
- Panel options available include ST, SC, FC, MTRJ, LC, and others
- High-density applications can be reached through Dual and quad LC applications
- Composite, metal, or ceramic sleeve options
- Blank panels are available for use as dust covers
- Plates are available for mounting bezel style jacks, creating a mixed-media environments



# **SC Adapter Plates**

oc maapte	
CATALOG NUMBER	DESCRIPTION
616MMSC	Fiber adapter plate, 6-port, SC, multimode, composite sleeve
616SC	Fiber adapter plate, 6-port, SC, multimode/single-mode, metal sleeve
616SC50G	Fiber adapter plate, 6-port, SC, multimode, 50µm, composite sleeve, 10GbE
616SMSC	Fiber adapter plate, 6-port, SC, single-mode, ceramic sleeve
616MMDSC	Fiber adapter plate, 6-port, dual SC, multimode, composite sleeve
616DSC	Fiber adapter plate, 6-port, dual SC, multimode/single-mode, metal sleeve
616SMDSC	Fiber adapter plate, 6-port, dual SC, single-mode, ceramic sleeve
616DSC50G	Fiber adapter plate, 6-port, dual SC, multimode, 50µm, composite sleeve, 10GbE
616SCAPC	Fiber adapter plate, 6-port, SC, single-mode, angled, composite sleeve
818MMSC	Fiber adapter plate, 8-port, SC, multimode, composite sleeve
818SC	Fiber adapter plate, 8-port, SC, multimode/single-mode, metal sleeve
818SMSC	Fiber adapter plate, 8-port, SC, single-mode, ceramic sleeve
818SCAPC	Fiber adapter plate, 8-port, SC, single-mode, angled, composite sleeve
6112MMDSC	Fiber adapter plate, 12-port, dual SC, multimode, composite sleeve
6112DSC	Fiber adapter plate, 12-port, dual SC, multimode/single-mode, metal sleeve
6112SMDSC	Fiber adapter plate, 12-port, dual SC, single-mode, ceramic sleeve
6112DSC50G	Fiber adapter plate, 12-port, dual SC, multimode, 50µm, composite sleeve, 10GbE
6112SMDSCAPC	Fiber adapter plate, 12-port, dual SC, single-mode, angled, ceramic sleeve





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(4.3a) Adapter Panels – Adapter Plates

# **LC Adapter Plates**

CATALOG NUMBER	DESCRIPTION
616MMDLC	Fiber adapter plate, 6-port, dual LC, multimode, composite sleeve
616DLC	Fiber adapter plate, 6-port, dual LC, multimode/single-mode, metal sleeve
616SMDLC	Fiber adapter plate, 6-port, dual LC, single-mode, ceramic sleeve
616DLC50G	Fiber adapter plate, 6-port, dual LC, multimode, 50µm, composite sleeve, 10GbE
818DLC	Fiber adapter plate, 8-port, dual LC, multimode/single-mode, composite sleeve
818SMDLC	Fiber adapter plate, 8-port, dual LC, single-mode, metal sleeve
6112DLC	Fiber adapter plate, 12-port, dual LC, multimode/single-mode, metal sleeve
6112MMDLC	Fiber adapter plate, 12-port, dual LC, multimode, ceramic sleeve
6112DLC50G	Fiber adapter plate, 12-port, dual LC, multimode, 50µm, composite sleeve, 10GbE
6112SMDLC	Fiber adapter plate, 12-port, dual LC, single-mode, ceramic sleeve
6124MMQLC	Fiber adapter plate, 24-port, quad LC, multimode, metal sleeve
6124SMQLC	Fiber adapter plate, 24-port, quad LC, single-mode, ceramic sleeve
616SMDLCAPC	Fiber adapter plate, 6-port, dual LC, APC, single-mode, ceramic sleeve
6112DLCAPC	Fiber adapter plate, 12-port, dual LC, APC, single-mode, metal sleeve
6124QLC50G	Fiber adapter plate, 24-port, quad LC, multimode, 50µm, composite sleeve, 10GbE



# **ST Adapter Plates**

CATALOG NUMBER	DESCRIPTION
616MMST	Fiber adapter plate, 6-port, ST, multimode, composite sleeve
616ST	Fiber adapter plate, 6-port, ST, multimode/single-mode, metal sleeve
616SMST	Fiber adapter plate, 6-port, ST, single-mode, ceramic sleeve
616SMDST	Fiber adapter plate, 6-port, dual ST, single-mode, ceramic sleeve
616ST/SC	Fiber adapter plate, 6-port, ST to SC patch, multimode/single-mode, composite sleeve
818MMST	Fiber adapter plate, 8-port, ST, multimode, composite sleeve
818ST	Fiber adapter plate, 8-port, ST, multimode/single-mode, metal sleeve
818SMST	Fiber adapter plate, 8-port, ST, single-mode, ceramic sleeve
6112MMDST	Fiber adapter plate, 12-port, dual ST, multimode, composite sleeve
6112DST	Fiber adapter plate, 12-port, dual ST, multimode/single-mode, metal sleeve
6112SMDST	Fiber adapter plate, 12-port, dual ST, single-mode, ceramic sleeve



# **MT Adapter Plates**

CATALOG NUMBER	DESCRIPTION	
616MMMT	Fiber adapter plate, 6-adapter, multimode, MTP	
616SMMT	Fiber adapter plate, 6-adapter, single-mode, MTP	
6112MMMT	Fiber adapter plate, 12-adapter, multimode, MTP	
6112SMMT	Fiber adapter plate, 12-adapter, single-mode, MTP	
6112MT50G	Fiber adapter plate, 12-adapter, multimode, 50µm, MTP, 10GbE	





(4.3a) Adapter Panels – Adapter Plates

# 50µm 10 Gig Adapter Plates

CATALOG NUMBER	DESCRIPTION
616SC50G	Fiber adapter plate, 6-port, SC, multimode, 50µm, composite sleeve
616DSC50G	Fiber adapter plate, 6-port, dual SC, multimode, 50μm, composite sleeve
6112DSC50G	Fiber adapter plate, 12-port, dual SC, multimode, 50µm, composite sleeve
616DLC50G	Fiber adapter plate, 6-port, dual LC, multimode, 50µm, composite sleeve
6112DLC50G	Fiber adapter plate, 12-port, dual LC, multimode, 50µm, composite sleeve
6124QLC50G	Fiber adapter plate, 24-port, quad LC, multimode, 50µm, composite sleeve



6112DLC50G



# **FC Adapter Plates**

CATALOG NUMBER	DESCRIPTION	
616FC	Fiber adapter plate, 6-port, FC, multimode/single-mode, metal sleeve	
616SMFC	Fiber adapter plate, 6-port, FC, single-mode, ceramic sleeve	
616FCAPC	Fiber adapter plate, 6-port, FC, single-mode, angled, ceramic sleeve	
818MMFC	Fiber adapter plate, 8-port, FC, multimode, composite sleeve	
818FC	Fiber adapter plate, 8-port, FC, multimode/single-mode, metal sleeve	
818SMFC	Fiber adapter plate, 8-port, FC, single-mode, ceramic sleeve	
818FCAPC	Fiber adapter plate, 8-port, FC, single-mode, angled, ceramic sleeve	



# **MT-RJ Adapter Plates**

CATALOG NUMBER	DESCRIPTION	
616MMRJ	Fiber adapter plate, 6-port, MT-RJ, multimode, composite sleeve	
616MMDRJ	Fiber adapter plate, 6-port, dual MT-RJ, multimode, composite sleeve	
818MMRJ	Fiber adapter plate, 8-port, MT-RJ, multimode, composite sleeve	
6112MMDRJ	Fiber adapter plate, 12-port, dual MT-RJ, multimode, composite sleeve	
6112SMDRJ	Fiber adapter plate, 12-port, dual MT-RJ, single-mode, composite sleeve	



# **Specialty Adapter Plates**

CATALOG NUMBER	DESCRIPTION	
600	Fiber adapter plate, 6-port, blank	
616BNC	Fiber adapter plate, 6-port, BNC adapters loaded	
616F	6F Fiber adapter plate, 6-port, F adapters loaded	
616SMA	Fiber adapter plate, 6-port, SMA adapters loaded	

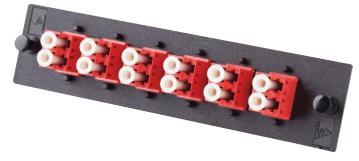




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(4.3b) Adapter Panels – Keyed Adapter Plates





# **Keyed Adapter Plates**

CATALOG NUMBER	6-PORT ADAPTER PLATES
LAX616DLCBL	Adapter plate, DLCX3, keyed, SM/MM, blue
LAX616DLCGN	Adapter plate, DLCX3, keyed, SM/MM, green
LAX616DLCRD	Adapter plate, DLCX3, keyed, SM/MM, red
LAX616DLCYL	Adapter plate, DLCX3, keyed, SM/MM, yellow
LAX616DLCPK	Adapter plate, DLCX3, keyed, SM/MM, pink
LAX616DLCWT	Adapter plate, DLCX3, keyed, SM/MM, white
LAX616DLCOR	Adapter plate, DLCX3, keyed, SM/MM, orange
LAX616DLCPL	Adapter plate, DLCX3, keyed, SM/MM, purple
LAX616DLCSL	Adapter plate, DLCX3, keyed, SM/MM, slate
LAX616DLCBN	Adapter plate, DLCX3, keyed, SM/MM, brown
LAX616DLCAQ	Adapter plate, DLCX3, keyed, SM/MM, aqua
LAX616DLCRS	Adapter plate, DLCX3, keyed, SM/MM, rose

CATALOG NUMBER	24-PORT ADAPTER PLATES
LAX6124QLCBL	Adapter plate, QLCX6, keyed, SM/MM, blue
LAX6124QLCGN	Adapter plate, QLCX6, keyed, SM/MM, green
LAX6124QLCRD	Adapter plate, QLCX6, keyed, SM/MM, red
LAX6124QLCYL	Adapter plate, QLCX6, keyed, SM/MM, yellow
LAX6124QLCPK	Adapter plate, QLCX6, keyed, SM/MM, pink
LAX6124QLCWT	Adapter plate, QLCX6, keyed, SM/MM, white
LAX6124QLCOR	Adapter plate, QLCX6, keyed, SM/MM, orange
LAX6124QLCPL	Adapter plate, QLCX6, keyed, SM/MM, purple
LAX6124QLCSL	Adapter plate, QLCX6, keyed, SM/MM, slate
LAX6124QLCBN	Adapter plate, QLCX6, keyed, SM/MM, brown
LAX6124QLCAQ	Adapter plate, QLCX6, keyed, SM/MM, aqua
LAX6124QLCRS	Adapter plate, QLCX6, keyed, SM/MM, rose

CATALOG NUMBER	12-PORT ADAPTER PLATES
LAX6112DLCBL	Adapter plate, DLCX6, keyed, SM/MM, blue
LAX6112DLCGN	Adapter plate, DLCX6, keyed, SM/MM, green
LAX6112DLCRD	Adapter plate, DLCX6, keyed, SM/MM, red
LAX6112DLCYL	Adapter plate, DLCX6, keyed, SM/MM, yellow
LAX6112DLCPK	Adapter plate, DLCX6, keyed, SM/MM, pink
LAX6112DLCWT	Adapter plate, DLCX6, keyed, SM/MM, white
LAX6112DLCOR	Adapter plate, DLCX6, keyed, SM/MM, orange
LAX6112DLCPL	Adapter plate, DLCX6, keyed, SM/MM, purple
LAX6112DLCSL	Adapter plate, DLCX6, keyed, SM/MM, slate
LAX6112DLCBN	Adapter plate, DLCX6, keyed, SM/MM, brown
LAX6112DLCAQ	Adapter plate, DLCX6, keyed, SM/MM, aqua
LAX6112DLCRS	Adapter plate, DLCX6, keyed, SM/MM, rose

CATALOG NUMBER	8-PORT ADAPTER PLATES
LAX818DLCBL	Adapter plate, DLCX4, SM/MM, blue
LAX818DLCGN	Adapter plate, DLCX4, SM/MM, green
LAX818DLCRD	Adapter plate, DLCX4, SM/MM, red
LAX818DLCYL	Adapter plate, DLCX4, SM/MM, yellow
LAX818DLCPK	Adapter plate, DLCX4, SM/MM, pink
LAX818DLCWT	Adapter plate, DLCX4, SM/MM, white
LAX818DLCOR	Adapter plate, DLCX4, SM/MM, orange
LAX818DLCPL	Adapter plate, DLCX4, SM/MM, purple
LAX818DLCSL	Adapter plate, DLCX4, SM/MM, slate
LAX818DLCBN	Adapter plate, DLCX4, SM/MM, brown
LAX818DLCAQ	Adapter plate, DLCX4, SM/MM, aqua
LAX818DLCRS	Adapter plate, DLCX4, SM/MM, rose



(4.4a) Connectors and Tools – Anaerobic Connectors

# **Fiber Optic Connectors**

For those who prefer to assemble connectors at the component level, Optical Cable Corporation offers a complete line of connector kits for field terminations. Each connector kit offers exceptional optical performance in an easy-to-install form factor.

- Available in FC, LC, SC, and ST connector styles.
- Single-mode and multimode
- Low insertion loss and back reflection

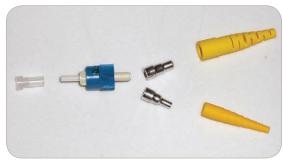
#### **Fiber Optic Connectors**

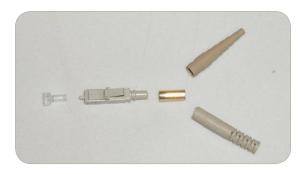
CATALOG NUMBER	DESCRIPTION	
FC-ST-SM	ST connector kit, single-mode	
FC-ST-MM	ST connector kit, multimode	
FC-SC-SM	SC connector kit, single-mode, blue housing	
FC-SC-MM	SC connector kit, multimode, beige housing	
FC-LC-SM	LC connector kit, single-mode, blue housing	
FC-LC-MM	LC connector kit, multimode, beige housing	
FC-FC-SM	FC connector kit, single-mode	
FC-FC-MM	FC connector kit, multimode	

# **Specifications**

PARAMETER	VALUE
Insertion loss (average)	0.2 dB
Reflectance	< -30 dB for PC < -40 dB for Super PC < -55 dB for Ultra PC < -65 dB for Angled PC
Durability	≤ 0.2 dB change, 500 rematings, FOTP -21
Tensile strength	≤ 0.2 dB change, 15 lb, FOTP -6
Temperature cycling	-40° to +75°C, 21 cycles, < 0.3 dB change
Material	Ferrule: preradiused zirconia Housing: thermoplastic









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(4.4b) Connectors and Tools – Xpress Connectors

#### **Xpress Connectors**

OCC's Xpress Fiber Connectors are the new generation in field-installable fiber terminations. These connectors eliminate the need for messy epoxies and expensive tools by offering a pre-polished solution that can be installed in minutes. Xpress Connectors have a pre-stubbed factory-polished ferrule that joins to the fiber using a precise mechanical alignment and a special low-loss index matching gel. Each connector comes with a specially designed clip that holds the clamping devices open for the fiber to be inserted. Once the fiber is inserted, squeeze the clip to release the blades, remove clip and discard.

- Available for single-mode and multimode fibers and come in SC, ST, and LC termination styles
- Easy to assemble
- No expensive tools or epoxy required
- No polishing required
- Fiber can be reinstalled
- Meets TIA/EIA 568 performance requirements



#### **Specifications**

PARAMETER	VALUE
Insertion loss: Single-mode 50/125 62.5/125	Average: 0.2 dB, Maximum: 0.5 dB Average: 0.1 dB, Maximum: 0.5 dB Average: 0.1 dB, Maximum: 0.5 dB
Return loss (single-mode)	Average: 56.4 dB, Maximum: 45 dB
Operating temperature	-40°C to +75°C



# **Xpress Fiber Connectors**

Apress i liber confidences		
CATALOG NUMBER	DESCRIPTION	
FXC-SCx-6	Xpress SC Connector, 6-pack	
FXC-SCx-12	Xpress SC Connector, 12-pack	
FXC-SCx-100	Xpress SC Connector, 100 contractor pack	
FXC-STx-6	Xpress ST Connector, 6-pack	
FXC-STx-12	Xpress ST Connector, 12-pack	
FXC-STx-100	Xpress ST Connector, 100 contractor pack	
FXC-LCx-6	Xpress LC Connector, 6-pack	
FXC-LCx-12	Xpress LC Connector, 12-pack	
FXC-LCx-100	Xpress LC Connector, 100 contractor pack	
Replace "x" with $\bf 5$ = 50 $\mu$ m, $\bf 5G$ =50 $\mu$ m 10 Gig, $\bf 6$ = 62.5 $\mu$ m, or $\bf 8$ = single-mode		



(4.4c) Cleaners and Tools

# **Fiber Optic Cleaners**

To complement our connectors, OCC offers dry-cloth cleaners specifically designed to clean single-fiber connectors. Each cleaner is easy to use and very effective at eliminating contaminants that can deter optical performance.

- Cleaning system rotates 180° for a complete sweep
- Easy pushing motion employs connector and commences cleaner
- Disposable with 525+ cleanings per unit

CATALOG NUMBER	DESCRIPTION
FC-SCK-LC-125	Fiber Optic Cleaner, LC-MU
FC-SCK-SC-250	Fiber Optic Cleaner, SC-FC-ST





#### **Anaerobic Field Termination Kit**

These small, lightweight kits offered by OCC are ideal for field terminations. These kits include interchangeable single-mode and multimode light sources, termination tools, and portable fiber meters.



# **Fiber Strippers and Cleavers**

To create a full solution, OCC offers fiber strippers and cleavers to assist in field fiber polishes and terminations. These tools, necessary for any fiber optic project installation, are backed by OCC's 15-year product warranty and are a value-added component to the OCC fiber product line.



CATALOG NUMBER	DESCRIPTION
FOCT	Precision fiber cleaver
FOCT2	Economy fiber cleaver (aka beaver)
FOST	Fiber stripper





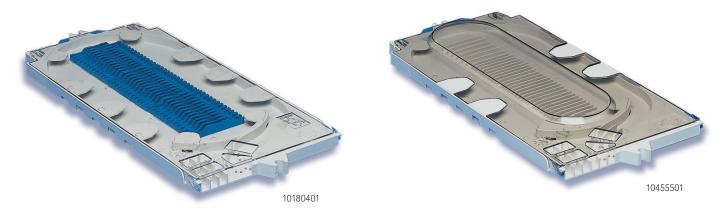


(4.5a) Accessories – Splice-Trays

# Splice-Trays

For the ultimate in splicing capabilities, Optical Cable Corporation offers fiber splice-trays that are available in a variety of options and are injection-molded for a cost-effective solution.

CATALOG NUMBER	DESCRIPTION
10180401	OCC standard tray for 24-fiber splices (up to 36 splices)
10455501	OCC splice-tray for (12) 12-ribbon fiber capacity
10630501	OCC thin tray for up to 36-fiber splices
10419901	OCC splice-tray for 12-fiber splices
10376701	OCC splice-tray for 24-fiber splices
80805110	OCC splice-tray with molded slots for up to 36-fiber splices





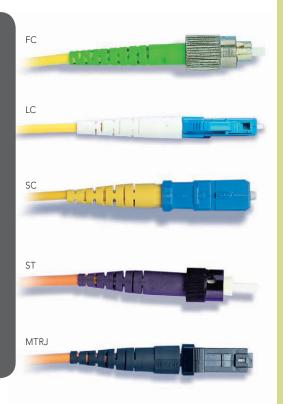


(4.6a) Assemblies – Fiber Optic Jumpers and Pigtails

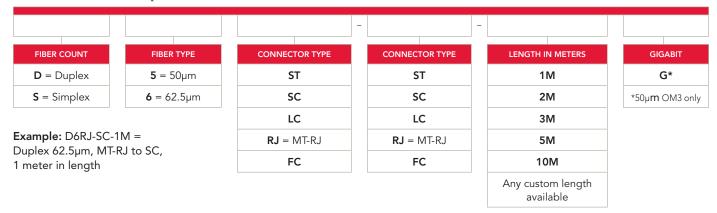
# Fiber Optic Jumpers and Pigtails

Get exactly the jumper you need to make the transition from cross-connect point to the electronics. With unmatched insertion loss and exceptional return loss performance, OCC's comprehensive line of fiber jumpers ensures the right connection every time. Each polish is 100% tested, including interferometer inspection of end-face geometry, and every assembly is provided with corresponding test data. Available in simplex or duplex, multimode (50/125 or 62.5/125) or single-mode and a variety of connector types and lengths, OCC's jumpers can be ordered to customize any fiber optic protocol.

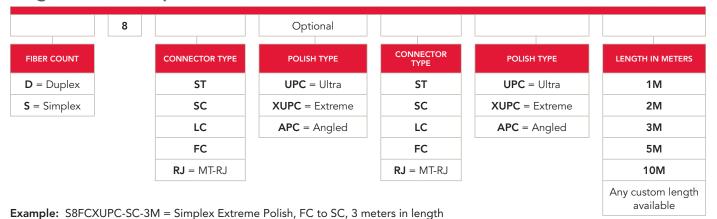
- ISO-certified
- Telcordia GR-326-CORE compliant
- Automated polishing equipment
- Interferometer testing for end-face geometry
- 100% testing on multimode for insertion loss
- 100% testing on single-mode for insertion and return loss
- Multi-fiber distribution cables, single or dual ended terminations
- Discrete connectors utilize ceramic ferrules
- Custom jacket colors for security applications
- Any specified length available
- PC polish is standard



#### **Multimode Jumpers**



#### Single-Mode Jumpers





(4.6b) Assemblies - Keyed LC

# **Keyed LC Fiber Optic Connectors**

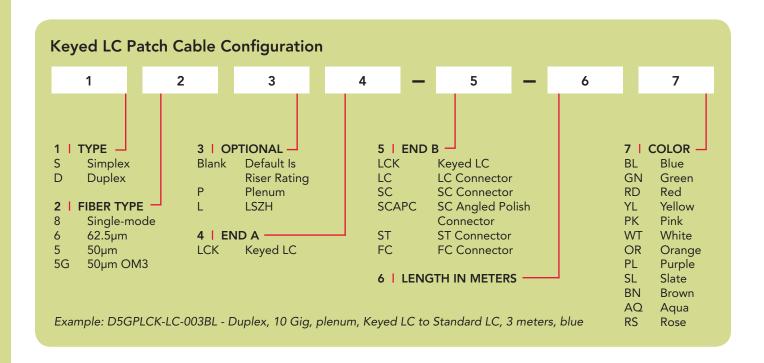
OCC introduces new keyed LC connectors to the Limited Axcess™ product line that offer limited accessibility to fiber optic networks through a physically restrictive cross-connect system. By utilizing the new Limited Axcess LC fiber optic connectors, network administrators can easily segregate networks for security or confidentiality concerns.

The LAX-series adapter plates and patch cables are available in 12 keyed, color-coded options that limit unauthorized access to network ports. All LAX adapter plates are accepted in any of OCC's fiber optic enclosures and can even be pre-terminated for easy plug-and-play installations.

#### **Features and Benefits**

- 12 keyed, color-coded options, Red, Blue, Green & Yellow being standard
- Keyed LC adapters prevent improper connection of separate networks with common access points



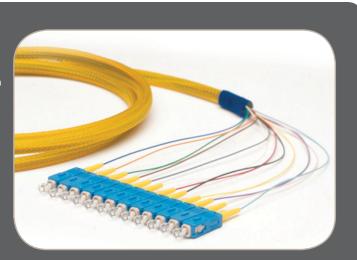


(4.6c) Assemblies – Fiber Optic Pigtails

# **Fiber Optic Pigtails**

OCC's fiber optic pigtail assemblies are designed for reliability and performance. All OCC pigtail assemblies may be ordered pre-terminated in any OCC rack- or wall-mount cabinet or custom configured for field installations. Either way, Optical Cable Corporation's pigtail assemblies combine high-precision zirconia ferrules and rugged composite hardware to provide the optical performance, durability and repeatability necessary for today's network applications.

- Available in 6- or 12-bundle pigtails
- Color-coded 900µm designed for splicing in enclosure environments
- Fiber sleeving color coded to differentiate multimode, single-mode, and 50µm
- Jacketed cable pigtails also available
- Any specified length available



#### **Pigtail Assemblies**



Example: P8SCUPC12-3M = Pigtail assembly, single-mode, SC, ultra polish, 12-fiber, 3 meters in length

#### Single-Mode Factory Polishes – Discretes

POLISH	RETURN LOSS	INSERTION LOSS
PC	-50 dB	.35 max
UPC	-55 dB	.30 max
XUPC	-55 dB	.20 max
APC	-65 dB	.30 max





**3** 

(4.6d) Assemblies - Secure LC

#### **Secure LC Fiber Optic Connectors**

OCC, through an agreement with Centric Solutions, introduces a new Secure LC fiber optic connector designed to provide an extra layer of secure access to network ports through a unique lock-and-key-style solution. The secure LC connectors utilize a special extraction tool to help prevent unauthorized release of the connector from the network panel. This added level of protection is ideal for military and government applications, as well as in data centers that require additional security against tampering. The connectors include secure LC patch cables available in eight color options, extraction tools, and port plugs. The connectors install easily in any industry-standard LC fiber adapter. Patch cables are available in a multitude of configurations using OCC's HD bend-tolerant cables, including multimode and single-mode options.



#### **Features and Benefits**

- When inserted, the tamper-proof Secure LC becomes locked to the port and requires a keyed extraction tool for removal
- Return loss = 55dB typical for UPC
- Mates with standard LC duplex & quad adapters and interfaces
- Compact, single-body duplex format
- Dust cap "retention" feature
- Suitable for 3mm mini-duplex cables
- 8 colors available
- Installs in any industry-standard LC fiber adapter
- Extraction tools and plugs may be ordered separately



# **Ordering Information**

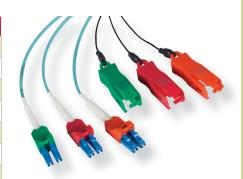
OCC PART NUMBER	CABLE TYPE	CONNECTOR SIDE "A"	CONNECTOR SIDE "B"
D6PLCSxx-LCSxx-xxM	62.5/125 orange plenum	LC Secure	LC Secure
D5PLCSxx-LCSxx-xxM	50/125 aqua OM3 plenum	LC Secure	LC Secure
D8PLCSxx-LCSxx-xxM	9/125 Single-mode Yellow Plenum	LC Secure	LC Secure
D6RLCSxx-LCSxx-xxM	62.5/125 orange riser	LC Secure	LC Secure
D5RLCSxx-LCSxx-xxM	50/125 aqua OM3 riser	LC Secure	LC Secure
D8RLCSxx-LCSxx-xxM	9/125 single-mode yellow riser	LC Secure	LC Secure
D6PLCSxx-LC-xxM	62.5/125 orange plenum	LC Secure	LC Singlebody
D5PLCSxx-LC-xxM	50/125 aqua OM3 plenum	LC Secure	LC Singlebody
D8PLCSxx-LC-xxM	9/125 single-mode yellow plenum	LC Secure	LC Singlebody
D6RLCSxx-LC-xxM	62.5/125 orange riser	LC Secure	LC Singlebody
D5RLCSxx-LC-xxM	50/125 aqua OM3 riser	LC Secure	LC Singlebody
D8RLCSxx-LC-xxM	9/125 single-mode yellow riser	LC Secure	LC Singlebody
D6PLCSxx-SC-xxM	62.5/125 orange plenum	LC Secure	SC Singlebody
D5PLCSxx-SC-xxM	50/125 aqua OM3 plenum	LC Secure	SC Singlebody
D8PLCSxx-SC-xxM	9/125 single-mode yellow plenum	LC Secure	SC Singlebody
D6RLCSxx-SC-xxM	62.5/125 orange riser	LC Secure	SC Singlebody
D5RLCSxx-SC-xxM	50/125 aqua OM3 riser	LC Secure	SC Singlebody
D8RLCSxx-SC-xxM	9/125 single-mode yellow riser	LC Secure	SC Singlebody
Replace "xx" with color c	Replace "xx" with color code from chart.		

"XX" COLOR CODES
OR – Orange
GR – Green
RD – Red
BK – Black
YW – Yellow
WH – White
BL – Blue
SL – Gray
VI – Purple



#### (4.6d) Assemblies – Secure LC

PART NUMBER	LC SECURED EXTRACTION HARDWARE	COLOR
LCS-ETOR	Extraction tool	Orange
LCS-ETGR	Extraction tool	Green
LCS-ETRD	Extraction tool	Red
LCS-ETBK	Extraction tool	Black
LCS-ETYW	Extraction tool	Yellow
LCS-ETWH	Extraction tool	White
LCS-ETBL	Extraction tool	Blue
LCS-ETSL	Extraction tool	Gray
LCS-METVI	Master extraction tool	Purple



PART NUMBER	LC SECURED LOCKING PLUG HARDWARE	COLOR
LCS-LPOR	Locking plug	Orange
LCS-LPGR	Locking plug	Green
LCS-LPRD	Locking plug	Red
LCS-LPBK	Locking plug	Black
LCS-LPYW	Locking plug	Yellow
LCS-LPWH	Locking plug	White
LCS-LPBL	Locking plug	Blue
LCS-LPSL	Locking plug	Gray

OCC PART NUMBER	LC SECURED DUST CAP HARDWARE	COLOR
LCS-DCBL	Dust cap	Blue



**3** 

(4.7a) Pre-Terminated Solutions – Procyon™ Fiber Panel

# Part of OCC's Procyon™ family of high-performance, easy-to-install data center solutions

The Procyon Fiber Panel by Optical Cable Corporation is designed for high density with comprehensive trunk and patch cord cable management features. The unit accommodates 144 LCs or 48 MTPs in 1RU. The unit is designed to be easily accessible when fully populated, can be horizontally or vertically mounted (with hardware) and is intended to be used for switching, server and storage applications.

#### Features & Benefits

- High-density connectivity containing 144 LC in 1RU (10G) or 48 MT in 1RU (40/100G)
- Accommodates 12 Procyon cassettes simultaneously, with each column containing three cassettes vertically, four columns left to right
- Combined cassette and panel chassis cable management for easy access to all connectivity during high-density installations
- Forward maneuverability of the sliding panel allows spatial offset from other panels for easy access during servicing
- Bow clip technology allows for easy positioning of the chassis during single-person service and installation
- The patent-pending forward side-exit cable management creates distinct 3-tier routing paths for each vertical cassette, allows for direct coupling with integrated cassette cable management, and has a waterfall feature for routing to the top or bottom of the cabinet
- Removable front and rear covers
- Labeling protected on the inside of front panel cover, accessible when panel is open
- TempGrip rear trunk cable management technology for easy installation and can be permanently locked down with covering bracket when installation is completed
- Large rear cable tray provides subgroup storage, accommodates cassette travel during post-installation servicing, and provides entry of up to 8 trunk cables
- Vertical or horizontal orientation of the connectivity hardware
- Vertical mounting kit available with horizontal cable management, accommodating 10 1RU panels vertically, left to right

# **Applications**

- High-density (144 LC/48 MT/1152 fiber)
- Data Center
- Vertically-oriented core switches
- Server cabinets
- Switching cabinets
- Fiber channel for storage area networks



Procyon fiber panels mounted vertically



Horizontal Procyon panel populated with cassettes





(4.7a) Pre-Terminated Solutions – Procyon™ Fiber Panel



# **Physical Specifications**

DIMENSION	VALUE
Height:	1.70"
Width:	22.17"
Depth:	19.80"

# **Ordering Information**

OCC PART NUMBER	DESCRIPTION	
PROF1U	Panel, fiber, 1RU empty	
PROVBKT	Vertical-mounting bracket with integrated cable management for PROF1U	





(4.7b) Pre-Terminated Solutions – Procyon™ MTP-MTP Cassette

# Part of OCC's Procyon™ family of high-performance, easy-to-install data center solutions

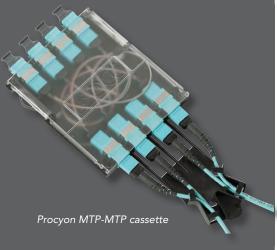
The Procyon Fiber Cassette by Optical Cable Corporation is designed to provide easy transition of trunk cables terminated with MTP-to-MTP patch cords for 40/100 Gbit/s Ethernet connectivity. It is part of an overall upgradable pre-terminated cabling architecture. The MTP-MTP cassette boasts a small form factor for maximum density and integrated cable management and cassette extraction features.

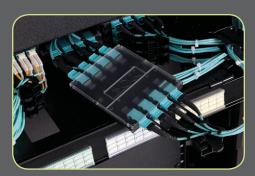
#### Features & Benefits

- Accommodates 4 MTP connections with either 12- or 24-fiber configurations in a single cassette
- Small overall form factor
- High-density (48 MTPS in 1RU) when used with OCC fiber panel
- Left or right directivity for preferred forward exit management
- Pull tab feature for easy cassette extraction
- Proprietary bow clip positioning and retention mechanism
- Clear cover for easy visual inspection
- Available with and without forward cable management
- Bidirectional capture mechanism when reverse orientation is required
- Upgradable from LC cassette for 10G to 40/100G future applications

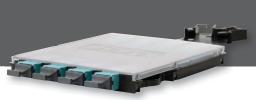
#### **Applications**

- High-density
- Data Center
- Horizontal panel for server/storage cabinets
- Vertical panel for switching cabinets
- Any bulk transport of MTP connections in a trunk cable
- 40G (12-fiber MT) or 100G (24-fiber)





Procyon MTP-MTP cassette loaded in Procyon Panel



Procyon MTP-MTP cassette





# **Ordering Information**

OCC PART NUMBER	DESCRIPTION	HEIGHT	WIDTH	DEPTH
PROMT48MTSLA	Cassette assembly, MTPX4, SM, fanout, Procyon	.49"	3.88"	8.89" (4.40" cassette only)
PROMT48MTABT	Cassette assembly, MTPX4, OM3, fanout, Procyon	.49"	3.88"	8.89" (4.40" cassette only)
PROMT48MTWLS	Cassette assembly, MTPX4, 62.5, fanout, Procyon	.49"	3.88"	8.89" (4.40" cassette only)
PROMT48MTABE	Cassette assembly, MTPX4, OM4, fanout, Procyon	.49"	3.88"	8.89" (4.40" cassette only)



(4.7c) Pre-Terminated Solutions – Procyon™ MTP-LC Cassette

# Part of OCC's Procyon™ family of high-performance, easy-to-install data center solutions

The Procyon Fiber Cassette by Optical Cable Corporation is designed to provide easy transition of trunk cables terminated with MTP connections to LC duplex connectivity in your data center. It is part of an overall pre-terminated cabling architecture, and with a small form factor and integrated cable management and cassette extraction features, it delivers high-density and at the same time maintains easy accessibility.

#### Features & Benefits

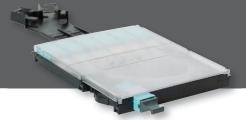
- Accommodates 1 MTP to 12 LC fiber connections
- Integrated left or right directive management
- Pull tab feature for easy cassette extraction
- Proprietary bow clip positioning and retention mechanism
- Clear cover for easy visual inspection
- Easily upgradable to 40/100 GBits Ethernet by replacing with an MTP-MTP cassette
- Can be inserted in forward or reverse orientation

#### **Applications**

- High-density
- Data Center
- Horizontal panel for server/storage cabinets
- Vertical panel chassis for switching cabinets
- Any bulk transport of LC duplex connections in a trunk cable
- 10GBit/s Ethernet
- Fiber channel for storage area networks



Procyon MTP-LC cassette



Procyon MTP-LC Cassette





# **Ordering Information:**

OCC PART NUMBER	DESCRIPTION	HEIGHT	WIDTH	DEPTH
PROMT12LCSLA	Cassette assembly, DLCX6, SM, fanout, Procyon	.49"	3.88"	8.2" (4.69" cassette only)
PROMT12LCABT	Cassette assembly, DLCX6, OM3, fanout, Procyon	.49"	3.88"	8.2" (4.69" cassette only)
PROMT12LCWLS	Cassette assembly, DLCX6, 62.5, fanout, Procyon	.49"	3.88"	8.2" (4.69" cassette only)
PROMT12LCABE	Cassette assembly, OM4, SM, fanout, Procyon	.49"	3.88"	8.2" (4.69" cassette only)
PROMT12LCAPCSLA	Cassette assembly, DLCAPCxG, SM, fanout, Procyon	.49"	3.88"	8.2" (4.69" cassette only)



part of the Procyon family of data center solutions



**3** 

(4.7d) Pre-Terminated Solutions - MT

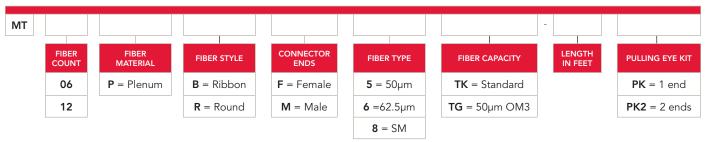
# MT Fiber Optic Cable Assemblies

The OCC MT-to-MT Cable Assembly coupled with OCC's MT Cassette Modules offers a true plug-and-play connectivity solution that effectively eliminates standard labor costs associated with fiber field installations. The MT solution ensures guaranteed performance through 100% testing to ISO procedures and provides a low-profile cross-connect solution designed for reliability. Included with the MT solution, OCC's pulling eye simplifies connectivity needs by streamlining connectors for snag-less installations. This product can be used for pulling connected cable through conduit or other channels, enabling quick connections.



- Available in 50/125µm or 62.5/125µm multimode
- Single-mode also available
- Plenum rated cable can be ordered in any length

#### MT to MT Cable Assemblies



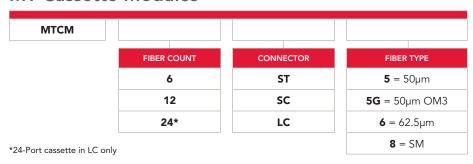
**Example:** MT12RBM5TK-03PK = MT riser cable assembly, 12-fiber, ribbon, male connectors, multimode  $50\mu m$ , 3 feet in length with one end pulling kit

# MT Plug-and-Play Cassette Modules

Designed for speed and effortless installation, OCC's fiber optic cassette modules are available with many adapter choices and offer customers a dependable, performance-driven solution. The cassettes simply snap in to any OCC fiber optic rack-mount or wall-mount cabinet and can be configured to meet any fiber optic protocol. These cassettes provide significant installation savings with no field terminations required. Simply plug-and-play!

- Available in 6-, 12-, and even 24-port adapters
- Easily field installable with snap-in pushpin design
- Fits into any OCC rack or wall-mount cabinet
- Available in 50, 62.5 or 8.3µm for either multimode or single-mode applications
- Both 6- and 12-port modules are available with Duplex ST, SC, MT-RJ, and LC adapters
- 24-port modules are available with new Quad LC adapters
- Cassette modules are factory terminated and 100% tested for guaranteed performance
- Standard configuration has male MT (with pins) installed

#### **MT Cassette Modules**





(4.7e) Pre-Terminated Solutions - RTC

#### **RTC Rack-Mount**

OCC's RTC series fiber optic cabinets offer a quick solution for easy high-density connectivity. Whether ordering empty for field installations or completely pre-terminated for easy plug-and-play installations, the RTC rack-mount cabinets are a versatile and flexible option for fiber optic structured cabling systems.

- Constructed of 16-gauge steel with a black powder-coat finish
- High-density patch and splice in a 1RU rack space
- Left and right rear cable entry
- Removable top access panel
- Cable management hoops included
- May be ordered pre-terminated for plug-and-play operability



#### **RTC Rack-Mount Cabinets**

CATALOG NUMBER	DESCRIPTION
RTC1UB-24SC	Rack-mount cabinet, 24-port, 1RU, SC, simplex, SM/MM, black
RTC1UB-24SCMM	Rack-mount cabinet, 24-port, 1RU, SC, simplex, MM, black
RTC1UB-24SCSM	Rack-mount cabinet, 24-port, 1RU, SC, simplex, SM, black
RTC1UB-48DLC	Rack-mount cabinet, 48-port, 1RU, LC, duplex, SM/MM, black
RTC1UB-48DLCMM	Rack-mount cabinet, 48-port, 1RU, LC, duplex, MM, black
RTC1UB-48DLCSM	Rack-mount cabinet, 48-port, 1RU, LC, duplex, SM, black
RTC1UB-96QLC	96 port, 1RU, LC, quad, SM/MM
RTC1UB-96QLCMM	96 port, 1RU, LC, quad, MM
RTC1UBU096QLCSM	96 port, 1RU, LC, quad, SM



RTC1UB-24SCSM



RTC1UB-96QLCMM



**3** 

(4.7f) Pre-Terminated Solutions – Loaded Enclosures

#### **Loaded Pre-Terminated Enclosures**

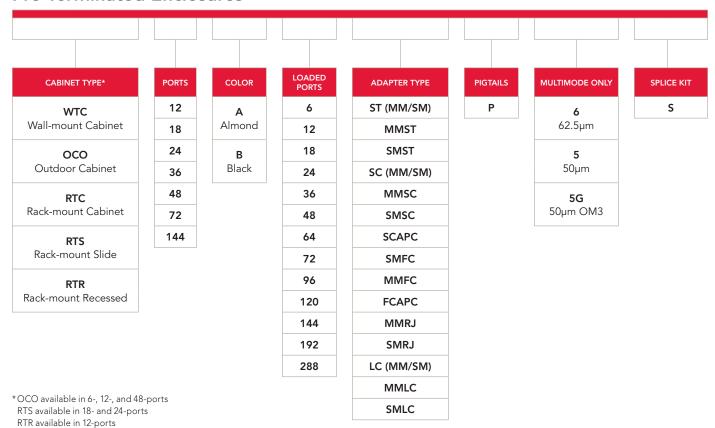
Optical Cable Corporation has always strived to provide an easy solution for any structured cabling problem. To alleviate the need for complicated fiber optic installations, OCC offers a complete line of pre-terminated and completely loaded fiber optic enclosures. Every OCC wallmount or rack-mount cabinet can be factory terminated for easy field installs and comes with testing information for 100% guaranteed performance.

- Any pre-terminated or loaded enclosure can be ordered using any OCC fiber optic enclosure
- Available in a variety of termination options and application combinations (single-mode or multimode)
- Testing information included with every pre-terminated cabinet



Use the ordering guide below to custom-configure any Optical Cable Corporation cabinet:

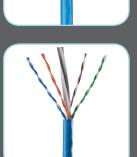
#### **Pre-Terminated Enclosures**



**Example:** WTC144A144SMSCPS = wall-mount cabinet, 144-port, almond, with 24 six-pack SMSC adapter plates, with splice kit and pigtails









# 5.0 Copper Cables

5.1	Categ	ory 6A	
	5.1a	UTP Copper Cables	206
	5.1b	U/FTP Copper Cables	208
5.2	Categ	ory 6	
	5.2a	6+ UTP Copper Cables	210
	5.2b	UTP Copper Cables	212
5.3	Categ	ory 5e	214
5.4	Shield	ed Cable Construction and Nomenclature	216

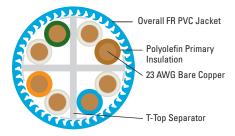
# **COPPER CABLES**



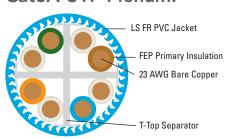
**3** 

(5.1a) Category 6A UTP Copper Cables

#### Cat6A UTP Riser:



#### Cat6A UTP Plenum:





#### Features & Benefits

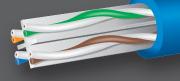
- Tested from 1 to 660MHz and offers guaranteed headroom to TIA Category 6A cable requirements
- Guaranteed 10GBASE-T performance compliant
- Cable components are twisted into pairs with varying left-hand lays to minimize cross-talk
- PoE+ compliant
- RoHS compliant
- Compatible with OCC Cat6A jacks and patch panels for optimal system performance
- Available in riser and plenum, UTP and U/FTP

#### Construction

- Conductor: 23 AWG (.55 mm) solid bare copper
- Color Code
  - Pair 1: Blue-White
  - Pair 2: Orange–White
  - Pair 3: Green-White
  - Pair 4: Brown-White
- Jacket:
  - Riser flame-retardant PVC, UL listed type FT4 per UL 444
  - Plenum low-smoke flame-retardant PVC, UL listed type FT6 per UL 444
- ullet Cabling
  - UTP Four twisted pairs are cabled around a T-top filler with a left-hand lay
- Ripcord: Applied longitudinally on UTP Category 6A riser and plenum cables

#### **Applications**

- 10GBASE-T Ethernet
- 1000BASE-T Gigabit Ethernet
- 100BASE-TX Fast Ethernet
- 100 Mbps TP-PMD
- 155/622/1000 Mbps ATM
- 10GBASE-T Ethernet
- Broadband Video
- 4/16 Mbps Token Ring
- Voice
- All other applications developed for operation over Category 6A cabling





(5.1a) Category 6A UTP Copper Cables

#### **Electrical Characteristics**

CATEGORY 6A UTP ELECTRICAL CHARACTERISTICS*							
Characteristic impedance:	100 ± 15 Ω (1 to 500MHz)						
Maximum conductor resistance:	8.9 Ω/100 meters @ 20°C						
Maximum resistance unbalance:	3%						
Maximum mutual capacitance:	5.6 nF/100 meters @ 1kHz						
Maximum capacitance unbalance:	330 pF/100 meters						

<sup>\*</sup>Discrete values are for information only. Equations for swept frequencies govern limits. Verified to meet Cat6A TIA 568-C.2 Cat6A performance requirements per the verification requirements defined in E108971.

#### **Standards**

- TIA 568-C.2 Category 6A
- IEE 802.3an (Clause 55.7) 100-meter link segment requirements
- NEC/CEC Type CMR (UL 1666) Riser
- NEC/CEC Type CMP (NFPA262) Plenum

# Electrical Performance - Category 6A UTP Riser and Plenum

Frequency (MHz)	Insertion Loss Max (dB/100) meters	NEXT Loss Mn. (dB)	PSNEXT Loss Mn. (dB)	ACR Mn. (dB)	PSACR Mn. (dB)	ACR-F Mn. (dB)	PSACRF Mn. (dB)	Return Loss Mn. (dB)	Propagation Delay Max (ns)	Delay Skew Max (ns)	TCL Mn. (dB)	ELTCTL Mn. (dB)	PSANEXT Loss Mn. (dB)	PSAACRF Loss Mn. (dB)
1	2.1	74.3	72.3	72.2	70.2	67.8	64.8	20	570	45	40	35	67	67
4	3.8	65.3	63.3	61.5	59.5	55.8	52.8	23	552	45	40	23	67	66.2
8	5.3	60.8	58.8	55.5	53.5	49.7	46.7	24.5	547	45	40	16.9	67	60.1
10	5.9	59.3	57.3	53.4	51.4	47.8	44.8	25	545	45	40	15	67	58.2
16	7.5	56.2	54.2	48.7	46.7	43.7	40.7	25	543	45	38	10.9	67	54.1
20	8.4	54.8	52.8	46.4	44.4	41.8	38.8	25	542	45	37	9	67	52.2
25	9.4	53.3	51.3	43.9	41.9	39.8	36.8	24.3	541	45	36	7	67	50.2
31.25	10.5	51.9	49.9	41.4	39.4	37.9	34.9	23.6	540	45	35.1	5.5	67	48.3
62.5	15.0	47.4	45.4	32.4	30.4	31.9	28.9	21.5	539	45	32	-	65.6	42.3
100	19.1	44.3	42.3	25.2	23.2	27.8	24.8	20.1	538	45	30	_	62.5	38.2
200	27.6	39.8	37.8	12.2	10.2	21.8	18.8	18	537	45	27	_	58	32.2
250	31.1	38.3	36.3	7.2	5.2	19.8	16.8	17.3	536	45	26	-	56.5	30.2
300	34.3	37.1	35.1	2.8	0.8	18.3	15.3	16.8	536	45	25.2	-	55.3	28.7
400	40.1	35.3	33.3	-	-	15.8	12.8	15.9	536	45	24	-	53.5	26.2
500	45.3	33.8	31.8	-	-	13.8	10.8	15.2	536	45	23	-	52	24.2

# **Ordering Information**

PART NO.	DESCRIPTION	UOM	O.D.	WEIGHT				
OCC-U6A4R-xx	Category 6A UTP CMR cable	REEL	0.34"	42 lbs./1,000 ft.				
OCC-U6A4PLM-xx	Category 6A UTP CMP cable	REEL	0.37"	53.3 lbs./1,000 ft.				
Replace "xx" with color code: <b>07</b> = blue, <b>05</b> = white. Other colors available, contact OCC Inside Sales for available colors.								

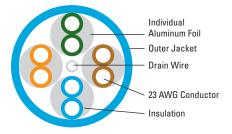
# **COPPER CABLES**



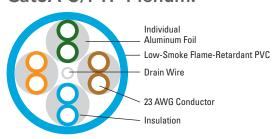
**3** 

(5.1b) Category 6A U/FTP Copper Cables

#### Cat6A U/FTP Riser:



#### Cat6A U/FTP Plenum:





#### Features & Benefits

- Tested from 1 to 600MHz and offers guaranteed headroom to TIA568-C.2 Category 6A cable requirements
- Guaranteed 10GBASE-T performance compliant
- Components are twisted into pairs with varying left-hand lays to minimize cross-talk
- PoE+ compliant
- RoHS compliant
- Compatible with OCC Cat6A jacks and patch panels for optimal system performance
- Available in riser and plenum

#### Construction

- Conductor: 23 AWG (.0226") solid bare copper
- Color Code
  - Pair 1: Blue-White
  - Pair 2: Orange-White
  - Pair 3: Green-White
  - Pair 4: Brown-White
- Jacket:
  - Riser flame-retardant PVC, UL listed type FT4 per UL 444
  - Plenum low-smoke flame-retardant PVC, UL listed type FT6 per UL 444
- Cabling:
  - U/FTP Four twisted pairs are cabled around a 24 AWG drain wire. Each pair is individually shielded with an aluminum foil with no separator.

# **Applications**

- 10GBASE-T Ethernet
- 1000BASE-T Gigabit Ethernet
- 100BASE-TX Fast Ethernet
- 100 Mbps TP-PMD
- 155/622/1000 Mbps ATM
- 10GBASE-T Ethernet
- Broadband Video
- 4/16 Mbps Token Ring
- Voice
- All other applications developed for operation over Category 6A cabling





(5.1b) Category 6A U/FTP Copper Cables

#### **Electrical Characteristics**

CATEGORY 6A U/FTP ELECTRICAL CHARACTERISTICS*								
Characteristic impedance:	100 ± 15 Ω (1 to 500MHz)							
Maximum conductor resistance:	8.9 Ω/100 meters @ 20° C							
Maximum resistance unbalance:	3%							
Maximum mutual capacitance:	5.6 nF/100 meters @ 1kHz							
Maximum capacitance unbalance:	330 pF/100 meters							

<sup>\*</sup>Discrete values are for information only. Equations for swept frequencies govern limits. Verified to meet Cat6A TIA-568-C.2 performance requirements per the verification requirements defined in E108971.

#### **Standards**

- TIA 568-C.2 Category 6A
- IEE 802.3an (Clause 55.7) 100-meter link segment requirements
- NEC/CEC Type CMR (UL 1666) Riser
- NEC/CEC Type CMP (NFPA262) Plenum

### Electrical Performance - Category 6A U/FTP Riser and Plenum

Frequency (MHz)	Insertion Loss Max (dB/100) meters	NEXT Loss Mn. (dB)	PSNEXT Loss Mn. (dB)	ACR Mn. (dB)	PSACR Mn. (dB)	ACR-F Mn. (dB)	PSACRF Mn. (dB)	Return Loss Mn. (dB)	Propagation Delay Max (ns)	Delay Skew Max (ns)	TCL Mn. (dB)	ELTCTL Mn. (dB)	PSANEXT Loss Mn. (dB)	PSAACRF Loss Mn. (dB)
1	2.1	74.3	72.3	72.2	70.2	73.8	70.8	20	570	35	50	35	77	77
4	3.8	74.3	72.3	70.5	68.5	61.8	58.8	23	552	35	44	23	77	76.2
10	5.9	74.3	72.3	68.3	66.3	53.8	50.8	25	545	35	40	16.9	77	68.2
16	7.5	74.2	71.2	66.6	63.6	49.7	46.7	25	543	35	38	15	77	64.1
20	8.4	72.8	69.8	64.3	61.3	47.8	44.8	25	542	35	37	10.9	77	62.2
31.25	10.5	69.9	66.9	59.1	56.1	43.9	40.9	23.6	540	35	35.1	9	77	58.3
62.5	15	65.4	62.4	49.9	46.9	37.9	34.9	21.5	539	35	32	7	75.6	52.3
100	19.1	62.3	59.3	42.4	39.4	33.8	30.8	20.1	538	35	30	5.5	72.5	48.2
200	27.6	57.8	54.8	28.6	25.6	27.8	24.8	18	537	35	27	_	68	42.2
250	31.1	56.3	53.3	23.3	20.3	25.8	22.8	17.3	536	35	26	_	66.5	40.2
300	34.3	55.1	52.1	18.5	15.5	24.3	21.3	16.8	536	35	25.2	_	65.3	38.7
350	37.2	54.1	51.1	14.2	11.2	22.9	19.9	16.3	536	35	24.6	_	64.3	37.3
400	40.1	53.3	50.3	10.1	7.1	21.8	18.8	15.9	536	35	24	_	63.5	36.2
500	45.3	51.8	48.8	2.7	-	19.8	16.8	15.2	536	35	23	_	62	34.2

# **Ordering Information**

PART NO.	DESCRIPTION	иом	O.D.	WEIGHT					
OCC-UF6A4R-xx	Category 6A U/FTP CMR cable	REEL	0.29"	40 lbs./1,000 ft.					
OCC-UF6A4PLM-xx	Category 6A U/FTP CMP cable	REEL	0.29"	36 lbs./1,000 ft.					
Replace "xx" with color code: <b>07</b> = blue, <b>05</b> = white. Other colors available, contact OCC Inside Sales for available colors.									

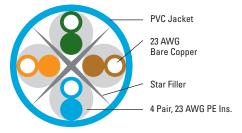
# **COPPER CABLES**



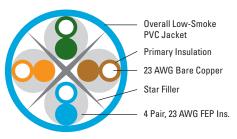
**3** 

(5.2a) Category 6+ UTP Copper Cables

#### Cat 6+ UTP Riser:



#### Cat 6+ UTP Plenum:





#### Features & Benefits

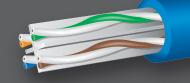
- Performance guaranteed to 350MHz and offers guaranteed headroom to Category 6 TIA-568-C.2 cable requirements
- Fully compliant with Power over Ethernet technology
- Components are twisted into pairs with varying left-hand lays to minimize cross-talk
- Reverse sequential numbering to eliminate guesswork of footage in box or reel
- Compatible with OCC Cat 6 jacks and patch panels for optimal system performance
- RoHS compliant
- Available in riser and plenum, UTP

#### Construction

- Conductor: 23 AWG (.0224") Solid Bare Copper
- Color Code
  - Pair 1: Blue-White
  - Pair 2: Orange-White
  - Pair 3: Green-White
  - Pair 4: Brown-White
- Jacket:
  - Riser flame-retardant PVC, UL listed type FT4 per UL 444
  - Plenum low-smoke flame-retardant PVC, UL listed type FT6 per UL 444
- · Cabling: Four twisted pairs are cabled around a cross-talk reduction separator with a left-hand lay
- Ripcord: Applied longitudinally under jacket

### **Applications**

- 1000BASE-T Gigabit Ethernet
- 100BASE-TX Fast Ethernet
- 100 Mbps TP-PMD
- 155/622/1000 Mbps ATM
- 10BASE-T Ethernet
- Broadband Video
- 4/16 Mbps Token Ring
- Voice
- All other applications developed for operation over Category 6 cabling



OCC reserves the right to change specifications without prior notification. To access the most current information about our Cat 6+ copper cable, contact OCC Inside Sales or visit occfiber.com.



(5.2a) Category 6+ UTP Copper Cables

#### **Electrical Characteristics**

CATEGORY 6+ ELECTRICAL CHARACTERISTICS*								
Characteristic impedance:	100 $\pm$ 15 $\Omega$ (1.0 to 250MHz)							
Maximum conductor resistance:	8.9 Ω/100 Meters @ 20° C							
Maximum resistance unbalance:	5%							
Maximum mutual capacitance:	5.6 nF/100 Meters @ 1kHz							
Maximum capacitance unbalance:	330 pF/100 Meters							
Maximum delay skew:	45 ns/100 Meters							

<sup>\*</sup>Discrete values are for information only. Equations for swept frequencies govern limits. Verified to meet Cat 6 ANSI/TIA-568-C.2 performance requirements per the verification requirements defined in E108971.

#### **Standards**

- ANSI/TIA 568-C.2
- ISO/IEC 11801
- ISO/IEC 11801, 2nd edition, Class E and Category 6
- ICEA S-102-700 (Cat 6)
- NEC/CEC Type CMR (UL 1666) Non-Plenum
- NEC/CEC Type CMP (NFPA262) Plenum

### Electrical Performance – Category 6+ UTP Riser and Plenum

FREQUENCY (MHz)	INSERTION LOSS MAX		OSS MIN 100M)	ACR (dB/1	MIN 00M)		T MIN 00M)	RETURN LOSS MIN	DELAY MAX
(IVITZ)	(dB/100M)	WP	PS	WP	PS	WP	PS	(dB/100M)	(ns/100M)
1	2.0	79.3	77.3	77.3	75.3	72.8	69.8	20.0	570
4	3.8	70.3	68.3	66.5	64.5	60.7	57.7	23.0	552
10	5.9	64.3	32.3	58.4	56.4	52.8	49.8	25.0	545
16	7.5	61.3	59.3	53.8	51.7	48.7	45.7	25.0	543
20	8.4	59.8	57.8	51.4	49.4	46.7	43.7	25.0	542
31.25	10.6	56.9	54.9	46.3	44.3	42.9	39.9	23.6	540
62.5	15.3	52.4	50.4	37.1	35.1	36.8	33.8	21.5	539
100	19.7	49.3	47.3	29.6	27.6	32.8	29.8	20.1	538
150	24.7	46.7	44.7	22.0	20.0	29.3	26.3	18.8	537
200	29.0	44.8	42.8	15.8	13.8	26.8	23.8	18.0	537
250	32.6	43.3	41.3	10.7	8.7	24.8	21.8	17.3	536
350	39.5	41.2	39.2	1.7	_	21.9	18.9	16.3	536
500	48.6	38.8	36.8	_	_	18.8	15.8	15.2	536

# **Ordering Information**

PART NO.	DESCRIPTION	UOM	O.D.	WEIGHT						
OCC-U64R-xx	Category 6+ UTP CMR cable	Box	0.24"	23 lbs.						
OCC-U64PLM-xx	Category 6+ UTP CMP cable	Вох	0.22"	24 lbs.						
Replace "xx" with color code: <b>07</b> = blo	Replace "xx" with color code: <b>07</b> = blue, <b>05</b> = white. Other colors available, contact OCC Inside Sales for available colors.									

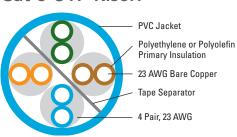
# **COPPER CABLES**



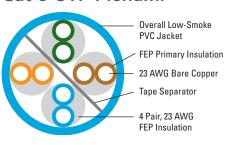
**3** 

(5.2b) Category 6 UTP Copper Cables

#### Cat 6 UTP Riser:



#### Cat 6 UTP Plenum:





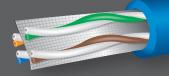
#### Features & Benefits

- Performance guaranteed to 350MHz and compliant to Category 6 TIA-568-C.2 cable requirements
- Fully compliant with Power over Ethernet (PoE+) technology
- Components are twisted into pairs with varying left-hand lays to minimize cross-talk
- Reverse sequential numbering to eliminate guesswork of footage in box or reel
- Compatible with OCC Cat 6 jacks and patch panels for optimal system performance
- RoHS compliant
- Available in riser and plenum, UTP

#### Construction

- Conductor: 23 AWG (.0224") Solid Bare Copper
- Color Code
  - Pair 1: Blue-White
  - Pair 2: Orange-White
  - Pair 3: Green-White
  - Pair 4: Brown-White
- Jacket:
  - Riser flame-retardant PVC, UL listed type FT4 per UL 444
  - Plenum low-smoke flame-retardant PVC, UL listed type FT6 per UL 444
- Cabling: Four twisted pairs are cabled with a tape separator and a left-hand lay
- Ripcord: Applied longitudinally under jacket

- 1000BASE-T Gigabit Ethernet
- 100BASE-TX Fast Ethernet
- 100 Mbps TP-PMD
- 155/622/1000 Mbps ATM
- Broadband Video
- 4/16 Mbps Token Ring
- Voice
- All other applications developed for operation over Category 6 cabling





(5.2b) Category 6 UTP Copper Cables

#### **Electrical Characteristics**

CATEGORY 6 ELECTRICAL CHARACTERISTICS*									
Characteristic impedance:	100 $\pm$ 15 $\Omega$ (1.0 to 250MHz)								
Maximum conductor resistance:	8.9 Ω/100 meters @ 20° C								
Maximum resistance unbalanced:	5%								
Maximum mutual capacitance:	5.6 nF/100 meters @ 1kHz								
Maximum capacitance unbalanced:	330 pF/100 meters								
Maximum delay skew:	45 ns/100 meters								

<sup>\*</sup>Discrete values are for information only. Equations for swept frequencies govern limits. Verified to meet Cat 6 ANSI/TIA-568-C.2 performance requirements per the verification requirements defined in E108971.

#### **Standards**

- ANSI/TIA 568-C.2
- ISO/IEC 11801
- ISO/IEC 11801, 2nd edition, Class E and Category 6
- ICEA S-102-700 (Cat 6)
- NEC/CEC Type CMR (UL 1666) Non-Plenum
- NEC/CEC Type CMP (NFPA262) Plenum

### **Electrical Performance – Category 6 UTP Riser and Plenum**

FREQUENCY	INSERTION LOSS MAX		OSS MIN 100M)		MIN IOOM)		T MIN 100M)	RETURN LOSS MIN	DELAY MAX	
(MHZ.)	(DB/100M)	WP	PS	WP	PS	WP	PS	(DB/100M)	(NS/100M)	
0.772	_	76.0	74.0	_	_	70.0	67.0	_	_	
1.0	2.0	74.3	72.3	72.3	70.3	67.8	64.8	20.0	570	
4.0	3.8	65.3	63.3	61.5	59.5	55.7	52.8	23.0	552	
8.0	5.3	60.8	58.8	55.4	53.4	49.7	46.7	24.5	547	
10.0	6.0	59.3	57.3	53.3	51.3	47.8	44.8	25.0	545	
16.0	7.6	56.2	54.2	48.7	46.7	43.7	40.7	25.0	543	
20.0	8.5	54.8	52.8	46.3	44.3	41.7	38.8	25.0	542	
25.0	9.5	53.3	51.3	43.8	41.8	39.8	36.8	24.3	541	
31.25	10.7	51.9	49.9	41.2	39.2	37.9	34.8	23.6	540	
62.5	15.4	47.4	45.4	32.0	29.9	31.8	28.9	21.5	539	
100.0	19.8	44.3	42.3	24.6	22.5	27.8	24.8	20.1	538	
155.0	25.2	41.4	39.4	16.3	14.3	24.0	21.0	18.8	537	
200.0	29.0	39.8	37.8	10.8	8.8	21.8	18.8	18.0	537	
250.0	32.8	38.3	36.3	5.5	3.5	19.8	16.8	17.3	536	
300.0	36.4	37.1	35.1	_	_	18.3	15.3	16.8	536	
350.0	39.8	36.1	34.1	_	_	16.9	13.9	16.3	536	
400.0	43.0	35.3	33.3	_	_	15.8	12.8	15.9	536	
500.0	48.9	33.8	31.8	_	_	13.8	10.8	15.2	536	

# **Ordering Information**

PART NO.	DESCRIPTION	иом	O.D.	WEIGHT				
OCC-UE64R-XX	Category 6 UTP CMR cable	Вох	0.22"	23 lbs.				
OCC-UE64PLM-XX Category 6 UTP CMP cable Box 0.21" 24 lbs.								
Replace "xx" with color code: <b>07</b> = bl	ue, <b>05</b> = white. Other colors available, co	ontact OCC Inside Sa	ales for available cold	ors.				

# **COPPER CABLES**



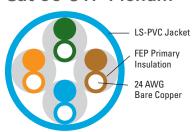
**)** 

(5.3) Category 5e UTP Copper Cables

#### Cat 5e UTP Riser



#### Cat 5e UTP Plenum





#### **Features & Benefits**

- Tested from 1 to 350MHz and offers guaranteed headroom to Category 5e TIA 568-C.2 cable requirements
- Guaranteed Gigabit throughput
- Components are twisted into pairs with varying left-hand lays to minimize cross-talk
- Reverse sequential footage numbering to eliminate guesswork in box or reel
- Compatible with OCC Cat 5e jacks and patch panels for optimal system performance
- RoHS compliant
- Available in UTP riser and plenum

#### Construction

- Conductor: 24 AWG (.020") solid bare copper
- Color Code
  - Pair 1: Blue-White/Blue
  - Pair 2: Orange–White/Orange
  - Pair 3: Green–White/Green
  - Pair 4: Brown–White/Brown
- Jacket:
  - Riser flame-retardant PVC, UL listed type FT4 per UL 444
  - Plenum low-smoke flame-retardant PVC, UL listed type FT6 per UL 444
- Ripcord: Applied longitudinally under jacket

- 1000BASE-T Gigabit Ethernet
- 100BASE-TX Fast Ethernet
- 100 Mbps TP-PMD
- 155/622/1000 Mbps ATM
- 10GBASE-T Ethernet
- Broadband Video
- 4/16 Mbps Token Ring
- Voice
- All other applications developed for operation over Category 5e cabling





(5.3) Category 5e UTP Copper Cables

#### **Electrical Characteristics**

CATEGORY 5E ELECTRICAL CHARACTERISTICS*								
Characteristic impedance:	100 ± 15 Ω (.772 to 100MHz)							
Maximum conductor resistance:	9.38 Ω/100 Meters @ 20° C							
Maximum resistance unbalance:	5%							
Maximum mutual capacitance:	5.6 nF/100 Meters @ 1kHz							
Maximum capacitance unbalance:	330 pF/100 Meters							
Maximum delay skew:	45 ns/100 Meters							

<sup>\*</sup>Discrete values are for information only. Equations for swept frequencies govern limits. Verified to meet TIA 568-C.2 Cat 5e performance requirements per the verification requirements defined in E108971.

#### **Standards**

- ANSI/TIA 568-C.2, Cat 5e
- ISO/IEC 11801, 2nd edition, Class E and Cat 5e component
- ICEA S-90-661 (Cat 5e)
- NEC/CEC Type CMR (UL 1666) Non-Plenum
- NEC/CEC Type CMP (NFPA262) Plenum

# **Electrical Performance – Category 5e UTP Riser and Plenum**

FREQUENCY	INSERTION LOSS MAX		OSS MIN IB)		MIN IB)		(T MIN IB)	RETURN LOSS MIN	DELAY MAX
(MHz)	(dB/100M)	WP	PS	WP	PS	WP	PS	(dB)	(ns)
0.772	1.8	67.0	64.0	65.2	62.2	66.0	63.0	_	_
1.0	2.0	65.3	62.3	63.3	60.3	63.8	60.8	20.0	570
4.0	4.1	56.3	53.3	52.2	49.2	51.8	48.8	23.0	552
8.0	5.8	51.8	48.8	46.0	43.0	45.7	42.7	24.5	547
10.0	6.5	50.3	47.3	43.8	40.8	43.8	40.8	25.0	545
16.0	8.2	47.2	44.2	39.0	36.0	39.7	36.7	25.0	543
20.0	9.2	45.8	42.8	36.5	33.5	37.8	34.8	25.0	542
25.0	10.3	44.3	41.3	33.9	30.9	35.8	32.8	24.3	541
31.25	11.7	42.9	39.9	31.2	28.2	33.9	30.9	23.6	540
62.5	17.0	38.4	35.4	21.4	18.4	27.9	24.9	21.5	539
100.0	22.0	35.3	32.3	13.3	10.3	23.8	20.8	20.1	538
155.0	28.1	32.4	29.4	_	_	20.0	17.0	18.8	537
200.0	32.4	30.8	27.8	_	_	17.8	14.8	18.0	537
250.0	36.9	29.3	26.3	_	_	15.8	12.8	17.3	536
300.0	41.0	28.1	25.1	_	_	14.3	11.3	16.8	536
350.0	44.9	27.1	24.1	_	_	12.9	9.9	16.3	536

# **Ordering Information**

PART NO.	DESCRIPTION	иом	O.D.	WEIGHT
OCC-U5E4R-xx	Category 5e UTP CMR cable	Вох	0.179"	22 lbs.
OCC-U5E4PLM-xx	Category 5e UTP CMP cable	Вох	0.180"	21 lbs.
Replace "xx" with color code: <b>07</b> = blo	ue, <b>05</b> = white. Other colors available, co	ontact OCC Inside Sa	ales for available cold	ors.

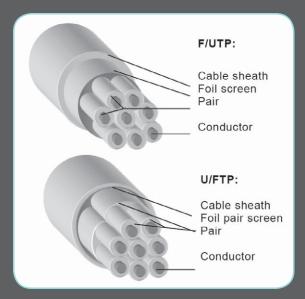
# **COPPER CABLES**



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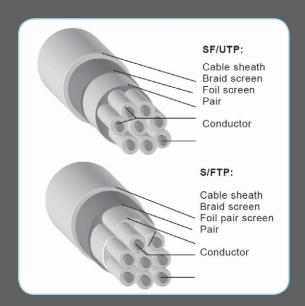
(5.4) Shielded Cable Construction and Nomenclature

#### **Shielded Cable Construction and Nomenclature**



The F/UTP cable construction has a foil screen surrounding four pairs of conductors. There may be other elements included as well, such as a drain wire and a pair separator.

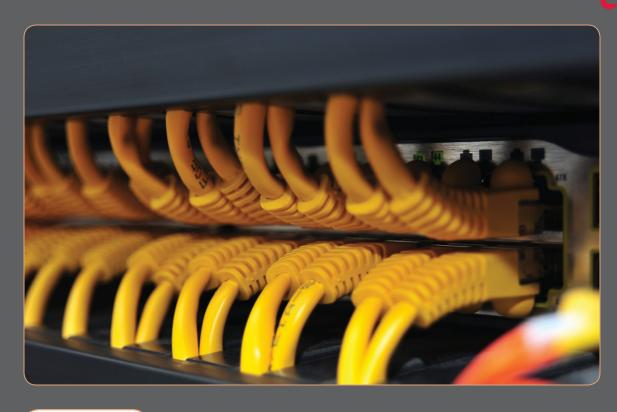
The U/FTP cable construction has individually foiled pairs (PIMF) with no overall cable screen. There may be other elements included in the cable, such as a drain wire.



The SF/UTP cable construction includes a braided overall screen as well as the foil overall screen. The pairs within the cable are not screened from each other. The cable may or may not include a drain wire.

The S/FTP cable construction includes an overall screen as well as foiled pairs. The overall screen may be a foil or a braid or both. The cable may also include a drain wire.

OCC offers several types of shielded cable in conjunction with our Category 5e, Category 6 and Category 6a shielded connectors. All of the cable constructions shown are compatible with OCC shielded slim-line connectors and provide a cost-effective solution with performance well in excess of all industry requirements.





# **6.0 Copper Connectivity**







6.1a Outlet Jacks	218
6.1b Patch Panels	220
6.1c Modular Patch Cords	221
6.2 Category 6	
6.2a Jacks	222
6.2b Patch Panels	224
6.2c Modular Patch Cords	225
6.2d 110 Blocks	226
6.3 Category 5e	
6.3a Jacks	227
6.3b Patch Panels	229
6.3c Cable Assemblies	231
6.3d 110 Blocks	232
6.4 Voice Products	
6.4a Jacks	233
6.4b Patch Panels	234
6.5 Multimedia Panels	235
6.6 Pre-Terminated Copper	
6.6a Category 5e Pre-Terminated Copper	236
6.6b Quad Box	241
6.6c Procyon Copper System	242
6.7 Structured Cabling System Protocols	244



(6.1a) Category 6A - KMJ Outlet Jacks

### Category 6A - KMJ Outlet Jacks

OCC's Category 6A jack offers a high-performance connecting hardware component in a compact form factor. This RJ45 slim-line Category 6A jack provides a comprehensive solution for high-performance structured cabling systems. Using patented cross-talk reduction technology, OCC engineering has developed its highest performing component product yet. The slim-line design supports high-density applications, allowing for 24-ports in a 1U panel for UTP and shielded applications.

- Meets IEC 60603-7 requirements
- Guaranteed ISO and TIA Category 6A compliant
- 110-style IDC contacts exceed TIA 568-C.2 requirements
- Slim-line profile allows 24-ports in a 1U panel, shielded jacks allow 48-ports in 1U
- TIA 568-C.2 Cat6A component compliant
- ISO 11801 Ed 2. Cat6A component compliant
- New high-performance contacts provide low cross-talk with improved mechanical robustness
- One-piece stuffer cap included
- Terma-grip technology for easy field installation
- Improved strain-relief system designed for Category 6A shielded cable
- UL 1863 listed communications circuit accessory
- Large, easy-to-read color-coded labels
- PoE+ Compliant
- Contact material high-strength beryllium copper alloy
- Contact plating 50 µin gold over nickel
- Insulation resistance 500 M $\Omega$  minimum
  - Dielectric withstand 1000 VAC RMS, AC 60 Hz or 1414 VDC P-P
  - DC current rating 1.5 A per conductor at 20°C ambient de-rated to 0.75 A at 60°C ambient

### Category 6A KMJ Outlet Jacks

CATALOG NUMBER	DESCRIPTION
K6Axx	Category 6A KMJ outlet jack, UTP, slim-line
K6A02S	Category 6A KMJ outlet jack, shielded, slim-line
K6A50xx Category 6A KMJ outlet jack, UTP, 50 pack	
Replace "xx" with color code.	

"XX" COLOR CODES	
00 – Electrical Ivory	07 – White
01 – Office White	08 – Orange
02 – Black	09 – Yellow
03 – Red	10 – Purple
04 – Green	11 – Brown
05 – Blue	12 – Bright White
06 – Data Gray	



- 10GBASE-T Ethernet
- 1000BASE-T Gigabit Ethernet
- 100BASE-TX Fast Ethernet
- 10BASE-T Ethernet
- Broadband Video
- 155/622 Mbps ATM
- 100 Mbps TP-PMD
- 4/16 Mbps Token Ring
- Voice





(6.1a) Category 6A – UMJ Outlet Jacks

### Category 6A – UMJ Outlet Jacks

OCC's Category 6A jack offers a high-performance connecting hardware component in a compact form factor. This RJ45 slim-line Category 6A jack provides a comprehensive solution for high-performance structured cabling systems. Using patented cross-talk reduction technology, OCC engineering has developed its highest performing component product yet. The slim-line design supports high-density applications, allowing for 24-ports in a 1U panel for UTP applications.

- Meets IEC 60603-7 requirements
- Guaranteed ISO and TIA Category 6A compliant
- 110-style IDC contacts exceed TIA 568-C.2 requirements
- Slim-line profile allows 24-ports in a 1U panel, shielded jacks allow 48-ports in 1U
- TIA 568-C.2 Cat6A component compliant
- ISO 11801 Ed 2. Cat6A component compliant
- New high-performance contacts provide low cross-talk with improved mechanical robustness
- One piece stuffer cap included
- Terma-grip technology for easy field installation
- Improved strain-relief system designed for Category 6A shielded cable
- UL 1863 listed communications circuit accessory
- Large, easy-to-read color-coded labels
- PoE+ Compliant
- Contact material high-strength beryllium copper alloy
- Contact plating 50µin gold over nickel
- Insulation resistance 500 M $\Omega$  minimum
  - Dielectric withstand 1000 VAC RMS, AC 60 Hz or 1414 VDC P-P
  - DC current rating 1.5 A per conductor at 20°C ambient de-rated to 0.75 A at 60°C ambient

### Category 6A UMJ Outlet Jacks

CATALOG NUMBER	DESCRIPTION
U6Axx	Category 6A UMJ outlet jack, UTP, slim-line
U6A50xx	Category 6A UMJ outlet jack, UTP, 50 pack
Replace "xx" with color code.	

"XX" COLOR CODES	
00 – Electrical Ivory	07 – White
01 – Office White	08 – Orange
02 – Black	09 – Yellow
03 – Red	10 – Purple
04 – Green	11 – Brown
05 – Blue	12 – Bright White
06 – Data Gray	



- 10GBASE-T Ethernet
- 1000BASE-T Gigabit Ethernet
- 100BASE-TX Fast Ethernet
- 10BASE-T Ethernet
- Broadband Video
- 155/622 Mbps ATM
- 100 Mbps TP-PMD
- 4/16 Mbps Token Ring
- Voice



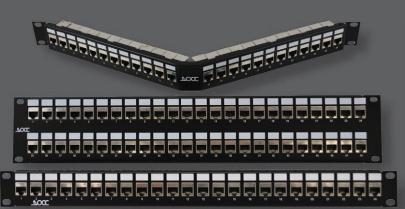
**3** 

(6.1b) Category 6A - Patch Panels

#### **Category 6A Patch Panels**

OCC's Category 6A Patch Panels offer a high-density solution for 10GBASE-T Ethernet applications. Our UTP and FTP Cat6A Patch Panels present a product solution that exceeds TIA Category 6A standards and achieves superior performance compliance. The Category 6A patch panel is ideal for end users who are looking for superior network performance to keep their infrastructure lasting well into the future.

- Guaranteed ISO and TIA Category 6A compliant
- Backward compatible to Category 3, 5, 5e, and 6
- Offers mounting flexibility and removable cable strain-relief bar that attaches directly to panel
- All-steel construction ensures panel rigidity and reliable terminations
- Can be easily mounted to any 19" rack or cabinet
- High-density configuration allows for 24-ports in a 1U rack space
- Write-on window plates for port identification
- ISO 11801 Ed 2 Cat6<sub>4</sub> component compliant
- CSA certified
- Compliant with Power over Ethernet (PoE+) requirements



#### **Category 6A Patch Panels**

CATALOG NUMBER	DESCRIPTION
DCC1688/1106A	Patch panel, 16-port, Category 6A, 110, UTP, 1RU, including K6A02 connectors
DCC2488/1106A	Patch panel, 24-port, Category 6A, 110, UTP, 1RU, including K6A02 connectors
ACC1688/1106A	Patch panel, 16-port, Category 6A, 110, UTP, 1RU, angled, including K6A02 connectors
ACC2488/1106A	Patch panel, 24-port, Category 6A, 110, UTP, 1RU, angled, including K6A02 connectors
DCC1688/1106A-S	Patch panel, 16-port, Category 6A, 110, shielded, 1RU, including K6A02S connectors
DCC2488/1106A-S	Patch panel, 24-port, Category 6A, 110, shielded, 1RU, including K6A02S connectors
DCC4888/1106A-S	Patch panel, 48-port, Category 6A, 110, shielded, 2RU, including K6A02S connectors
ACC1688/1106A-S	Patch panel, 16-port, Category 6A, 110, shielded, 1RU, angled, including K6A02S connectors
ACC2488/1106A-S	Patch panel, 24-port, Category 6A, 110, shielded, 1RU, angled, including K6A02S connectors
ACC4888/1106A-S	Patch panel, 48-port, Category 6A, 110, shielded, 2RU, angled, including K6A02S connectors





(6.1c) Category 6A - Modular Patch Cords

### Category 6A Patch Cords

To complete the link, OCC created Category 6A modular cords with guaranteed Cat6A compliance that offer superior PSANEXT performance suitable for mitigation of alien cross-talk. These modular cords also improve the external noise immunity of structured communications cabling systems and EMI suppression through shielded cable and plug design. Overall, OCC's Cat6A patch cords assist in creating a complete 10 Gigabit throughput system that is reliable for years to come.

- Guaranteed ISO and TIA Category 6A compliant
- 100% component performance tested
- Backward compatible with Category 3, 5, 5e and 6
- Superior PSANEXT performance
- Superior PSAACR-F performance
- Superior EMI suppression
- Improves the external noise immunity of structured cabling systems
- LS0H or PVC cable construction
- PVC patch cord is UL listed
- Utilizes OCC's patented modular plug design
- Compliant with Power over Ethernet (PoE+) requirements
- Insulation resistance 500  $M\Omega$  minimum
  - Dielectric withstand 1000 VAC RMS, AC 60 Hz or 1414 VDC P-P
  - DC current rating 1.5 A per conductor at 20°C ambient de-rated to 0.75 A at 60°C ambient
- Centered modular plugs
- Slim-line strain-relief boot
- Snagless design



### Category 6A Patch Cords

CATALOG NUMBER	DESCRIPTION
PC6AU-B-xxxy	Category 6A patch cord with boot, PVC, UTP, UL listed
PC6AS-B-xxyy	Category 6A patch cord with boot, PVC, shielded, UL listed
Replace "xx" with length in feet; replace "yy" with color code – <b>06</b> = gray (standard) UL Listed CCA File E137579 Ex: PC6AS-B-0306 = Category 6A patch cord with boot, 3 feet, gray (standard)	

Additional colors available. Contact OCC for ordering information.

PART NUMBER OUTSIDE THE US	DESCRIPTION
IPC6AxxxByy	Category 6 <sub>A</sub> patch cord with boot, UTP, PVC
IPC6AxxxByyLZH	Category 6 <sub>A</sub> patch cord with boot, UTP, LSZH
ISPC6AxxxByy	Category 6 <sub>A</sub> patch cord with boot, shielded, PVC
ISPC6AxxxByyLZH Category 6 <sub>A</sub> patch cord with boot, shielded, LSZH	
Replace "xx" with length in feet; replace "yy" with color code – $\bf 06$ = gray (standard) Ex: IP6A003B06 = Category 6 <sub>A</sub> patch cord with boot, 3 meters, gray (standard)	

Additional colors available. Contact OCC for ordering information.



(6.2a) Category 6 – Jacks

### Category 6 KMJ Jacks

OCC's KMJ jacks offer printed circuit board technology that provide best-in-class Category 6 component performance. With standard 110-style terminations, OCC's Category 6 KMJ jacks are ETL verified to TIA 568-C.2 Category 6 specifications.

- Meets IEC 60603-7 requirements
- ETL verified to TIA 568-C.2 Cat 6
- Category 6 component compliant
- 110-style IDC contacts exceed TIA 568-C.2 requirements
- Mounting flexibility
- Large, easy-to-read color-coded labels
- Universal T568A/B wiring for easy installation
- Long-term application confidence
- Backward compatible, Cat 3, 5, & 5e compliant
- TERMA Grip conductor retention for easy wiring
- Fits all OCC Keystone faceplates and surface mount boxes
- Slim-line design allows up to 48-ports in 1RU
- Insulation resistance 500  $M\Omega$  minimum
  - Dielectric withstand 1000 VAC RMS, AC 60 Hz or 1414 VDC P-P
  - DC current rating 1.5 A per conductor at 20°C ambient de-rated to 0.75 A at 60°C ambient
- Compliant with Power over Ethernet (PoE+) requirements
- One-piece stuffer cap included

### **KMJ Category 6 Jacks**

CATALOG NUMBER	DESCRIPTION
KMJA6xx	KMJ Category 6 jack, universal 568A/B wiring
KMJA650xx	KMJ Category 6 jack, universal 568A/B wiring, 50 pack
KMJA602S	KMJ Category 6 shielded jack, slim-line, universal 568A/B wiring
Replace "xx" with color code.	





- 1000BASE-T Gigabit Ethernet
- 100BASE-TX Fast Ethernet
- 100 Mbps TP-PMD
- 155/622/1000 Mbps ATM
- 10BASE-T Ethernet
- Broadband Video
- 4/16 Mbps Token Ring
- Voice
- All other applications developed for operation over Category 6 cabling

(6.2a) Category 6 – Jacks

#### Category 6 UMJ Jacks

OCC's Category 6 jacks are world-class performers with patented printed circuit board technology to provide true Category 6 component performance on all pair combinations. With a standard 110-style punch-down termination, our Category 6 UMJ style jacks are manufactured to comply with TIA component performance requirements and are ETL verified to TIA 568-C.2 Cat 6 standards.

- Meets IEC 60603-7 requirements
- 110-style IDC contacts exceed TIA 568-C.2 requirements
- ETL verified to TIA 568-C.2 Category 6
- Backward compatible, Cat 3, 5, and 5e compliant
- Full 6-position, modular plug compatible with bezel
- Universal T568A/B wiring for easy installation
- TERMA Grip conductor retention for easy wiring
- Available with 20 labeling and color options
- Secure mounting locks jack into faceplate
- Fits all OCC UMJ faceplates and surface mount boxes
- Insulation resistance 500 MΩ minimum
  - Dielectric withstand 1000 VAC RMS, AC 60 Hz or 1414 VDC P-P
  - DC current rating 1.5 A per conductor at 20°C ambient de-rated to 0.75 A at 60°C ambient
- Compliant with Power over Ethernet (PoE+) requirements
- One-piece stuffer cap included

### Category 6 UMJ Jacks

CATALOG NUMBER	DESCRIPTION
UMJA6	UMJ Category 6 Jack, universal 568A/B wiring, no bezel
UMJA6xx	UMJ Category 6 Jack, universal 568A/B wiring, colored bezel
UMJA650xx	UMJ Category 6 Jack, universal 568A/B wiring, 50 pack
Replace "xx" with color code.	

"XX" COLOR CODES	
00 – Electrical Ivory	07 – White
01 – Office White	08 – Orange
02 – Black	09 – Yellow
03 – Red	10 – Purple
04 – Green	11 – Brown
05 – Blue	12 – Bright White
06 – Data Gray	



- 1000BASE-T Gigabit Ethernet
- 100BASE-TX Fast Ethernet
- 100 Mbps TP-PMD
- 155/622/1000 Mbps ATM
- 10BASE-T Ethernet
- **Broadband Video**
- 4/16 Mbps Token Ring
- All other applications developed for operation over Category 6 cabling



(6.2b) Category 6 – Patch Panels

### **Category 6 Patch Panels**

When Category 6 was introduced to the market, OCC brought a product offering that was designed to exceed industry expectations and surpass the governing standards. We created Category 6 connectivity components that offered patented technology and guaranteed bandwidth performance. OCC's Category 6 patch panels were no exception. Developed to offer true performance, our Category 6 patch panels are truly standards compliant.

- Category 6 component compliant
- 610 punch-down block
- ETL verified to TIA 568.C-2 Category 6
- Power-safe modular jack contacts
- OCC patented PCB technology
- Backward compatible, Cat 3, 5, & 5e
- Mounting flexibility
- Removable cable strain-relief bar attaches directly to panel
- All-steel panel (no plastic frames) ensures panel rigidity and reliable terminations
- IKON compatible 12 colors
- Universal T568A/B wiring for easy installation
- 6-Port component modules
- Write-on label fields
- Rigid box-section panel construction
- Long-term application confidence
- Compliant with Power over Ethernet (PoE+) requirements
- Insulation resistance 500 MΩ minimum
  - Dielectric withstand 1000 VAC RMS, AC 60 Hz or 1414 VDC P-P
  - DC current rating 1.5 A per conductor at 20°C ambient de-rated to 0.75 A at 60°C ambient



### **Applications**

- 1000BASE-T Gigabit Ethernet
- 100BASE-TX Fast Ethernet
- 100 Mbps TP-PMD
- 155/622/1000 Mbps ATM
- 10BASE-T Ethernet
- Broadband Video
- 4/16 Mbps Token Ring
- Voice
- All other applications developed for operation over Category 6 cabling

### **Category 6 Patch Panels**

CATALOG NUMBER	DESCRIPTION
PP12SIX	Wall-mount patch panel, 568A/B wired, 12-port, 89D bracket
PP1288/110A6	Wall-mount patch panel, 568A/B wired, 12-port
PP2488/110A6	Wall-mount patch panel, 568A/B wired, 24-port
DCC1288/110SIX	Rack-mount patch panel, 568A/B wired, 12-port, 1RU
DCC1688/110SIX	Rack-mount patch panel, 568A/B wired, 16-port, 1RU
DCC2488/110SIX	Rack-mount patch panel, 568A/B wired, 24-port, 1RU
DCC3288/110SIX	Rack-mount patch panel, 568A/B wired, 32-port, 2RU
DCC4888/110SIX	Rack-mount patch panel, 568A/B wired, 48-port, 2RU
DCC6488/110SIX	Rack-mount patch panel, 568A/B wired, 64-port, 4RU
DCC9688/110SIX	Rack-mount patch panel, 568A/B wired, 96-port, 4RU
DCC12088/110SIX	Rack-mount patch panel, 568A/B wired, 120-port, 5RU
DCC1688/110SIX-S	Rack-mount patch panel, 16-port, KMJ shielded jacks, 1RU
DCC2488/110SIX-S	Rack-mount patch panel, 24-port, KMJ shielded jacks, 2RU
DCC3288/110SIX-S	Rack-mount patch panel, 32-port, KMJ shielded jacks, 2RU
DCC4888/110SIX-S	Rack-mount patch panel, 48-port, KMJ shielded jacks, 2RU
ACC2488/110SIX	Rack-mount patch panel, angled, 568A/B wired, 24-port, 1RU
ACC4888/110SIX	Rack-mount patch panel, angled, 568A/B wired, 48-port, 2RU





PP1288/110A6 and PP2488/110A6



(6.2c) Category 6 - Modular Patch Cords

### Category 6 Patch Cords

OCC's Category 6 patch and workstation cords are the perfect complement to any OCC Category 6 copper system. In addition, our Category 6 patch cords utilize straight-through pair orientation and are 100% component performance tested. OCC's test methods have formed the basis for standard patch cord component testing methods in TIA 568-C.2 Category 6 standards.

- 100% component performance tested
- Exceeds TIA 568-C.2 Cat 6 specifications
- Customizable lengths and colors available
- Shielded version available
- Compliant with Power over Ethernet (PoE+) requirements
- Insulation resistance 500  $M\Omega$  minimum

Category 6 Patch Cords

- Dielectric withstand 1000 VAC RMS, AC 60 Hz or 1414 VDC P-P
- DC current rating 1.5 A per conductor at 20°C ambient de-rated to 0.75 A at 60°C ambient
- Centered modular plugs
- Slim-line strain-relief boot
- Snagless design



CATALOG NUMBER	DESCRIPTION
PCSIXxxyy	Category 6 UTP patch cord without boot
PCSIXxxByy	Category 6 UTP patch cord with boot
PCSIXSxxByy	Category 6 shielded patch cord with boot
Replace "xx" with length in feet; replace "yy" with color code – <b>06</b> = gray, <b>09</b> = yellow Ex: PCSIX03B09 = Category 6 patch cord, 3 feet, with boot, yellow	

Additional colors available. Contact OCC for ordering information.

### **Applications**

- 1000BASE-T Gigabit Ethernet
- 100BASE-TX Fast Ethernet
- 10BASE-T Ethernet
- **Broadband Video**
- 155/622 Mbps ATM
- 100 Mbps TP-PMD
- 4/16 Mbps Token Ring
- Voice
- All applications developed for operation over Category 6 or class E cabling

PART NUMBER OUTSIDE THE US	DESCRIPTION
IPCSIXxxxByy	Category 6 patch cord with boot, UTP, PVC, class E
IPCSIXxxxByyLZH	Category 6 patch cord with boot, UTP, LSZH, class E
ISPCSIXxxxByy	Category 6 patch cord with boot, shielded, PVC, class E
ISPCSIXxxxByyLZH	Category 6 patch cord with boot, shielded, LSZH, class E
Replace "xxx" with length in feet; replace "yy" with color code – <b>06</b> = gray, <b>09</b> = yellow Ex: IPCSIX003B06 = Category 6 patch cord, 3 meters, with boot, gray	

Additional colors available. Contact OCC for ordering information.



**3** 

(6.2d) Category 6 - 110 Blocks

### **Category 6 110 Wiring Products**

Whether installing a Category 5e or Category 6 system, OCC offers a complete solution with 110 block connectivity. OCC's 110 product line offers easy network cabling consolidation and quick transitions with maximum performance. From wall-mount to rack-mount 110 blocks and cable organizers, OCC's selection of products offer customers a solid backbone for an exceptional structured wiring solution.

- Exceeds industry standards for Category 6 specifications
- 110 blocks may be field terminated with 22-26 AWG solid wire
- Color-coded pairs for easy identification
- Designation labels included
- Order with legs when back-case routing
- Order without legs when depth is limited or when frame mounting
- 110 block may be kitted for easy installation



#### **Category 6 110 Wiring Products**

CATALOG NUMBER	DESCRIPTION
C64-10	Category 6 110 C-4 connector blocks
DCC48/110SIX*	Category 6 wall-mount 110 block, 48-pair, without legs
DCC48/110SIXL*	Category 6 wall-mount 110 block, 48-pair, with legs
DCC96/110SIX*	Category 6 wall-mount 110 block, 96-pair, without legs
DCC96/110SIXL*	Category 6 wall-mount 110 block, 96-pair, with legs
DCC288/110SIX*	Category 6 wall-mount 110 block, 288-pair, without legs
DCC288/110SIXL*	Category 6 wall-mount 110 block, 288-pair, with legs
DCC288/110SIXTWB	Category 6 wall-mount 110 tower, 288-pair, mounting frame
DCC288/110SIXTEXP	Category 6 wall-mount 110 tower, 288-pair, extension mounting frame
DCC96/110SIXRK	Category 6 rack-mount 110 block, kitted 96-pair
DCC192/110SIXRK	Category 6 rack-mount 110 block, kitted 192-pair
DCC288/110SIXRK	Category 6 rack-mount 110 block, kitted 288-pair
*Place a "K" at the end of the part number for a complete kit.  Ex: DCC48/110SIXLK = Category 6 wall-mount 110 block with legs and connectors	

#### Category 6 110 Block Cable Organizers

CATALOG NUMBER	DESCRIPTION
COH110	Wall-mount horizontal cable organizer without legs
COH110L	Wall-mount horizontal cable organizer with legs
DCC300/110EFSTHVCM	Wall-mount vertical cable organizer, for 110 tower
DCC300/110EFSTVCM	Wall-mount vertical cable organizer extension, for 110 tower
COH110R	Rack-mount horizontal cable organizer, 19" width

- 1000BASE-T Gigabit Ethernet
- 100BASE-TX Fast Ethernet
- 10BASE-T Ethernet
- Broadband Video
- 155/622/1000 Mbps ATM
- 100 Mbps TP-PMD
- 100 VG AnyLAN
- Voice



(6.3a) Category 5e – Jacks

#### Category 5e KMJ Jacks

The OCC Category 5e Keystone Modular Jack is a great alternative for high-density applications. Featuring a lower profile and a snap-in design, the KMJ Category 5e jacks by OCC offer exceptional performance that exceeds industry standards. Offering universal T568A/B wiring and component compliance to Cat 5e specifications, these Keystone jacks may be ordered with OCC's patented PC board technology or in a leadframe configuration for cost-effective solutions.

- Meets IEC 60603-7 requirements
- 110-style IDC contacts meet TIA 568-C.2 requirements
- Backward compatible, Cat 3, and Cat 5 compliant
- Universal T568A/B wiring for easy installation
- Available in 12 color options
- Fits all OCC Keystone faceplates and surface mount boxes
- Compliant with Power over Ethernet (PoE+) requirements
- Insulation resistance 500  $M\Omega$  minimum
  - Dielectric withstand 1000 VAC RMS, AC 60 Hz or 1414 VDC P-P
  - DC current rating 1.5 A per conductor at 20°C ambient de-rated to 0.75 A at 60°C ambient
- One-piece stuffer cap included



CATALOG NUMBER	DESCRIPTION
KMJA5Exx	KMJ Category 5e jack, universal 568A/B wiring
KMJA5E50xx	KMJ Category 5e jack, universal 568A/B wiring, 50 pack
KMJVL8A/Bxx	KMJ Category 5e leadframe jack, universal 568A/B wiring
KMJVL8A/B50xx	KMJ Category 5e leadframe jack, universal 568A/B wiring, 50 pack
KMJVL8A/B02S	KMJ Category 5e leadframe shielded jack, universal 568A/B wiring
Replace "xx" with color code.	

"XX" COLOR CODES	
00 – Electrical Ivory	07 – White
01 – Office White	08 – Orange
02 – Black	09 – Yellow
03 – Red	10 – Purple
04 – Green	11 – Brown
05 – Blue	12 – Bright White
06 – Data Gray	



- 1000BASE-T Gigabit Ethernet
- 100BASE-TX Fast Ethernet
- 10BASE-T Ethernet
- **Broadband Video**
- 270 Mbps digital video
- 155/622 Mbps ATM
- 100 Mbps TP-PMD
- 4/16 Mbps Token Ring
- Voice





(6.3a) Category 5e – Jacks

#### Category 5e UMJ Jacks

OCC's Category 5e Bezel Jacks utilize our patented PC board technology to exceed the TIA 568-C.2 Cat 5e requirements with headroom to spare. For a more cost-effective solution, OCC also offers a Leadframe Bezel Jack that utilizes our patented Leadframe technology. 110-style punch downs accommodate 22 AWG solid through 26 AWG solid and 24 AWG stranded conductors and each OCC jack offers universal T568A/B wiring and performance enhancements to exceed industry standards.

- Meets IEC 60603-7 requirements
- 110-style IDC contacts meet TIA 568-C.2 requirements
- Backward compatible, Cat 3, and Cat 5 compliant
- Full 6-position, modular plug compatible with bezel
- Universal T568A/B wiring for easy installation
- Available with 20 labeling and color options
- Secure mounting locks jack into faceplate
- Fits all OCC UMJ faceplates and surface mount boxes
- Compliant with Power over Ethernet (PoE+) requirements
- Insulation resistance 500 MΩ minimum
  - Dielectric withstand 1000 VAC RMS, AC 60 Hz or 1414 VDC P-P
  - DC current rating 1.5 A per conductor at 20°C ambient de-rated to 0.75 A at 60°C ambient
- One-piece stuffer cap included



#### **UMJ Jacks**

CATALOG NUMBER	DESCRIPTION
UMJA5E	UMJ Category 5e jack, universal 568A/B wiring, no bezel
UMJA5Exx	UMJ Category 5e jack, universal 568A/B wiring, colored bezel
UMJA5E50xx	UMJ Category 5e jack, universal 568A/B wiring, 50-pack
UMJVL8A/B	UMJ Category 5e leadframe jack, universal 568A/B wiring, no bezel
UMJVL8A/Bxx	UMJ Category 5e leadframe jack, universal 568A/B wiring, colored bezel
UMJVL8A/B50xx	UMJ Category 5e leadframe jack, universal 568A/B wiring, 50-pack
Replace "xx" with	color code.

"XX" COLOR CODES	
00 – Electrical Ivory	07 – White
01 – Office White	08 – Orange
02 – Black	09 – Yellow
03 – Red	10 – Purple
04 – Green	11 – Brown
05 – Blue	12 – Bright White
06 – Data Gray	

- 1000BASE-T Gigabit Ethernet
- 100BASE-TX Fast Ethernet
- 10BASE-T Ethernet
- Broadband Video
- 155/622 Mbps ATM
- 100 Mbps TP-PMD
- 4/16 Mbps Token Ring
- Voice



(6.3b) Category 5e – Patch Panels

### Category 5e 110-Style Patch Panels

OCC's Category 5e patch panels incorporate our best design and application performance specifications ever. The Category 5e product line provides unmatched performance in premises connectivity. Designed for the most demanding network applications, OCC Category 5e patch panels offer customers the highest level of headroom to any Category 5e link or channel specification.

- Comfortably exceeds TIA 568-C.2 Cat 5e requirements
- ISO/IEC60603-7 compliant
- Patented PC board technology
- Constructed of cold rolled steel for durability
- Rigid design provides solid frame for high-impact punch-down tools
- Universal TIA 568A/B wiring configuration
- IDC's rated for 200 wire insertions
- Write-on label fields
- IKON compatible 12 colors
- Cable strain-relief bar provided
- Compliant with Power over Ethernet (PoE+) requirements
- Insulation resistance 500  $M\Omega$  minimum
  - Dielectric withstand 1000 VAC RMS, AC 60 Hz or 1414 VDC P-P
  - DC current rating 1.5 A per conductor at 20°C ambient de-rated to 0.75 A at 60°C ambient



#### Category 5e Patch Panels

CATALOG NUMBER	DESCRIPTION
PP12A5E	Wall-mount patch panel, 568A/B wired, 12-port, with 89D bracket
PP1288/110A5E	Wall-mount patch panel, 568A/B wired, 12-port
PP2488/110A5E	Wall-mount patch panel, 568A/B wired, 24-port
DCC1288/110A5E	Rack-mount patch panel, 568A/B wired, 12-port, 1RU
DCC1688/110A5E	Rack-mount patch panel, 568A/B wired, 16-port, 1RU
DCC2488/110A5E	Rack-mount patch panel, 568A/B wired, 24-port, 1RU
DCC3288/110A5E	Rack-mount patch panel, 568A/B wired, 32-port, 2RU
DCC4888/110A5E	Rack-mount patch panel, 568A/B wired, 48-port, 2RU
DCC6488/110A5E	Rack-mount patch panel, 568A/B wired, 64-port, 4RU
DCC9688/110A5E	Rack-mount patch panel, 568A/B wired, 96-port, 4RU
DCC12088/110A5E	Rack-mount patch panel, 568A/B wired, 120-port, 5RU
ACC2488/110A5E	Rack-mount patch panel, angled, 568A/B wired, 24-port, 1RU
ACC4888/110A5E	Rack-mount patch panel, angled, 568A/B wired, 48-port, 2RU



- 1000BASE-T Gigabit Ethernet
- 100BASE-TX Fast Ethernet
- 10BASE-T Ethernet
- Broadband video
- 270 Mbps digital video
- 155/622 Mbps ATM
- 100 Mbps TP-PMD
- 4/16 Mbps Token Ring
- Voice



PP1288/110A5E and PP2488/110A5E



**3** 

(6.3b) Category 5e - Patch Panels

### Category 5e - Shielded 110-Style

OCC's shielded Category 5e patch panels provide superior performance with an extra sense of security. A removable cover protects against external noise while also offering easy access for termination.

- Comfortably exceeds TIA 568-C.2 Category 5e standards
- ISO/IEC60603-7 compliant
- Fully shielded RJ45 jacks
- Patented PC board technology
- Rigid design provides solid frame for high-impact punch-down tools
- 110-style punch down for easy terminations
- IDC's rated for 200 wire insertions
- Write-on label fields
- IKON compatible 12 colors
- Removable cable strain-relief bar attaches directly to panel
- Removable cover for protection from EMI and RFI emissions
- Compliant with Power over Ethernet (PoE+) requirements
- Insulation resistance 500 MΩ minimum
  - Dielectric withstand 1000 VAC RMS, AC 60 Hz or 1414 VDC P-P
  - DC current rating 1.5 A per conductor at 20°C ambient de-rated to 0.75 A at 60°C ambient

# **Applications**

- 1000BASE-T Gigabit Ethernet
- 100BASE-TX Fast Ethernet
- 10BASE-T Ethernet
- Broadband video
- 270 Mbps digital video
- 155/622 Mbps ATM
- 100 Mbps TP-PMD
- 4/16 Mbps Token Ring
- Voice



### **Category 5e Shielded Patch Panels**

CATALOG NUMBER	DESCRIPTION
DCC1688/110S01	Rack-mount patch panel, shielded 110-style, 568B wired, 8-port modules, 16-port, 1RU
DCC1688/110S03	Rack-mount patch panel, shielded 110-style, 568A wired, 8-port modules, 16-port, 1RU
DCC2488/110SAB	Rack-mount patch panel, shielded, 110-style, 568A/B wired, 8-port modules, 24-port, 1RU



(6.3c) Category 5e - Cable Assemblies

# Category 5e Patch Cords

OCC's Category 5e patch cords are manufactured to strict standards and individually performance tested to comply with TIA 568-C.2 component performance requirements. After all, OCC's test methods for patch cord component testing have helped form the basis for the Category 5e standards. This commitment to guaranteed performance is what makes our Category 5e patch cords an excellent addition to any OCC Category 5e structured cabling system.

- 100% component performance tested
- Exceeds TIA 568-C.2 Category 5e requirements
- Customizable lengths and colors available
- Compliant with Power over Ethernet (PoE+) requirements
- Insulation resistance 500  $M\Omega$  minimum
  - Dielectric withstand 1000 VAC RMS, AC 60 Hz or 1414 VDC P-P
  - DC current rating 1.5 A per conductor at 20°C ambient de-rated to 0.75 A at 60°C ambient



#### **Applications**

- 1000BASE-T Gigabit Ethernet
- 100BASE-TX Fast Ethernet
- 10BASE-T Ethernet
- **Broadband Video**
- 155/622 Mbps ATM
- 100 Mbps TP-PMD
- 4/16 Mbps Token Ring
- All applications developed for operation over Category 5e or class D cabling

### Category 5e Patch Cords

CATALOG NUMBER	DESCRIPTION
PC5EBxxyy	Category 5e patch cord without boot, UTP
PC5EBxxByy	Category 5e patch cord with boot, UTP
Replace "xx "with length in feet; replace "yy" with color code – <b>06</b> = gray, <b>09</b> = yellow Ex: PC5EB03B09 = Category 5e patch cord, 3 feet, with boot, yellow	

Additional colors available. Contact OCC for ordering information.

PART NUMBER OUTSIDE THE US	DESCRIPTION
IPC5ExxxByy	Category 5e patch cord with boot, UTP, PVC, class D
IPC5ExxxByyLZH	Category 5e patch cord with boot, UTP, LSZH, class D
ISPC5ExxxByy	Category 5e patch cord with boot, shielded, PVC, class D
ISPC5ExxxByyLZH	Category 5e patch cord with boot, shielded, LSZH, class D
Replace "xxx "with length in feet; replace "yy" with color code – <b>06</b> = gray, <b>09</b> = yellow **Ex: IPC5E003B06 = Category 5e patch cord, 3 meters, with boot, gray	

Additional colors available. Contact OCC for ordering information.



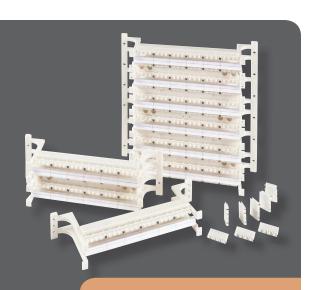
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(6.3d) Category 5e - 110 Blocks

### Category 5e 110 Blocks

Whether installing a Category 5e or Category 6 system, OCC offers a complete solution with 110 block connectivity. OCC's 110 product line offers easy network cabling consolidation and quick transitions with maximum performance. From wall-mount to rack-mount 110 blocks and cable organizers, OCC's selection of products offer customers a solid backbone for an exceptional structured wiring solution.

- Exceeds industry standards for Category 5e specifications
- 110 blocks may be field terminated with 22-26 AWG solid wire
- Color-coded pairs for easy identification
- Designation labels included
- Order with legs when back-case routing
- Order without legs when depth is limited or when frame mounting
- 110 block may be kitted for easy installation



#### **Category 5e 110 Wiring Products**

CATALOG NUMBER	DESCRIPTION	
C410	Category 5e 110 C-4 connector blocks	
C510	Category 5e 110 C-5 connector blocks	
DCC50/110EFS*	Category 5e wall-mount 110 block, 50-pair, without legs	
DCC50/110EFSL*	Category 5e wall-mount 110 block, 50-pair, with legs	
DCC100/110EFS*	Category 5e wall-mount 110 block, 100-pair, without legs	
DCC100/110EFSL*	Category 5e wall-mount 110 block, 100-pair, with legs	
DCC300/110EFS*	Category 5e wall-mount 110 block, 300-pair, without legs	
DCC300/110EFSL*	Category 5e wall-mount 110 block, 300-pair, with legs	
DCC300/110EFSTWB	Category 5e wall-mount 110 tower, 300-pair, mounting frame	
DCC300/110EFSTEXP	Category 5e wall-mount 110 tower, 300-pair, extension mounting frame	
DCC100/110EFSRK	Category 5e rack-mount 110 block, kitted 100-pair	
DCC200/110EFSRK	Category 5e rack-mount 110 block, kitted 200-pair	
DCC300/110EFSRK	Category 5e rack-mount 110 block, kitted 300-pair	
*Place a "K" at the end of the part number for a complete kit.		

<sup>\*</sup>Place a "K" at the end of the part number for a complete kit. Ex: DCC48/110EFSLK = Category 5e wall-mount 110 block with legs and connectors

### Cable Organizers

CATALOG NUMBER	DESCRIPTION
COH110	Wall-mount horizontal cable organizer without legs
COH110L	Wall-mount horizontal cable organizer with legs
DCC300/110EFSTHVCM	Wall-mount vertical cable organizer, for 110 tower
DCC300/110EFSTVCM	Wall-mount vertical cable organizer extension, for 110 tower
COH110R	Rack-mount horizontal cable organizer, 19" width

- 1000BASE-T Gigabit Ethernet
- 100BASE-TX Fast Ethernet
- 10BASE-T Ethernet
- Broadband Video
- 155/622/1000 Mbps ATM
- 100 Mbps TP-PMD
- 4/16 Mbps Token Ring
- Voice





(6.4a) Voice Products - Jacks

### Category 3 KMJ Voice Grade Jacks

For voice-grade applications, OCC offers a Keystone Modular Jack that exceeds performance specifications to any Category 3 requirement. OCC's KMJ Category 3 Jacks offer easy installations with 110-style terminations on back for 26, 24, and 22 AWG solid conductors and deliver unsurpassed performance, keeping with OCC's guarantee for consistent performance.

- Meets IEC 60603-7 requirements
- 110-style IDC contacts
- Available in 12 color options
- Fits all OCC Keystone faceplates and surface mount boxes
- Compliant with Power over Ethernet (PoE+) requirements
- Insulation resistance 500 M $\Omega$  minimum
  - Dielectric withstand 1000 VAC RMS, AC 60 Hz or 1414 VDC P-P
  - DC current rating 1.5 A per conductor at 20°C ambient de-rated to 0.75 A at 60°C ambient
- One-piece stuffer cap included



#### **KMJ Category 3 Jacks**

CATALOG NUMBER	DESCRIPTION	
KMJL8A/Bxx	KMJ jack 568A/B, 8x8 leadframe, 110-style	
KMJL06Uxx	KMJ jack USOC, 6x6 leadframe, 110-style	
Replace "xx" with color code below.		

# Category 3 UMJ Voice-Grade Jacks

OCC's Category 3 Jacks offer customers OCC's patented Leadframe technology for a cost-effective solution to voice-grade systems. 110-style IDC connectors on back for 26, 24, and 22 AWG solid conductors make OCC's Category 3 Jacks easy to install and offer unmatched performance. Add the locking color/icon bezel to provide distinctive jack identification.

- Meets IEC 60603-7 requirements
- 110-style IDC contacts
- Available with 20 labeling and color options
- Secure mounting locks jack into faceplate
- Fits all OCC UMJ faceplates and surface mount boxes
- Compliant with Power over Ethernet (PoE+) requirements
- Insulation resistance 500  $M\Omega$  minimum
  - Dielectric withstand 1000 VAC RMS, AC 60 Hz or 1414 VDC P-P
  - DC current rating 1.5 A per conductor at 20°C ambient de-rated to 0.75 A at 60°C ambient
- One-piece stuffer cap included



#### **UMJ Category 3 Jacks**

CATALOG NUMBER	DESCRIPTION	
UMJL06U	USOC 6x6 leadframe, 110-style, no bezel	
UMJL06Uxx	USOC 6x6 leadframe, 110-style, colored bezel	
UMJL08U	USOC 8x8 leadframe, 110-style, no bezel	
UMJL08Uxx	USOC 8x8 leadframe, 110-style, colored bezel	
UMJL08A/B	568A/B, 8x8 leadframe, 110-style, no bezel	
UMJL08A/Bxx	568A/B, 8x8 leadframe, 110-style, colored bezel	
Replace "xx" with color code.		

"XX"COLOR CODES		
00 – Electrical Ivory	07 – White	
01 – Office White	08 – Orange	
02 – Black	09 – Yellow	
03 – Red	10 – Purple	
04 – Green	11 – Brown	
05 – Blue	12 – Bright White	
06 – Data Gray		



(6.4b) Voice Products - Patch Panels

#### Voice-Grade Telco

The same cross-connect solutions available for Ethernet applications are also available for PBX equipment. For these applications, OCC offers Voice-Grade Telco Patch Panels, which break out to 24-RJ45 jacks. Customers can easily patch their phone system into the permanent link by simply using patch cords and open-ended cable assemblies punched down to a 110 block, 66 block, or 110 patch panel.

- Patented PC board technology
- Constructed of extruded aircraft -grade aluminum
- 25-pair Telco connectors allow for quick connects and easy installations
- Write-on label fields
- IKON compatible 12 colors
- Compliant with Power over Ethernet (PoE+) requirements
- Insulation resistance 500  $M\Omega$  minimum
  - Dielectric withstand 1000 VAC RMS, AC 60 Hz or 1414 VDC P-P
  - DC current rating 1.5 A per conductor at 20°C ambient de-rated to 0.75 A at 60°C ambient



#### **Voice-Grade Telco Patch Panels**

CATALOG NUMBER	DESCRIPTION	
DCC2462/2502	Rack-mount patch panel, telco interface panel, 6-pos., 2-wire, USOC, 24-port	
DCC2464/2502	Rack-mount patch panel, telco interface panel, 6-pos., 4-wire, USOC, 24-port	
DCC2482/2502	Rack-mount patch panel, telco interface panel, 8-pos., 2-wire, USOC, 24-port	
DCC2482/VG224	Rack-mount patch panel, telco interface panel, 8-pos., 2-wire, USOC, 24-port, numbered 0–23 consistent with Cisco VG224 analog module	

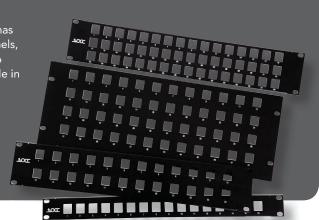


(6.5a) Multimedia Panels

# **Snap-in Multimedia Panels**

The ability to be flexible and adaptable to each customer's unique needs has been OCC's specialty for years. With OCC's Snap-In Multimedia patch panels, any combination of UMJ or KMJ style jacks and adapters can be chosen to configure a custom patch panel. All multimedia patch panels are mountable in any 19" rack.

- Panel designs to accept either UMJ or KMJ jacks and adapters
- Constructed of extruded aircraft-grade aluminum for durability
- Write-on label fields
- IKON compatible 12 colors
- Compliant with Power over Ethernet (PoE+) requirements



### **Snap-In Multimedia Patch Panels**

CATALOG NUMBER	RU	DESCRIPTION	
AK16	1	Rack-mount field configurable panel, KMJ, 16-port	
AK24*	1	Rack-mount field configurable panel, KMJ, 24-port	
AK48H*	2	Rack-mount field configurable panel, KMJ, 48-port	
AK481U*	1	Rack-mount field configurable panel, KMJ, 48-port	
ACC16K	1	Rack-mount field configurable panel, angled KMJ, 16-port	
ACC24K*	1	Rack-mount field configurable panel, angled KMJ, 24-port	
ACC48K*	2	Rack-mount field configurable panel, angled KMJ, 48-port	
ACC48K1U*	1	Rack-mount field configurable panel, angled KMJ, 48-port	
AKXG241U	1	Rack-mount field configurable panel, KMJ, 24-port, for 6A systems	
ACCXG24K	1	Rack-mount field configurable panel, angled KMJ, 24-port, for 6A systems	
AK16STP▲	1	Rack-mount field configurable panel, shielded, KMJ, 16-port	
AK24STP▲	1	Rack-mount field configurable panel, shielded, KMJ, 24-port	
AK48STP▲	2	Rack-mount field configurable panel, shielded, KMJ, 48-port	
ACC16KS▲	1	Rack-mount field configurable panel, shielded, angled, KMJ, 16-port	
ACC24KS▲	1	Rack-mount field configurable panel, shielded, angled, KMJ, 24-port	
ACC48KS▲	2	Rack-mount field configurable panel, shielded, angled, KMJ, 48-port	
ACC48KS1U▲	1	Rack-mount field configurable panel, shielded, angled, KMJ, 48-port	
A16	1	Rack-mount field configurable panel, UMJ, 16-port	
A24	2	Rack-mount field configurable panel, UMJ, 24-port	
A32	2	Rack-mount field configurable panel, UMJ, 32-port	
A48	3	Rack-mount field configurable panel, UMJ, 48-port	
A48H	2	Rack-mount field configurable panel, UMJ, 48-port	
ACC24U*	1	Rack-mount field configurable panel, angled, UMJ, 24-port	
ACC48U*	2	Rack-mount field configurable panel, angled, UMJ, 48-port	

<sup>\*</sup> Not recommended for 6A UTP applications

<sup>▲</sup> Recommended only for shielded connectivity



**3** 

(6.6a) Pre-Terminated Copper

### **Gigabit Ethernet Telco**

High-speed data connections are essential for keeping pace with today's business climate. OCC took this into consideration when developing patch panels that offered 1000BASE-T Gigabit Ethernet performance. Not only does the performance exceed industry standards, OCC's Gigabit Ethernet Patch Panels are 100% component tested in the factory, guaranteeing the customer worry-free installations.

- Exceeds TIA 568-C.2 specifications
- ISO/IEC60603-7 compliant
- Patented PC board technology
- All-steel construction for durability
- Each female Telco connector is split out to 6 RJ45 ports in TIA T568A or T568B configuration supporting 1000BASE-T applications
- Fast and easy installations
- Write-on label fields
- Fully adjustable cable management support bar and bend radius requirements
- IKON compatible 12 colors
- Use with OCC Telco Category 5e cable assemblies
- Compliant with Power over Ethernet (PoE+) requirements
- Insulation resistance 500 MΩ minimum
  - Dielectric withstand 1000 VAC RMS, AC 60 Hz or 1414 VDC P-P
  - DC current rating 1.5 A per conductor at 20°C ambient de-rated to 0.75 A at 60°C ambient



PP1288/25V03 and PP2488/25V03





### **Applications**

- 1000BASE-T Gigabit Ethernet
- 100BASE-TX Fast Ethernet
- 10BASE-T Ethernet
- Broadband video
- 155/622 Mbps ATM
- 100 Mbps TP-PMD
- 4/16 Mbps Token Ring
- Voice

### **Category 5e Gigabit Ethernet Patch Panels**

CATALOG NUMBER	DESCRIPTION
PP1288/25V03	Wall-mount patch panel, gigabit telco, 568A wired, 12-port
PP1288/25V01	Wall-mount patch panel, gigabit telco, 568B wired, 12-port
PP2488/25V03	Wall-mount patch panel, gigabit telco, 568A wired, 24-port
PP2488/25V01	Wall-mount patch panel, gigabit telco, 568B wired, 24-port
DCC24A/GBASET21	Rack-mount patch panel, gigabit telco, 568A wired, 24-port with cover
DCC24B/GBASET21	Rack-mount patch panel, gigabit telco, 568B wired, 24-port with cover
DCC48A/GBASET21	Rack-mount patch panel, gigabit telco, 568A wired, 48-port with cover
DCC48B/GBASET21	Rack-mount patch panel, gigabit telco, 568B wired, 48-port with cover
DCC2488/25S-01	Rack-mount patch panel, shielded gigabit telco, 568B wired, 24-port with cover
ACC2488/25V01	Rack-mount patch panel, angled, gigabit telco, 568B wired, 24-port, 1RU
ACC4888/25V01	Rack-mount patch panel, angled, gigabit telco, 568B wired, 48-port, 2RU

(6.6a) Pre-Terminated Copper

#### Category 5e Cable Assemblies

As the industry demands systems with faster installation times and less network interruption, OCC developed a modular solution to meet those specific communications cabling needs. Using 25-pair Category 5e Telco cable assemblies coupled with our Category 5e Telco patch panels, OCC created a solution that is as simple as Plug-and-Play. OCC's 25-pair Telco cable assemblies make moves/ adds/changes more flexible, prevent air-passage restriction and keep data throughput rates from being interrupted.

Each 25-pair assembly is designed to support new interface technology of leading switch manufacturers. Constructed to exceed EIA/ TIA Category 5e specifications, OCC's Telco assemblies offer guaranteed Gigabit Ethernet throughput. From rack-mount to zone distribution, OCC's PowerSum-Rated 5e assemblies offer a wide variety of options to meet 10/100 and Gigabit Ethernet solutions.

- Exceeds TIA Category 5e specifications
- Utilizes UL certified Cat 5e 25-pair cable
- Cable assemblies are 100% performance tested
- All Telco-to-Telco assemblies are male-to-male
- All Hydra cable assemblies are manufactured with precise leg measurements to span 19" racks or a stand-alone switch
- Works with high-density 48-port blades
- 50-pin Telco connectors available in 120° or 180° cable exit angles
- Available with right, left, or straight connectors plenum or
- Shielded 25-pair cable assemblies also available



- 1000BASE-T Gigabit Ethernet

- **Broadband Video**
- 155 Mbps ATM
- 100 Mbps TP-PMD
- 4/16 Mbps Token Ring
- Voice



#### Telco-to-Telco Cable Assemblies

#### 25-Pair Telco-to-Telco Cable Assemblies



Example: 25PA/TR-TR-5E-100 =

25-pair cable assembly with Telco Right to Telco Right, Cat 5e riser, 100 feet

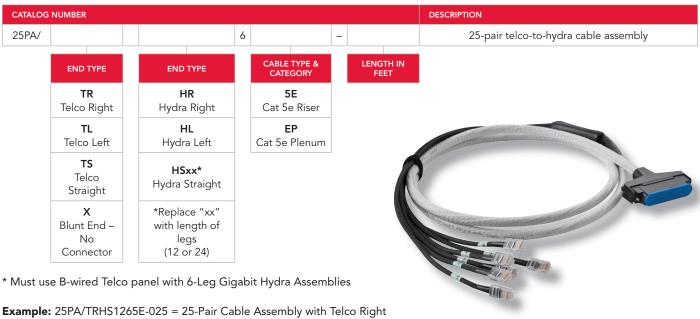




(6.6a) Pre-Terminated Copper

#### **Hydra Cable Assemblies**

25-Pair Telco-to-Gigabit Hydra Cable Assemblies (6 Legs)



to Gigabit Hydra Straight, 6 Legs at 12", Cat 5e Riser, 25 Feet

#### 25-Pair Telco to 10/100 Hydra Cable Assemblies (12 Legs)



**Example:** 25PA/TRHS24-5E-050 = 25-pair cable assembly with Telco Right to 10/100 Hydra Straight, 12 legs at 24", Cat 5e riser, 50 feet



(6.6a) Pre-Terminated Copper

#### **Zone Distribution Solutions**

OCC's zone distribution solutions optimize any horizontal cabling infrastructure. Through innovative designs, OCC continues to provide zone cross-connect solutions that meet every need. The convenience and reliability of OCC technology guarantees performance for high-speed applications.

OCC's Inter-Connect Module offers ease and compact design to give customers an alternative to multiple outlets in an office environment. The 6-port module allows for termination between 25-pair cables to modular RJ45 ports at the workstation, minimizing the need for multiple horizontal cable runs.

- Universal 568A/B wiring
- Compact design allows for easy installation
- Ideal in multiple situations, i.e., under floor, power pole, and multi-port workstations
- May be factory assembled with cable or field terminated

# **Applications**

- 1000BASE-T Gigabit Ethernet
- 100BASE-TX Fast Ethernet
- 10BASE-T Ethernet
- Broadband Video
- 155/622 Mbps ATM
- 100 Mbps TP-PMD
- 4/16 Mbps Token Ring
- Voice

#### Zone Inter-Connect Modules (Field Terminable)

CATALOG NUMBER	DESCRIPTION
ZDIMA5E	Zone inter-connect module, Category 5e, 568A/B wired, 6-port (pictured above)
ZDIMSIX6A/B	Zone inter-connect module, Category 6, 568A/B wired, 6-port (not pictured, mounts to an 89D bracket)

#### 25-Pair Zone Distribution Cable Assemblies

25-Pair	Zone Distribution (	Cable Asser	nblies		
		CATALOG N	UMBER		DESCRIPTION
25ZD/				-	25-pair zone distribution cable assembly
	CABLE TYPE & CATEGORY	WIRING TYPE	END TYPE	LENGTH IN FEET	
	<b>5E</b> Cat 5e Riser	<b>6A</b> 568A wired	<b>TR</b> Telco Right		
	<b>EP</b> Cat 5e Plenum	<b>6B</b> 568B wired	<b>TL</b> Telco Left		
			<b>TS</b> Telco Straight		
			<b>X</b> Blunt End – No Connector		
			<b>HR</b> Hydra Right		
			<b>HL</b> Hydra Left	•	ZD/5E6BTS-100 = 25-pair cable assembly, tion module to Telco Straight, Cat 5e riser,
			<b>HSxx*</b> Hydra Straight	568B wired, 1	
			*Replace "xx" with length of legs (12 or 24)		



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(6.6a) Pre-Terminated Copper

#### **Zone Distribution Jack Packs**

Created for completely modular connections, the OCC Jack Pack is ideal for any zone distribution application and can easily be mounted anywhere. With Category 5e performance that exceeds all standards requirements, the Jack Pack offers a multitude of application solutions. Whether mounting to cable tray for a quick cross-connect point or using as a distribution site within an equipment room, the OCC Jack Pack offers guaranteed performance in a compact package.



- Available for 10/100 or Gigabit Ethernet applications
- TIA 568-C.2 Cat5e
- Patented PC board technology
- Compact design
- Mounts anywhere
- Also available in shielded

#### **Zone Distribution Jack Packs**

CATALOG NUMBER	DESCRIPTION
ZDIM8625A	Zone distribution jack pack, gigabit RJ45 to female telco, 568A wired, 6-port
ZDIM8625B	Zone distribution jack pack, gigabit RJ45 to female telco, 568B wired, 6-port
ZDIM8625BS	Zone distribution jack pack, gigabit shielded RJ45 to female telco, 568B wired, 6-port



#### (6.6b) Pre-Terminated Copper – Quad Box

OCC's newest design for effortless data center cabling is a 4-channel pre-terminated system that allows rapid plug-and-play deployment. The Quad Box provides the ultimate in flexibility and functionality, and is ideal for installations requiring minimal downtime.

Designed for easy implementation, the unique housing construction utilizes any of OCC's Cat6A compliant shielded or Cat 6 compliant unshielded connectivity. The quad housing includes a protective cover with integrated pulling eye and label field. OCC's Quad Box shielded cable assemblies for the data center are preassembled and tested, guaranteeing reliability and performance compliance to Cat6A requirements, including alien cross-talk. This takes the time and worry out of cabling for 10GBASE-T and other high-bandwidth, high-reliability applications.

#### **Features and Benefits**

- The 2X2 construction along with a tapered Pulling Eye Cover reduces overall size of housing, making it easier to pull through pathways
- 4-port module matches port increments in active gear
- Allows for rapid deployment, reducing implementation time and downtime
- Assembly options allow for multiple network configurations including Data Center Permanent Link, Zone Distribution, and Cross Connect
- Labeling options consistent with 606 Administration standard
- Panel mounting options for both rear and front access
- Cabling is installed in minutes instead of hours
- Channel compliance is assured without the need for extensive testing and verification
- The 4X port counts integrate with many 10GBASE-T servers and switches

#### Construction Considerations

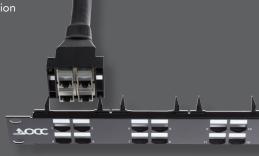
• Construction options include: Category 6 (UTP) and Category 6A (U/FTP); each cable option is available in both CMR and CMP

#### Assembly Options Include

- Quad Box-Quad Box for creating a permanent link between network devices
- Quad Box-Open for discreet IDC termination to another panel

#### **Applications**

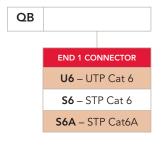
- Mission Critical and Enterprise Data Centers
- Storage Area Networks
- Zone Distribution
- Colocation facilities
- Campus environments
- Any application requiring quick termination and little downtime

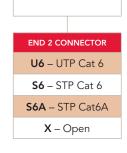


### **Ordering Information**

PART NUMBER	DESCRIPTION
AQB24	Quad box patch panel, 24-port, accommodates 6-quad box snap-in pre-terminated cable assemblies

#### Quad Box Pre-Terminated Cable Assemblies





CABLE TYPE	COLOR	CABLE RATING	LENGTH (IN FEET)
<b>U</b> – UTP	<b>W</b> – White	<b>R</b> – Riser	
<b>UF</b> – UFTP	<b>B</b> – Blue	<b>P</b> – Plenum	
		<b>L</b> – LSZH	



(6.6c) Pre-Terminated Copper – Procyon<sup>™</sup> Copper System

# Part of OCC's Procyon™ family of high-performance, easy-to-install data center solutions

The Procyon copper system by Optical Cable Corporation is designed for high-density copper connectivity in the data center, and to be interchangeable with the fiber panels for maximum flexibility for the end user. Each copper module provides 48 Cat6A ports in a single bay. The copper panel mates with 12 pre-terminated high-density copper cable assemblies, each providing cabling for four RJ45 ports under a single wrap. OCC's rugged and shielded cable assembly allows for fast installation of high-speed copper inter-connects. An easy-to-remove metal pulling eye is incorporated to aid in cable installation.

#### **Panel Features & Benefits**

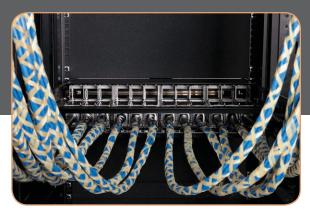
- Exceeds TIA Cat6A cabling performance depending on cable selection
- 48-ports in 1RU to match high-density switching hardware
- Mates with pre-terminated high-density copper cable assemblies for easy installation and reliable performance
- Copper panel slides forward for easy access to patch field
- Integrated equipment/patch cord management features
- Integrated rear cable management
- Front panel port identification labels
- Front panel flips up, concealing cabling for neat appearance

# Panel Applications

- High-density
- Data Center
- Use Procyon fiber panel for server/storage cabinets
- Use vertical panel mounting kit for switching cabinets
- PoE and PoE+
- Video surveillance
- IEEE 10GBASE-T Ethernet compliant



Procyon copper panel with integrated cable management

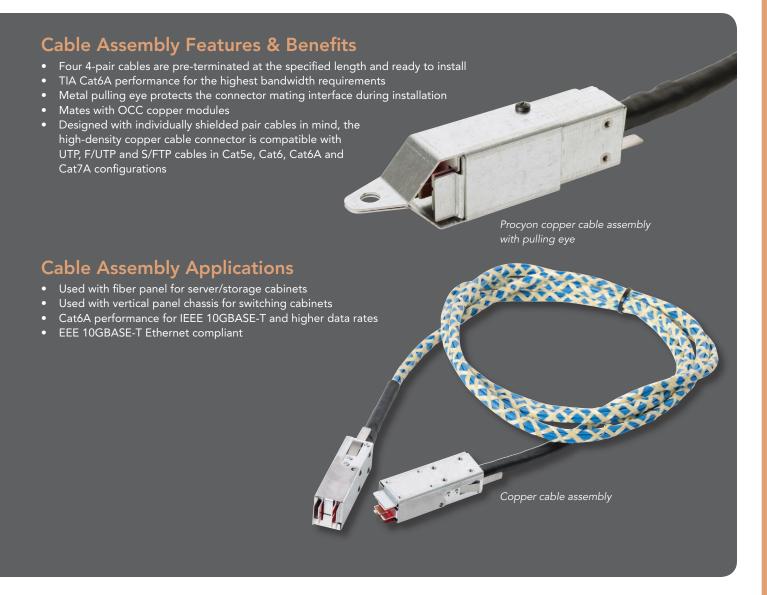


Back of copper panel with integrated cable manager





(6.6c) Pre-Terminated Copper – Procyon™ Copper System



#### **Ordering Information**

CATALOG NUMBER	DESCRIPTION	HEIGHT	WIDTH	DEPTH	TEMPERATURE RANGE
PROC1U	Panel, copper, 48-port, 1RU	1RU	19"	28.375"	-40° to +120° C
PROC4G6A-xxx	Copper cable assembly w/pulling eye	1.445"	1.152"	5.501" total (4.308" w/o pulling eye)	-40° to +120° C

Replace "xxx" with length in feet.





**3** 

(6.7) Structured Cabling System Protocols

#### What Is the Best Structured Cabling System Protocol for My Application?

#### **CATEGORY 5E**

- Ideal for K-12 educational facilities, residential or applications where budget is an issue
- Good for systems wanting 10/100/1000 Mbps (also known as 1000BASE-T or Gigabit Ethernet)
- Not ideal to support Power over Ethernet (PoE); PoE allows for low voltage, 15.4 Watts DC or up to 44 Volts DC, to be run over the same twisted pair cabling as data
- Does not support Voice over Internet Protocol (VoIP); VoIP allows voice communications and multimedia to be transmitted over twisted pair cabling typically used for the Internet and data
- Available in Shielded and Unshielded (UTP)
  - Utilize shielded systems in high-noise environments (Electromagnetic Interference EMI or Radio Frequencies RF are present these sources of interference weaken the signal within a cable), manufacturing facilities, or in restaurants
  - · Utilize unshielded systems for classrooms, multi-dwelling units, single-family homes, or budget-conscious commercial spaces
- OCC Products for Category 5e Systems:
  - OCC Category 5e Copper Cable
  - OCC 110-Style Shielded and Unshielded Patch Panels (angled, rack-mount and wall-mount)
  - OCC Telco Shielded and Unshielded Patch Panels (angled, rack-mount and wall-mount)
  - OCC Telco Cable Assemblies (various configurations)
  - OCC Keystone Insert Jacks (available in 12 colors)
  - OCC Patch Cords (made to length)

#### **CATEGORY 6**

- Ideal for commercial installations, colleges and universities, and wisest choice when taking into consideration any possible future updates to your network
- Good for systems wanting 10/100/1000 Mbps. Shielded Cat 6 systems can also handle 10,000 Mbps or 10 Gig protocols
- Ideal to support Power over Ethernet (PoE) and PoE+. PoE+ provides for up to 25.5 Watts DC of low-voltage power over a single cable
- Supports VoIP
- Supports network video and camera systems
- Available in Shielded and Unshielded (UTP)
  - Utilize shielded systems to suppress EMI/RF in applications that include banking, government and healthcare
  - Utilize unshielded systems for general office, campus locations, and commercial spaces
- OCC Products for Category 6 Systems:
  - OCC Category 6 Shielded and Unshielded Copper Cable
  - OCC 110-style Shielded and Unshielded Patch Panels (angled, rack-mount and wall-mount)
  - OCC QuadBox Shielded and Unshielded Patch Panels (rack-mount)
  - OCC QuadBox Shielded and Unshielded Cable Assemblies (various configurations)
  - OCC Keystone Insert Jacks (available in 12 colors)
  - OCC Patch Cords (made to length)

#### **CATEGORY 6A**

- · Ideal for data centers and applications where higher bandwidths and future expansion are being considered
- Good for systems wanting 10/100/1000/10,000 Mbps. Best for applications requiring 10 Gig data throughputs
- · Will support Power over Ethernet (PoE) but only PoE+ for systems intending to run 1 Gig data throughput
- Supports VoIP
- Supports network video and camera systems
- Available in Shielded and Unshielded (UTP)
- OCC Products for Category 6A Systems:
  - OCC Category 6A Shielded and Unshielded Copper Cable
  - OCC 110-style Shielded and Unshielded Patch Panels (angled and rack-mount)
  - OCC QuadBox Shielded and Unshielded Patch Panels (rack-mount)
  - OCC QuadBox Shielded and Unshielded Cable Assemblies (various configurations)
  - OCC Keystone Insert Jacks (available in 12 colors)
  - OCC Patch Cords (made to length)









# 7.0 Workstation Products

7.1	KMJ Adapters	.246
7.2	UMJ Adapters	.247
7.3	Bezel Inserts	.248
	Limited Axcess™	.249
7.5	KMJ Faceplates	.250
7.6	UMJ Faceplates	.253
7.7	Surface-mount Products	.257



(7.1) KMJ Adapters

### **KMJ Adapters**

OCC's Keystone adapters offer a full array of data, video, and audio ports for fiber, copper, coaxial and speaker cables. Featuring snap-in accessibility and a wide arrange of multimedia options, the OCC KMJ adapter line gives customers a flexible solution to meet any connectivity demand.

Fits all OCC Keystone faceplates and surface-mount boxes





AKSVHS12

AKBLK12





AKRCA110B12

AKBP212





AKF12

AKRCA110Y12





AKDLCM00

AKSCM01





AKRCAP12

AKSTM12

#### **KMJ Adapters**

CATALOG NUMBER	DESCRIPTION
AKSCMxx	KMJ snap-in SC multimode adapter
AKSTMxx	KMJ snap-in ST multimode adapter
AKDLCMxx	KMJ snap-in dual LC multimode adapter
AKBNCxx	KMJ snap-in BNC coupler
AKFxx	KMJ snap-in F coupler
AKSVHSxx	KMJ snap-in Super VHS adapter
AKRCAPxx	KMJ snap-in gold-plated RCA bulkhead adapter
AKRCA110yxx	KMJ snap-in RCA to 110 adapter
AKBP2xx	KMJ snap-in gold-plated binding posts (pair)
AKBC2xx	KMJ snap-in gold-plated banana adapters (pair)
AKBLKxx	KMJ snap-in blank adapters

Replace "xx" with color choice: **00** = electrical ivory,

**01** = office white, or **12** = bright white.

Replace "y" with color inset choice: **R** = red, **Y** = yellow,

 $\mathbf{B} = \text{black}$ , or  $\mathbf{W} = \text{white}$ .

### KMJ Keyed LC Ordering Guide

CATALOG NUMBER	DESCRIPTION	
LAXAKDLCKWT-xx	Limited Axcess keystone adapter, DLC, keyed, SM/MM, white	
LAXAKDLCKOR-xx	Limited Axcess keystone adapter, DLC, keyed, SM/MM, orange	
LAXAKDLCKPL-XX	Limited Axcess keystone adapter, DLC, keyed, SM/MM, purple	
LAXAKDLCKSL-xx	Limited Axcess keystone adapter, DLC, keyed, SM/MM, slate	
LAXAKDLCKBN-xx	Limited Axcess keystone adapter, DLC, keyed, SM/MM, brown	
LAXAKDLCKAQ-xx	Limited Axcess keystone adapter, DLC, keyed, SM/MM, aqua	
LAXAKDLCKRS-xx	Limited Axcess keystone adapter, DLC, keyed, SM/MM, rose	
AKRCA110Yxx	KMJ snap-in RCA to 110 Adapter	
AKBP2xx	KMJ snap-in gold-plated binding posts (pair)	
AKBC2XX	KMJ snap-in gold-plated banana adapters (pair)	
AKBLKxx	KMJ snap-in blank adapters	
Replace "xx" with color choice: <b>00</b> = electrical ivory,		

**01** = office white, or **12** = bright white.



(7.2) UMJ Adapters

# **UMJ** Adapters

For multimedia options, OCC created a complete line of data, video, and audio ports for fiber, copper, coaxial and speaker cables. Combined with the multicolor, low-profile recessed bezels, OCC's UMJ-style adapters offer a flexible alternative for port identification, no matter what the application.

- Available with 12 color options
- Secure mounting locks adapters into faceplate
- Fits all OCC UMJ faceplates and surface-mount boxes





APBLK01

AARCA01





AASTM01

AABNC01





AASCM01

AAF01



AADLCM01

#### **UMJ Adapters**

CATALOG NUMBER	DESCRIPTION
AASCMxx	UMJ snap-in SC multimode adapter
AASCSxx	UMJ snap-in SC single-mode adapter
AASTMxx	UMJ snap-in ST multimode adapter
AASTSxx	UMJ snap-in ST single-mode adapter
AADLCMxx	UMJ snap-in dual LC multimode adapter
AAFxx	UMJ snap-in F coupler
AABNCxx	UMJ snap-in BNC coupler
AARCAxx	UMJ snap-in RCA adapter with solder tab
APBLKxx	UMJ snap-in blank bezel (20 pack)
Replace "xx" with color code.	

"XX" COLOR CODES		
00 – Electrical Ivory	05 – Blue	10 – Purple
01 – Office White	06 – Data Gray	11 – Brown
02 – Black	07 – White	12 – Bright White
03 – Red	08 – Orange	
04 – Green	09 –Yellow	

### **UMJ Keyed LC Ordering Guide**

CATALOG NUMBER	DESCRIPTION	
LAXAAKDLCGN-xx	Limited Axcess adapter, DLC, keyed, SM/MM, green	
LAXAAKDLCRD-xx	Limited Axcess adapter, DLC, keyed, SM/MM, red	
LAXAAKDLCYL-xx	Limited Axcess adapter, DLC, keyed, SM/MM, yellow	
LAXAAKDLCPK-xx	Limited Axcess adapter, DLC, keyed, SM/MM, pink	
LAXAAKDLCWT-xx	Limited Axcess adapter, DLC, keyed, SM/MM, white	
LAXAAKDLCOR-xx	Limited Axcess adapter, DLC, keyed, SM/MM, orange	
LAXAAKDLCPL-xx	Limited Axcess adapter, DLC, keyed, SM/MM, purple	
LAXAAKDLCSL-xx	Limited Axcess adapter, DLC, keyed, SM/MM, slate	
LAXAAKDLCBN-xx	Limited Axcess adapter, DLC, keyed, SM/MM, brown	
LAXAAKDLCAQ-xx	Limited Axcess adapter, DLC, keyed, SM/MM, aqua	
LAXAAKDLCRS-xx	Limited Axcess adapter, DLC, keyed, SM/MM, rose	
People of "w" with color chairs 100 - electrical ivers		

Replace "xx" with color choice: **00** = electrical ivory, **01** = office white, or **12** = bright white.



(7.3) Bezel Inserts

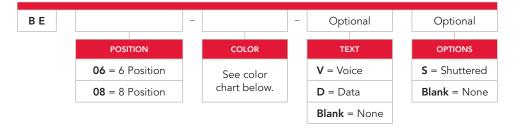
#### **UMJ** Bezels

Whether ordering kitted or separate for field installations, OCC's unique bezel system offers an easy and affordable alternative for desktop port identification. Bezels may be ordered blank or labeled and with a multitude of colors to choose from. The flexibility and variety of combinations for workstation labeling are endless.

- 12 different color and four labeling options
- Standard package of bezels is 20 per bag
- Can be easily customized or kitted with jacks/adapters for special orders
- Available for six or eight position plugs
- Locks the jack or adapter into the faceplate
- Shuttered bezels available for dust protection



#### **UMJ Bezels**



UMJ COLOR CODES		
00 – Electrical Ivory	07 – White	
01 – Office White	08 – Orange	
02 – Black	09 – Yellow	
03 – Red	10 – Purple	
04 – Green	11 – Brown	
05 – Blue	12 – Bright White	
06 – Data Gray		



(7.4) Limited Axcess™

#### **Limited Axcess Jacks**

OCC's patented Limited Axcess jacks are the initial component when creating a Limited Axcess secure network. These unique jacks offer an innovative security layer for establishing a physically restrictive network system through keyed configurations and locking keyed bezels. Deployed with the keyed strain-relief and plugs found on the Limited Axcess patch cords, the entire system can easily segregate any network segment for physical security. In addition to the security aspect of the Limited Axcess jacks, these RJ45 components exceed TIA Category 6A component performance requirements with a dramatic increase in primary parameter performance.

- Bezels may be applied after installation to lock jacks in place
- Compliant with Power over Ethernet (PoE) requirements
- Contact material is high-strength beryllium copper alloy; contact plating -50µm gold over nickel
- Available in eight different colored keyed bezel combinations
- Shielded keystone version available as well call factory for details

CATALOG NUMBER	DESCRIPTION
LA6Axx	Limited Axcess Cat6A RJ45 jack with keyed bezel
Replace "xx" with color code.	



COLOR CODES		
02 – Black		
00	5 1	

04 – Green

05 – Blue

07 - White

08 – Orange

09 - Yellow

#### **Limited Axcess Patch Cords**

The Limited Axcess patch cord, with its patented plug technology, is a key component to creating a secure Limited Axcess system. This one-of-a-kind patch cord uses a keyed plug and a unique locking boot to provide two layers of physically restrictive network security. Both these layers of enhanced security may be deployed independently as either the proprietary plugs with corresponding jacks or the keyed bezels with matching locking boots. In addition, performance exceeds TIA Category 6A component requirements.

- Locking boot is applied during manufacturing
- Conversion patch cords are available to connect standard Ethernet hardware to the Limited Axcess system
- Available in eight different colored keyed boot combinations
- Cable color is gray



#### **Limited Axcess Patch Cords**

#### CATALOG NUMBER CABLE TYPE PLUG ONE PLUG TWO PLUG TWO BOOT LENGTH IN FEET DENOTES BOOT COLOR LA S Κ Μ Κ See color code Keyed Boot Shielded Keyed Plug Keved Boot chart above. U Unshielded Non-keyed Boot 568A Wired Non-keyed Boot Ex: LAPC6AS-MK-AS0309 = Limited Axcess shielded patch cord, 568B Wired Slimline Boot keyed plug and boot on one side Ν and A wired with slimline boot on

No Boot

other side, 3 feet, yellow



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(7.5) KMJ Faceplates

#### **KMJ Faceplates**

OCC's Keystone line of faceplates offers customers a versatile and flexible approach to any workstation demand. Available to meet a variety of configurations, OCC's KMJ faceplates offer convenience in a visually appealing solution for any desktop purpose.



#### **KMJ Commercial Faceplates**

- Keystone commercial-grade faceplates accept any KMJ-style jack or adapter
- ID windows include write-on labels and plastic protective covers
- Slotted mounting holes simplify installation
- Available in most popular colors



CATALOG NUMBER	DESCRIPTION
FPSK01xx	Single-gang commercial faceplate, KMJ, 1-port
FPSK02xx	Single-gang commercial faceplate, KMJ, 2-port
FPSK03xx	Single-gang commercial faceplate, KMJ, 3-port
FPSK04xx	Single-gang commercial faceplate, KMJ, 4-port
FPSK06xx	Single-gang commercial faceplate, KMJ, 6-port
DPSK06xx	Double-gang commercial faceplate, KMJ, 6-port
DPSK12xx	Double-gang commercial faceplate, KMJ, 12-port
Replace "xx" with color choice: <b>00</b> = electrical ivory, <b>01</b> = office white, or <b>12</b> = bright white.	

### **KMJ Commercial Angled Faceplates**

• Angled faceplate reduces strain on existing station cables

CATALOG NUMBER	DESCRIPTION
FPSK04Axx	Single-gang commercial faceplate, angled KMJ, 4-port
DPSK08Axx	Double-gang commercial faceplate, angled KMJ, 8-port
Replace "xx" with color choice: <b>00</b> = electrical ivory, <b>01</b> = office white, or <b>12</b> = bright white.	





(7.5) KMJ Faceplates

### **KMJ Residential Faceplates**

- Smooth surface faceplates accept any KMJ jack or adapter
- Available in oversized for coverage of imperfect drywall cuts
- Three color options

CATALOG NUMBER	DESCRIPTION
FPKS01xx	Single-gang smooth faceplate, KMJ, 1-port
FPKS02xx	Single-gang smooth faceplate, KMJ, 2-port
FPKS03xx	Single-gang smooth faceplate, KMJ, 3-port
FPKS04xx	Single-gang smooth faceplate, KMJ, 4-port
FPKS06xx	Single-gang smooth faceplate, KMJ, 6-port
FPK01xx	Single-gang smooth faceplate, oversized, KMJ, 1-port
FPK02xx	Single-gang smooth faceplate, oversized, KMJ, 2-port
FPK03xx	Single-gang smooth faceplate, oversized, KMJ, 3-port
FPK04xx	Single-gang smooth faceplate, oversized, KMJ, 4-port
FPK06xx	Single-gang smooth faceplate, oversized, KMJ, 6-port
DPK06xx	Double-gang smooth faceplate, KMJ, 6-port
DPK12xx	Double-gang smooth faceplate, KMJ, 12-port
Replace "xx" with color choice: <b>00</b> = electrical ivory, <b>01</b> = office white, or <b>12</b> = bright white.	







### **KMJ Stainless-Steel Faceplates**

- Stainless-steel construction
- Accommodates any KMJ jack or adapter
- Corrosion resistant



CATALOG NUMBER	DESCRIPTION	
FPSK01SS	Single-gang stainless-steel faceplate, KMJ, 1-port	
FPSK02SS	Single-gang stainless-steel faceplate, KMJ, 2-port	
FPSK03SS	Single-gang stainless-steel faceplate, KMJ, 3-port	
FPSK04SS	Single-gang stainless-steel faceplate, KMJ, 4-port	
FPSK06SS	Single-gang stainless-steel faceplate, KMJ, 6-port	
DPSK04SS	Double-gang stainless-steel faceplate, KMJ, 4-port	
DPSK06SS	Double-gang stainless-steel faceplate, KMJ, 6-port	
DPSK12SS Double-gang stainless-steel faceplate, KMJ, 12-port		



)

(7.5) KMJ Faceplates

#### **KMJ Receptacle Housing Inserts**

- Fits inside any standard electrical faceplate
- Accommodates two or four KMJ ports

CATALOG NUMBER	DESCRIPTION	
A106Kxx	KMJ Receptacle Insert, 2-port	
A106K4xx	KMJ Receptacle Insert, 4-port	
Replace "xx" with color choice: <b>00</b> = electrical ivory, <b>01</b> = office white, or <b>12</b> = bright when the color choice is the color choice in the color choice is the color choice.		



### **KMJ Industrial Faceplate Kit**

- Industrial faceplate kit includes plate and industrial jack housing
- Seal also included for complete water resistance
- Accepts any KMJ jack
- KMJ jack is not included

CATALOG NUMBER	DESCRIPTION	
FPWR01xx	1xx KMJ Industrial faceplate kit with housing, vertical ID window, 1-port	
FPWR02xx	KMJ Industrial faceplate kit with housing, vertical ID window, 2-ports	
Replace "xx" with color choice: <b>00</b> = electrical ivory, <b>01</b> = office white, <b>12</b> = bright w or <b>SS</b> = stainless-steel.		





(7.6) UMJ Faceplates

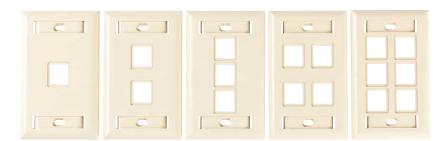
### **UMJ Faceplates**

OCC's UMJ solution isn't complete without our UMJ faceplates. Available in a multitude of configurations and designed to meet any application, the UMJ faceplates for UMJ-style jacks and adapters offer a convenient and aesthetically appealing solution for any desktop purpose.



### **UMJ Commercial Faceplates**

- Commercial-grade faceplates accept any UMJ Bezel jack or adapter
- ID windows include write-on labels and plastic protective covers
- Slotted mounting holes simplify installation
- Available in most popular colors



CATALOG NUMBER	DESCRIPTION
FPSR01xx	Single-gang commercial faceplate, recessed UMJ, 1-port
FPSR02xx	Single-gang commercial faceplate, recessed UMJ, 2-port
FPSR03xx	Single-gang commercial faceplate, recessed UMJ, 3-port
FPSR04xx	Single-gang commercial faceplate, recessed UMJ, 4-port
FPSR06xx	Single-gang commercial faceplate, recessed UMJ, 6-port
DP01xx	Double-gang commercial faceplate, UMJ, 1-port
DP02xx	Double-gang commercial faceplate, UMJ, 2-port
DP03xx	Double-gang commercial faceplate, UMJ, 3-port
DP04xx	Double-gang commercial faceplate, UMJ, 4-port
DP06xx	Double-gang commercial faceplate, UMJ, 6-port
Replace "xx" with color or <b>12</b> = bright white.	r choice: <b>00</b> = electrical ivory, <b>01</b> = office white, <b>07</b> = white,

#### **UMJ Commercial Angled Faceplates**

- Angled faceplates reduce strain on existing station cables
- ID windows include write-on labels and plastic protective cover
- Available in most popular colors

CATALOG NUMBER	DESCRIPTION	
FP04Axx	Single-gang commercial faceplate, angled UMJ, 4-port	
DP08Axx	Double-gang commercial faceplate, angled UMJ, 8-port	
Replace "xx" with color choice: <b>00</b> = electrical ivory, <b>01</b> = office white, <b>07</b> = white, or <b>12</b> = bright white.		





(7.6) UMJ Faceplates

#### **UMJ Residential Faceplates**

- Smooth surface faceplates accept any UMJ Bezel jack or adapter
- Bezel openings are recessed for neater appearance
- Available in most popular colors



CATALOG NUMBER	DESCRIPTION
FPR01xx	Single-gang smooth faceplate, UMJ, 1-port
FPR02xx	Single-gang smooth faceplate, UMJ, 2-port
FPR03xx	Single-gang smooth faceplate, UMJ, 3-port
FPR04xx	Single-gang smooth faceplate, UMJ, 4-port
FPR06xx	Single-gang smooth faceplate, UMJ, 6-port
5 1 " " ::1	1 1 2 00 1 2 1 00 1 1 00 1 1 00 1 1 1 1

Replace "xx" with color choice: **00** = electrical ivory, **01** = office white, **07** = white, or **12** = bright white.



#### **UMJ Stainless-steel Faceplates**

- Stainless-steel faceplates accept any UMJ Bezel jack or adapter
- Corrosion resistant
- May be ordered with tamper-proof screws



CATALOG NUMBER	DESCRIPTION
FP01SS	Single-gang stainless-steel faceplate, UMJ, 1-port
FP02SS	Single-gang stainless-steel faceplate, UMJ, 2-port
FP03SS	Single-gang stainless-steel faceplate, UMJ, 3-port
FP04SS	Single-gang stainless-steel faceplate, UMJ, 4-port
FP06SS	Single-gang stainless-steel faceplate, UMJ, 6-port
DP01SS	Double-gang stainless-steel faceplate, UMJ, 1-port
DP02SS	Double-gang stainless-steel faceplate, UMJ, 2-port
DP03SS	Double-gang stainless-steel faceplate, UMJ, 3-port
DP04SS	Double-gang stainless-steel faceplate, UMJ, 4-port
DP06SS	Double-gang stainless-steel faceplate, UMJ, 6-port

### **UMJ Office Furniture Faceplates**

- Fits most popular office furniture including Herman Miller and Steelcase
- Available in gray or black
- Attractive and functional



CATALOG NUMBER	DESCRIPTION	CUTOUT DIMENSIONS	OFFICE FURNITURE COMPATIBLE				
CAIALOG NUMBER	DESCRIPTION	COTOOT DIMENSIONS	HERMAN MILLER	STEELCASE	HAWORTH	HON	OTHER
FAP3xx	Furniture faceplate, 3-port	2.65"W x 1.35"H		X	X	X	
FAP302-HM	Furniture faceplate, 3-port	2.98"W x 1.88"H	X				
FAP4xx	Furniture faceplate, 4-port	5.25"W x 1.37"H				X	X
Replace "xx" with co	Replace "xx" with color choice: <b>02</b> = black or <b>06</b> = data gray.						



(7.6) UMJ Faceplates

#### **UMJ Front Axcess™ Faceplates**

- Custom configurable to accommodate UMJ- and KMJ-style jacks and adapters
- Accommodates three individual modules for ultimate flexibility
- Additional cable storage depth
- Slim design

CATALOG NUMBER	DESCRIPTION	
FP-FAOR-xx	FP-FAOR-xx Front Axcess™ faceplate, single-gang ring	
FAOC-1A-xx	FAOC-1A-xx Front Axcess™ UMJ faceplate, 1-port insert	
FAOC-2A-xx Front Axcess™ UMJ faceplate, 2-port insert		
FAOC-B-xx Front Axcess™ faceplate, blank insert		
Replace "xx" with color choice: <b>00</b> = electrical ivory, <b>01</b> = office white, or <b>07</b> = white.		



#### **UMJ Receptacle Housing Insert**

- Fits inside any standard electrical faceplate
- Accommodates two UMJ ports

	CATALOG NUMBER	DESCRIPTION
	A106xx	UMJ receptacle insert, 2-port
Replace "xx" with color choice: <b>00</b> = electrical ivory, <b>01</b> = office white, or <b>07</b> = white.		







(7.6) UMJ Faceplates

### **Wallplates & Connectors**

For standard voice-grade applications, OCC has developed a durable and practical solution that meets any residential or commercial protocol. Featuring OCC's superior performance jacks, the OCC wallplate is guaranteed to be ideal for any single-jack application.

- Available in stainless-steel or fire-retardant plastic
- Easily mounts on any wall
- Mounting screws provided

### **OCC Standard Commercial/Residential Wallplate**

CATALOG NUMBER	DESCRIPTION	
WP07 Plastic wallplate, 6 position, USOC jack, 1-port, white		
WPSS	Stainless-steel wallplate, 6 position, USOC jack, 1-port	
WP-5E-SS	Stainless-steel wallplate, Category 5e jack, 1-port	
WP-A6-SS Stainless-steel wallplate, Category 6 jack, 1-port		



For applications requiring both voice-grade and coaxial access, OCC created a line of smooth standard-size flush mount plates with jacks and/or F-connectors in a single-gang format. All of these wallplates install easily into standard electrical boxes and offer 110 style terminations for easy installation.

- One-piece construction
- Easily mounts to any standard electrical box
- 110-style punch-down termination
- Mounting hardware included

CATALOG NUMBER	DESCRIPTION		
WP1V12	Plastic wallplate with (1) 6 position, 4 conductor modular jack, bright white		
WP2V12	Plastic wallplate with (2) 6 position, 4 conductor modular jacks, bright white		
WP1F12	Plastic wallplate with (1) twist-on F-connector, bright white		
WP2F12	Plastic wallplate with (2) twist-on F-connectors, bright white		
WP1V1F12	Plastic wallplate with (1) 6 position, 4 conductor modular jack and (1) twist-on F-connector, bright white		











(7.7) Surface-Mount Products

#### **Surface-Mount Boxes**

Whether installing single- or double-gang faceplates, OCC's surface-mount boxes provide the depth for proper cable orientation into jacks or adapters with easy knockouts for quick terminations. Ideal for raceway applications, OCC's surface-mount boxes offer a flexible approach for workstation applications.

- Available in single- and double-gang
- Mounting screws, double-sided tape, and cable ties included
- Perfect for raceway or cable tray applications
- Will accommodate any OCC UMJ or KMJ faceplate



#### Surface-Mount Boxes

CATALOG NUMBER	DESCRIPTION
SMSGxx	Surface-mount box, single-gang
SMDGxx	Surface-mount box, double-gang
Replace "xx" with color choice: <b>00</b> = electrical ivory, <b>01</b> = office white, <b>07</b> = white, or <b>12</b> = bright white.	

#### **Surface-Mount Enclosures**

OCC's surface-mount enclosures are a low-profile workstation solution that offers flexibility for multiple network configurations. In addition, the surface-mount enclosures are a cost-effective approach for multiple desktop applications, including cubicle settings and numerous workstation complexes.

- Available for UMJ- or KMJ- style jacks and adapters
- Knockouts on three sides as well as in the base for easy cable entry
- Port designation included along with blank port cover(s)
- Designation windows
- Mounting screws, double-sided tape and cable ties included



#### **UMJ Surface-mount Enclosures**

CATALOG NUMBER	DESCRIPTION
SME2xx	Surface-mount enclosure, UMJ, 2-port
SME4xx	Surface-mount enclosure, UMJ, 4-port
SME8xx	Surface-mount enclosure, UMJ, slimline, 8-port
SME10xx	Surface-mount enclosure, UMJ, slimline,10-port



CATALOG NUMBER	DESCRIPTION
SMEK1xx	Surface-mount enclosure, KMJ, 1-port
SMEK2xx	Surface-mount enclosure, KMJ, 2-port
SMEK4xx	Surface-mount enclosure, KMJ, 4-port
SMEK6xx	Surface-mount enclosure, KMJ, 6-port



Replace "xx" with color choice:

00 = electrical ivory

**01** = office white

**07** = white

12 = bright white



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(7.7) Surface-mount Products

### **Multimedia Boxes**

For conditions that require a variety of media applications, consider OCC's full product line of multimedia boxes. The multimedia box is a one-stop solution for all your workstation applications. It offers complete flexibility in design and can be kitted for multiple hardware options.

- Optional plates available
- Complete kits ready for installation
- Ideal for small zone distribution applications
- Fiber storage meets TIA/EIA specifications
- Available only for UMJ-style jacks and adapters



#### **OCC Multimedia Boxes**

CATALOG NUMBER	DESCRIPTION
MMAPxx	Multimedia box, UMJ, blank
MMAPxxA1	Multimedia box, UMJ, optional plate, 1-port
MMAPxxA2	Multimedia box, UMJ, optional plate, 2-port
MMAPxxA4	Multimedia box, UMJ, optional plate, 4-port
MMAPxxA6	Multimedia box, UMJ, optional plate, 6-port
MMAPxxDSC1	Multimedia box, UMJ, optional plate, (1) SM/MM dual SC port loaded
MMAPxxDSC2	Multimedia box, UMJ, optional plate, (2) SM/MM dual SC ports loaded
MMAPxxDSC3	Multimedia box, UMJ, optional plate, (3) SM/MM dual SC ports loaded
MMA77xxP2W4	Multimedia box, UMJ, kitted, 4-port & 3 blank sides
MMA77xxP2W6	Multimedia box, UMJ, kitted, 6-port & 3 blank sides
MMA77xxP2W	Multimedia box, UMJ, kitted, 3 blank sides
Replace "xx" with color choice: <b>00</b> = electrical ivory or <b>01</b> = office white.	





#### 8.0 Residential Products

8.1	MSDE™ Enclosures	260
8.2	Modules	261
	Economy Distribution Solutions	
	Residential Diagram	26/

As technological advances creep from the workplace to the home, the demand for residential structured wiring solutions has dramatically increased. In response to this rising need, OCC designed a residential system that offers a complete, cost-effective resolution to turning today's single-family homes and apartment/condo complexes into tomorrow's smart homes.

From enclosure to outlet, OCC offers a comprehensive line of high-quality wiring products composed of enclosures, modules and modular outlets. The OCC



residential product line offers a structured wiring solution to help add value to the home while taking full advantage of the latest in electronic technology. By utilizing this system, customers obtain a convenient method for networking, customizing and distributing all of the electronic services in the home including voice, data, video, audio and security. All this managed from one central location.



(8.1) MSDE™ Enclosures

#### **MSDE Enclosures**

The MSDE, Multiple Service Distribution Enclosure, offers a complete and cost-effective solution for distributing high-speed data, communication and video services in multi-dwelling units, townhouses and small residences. With this centralized location, all household services can be easily distributed to multiple sites within the residence. This 10" Series enclosure is very versatile and can be completely customized to fit any demand.

- Standard 16" stud-wall installation (can also be turned to fit 12"-center wall studs)
- Module bracket to accommodate future needs
- Rugged steel construction, including flanged, latching door
- White powder-coat finish covers
- Knockouts on top, bottom and side for easy cable entrance
- Flexible tie-down locations for cable management
- In-wall flush-mount design
- Preset wall thickness tabs for easy installation
- Can be ordered empty or preconfigured
- Includes J-box cutout
- UL<sup>®</sup> listed



#### **Specifications for System:**

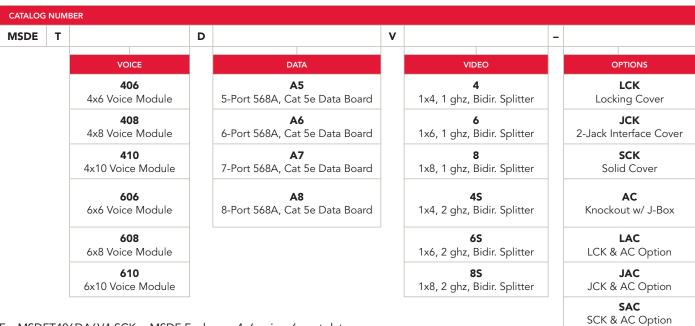
- TIA/EIA 568 Category 3 and 5 compliant
- UL 1863 Communication Circuit Accessory

#### **Dimensions:**

• 14.38"W x 10.62"H x 3.12"D

CATALOG NUMBER	DESCRIPTION
MSDET000D00V0	MSDE 10" enclosure with 3-position bracket, hinged cover, and J-box cutout
MSDET000D00V0-AC	MSDE 10" enclosure with 3-position bracket, hinged cover, and J-box kit
MSDE-BOX1	MSDE 10" enclosure with 3-position bracket, no cover, and J-box cutout
MSDE-BOX2	MSDE 10" enclosure with no bracket, no cover and J-box cutout
MSDE-DOOR	MSDE 10" standard hinged cover

#### MSDE Preconfigured Enclosures - Ordering Guide



Ex: MSDET406DA6V4-SCK = MSDE Enclosure 4x6 voice, 6-port data, 4-port satellite splitter with solid cover door



(8.1) MSDE™ Enclosures

#### **MSDE Cover Options**

No matter what the specification, MSDE enclosures offer door options to meet any need. Whether selecting a simple locking door or a tamper-resistant solid cover, all MSDE cover options are built with durable steel construction and white powder-coat finishes, ready to be shipped to the job site.

### **Locking Door Option**

For extra security, this special latching door offers a stainless-steel locking option complete with key set.

CATALOG NUMBER	DESCRIPTION
MSDET000D00V0-LCK	MSDE 10" enclosure with 3-position bracket, locking cover, and J-box cutout
MSDE-DOOR-LCK	MSDE locking steel cover



#### **Tamper-Resistant Solid Cover Option**

An optimal security environment can be achieved with this solid cover, which utilizes four tamper-resistant screws.

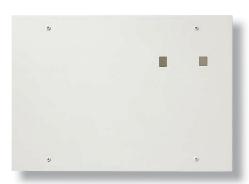
CATALOG NUMBER	DESCRIPTION
MSDET000D00V0-SCK	MSDE 10" enclosure with 3-position bracket, tamper-resistant solid cover, and J-box cutout
MSDE-DOOR-SCK	MSDE tamper-resistant solid cover



### Tamper-Resistant Cover with Interface Jack Option

This solid cover offers heightened security using four tamper-resistant screws, but the RJ31X Security Jack and Telephone Test Jack can be easily accessed through exterior entry points using the module kit included.

CATALOG NUMBER	DESCRIPTION
MSDET000D00V0-JCK	MSDE 10" enclosure with 3-position bracket, tamper resistant solid cover with interface jack, and J-box cutout
MSDE-DOOR-JCK	MSDE tamper-resistant solid cover with interface jack



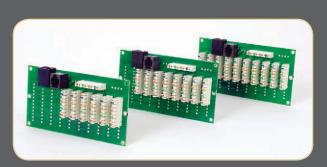


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(8.2) Modules

#### **MSDE Voice Modules**

To provide project-specific solutions, the OCC Residential product line offers voice modules that are specifically designed for multi-dwelling environments featuring a non-expansion footprint. MSDE Voice Modules were created explicitly for the 10" Series Enclosures and offer the highest levels of performance.



CATALOG NUMBER	DESCRIPTION
MOD-T406	MSDE Voice Module, 4x6, includes RJ31X and network test jacks
MOD-T408	MSDE Voice Module, 4x8, includes RJ31X and network test jacks
MOD-T410	MSDE Voice Module, 4x10, includes RJ31X and network test jacks
MOD-T606	MSDE Voice Module, 6x6, includes RJ31X and network test jacks
MOD-T608	MSDE Voice Module, 6x8, includes RJ31X and network test jacks
MOD-T610	MSDE Voice Module, 6x10, includes RJ31X and network test jacks

#### **Data Modules**

OCC's Residential Data Modules allow for the termination of high-speed data service to multiple locations. These Category 5e (568A or 568B wired) modules provide exceptional performance using OCC's patented circuit board technology for true Category 5e compliance. In addition to high-speed Internet distribution, the Data Modules can also be used in conjunction with a PBX system using the cross-connect module.



- 110-style connector termination style for easy installations
- Color-coded blue for module recognition
- Easily fits into any MSDE 3-position bracket
- Pushpin mounting

CATALOG NUMBER	DESCRIPTION
MOD-DB4	Data Module, Cat 5e, 568B wired, 4-port
MOD-DB5	Data Module, Cat 5e, 568B wired, 5-port
MOD-DB6	Data Module, Cat 5e, 568B wired, 6-port
MOD-DB7	Data Module, Cat 5e, 568B wired, 7-port
MOD-DB8	Data Module, Cat 5e, 568B wired, 8-port

### **Applications**

- 1000BASE-T Gigabit Ethernet
- 100BASE-TX Fast Ethernet
- 10BASE-T Ethernet
- Broadband Video
- 100 Mbps TP-PMD
- 4/16 Mbps Token Ring
- 270 Mbps digital video
- 155/622 Mbps ATM
- Voice



(8.2) Modules

#### Video

OCC's Video Modules deliver a wealth of choices for all cable and satellite needs. Combining bidirectional capabilities perfect for cable modem/set-top box use, these modules deliver superior digital performance in a completely modular design.

- Bidirectional
- Completely digital
- May be mounted in multiple configurations

#### Passive Splitters - CATV

CATALOG NUMBER	DESCRIPTION
MOD-V4	Passive CATV Splitter, bidirectional, digital, 1ghz, 4-way
MOD-V6	Passive CATV Splitter, bidirectional, digital, 1ghz, 6-way
MOD-V8	Passive CATV Splitter, bidirectional, digital, 1ghz, 8-way



# Passive Splitters – CATV Technical Specifications

	INSERTION LOSS (DB)			ISOLATION (DB)				RETURN LOSS (DB)				
Frequency (MHz)	5–50	50–750	750–860	860–1000	5–50	50–750	750–860	860–1000	5–50	50–750	750–860	860–1000
MOD-V4	6.9	7.2	7.7	8.4	28	32	28	24	25	26	20	25
MOD-V6	9.0	9.5	9.8	10.0	28	32	28	24	25	26	20	25
MOD-V8	10.2	10.8	11.2	13.0	28	32	26	26	22	25	22	20

### Passive Splitters - Satellite

CATALOG NUMBER	DESCRIPTION
MOD-V4S2G	Passive Satellite Splitter, bidirectional, digital, 2ghz, 4-way
MOD-V6S2G	Passive Satellite Splitter, bidirectional, digital, 2ghz, 6-way
MOD-V8S2G	Passive Satellite Splitter, bidirectional, digital, 2ghz, 8-way



### Passive Splitters – Satellite Technical Specifications

	INSERTION LOSS (DB)				ISOLATION (DB)				RETURN LOSS (DB)			DB)				
Frequency (MHz)	15–47	950	1450	2025	2150	15–47	950	1450	2025	2150		15–47	950	1450	2025	2150
MOD-V4S2G	7.3	8.2	9.2	9.8	12.0	35	22	24	23	22		10	18	17	17	16
MOD-V6S2G	11.5	11.5	12.0	14.2	14.7	27	22	21	21	22		7.5	18	17	18	17
MOD-V8S2G	11.5	11.5	12.0	14.2	15.0	28	22	21	20	19		7.5	20	20	18	18





(8.2) Modules

### **Video Amplified Splitter**

The OCC Amplified Splitter is the heart of the multiroom video distribution system. It can connect up to eight televisions to CATV, TV antennae or local modulated video signals such as satellite, VCR, DVD and security cameras. Multiple splitters can be linked to provide up to 15 output locations.

For mounting in the Home Axcess™ 31" Series Enclosure, brackets are included.

CATALOG NUMBER	DESCRIPTION
HAX-V8A	Video Amplifier Splitter, bidirectional, digital, 1 ghz, 8-way

#### Video Amplified Splitter – Specifications

Part Number	HAX-V8A
FORWARD	
Pass Band (MHz)	54–1000
Gain (input to output) (dB) (type)	4.0
Return Loss (dB) (min)	18
Noise Figure	
54–860MHz (dB) (max)	3.5
860–1000MHz (dB) (max)	3.8
Isolation	
Output-to-Output 5–8MHz (dB)	22
Output-to-Output 8–40MHz (dB)	25
Output-to-Output 54–860MHz (dB)	25
Output-to-Output 860–1000 MHz (dB)	20
REVERSE	
Pass Band (MHz)	5.42
Return Path Loss (dB) (typ)	-11.5
Return Loss (dB) (min)	18





(8.3) Economy Distribution Solutions

### **Economy Distribution Solutions**

For applications requiring a more economical means of distributing household services, OCC developed the WP Series. These wall plates save time and money in any multi-dwelling, hotel or small residence project while continuing to deliver unsurpassed performance. Whether installing voice or voice and/or video, the WP Series wallplates offer a cost-effective and versatile solution for quick disbursement of services.

- Cost-effective solution
- Flush-mount
- Fits standard dual- and quad-gang junction boxes and mud rings
- Saves valuable installation time
- Oversized double-gang or quad-gang wallplates

CATALOG NUMBER	DESCRIPTION
CATALOG NUMBER	DESCRIPTION
HAX-WP407	4x7 Voice Module (only)
HAX-WP407-xx	4x7 Voice Module with dual-gang plate
HAX-WP407V4-xx	4x7 Voice Module, 1x4 Video Splitter with quad-gang plate
HAX-WP407V6-xx	4x7 Voice Module, 1x6 Video Splitter with quad-gang plate
HAX-WP407V8-xx	4x7 Voice Module, 1x8 Video Splitter with quad-gang plate
Replace "xx" with color or <b>12</b> = bright white.	r choice: <b>00</b> = electrical ivory, <b>01</b> = office white, <b>07</b> = white,





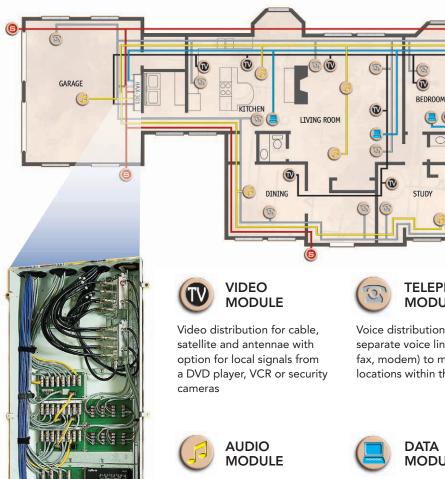


(8.4) Residential Diagram

#### **Residential Diagram**

Structured wiring maximizes the potential of today's computers and communications devices, allowing you to expand, integrate and customize all of your electronic systems. It also provides the infrastructure you need to take advantage of future technologies, ensuring room for growth while increasing the resale value of your home.

- Provide whole-house audio/media system
- Integrated security systems
- Use multiple phone lines voice, fax or modem
- Video monitoring
- Home office
- Multiple/shared Internet access
- Network computers, printers and files
- Telephone / HDTV / printer / cable / fax / MP3 / VCR or DVD player / satellite / multimedia / entertainment system





Provides distribution to indoor or outdoor speaker locations from a central home audio system

#### **TELEPHONE MODULE**

Voice distribution of four separate voice lines (telephone, fax, modem) to multiple locations within the home



#### **SECURITY** SYSTEM

Provides monitoring of all entry/exit doors with optional fire monitoring with the capability to sound a local alarm and call the security monitoring service

#### **DATA MODULE**

Provides capability to network personal computing devices within the home and to share a broadband, high-speed connection (e.g., cable modem or DSL service)



#### **MODULAR OUTLET**

Modular outlet solutions provide convenient access to all your multimedia services while creating flexible choices of how a room may be used now and in the future





### 9.0 Cabinets, Racks & Enclosures

	Freestanding Racks & Cabinets	1268
.2	Wall-Mount Racks, Cabinets, & Brackets	272
	Shelving	.277
	Cable Management	.279
2.5	Accessories	283



(9.1) Freestanding Racks & Cabinets

#### **Data Center Cabinet**

- Two widths 24" and 30"
- 45RU accommodation
- 45" extended cabinet depth to accommodate expanding depth requirements
- Door hinges mounted on either left or right sides for dynamic door swing
- Side panels hinged for easy access inside the cabinet
- Heavy-duty oversized castors and leveling legs
- Fully welded 14-gauge steel frame that supports up to 2,500 lbs.
- Front and back mounting rails that can be freely adjusted for more depth, without requiring tools
- 6 1/2" rear clearance for PDU cable exit
- Angled PDU mounting bracket for reduced power cable strain and easy inspection of visual telemetry during rack operation
- Generic PDU mounting bracket that accommodates popular vendor components
- Doors available with 63% perforation for enhanced airflow or optional Plexiglas® for high-visibility preferences
- Unique two-point latch system in the middle of the doors
- 4" roof knockouts for increased cable-entry capacity
- Vertical exhaust system ready with available fan kit
- 24" cabinet to 30" cabinet conversion available
- Locks and latches standard



#### **Applications**

- Data Centers
- MDF
- Co-location Facilities
- Central Offices
- Equipment Rooms
- Processing Facilities



### **Cabinet Frame Ordering Information**

OCC PART NUMBER	DESCRIPTION
CDC4530	45RU X 30" black frame with rack unit markings screened on the mounting rails
CDC4524	45RU X 24" black frame with rack unit markings screened on the mounting rails

06 - Yellow



#### **Option Codes**

CABINET COLOR	FRONT DOOR	PERF INSERT COLORS	LEFT SIDE	RIGHT SIDE	ROOF	REAR DOOR
<b>01</b> – Black	<b>P</b> – Perf	<b>01</b> – Black	<b>L</b> – Locking	<b>L</b> – Locking	<b>SL</b> – Sliding*	<b>P</b> – Perf
<b>02</b> – White	<b>A</b> – Acrylic	<b>02</b> – White	<b>H</b> – Hinged Kit	<b>H</b> – Hinged Kit	<b>K</b> – Knockout	<b>S</b> – Solid (optional)
	0 – None	<b>03</b> – Blue	<b>B</b> – Bolt-on	<b>B</b> – Bolt-on	<b>0</b> – None	<b>0</b> – None
	<b>S</b> – Solid	<b>04</b> – Green	0 – None	0 – None	DE	ROCY®N®
		<b>05</b> – Red				
			-		part	of the Procyon family

\*Note: Sliding roof option is for 24" wide only.

(Plexiglas  $\!\!^{\scriptscriptstyle{(\!0\!)}}\!\!$  is a registered trademark of Rohm & Haas.)

of data center solutions

Example: CDC4530-01P05HHKP – 45RU, 30" wide, black, perf front door w/red insert, hinged side panels, both sides, knockout top, perf rear door. CDC4530-01S00KP – 45RU, 30" wide, black, solid front door, no side panels, knockout top, perf rear door.



(9.1) Freestanding Racks & Cabinets

#### **Freestanding Racks & Cabinets**

In keeping with our dedication to providing convenient solutions for structured cabling needs, OCC offers the Rack Max, an integrated open-frame rack and cable-management system in one. The Rack Max Cable Management Rack is able to accommodate 19" or 23" mounting widths in an 84" high open-frame rack configuration. Its wide stance provides above-average strength and a high-capacity 6.5" deep aluminum vertical channel allows for safe management of large bundles of copper or fiber cabling. Overall, the Rack Max solution offers maximum rack space with greater mounting flexibility and the added bonus of an integrated vertical cable path for increased cable management and greater aesthetic appeal.

- Built-in protected vertical cable pathway
- Vertical channels tapped on front and back with 4" x 4" side holes for easy cable entry
- Top bars with parallel and perpendicular attachment points for cable tray or ladder rack
- Built-in bend radius protection
- May accommodate 19" or 23" mounting widths
- (18) hook & loop fasteners
- EIA standard 5/8", 5/8", 1/2" hole mounting patterns with #12–24 tapped holes
- Sturdy aluminum construction
- Durable black powder-coat finish







#### Rack Max Cable Management Rack

CATALOG NUMBER	DESCRIPTION		LOAD RATING	RU'S	SHIPPING WEIGHT
CMR45	Rack Max 45RU cable management rack, 19" or 23" mounting	84"H x 6.5"D	1,000 lbs.	45	43 lbs.



(9.1) Freestanding Racks & Cabinets

### **Open-Frame Racks**

When it comes to standard EIA-compliant aluminum open-frame relay racks, OCC offers top-of-the-line relay racks that feature a variety of heights to meet any cabling infrastructure needs. Ideal for equipment rooms and telecommunications closets, our open-frame rack is an excellent foundation to build any network system.

- 3" deep vertical channels tapped on front and back for #12-24 pilot point combo head screws
- Side web holes for linking racks
- Two top and two bottom crossbars
- 7/8" holes for floor bolting
- Sturdy aluminum construction
- Available in durable black powder-coat finish or silver coating



CATALOG NUMBER	DESCRIPTION	DIMENSIONS	LOAD RATING	RU'S	SHIPPING WEIGHT
OF4502	84" open-frame rack, silver	84"H x 19"W x 3"D	900 lbs.	45	32 lbs.
OF4503	84" open-frame rack, black	84"H x 19"W x 3"D	900 lbs.	45	32 lbs.
OF4503HD	84" heavy-duty open-frame rack, black	84"H x 19"W x 3"D	1200 lbs.	45	40 lbs.
OF3602	68.25" open-frame rack, silver	68.25"H x 19"W x 3"D	900 lbs.	36	29 lbs.
OF3603	68.25" open-framee rack, black	68.25"H x 19"W x 3"D	900 lbs.	36	29 lbs.
OF2402	48" open-frame rack, silver	48"H x 19"W x 3"D	900 lbs.	24	24 lbs.
OF2403	48" open-frame rack, black	48"H x 19"W x 3"D	900 lbs.	24	24 lbs.

### **Freestanding Cabinets**

With OCC's complete line of freestanding cabinets, customers can provide seamless, upscale integration for any size network installation. This cabinet line offers a broad variety of solutions to fit any system application and the finest quality workmanship with the flexibility to meet any infrastructure demand.

- Removable sides and doors
- Four adjustable mounting rails
- Vented top with three 3" diameter cable-entry points
- Universal EIA alternating 5/8", 5/8", 1/2" hole pattern
- All-aluminum frame construction
- Black powder-coat finish
- IN-SERIES installation kit for multi-bay applications available
- Filter kits, bottom panels, and more accessories also available





(9.1) Freestanding Racks & Cabinets

# 19" Freestanding Cabinets

All 19" freestanding cabinets feature:

- Four mounting rails
- Vented top with three 3" diameter cable-entry points
- Quick-release locking, vented sides
- Smoked Plexiglas™ locking front door
- Solid steel, locking, vented rear door
- Leveling feet standard; locking casters optional
- Includes #12–24 pilot-point combo-head screws



CATALOG NUMBER	DESCRIPTION	DIMENSIONS	LOAD RATING	RU'S	SHIPPING WEIGHT
CC1203	19" freestanding cabinet, black	24"H x 25"W x 24"D	240 lbs.	12	90 lbs.
CC1803	19" freestanding cabinet, black	36"H x 25"W x 24"D	360 lbs.	18	115 lbs.
CC2403	19" freestanding cabinet, black	48"H x 25"W x 24"D	480 lbs.	24	130 lbs.
CC2404	19" freestanding cabinet, black	48"H x 25"W x 32"D	480 lbs.	24	130 lbs.
CC3003	19" freestanding cabinet, black	60"H x 25"W x 24"D	600 lbs.	30	150 lbs.
CC3803	19" freestanding cabinet, black	72"H x 25"W x 24"D	760 lbs.	38	165 lbs.
CC3804	19" freestanding cabinet, black	72"H x 25"W x 32"D	760 lbs.	38	195 lbs.
CC3807	19" freestanding server cabinet, black	72"H x 25"W x 36"D	760 lbs.	38	230 lbs.
CC4503	19" freestanding cabinet, black	84"H x 25"W x 24"D	900 lbs.	45	215 lbs.
CC4504	19" freestanding cabinet, black	84"H x 25"W x 32"D	900 lbs.	45	220 lbs.
CC4507	19" freestanding server cabinet, black	84"H x 25"W x 36"D	900 lbs.	45	240 lbs.
Add "C" for caster	S				

### 23" Freestanding Cabinets

23" freestanding cabinets offer:

- Either 23" or 19" mounting shelves with ample room for cable management
- Four shelf mounting rails
- Vented top and bottom with three 4.5" diameter cable-entry points
- Quick release, locking, vented sides
- Smoked Plexiglas<sup>™</sup> locking front door
- Solid steel, locking, vented rear door
- Leveling feet standard; locking casters optional
- Includes #12-24 pilot-point combo-head screws

CATALOG NUMBER	DESCRIPTION	DIMENSIONS	LOAD RATING	RU'S	SHIPPING WEIGHT
CC3805	23" freestanding cabinet, black	72"H x 31"W x 24"D	760 lbs.	38	230 lbs.
CC3806	23" freestanding cabinet, black	72"H x 31"W x 32"D	760 lbs.	38	245 lbs.
CC4505	23" freestanding cabinet, black	84"H x 31"W x 24"D	900 lbs.	45	250 lbs.
CC4506	23" freestanding cabinet, black	84"H x 31"W x 32"D	900 lbs.	45	265 lbs.
Add "C" for	Add "C" for casters				

(Plexiglas® is a registered trademark of Rohm & Haas.)





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(9.2) Wall-Mount Racks, Cabinets & Brackets

### **Wall-Mount Swing Racks**

For applications requiring wall-mountable access to network connectivity components, OCC offers the wall-mount swing racks for easy access and versatile equipment options. Like all of our products, quality is built into the design. The 19" Swing Rack will accommodate any of OCC's horizontal cable management accessories.

- Swings open in either direction, even with 12", 18" or 25" depth equipment installed
- 19" mounting rails
- Includes hook & loop or tie-wrap tie-down points
- Black powder-coat finish
- Durable aluminum construction



CATALOG NUMBER	DESCRIPTION	DIMENSIONS	LOAD CAPACITY	RU'S	SHIPPING WEIGHT
SR412	19" wall-mount swing rack, black	46.3"H x 20.6"W x 12"D	120 lbs.	25	29 lbs.
SR418	19" wall-mount swing rack, black	46.3"H x 20.6"W x 18"D	120 lbs.	25	39 lbs.
SR425	19" wall-mount swing rack, black	46.3"H x 20.6"W x 25"D	120 lbs.	25	58 lbs.
SR312	19" wall-mount swing rack, black	37.6"H x 20.6"W x 12"D	100 lbs.	20	28 lbs.
SR318	19" wall-mount swing rack, black	37.6"H x 20.6"W x 18"D	100 lbs.	20	38 lbs.
SR325	19" wall-mount swing rack, black	37.6"H x 20.6"W x 25"D	100 lbs.	20	57 lbs.
SR212	19" wall-mount swing rack, black	23.5"H x 20.6"W x 12"D	80 lbs.	12	25 lbs.
SR218	19" wall-mount swing rack, black	23.5"H x 20.6"W x 18"D	80 lbs.	12	35 lbs.
SR225	19" wall-mount swing rack, black	23.5"H x 20.6"W x 25"D	80 lbs.	12	54 lbs.

(9.2) Wall-Mount Racks, Cabinets & Brackets

### **Wall-Mount Cabinet Enclosures**

When networks need added security for wall-mounted applications, Optical Cable Corporation offers wall-mount cabinet enclosures. The OCC Wall-mount Enclosures feature a locking smoked  $Plexiglas^{TM}$  or steel front door, two adjustable shelf mounting rails and a locking rear swing frame with heavy-duty quick-release hinges for easy wall-mounting and fast access to the rear of installed equipment.

- Removable doors
- Two adjustable shelf-mounting rails
- Disassembles for easy mounting
- Solid steel or locking smoked Plexiglas™ doors available
- Vented sides and top
- Ample cable entry and exit
- Accepts fan tray kits









CATALOG NUMBER	DESCRIPTION	DIMENSIONS	LOAD CAPACITY	RU'S	SHIPPING WEIGHT
WC818	Wall-mount cabinet, black	15"H x 21"W x 16"D	125 lbs.	8	37 lbs.
WC828	Wall-mount cabinet, black	15"H x 21"W x 20"D	125 lbs.	8	40 lbs.
WC1218	Wall-mount cabinet, black	24"H x 21"W x 16"D	125 lbs.	12	50 lbs.
WC1228	Wall-mount cabinet, black	24"H x 21"W x 20"D	125 lbs.	12	58 lbs.
WC1238	Wall-mount cabinet, black	24"H x 21"W x 24"D	125 lbs.	12	60 lbs.
WC1818	Wall-mount cabinet, black	36"H x 21"W x 16"D	125 lbs.	18	60 lbs.
WC1828	Wall-mount cabinet, black	36"H x 21"W x 20"D	125 lbs.	18	65 lbs.
WC1838	Wall-mount cabinet, black	36"H x 21"W x 24"D	125 lbs.	18	65 lbs.
WC2428	Wall-mount cabinet, black	45"H x 21"W x 20"D	175 lbs.	24	80 lbs.
WC2438	Wall-mount cabinet, black	45"H x 21"W x 24"D	175 lbs.	24	90 lbs.
Replace last digit "8" with "9" for solid steel door.					



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(9.2) Wall-Mount Racks, Cabinets & Brackets

#### **TERAX™** Enclosures

TERAX enclosures are designed explicitly for applications requiring large zone distribution capabilities and easy installation. These cabinets offer a modular solution for housing telecommunications and networking equipment in locations requiring a safe and secure environment.

- Cabinets hold up to 4RU of passive products and up to 3 RU of active equipment
- Design accepts all OCC copper rack-mount patch panels
- Patch panel brackets rotate 90°, allowing for easy installs
- Ideal cable management allows adequate space for routing and managing patch cords
- Enclosures have 16-gauge CRS welded construction
- Durable powder-coat finish protects equipment in isolated locations
- Load capacity: 100 lbs.







CATALOG NUMBER	DESCRIPTION	DIMENSIONS	LOAD CAPACITY
TERAX2	Telecom equipment remote access enclosure, select model, mounts two patch panels, cylinder lock included	40"H x 27.12"W x 6.8"D	100 lbs.
TERAX2S	Telecom equipment remote access enclosure, standard model, mounts two patch panels, lock tab for padlock	40"H x 27.12"W x 6.88"D	100 lbs.
TERAX-FK	TERAX fan kit		



(9.2) Wall-Mount Racks, Cabinets & Brackets

#### **Compact Sideways-Mount Enclosures**

A perfect solution for tight spaces is the OCC Sideways-Mount Enclosure. With their compact design, these wall-mountable cabinets offer an economical means for protecting network components. Their all-steel construction provides excellent protection from high-traffic areas, common in retro-fit network closets. In addition to its rugged construction, oversized cable-entry points and a vented top and bottom make the sideways-mount enclosure an excellent solution for small spaces.

- Vented top and bottom that allow airflow for network equipment
- Mounts with four keyhole screw slots in standard 16" stud spacing
- Includes #12-24 pilot-point combo-head screws for fast installations
- All-steel construction with black powder-coat finish



CSM-2

#### 19" Sideways-Mount Enclosures

For 19" mounting widths, OCC's Sideways-Mount Enclosures offer:

- Removable cover provides for unobstructed access
- Standard 19" mounting
- Oversized cable entry for in-wall home-run access
- Built-in cable tie-downs for plastic tie-wraps or hook & loop fasteners

CATALOG NUMBER	DESCRIPTION	DIMENSIONS	LOAD CAPACITY	RU'S	SHIPPING WEIGHT
CSM-2	19" sideways- mount enclosure	20"H x 19"W x 3.75"D	75 lbs.	2	17 lbs.
CSM-4	19" sideways- mount enclosure	20"H x 19"W x 7.25"D	75 lbs.	4	17 lbs.



CSM-4

#### 23" Sideways-Mount Enclosures

CATALOG NUMBER	DESCRIPTION	DIMENSIONS	LOAD CAPACITY	RU'S	SHIPPING WEIGHT
CSM-7	23" sideways- mount enclosure	22.5"H x 24"W x 13.5"D	75 lbs.	7	45 lbs.
Add-on Options					
CSM-7MR Additional mounting rails, pair					
FAN2	Dual fan cooling module				









(9.2) Wall-Mount Racks, Cabinets & Brackets

#### **Wall-Mount Brackets**

OCC's Wall-Mount Brackets are best suited for mounting patch panels and mixed media panels in telecom closets or any cross-connect areas where space is a premium. These brackets are designed to offer quick network connect points for 19" mounting applications and may be stacked easily for rack-mount 110 tower applications. Either way, the OCC wall-mount brackets offer durability and flexible customization to meet any cabling infrastructure need.

- Features a quick-release design for speedy access to the back of installed equipment
- Includes #12–24 pilot-point combo-head screws for quick installations
- All-steel construction with black powder-coat finish

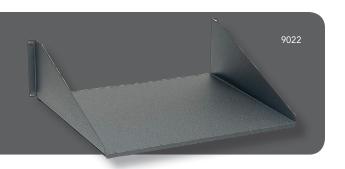
CATALOG NUMBER	DESCRIPTION	DIMENSION	SHIPPING WEIGHT
WF101	1RU wall-mount bracket	1.75"H x 20"W x 4"D	2 lbs.
WF102	1RU wall-mount bracket	1.75"H x 20"W x 8"D	2 lbs.
WF201	2RU wall-mount bracket	3.50"H x 20"W x 4"D	3 lbs.
WF202	2RU wall-mount bracket	3.50"H x 20"W x 8"D	4 lbs.
WF203	2RU wall-mount bracket	3.50"H x 20"W x 12"D	4 lbs.
WF401	4RU wall-mount bracket	7.00"H x 20"W x 4"D	5 lbs.
WF402	4RU wall-mount bracket	7.00"H x 20"W x 8"D	8 lbs.
WF403	4RU wall-mount bracket	7.00"H x 20"W x 12"D	8 lbs.
WF404	4RU wall-mount bracket, tilts down	7.00"H x 20"W x 15"D	12 lbs.
WF601	6RU wall-mount bracket	10.50"H x 20"W x 4"D	8 lbs.
WF602	6RU wall-mount bracket	10.50"H x 20"W x 8"D	11 lbs.
WF603	6RU wall-mount bracket	10.50"H x 20"W x 12"D	12 lbs.



(9.3) Shelving

#### 19" Shelves for Cabinets or Racks

OCC's product line offers a full selection of shelving options for any open-frame relay rack or freestanding cabinet requiring 19" mounting applications. Each shelf may be ordered independently or kitted with any OCC enclosure to create a custom configured cabinet or rack.



#### 19" Cantilever Shelves

CATALOG NUMBER	DESCRIPTION	DEPTH	LOAD CAPACITY	SHIPPING WEIGHT
9021	1RU cantilever shelf	6.8"D	44 lbs.	2 lbs.
9021V	1RU vented cantilever shelf	6.8"D	44 lbs.	2 lbs.
9127	1RU double-sided cantilever shelf	16.0"D	75 lbs.	5 lbs.
9022	2RU cantilever shelf	10.5"D	55 lbs.	5 lbs.
9022V	2RU vented cantilever shelf	10.5"D	50 lbs.	6 lbs.
RRS1914A	2RU deep cantilever shelf	14.5"D	66 lbs.	6 lbs.
RRS1914AV	2RU deep vented cantilever shelf	14.5"D	66 lbs.	6 lbs.
9125	2RU double-sided cantilever shelf	25.0"D	90 lbs.	10 lbs.
9125V	2RU double-sided vented cantilever shelf	25.0"D	85 lbs.	10 lbs.
9023	3 RU cantilever shelf	15.5"D	66 lbs.	6 lbs.
9023V	3 RU vented cantilever shelf	15.5"D	60 lbs.	6 lbs.
9132	Center-mount or top-mount shelf	20.0"D	200 lbs.	10 lbs.

#### 19" Four-Point Cabinet Shelves

CATALOG NUMBER	DESCRIPTION	DEPTH	LOAD CAPACITY	SHIPPING WEIGHT
9024	Four-point vented cabinet shelf	16.0"D	220 lbs.	7 lbs.
9025	Four-point vented cabinet shelf	18.0"D	220 lbs.	7 lbs.
9026	Four-point vented cabinet shelf	24.0"D	220 lbs.	8 lbs.
9027	Four-point vented cabinet shelf	30.0"D	220 lbs.	12 lbs.



# 19" Sliding Shelves

CATALOG NUMBER	DESCRIPTION	DEPTH	LOAD CAPACITY	SHIPPING WEIGHT
9028	1RU vented sliding shelf	16.0"D	110 lbs.	10 lbs.
9030	1RU vented sliding shelf for 36" deep cabinets	30.0"D	110 lbs.	10 lbs.
9121	1RU sliding drawer	16.0"D	90 lbs.	11 lbs.
9126	1RU sliding shelf for open-frame rack	16.0"D	90 lbs.	10 lbs.
9129	1RU sliding shelf for 19" Rack Max	16.0"D	90 lbs.	12 lbs.
9130	2RU sliding keyboard shelf	16.0"D	90 lbs.	12 lbs.
9029	1RU vented sliding shelf	24.0"D	110 lbs.	19 lbs.







(9.3) Shelving

### 23" Shelving for Cabinets or Racks

For 23" mounting applications, OCC's product line offers a variety of shelving options to choose from. As with the 19" shelving, all 23" shelves may be purchased separately or kitted with any OCC rack or cabinet to create a custom solution to meet any network foundation needs.

#### 23" Cantilever Shelves

CATALOG NUMBER	DESCRIPTION	DEPTH	LOAD CAPACITY	SHIPPING WEIGHT
9231	1RU cantilever shelf	6.8"D	44 lbs.	7 lbs.
9232	2RU cantilever shelf	10.5"D	55 lbs.	7 lbs.
9232V	2RU vented cantilever shelf	10.5"D	50 lbs.	7 lbs.
9218	2RU double-sided cantilever shelf	25.0"D	90 lbs.	12 lbs.
9218V	2RU double-sided vented cantilever shelf	25.0"D	85 lbs.	12 lbs.
9233	3 RU cantilever shelf	15.5"D	66 lbs.	9 lbs.
9233V	3 RU vented cantilever shelf	15.5"D	60 lbs.	9 lbs.



#### 23" Four-Point Cabinet Shelves

CATALOG NUMBER	DESCRIPTION	DEPTH	LOAD CAPACITY	SHIPPING WEIGHT
9234	Four-point vented cabinet shelf	16.0"D	220 lbs.	9 lbs.
9235	Four-point vented cabinet shelf	18.0"D	220 lbs.	9 lbs.
9236	Four-point vented cabinet shelf	24.0"D	220 lbs.	10 lbs.



# 23" Sliding Shelves

CATALOG NUMBER	DESCRIPTION	DEPTH	LOAD CAPACITY	SHIPPING WEIGHT
9238	Vented sliding shelf	16.0"D	110 lbs.	12 lbs.
9226	Sliding shelf for open-frame rack	16.0"D	90 lbs.	12 lbs.
9229	Sliding shelf for 23" Rack Max	16.0"D	90 lbs.	12 lbs.
9239	Vented sliding shelf	24.0"D	110 lbs.	17 lbs.





(9.4) Cable Management

### **Vertical Cable Management**

To keep cables neatly arranged and aesthetically appealing, OCC offers vertical cable management options to organize closet space and provide additional storage for cable routing. Whether installing cabinets in a data center or open-frame racks in an equipment room, using OCC's vertical options upgrades any installation.





### **Vertical Cable Management for Cabinets**

CATALOG NUMBER	DESCRIPTION	
CM201	Vertical cable management double ring for freestanding cabinets	
CM203	Vertical cable manager with Velcro® belts for 84" freestanding cabinets	
CM204	Vertical cable manager with Velcro® belts for 72" freestanding cabinets	
CM205	Vertical cable manager with Velcro® belts for 60" freestanding cabinets	
CM206	Vertical cable manager with Velcro® belts for 48" freestanding cabinets and 24RU wall cabinets	
VB13	Double-sided cable management Velcro® belt 13"	

### Vertical Cable Management for Open-Frame Racks

CATALOG NUMBER	DESCRIPTION	
RC1	Vertical cable management, rack channel ring, pair	
AR24	Vertical cable management, 2" x 4" cable ring, pair	
AR44	Vertical cable management, 4" x 4" cable ring, pair	
CM202	Vertical cable management double ring for open-frame racks	
VCM3	Vertical cable organizer, 3" x 7', double-sided	
VCM6	Vertical cable organizer, 6" x 7', double-sided	
VFCM6-2D	Vertical fiber cable organizer, 6" x 2', double-sided	
VFCM6-2S	Vertical fiber cable organizer, 6" x 2', single-sided	
VFCM6-6D	Vertical fiber cable organizer, 6" x 7', double-sided	
VFCM6-6S	Vertical fiber cable organizer, 6" x 7', single-sided	
CM207	"Vortex" 84" vertical cable manager for open-frame racks and CMR45 Rack Max	
VCMFD-36SS	Vertical fiber cable organizer, finger duct, 36", single-sided, side mount	
VCMFD-36DS	Vertical fiber cable organizer, finger duct, 36", double-sided, side mount	
VCMFD-72SS	Vertical fiber cable organizer, finger duct, 72", single-sided, side mount	
VCMFD-72DS	Vertical fiber cable organizer, finger duct, 72", double-sided, side mount	
VCMFD-36SB	Vertical fiber cable organizer, finger duct, 36", single-sided, bridge mount	
VCMFD-36DB	Vertical fiber cable organizer, finger duct, 36", double-sided, bridge mount	
VCMFD-72SB	Vertical fiber cable organizer, finger duct, 72", single-sided, bridge mount	
VCMFD-72DB	Vertical fiber cable organizer, finger duct, 72", double-sided, bridge mount	



VCMFD-72SS



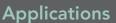
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(9.4) Cable Management

### **High-Capacity Cable Management**

Introducing Optical Cable Corporation's new vertical and horizontal cable management products that provide increased functionality, ease of use and a neat end appearance. These high-quality cable management products are designed for modern, high-performance network cabling. OCC's products feature effective cable management options with built-in flexibility to address any structured cabling platform and offer multiple options for width, height and depth and all the configurations you need for rack-mounted cable management requirements.

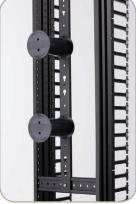
- Aesthetically pleasing design
- Simple, modular and easy to install
- Built-in flexibility
- Multiple options for width, height and depth
- Options for widely or closely spaced fingers for low- or high-density cabling on and between vertical racks
- Optional back covers with pass-through openings and vertical slots for attaching cable straps
- Standard back covers with pass-through openings for cable routing, slots for cable straps and keyhole slots for attaching cable spools
- Horizontal cable managers with snap-on removable hinged doors that open past 180° and remain open in the up position for convenient cable access
- Meets or exceeds all applicable TIA/EIA cable management standards



- Data Centers
- MDF
- Co-location Facilities
- Central Offices
- Equipment Rooms
- Processing Facilities







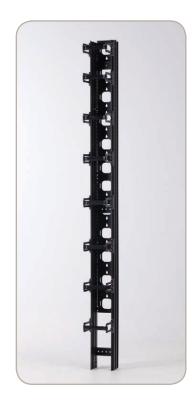




(9.4) Cable Management

## **Cable Management Solutions**

PART NUMBER	DESCRIPTION
VCM645RUHD	Vertical cable manager, single-sided, high-density, 6" wide, 84" w/cover
VCM1045RUHD	Vertical cable manager, single-sided, high-density, 10" wide, 84" w/cover
VCM645RULD	Vertical cable manager, single-sided, low density/gate, 6" wide, 84" tall
VCM1045RULD	Vertical cable manager, single-sided, low density/gate, 10" wide, 84" tall
CM503	Horizontal manager, single-sided, 2U w/hinged cover
CM504	Horizontal manager, double-sided, 2U w/hinged cover
VCM645RUBACK	Vertical cable manager back cover, 6" wide, 84" tall
VCM1045RUBACK	Vertical cable manager back cover, 10" wide, 84" tall
VCM62RUGATE	Gate and fingers, 2U, 6" wide
VCM102RUGATE	Gate and fingers, 2U, 10" wide
VCM6GATE	Gate only, 6" wide
VCM10GATE	Gate only, 10" wide
VCM6RETBAR	Retaining bar, 6" wide
VCM10RETBAR	Retaining bar, 10" wide
VCMSPOOL	Adjustable cable spool, single
VCMSPOOLKIT84	Adjustable cable spool kit for 84" tall vertical managers









# CABINETS, RACKS & ENCLOSURES





(9.4) Cable Management

## Horizontal Cable Management

Optimize closet space and organize your cabling system with any of OCC's horizontal cable managers. This complete line of horizontal cable management provides a versatile selection for maintaining cable runs and preserving connectivity components' lifespan.

## Ring and Velcro Horizontal Cable Management

CATALOG NUMBER	DESCRIPTION
CM102	19" cable management panel, 1RU, Velcro® belts
CM104	Front/rear side towel bar, 1RU
CM105	Cable management tab, Velcro® belts



## **Horizontal Cable Organizers**

CATALOG NUMBER	DESCRIPTION
CO17519	19" front-side cable organizer, intra-bay, 1.75", 1RU
CO17519L	19" front-side cable organizer, inter-bay, 1.75", 1RU
CO1719H	19" front-side cable organizer, inter-bay, 1.75", 1RU high density
CO3519	19" front-side cable organizer, intra-bay, 3.5", 2RU
CO3519L	19" front-side cable organizer, inter-bay, 3.5", 2RU
COMB3519	19" cable organizer, single-sided with cover, 3.5", 2RU
COMBD3519	19" cable organizer, double-sided with cover, 3.5", 2RU
CMB19	19" cable management bar for Cat 5e panel
SB1719	19" cable support bar kit for EIA mounting



CO3519



## Finger Duct Horizontal Cable Organizers

CATALOG NUMBER	DESCRIPTION
CM401	19" horizontal cable manager, finger style, 1RU single-sided
CM402	19" horizontal cable manager, finger style, 1RU double-sided
CM403	19" horizontal cable manager, finger style, 2RU single-sided
CM404	19" horizontal cable manager, finger style, 2RU double-sided



# CABINETS, RACKS & ENCLOSURES



(9.5) Accessories

#### Accessories

To complete any structured cabling foundation, OCC provides a complete collection of rack and cabinet accessories. For every application, OCC has created a product to meet that demand. From power panels to environmental control fans to casters and leveling feet, the OCC product line offers solutions that guarantee durability and are backed by our 15-year out-of-the-box warranty.

#### **Environmental Control**

CATALOG NUMBER	DESCRIPTION
FAN2	2-fan module, 216cfm, 115VAC, 12' cord (fits wall cabinets and 19" freestanding cabinets)
FAN3	3-fan module, 325cfm, 115VAC, 12' cord (fits 23" freestanding cabinets – factory-installed only)
FAN310	3-fan housing with fan grilles, 1RU rack-mount, 115VAC, 12' cord, 19" mounting brackets
FAN320	3-fan housing with fan grilles, 1RU rack-mount, 115VAC, 12' cord, 23" mounting brackets
FAN4	4-fan module, 432cfm, 115VAC, 12' cord (fits 19" freestanding cabinets only)





#### **Power Panels**

CATALOG NUMBER	DESCRIPTION
PS115	19" rack-mount power panel with surge suppression, 115VAC 15A, 12 outlets, 15' cord
PS120	19" rack-mount power panel with surge suppression, 115VAC 20A, 12 outlets, 15' cord
PS215	19" rack-mount power panel, 115VAC 15A, 10 outlets, 15' cord
PS220	19" rack-mount power panel, 115VAC 20A, 10 outlets, 15' cord
PS315	48" power strip, 115VAC 15A, 8 outlets, 15' cord
PS320	48" power strip, 115VAC 20A, 8 outlets, 15' cord



### Seismic Anchoring Kits

CATALOG NUMBER	DESCRIPTION
SAK	Seismic anchoring kit for 19" freestanding cabinets (2 angles)
SBK24	Seismic bracing/anchoring kit for 24" deep freestanding cabinets (factory installation only)
SBK32	Seismic bracing/anchoring kit for 32" deep freestanding cabinets (factory installation only)
SBK36	Seismic bracing/anchoring kit for 36" deep freestanding cabinets (factory installation only)



# CABINETS, RACKS & ENCLOSURES





(9.5) Accessories

## **Casters or Leveling Feet**

CATALOG NUMBER	DESCRIPTION
9171HD	Heavy-duty locking swivel casters for freestanding cabinet, set of four
9172	Heavy-duty leveling feet for freestanding cabinets, set of four



## **Grounding Bars**

CATALOG NUMBER	DESCRIPTION
GRD19	19" horizontal copper rack-mount grounding bar, 1/8" x 1"
GRD30	Vertical-mount copper grounding bar for 60"/30RU cabinet, 1/8" x 1"
GRD38	Vertical-mount copper grounding bar for 72"/38RU cabinet, 1/8" x 1"
GRD45	Vertical-mount copper grounding bar for 84"/45RU cabinet, 1/8" x 1"



## 23" to 19" Reducers

CATALOG NUMBER	DESCRIPTION
RED1	23" to 19" reducer bracket, pair, 1RU
RED2	23" to 19" reducer bracket, pair, 2RU
RED3	23" to 19" reducer bracket, pair, 3RU



## 19" Blank Filler Panels

CATALOG NUMBER	DESCRIPTION
9041	1RU blank filler panel, black wrinkle powder-coat finish
9042	2RU blank filler panel, black wrinkle powder-coat finish
9043	3 RU blank filler panel, black wrinkle powder-coat finish
9044	4RU blank filler panel, black wrinkle powder-coat finish



## **Additional Rack or Cabinet Accessory Options**

CATALOG NUMBER	DESCRIPTION
9072	Splice kit for linking freestanding cabinets in series
9074	M6 mounting screws with washer and cage nut, set of four each
9075	M6 mounting screws with washer and cage nut, set of 100 each
9076	#12–24 cage nut, bag of 100
9173	#12–24 pilot-point combination-head rack screws, bag of 50, silver finish
9174	#12–24 pilot-point combination-head rack screws, bag of 50, black finish
9176	#12–24 pilot-point combination-head rack screws, bag of 100, silver finish
9177	#12–24 pilot-point combination-head rack screws, bag of 100, black finish
CM106	Cable tray/ladder rack top anchor for 3" deep relay rack, with cable waterfall, black
CM107	Cable tray/ladder rack top anchor for freestanding cabinets (factory installation only)





# 10.0 Military/Harsh Environment Connectors





10.1	r-Link inter-Connect Solution	200
10.2	OCC Pierside Family	294
10.3	EZ-Mate <sup>™</sup> Connectors	298
10.4	Commercial COTS-83526	305
10.5	R-Jack® Solution	312
10.6	Intelligent Release Inter-Connect System (IRIS™)	320
	MHC® II Fiber Optic Connector	
10.8	MIL-C-83522 ST and ST Adapters	336
10.9	Military Specified (QPL) M29504/14 and M29504/15	
	Fiber Optic Termini	341



(10.1) F-LINK™ Inter-Connect Solution



#### F-LINK™ Inter-Connect Solution

#### Overview

Optical Cable Corporation (OCC®) introduces the F-LINK™ Inter-Connect platform, which is simply the most remarkable connector system ever conceived. Born out of the proven performance of MIL-SPEC cylindrical components, the F-LINK Inter-Connect System is a cost-effective solution for commercial, industrial and military applications. The F-LINK Inter-Connect platform is a comprehensive family of connector components designed to solve a multitude of fiber optic applications, as well as enable the emerging trends and technological advances toward hybrid inter-connect systems (the combination of fiber optic and electrical power).

### Background

Multi-channel fiber optic cylindrical connectors have long been the preferred inter-connect solution for military and defense systems. Ideal for electrical or RF applications, the integration of fiber optic connectivity into cylindrical components has proven challenging, resulting in expensive connector systems. The F-LINK Inter-Connect platform captures the proven performance of MIL-SPEC cylindrical-style components, which are designed for extended operation in harsh or uncontrolled environments. Protective sealing features along with advanced materials enable F-LINK components to operate across a wide temperature and humidity range, and in high-vibration and/or corrosive environments. F-LINK's 1.25mm ceramic ferrule technology coupled with patent-pending, thermal plastic features provides a scalable, cost-effective inter-connect solution.

The flexibility of provisioning independent channels, gender-selectable plug and receptacles with superior environmental sealing positions the F-LINK Inter-Connect platform as the ideal solution for almost any application. The F-LINK Inter-Connect platform also features a comprehensive family of connector configurations, back shells and accessories. The platform is available in three shell sizes.



(10.1) F-LINK™ Inter-Connect Solution – Features and Benefits

FEATURES			BENEFITS
Maximum provisioning flexibility		BLANK HOLE CONFIGURATION CONFIGURATION (DEFAULT)	All termini cavities start as "BLANKS" and are machined to provide application-specific fiber optic/electrical requirements.  BLANKS can be machined for 1.25mm F/O pin or socket, 16#AWG copper pin and 16#AWG copper socket.
Interchangeable pin/socket insert caps	In-line Recpt., Male Insert Cap 6 Fiber	In-line Recpt., Female Insert Cap 6 Fiber	F-LINK™ allows interchangeability of pin or socket insert caps, which can be provisioned into either plug or receptacle components.
Exceptional environmental sealing capability	Pacie Searing Surface To Pin Cas  Recession  Casar Sea Searing Surface To Pin Cas  Casar Sea Searing Searing  Casar Sea	Tacial Seal To Social Cap Pro	Four sealing surfaces, including insert cap, insert body, plug and receptacle body and rear cable seal, provide IP-68 compliance.
Versatile, retractable backshell system	Cable Retention System – Extended	Cable Retention System – Retracted	The backshell system is common to both fiber optic and composite cable (fiber optic and electrical).  The F-LINK backshell system provides ease of termination, allowing extension and retraction of the inner cable retention system.
Interchangeable fiber optic or composite hybrid cable retention system	Cable Retention System – Fiber Optic Style Cable	Cable Retention System – Composite Style Cable	Supports either fiber optic cable or composite hybrid cable by replacement of the cable retention system for either fiber optic – or hybrid-style cables.
F-LINK™ termini and electrical pin/socket contacts	THE REAL PROPERTY OF THE PARTY		The component's 1.25mm ceramic ferrules are used within the F-LINK fiber optic termini. Electrical contacts are based on the same proven technology used in D38999 connectors. Insertion/extraction tools are common and low cost.



(10.1) F-LINK™ Inter-Connect Solution – Connector Configurations





(10.1) F-LINK™ Inter-Connect Solution – Performance Specifications

#### **Performance Specifications**

PERFORMANCE	SPECIFICATION	PARAMETER
Insertion loss (multimode)	EIA/TIA-455-171	0.50dB – typical, 0.75dB – max.
Insertion loss (single-mode)	EIA/TIA-455-171	0.40dB – typical, 0.75dB – max.
Back reflection (single-mode UPC polish)	EIA/TIA-455-107	-50dB – typical, -40dB – max.
Operating temperature	TIA/EIA-455-5	-40°C to + 85°C
Storage temperature	TIA/EIA-455-5	-40°C to + 85°C
Mating durability	TIA-455-21	500 cycles
Impact	TIA/EIA-455-2	Method B, omit wall pipe
Twist	TIA-455-36	±90° rotation, 1 cycle/5 sec., 1000 cycles
Cable sealing flex	EIA/TIA-455-1	Procedure I
Cable retention <sup>1</sup>	TIA-455-6	400 lbs. min.
Crush resistance	TIA-455-26	450 lbs.
Temperature life	TIA/EIA-455-4	250 hrs., 85 ± 2°C
Thermal shock	TIA-455-71	Condition B-0 except 10 cycles, @ 85°C and -62°C
Physical shock	EIA/TIA-455-14A	Condition C, 5 shocks/axis
Vibration	EIA/TIA-455-11B	Condition III and VI condition C for 1.5 hrs., except III
Humidity	EIA/TIA-455-5	Туре ІІ
Water submersion	IP-68, IEC-60529	1m depth, 48 hours, bulkhead mounted in watertight cube

#### **NOTES**

## Ordering Information – F-LINK Shell Size 16 (6 Channel)

PART NUMBER	CONFIGURATION	PRODUCT DESCRIPTION
HDANNNNNBU30B	Plug, w/backshell	6 CH (blank¹), plug, male, backshell, black anodized, 0.240–0.269" cable O.D.
HDBNNNNNBU30B	Plug, w/backshell	6 CH (blank¹), plug, female, backshell, black anodized, 0.240–0.269" cable O.D.
HDANNNNNBU30D	Plug, w/backshell	6 CH (blank¹), plug, male, backshell, black anodized, 0.316–0.345" cable O.D.
HDBNNNNNBU30D	Plug, w/backshell	6 CH (blank¹), plug, female, backshell, black anodized, 0.316–0.345" cable O.D.
HDCNNNNNBM30B	Recpt., in-line w/backshell	6 CH (blank¹), in-line recpt., male, backshell, black anodized, 0.240–0.269" cable O.D.
HDDNNNNNBM30B	Recpt., in-line w/backshell	6 CH (blank¹), in-line recpt., female, backshell, black anodized, 0.240–0.269" cable O.D.
HDCNNNNNBM30D	Recpt., in-line w/backshell	6 CH (blank¹), in-line recpt., male, backshell, black anodized, 0.316–0.345" cable O.D.
HDDNNNNNBM30D	Recpt., in-line w/backshell	6 CH (blank¹), in-line recpt., female, backshell, black anodized, 0.316–0.345" cable O.D.
HDENNNNBM00	Receptacle, panel-mount	6 CH (blank¹), panel-mount receptacle, male, black anodized
HDFNNNNNBM00	Receptacle, panel-mount	6 CH (blank¹), panel-mount receptacle, female, black anodized
HDQNNNNNBU00	Plug, panel-mount	6 CH (blank¹), panel-mount plug, male, black anodized
HDRNNNNBU00	Plug, panel-mount	6 CH (blank¹), panel-mount plug, female, black anodized

<sup>&</sup>lt;sup>1</sup> Uses military tactical cable for test purposes

<sup>&</sup>lt;sup>1</sup> "Blank" refers to an untapped cavity that can be modified (drilled or molded) to accommodate fiber optic pin, fiber optic socket, electrical pin or electrical socket.





(10.1) F-LINK<sup>™</sup> Inter-Connect Solution – Ordering Information

#### F-LINK Shell Size 16 (6 Channel)

PART NUMBER	CONFIGURATION	PRODUCT DESCRIPTION
HDSNNNNNBM00	Receptacle, jam nut, internal	6 CH (blank¹), jam nut receptacle, male, internal, black anodized, w/o D-Flat
HDTNNNNNBM00	Receptacle, jam nut, internal	6 CH (blank¹), jam nut receptacle, female, internal, black anodized, w/o D-Flat
HDUNNNNNBM00	Receptacle, jam nut, external	6 CH (blank¹), jam nut receptacle, male, external, black anodized, w/o D-Flat
HDVNNNNNBM00	Receptacle, jam nut, external	6 CH (blank¹), jam nut receptacle, female, external, black anodized, w/o D-Flat
HDJNNNNNB001	Dust cap	SS16, dust cover, metal, plug, black anodized
HDJNNNNNH001	Dust cap	SS16, dust cover, plastic, plug, black anodized
HDJNNNNNB002	Dust cap	SS16, dust cover, metal, receptacle, internal jam nut, black anodized
HDJNNNNNB003	Dust cap	SS16, dust cover, metal, receptacle, ext. jam nut, black anodized
HDJNNNNNB004	Dust cap	SS16, dust cover, metal, receptacle, panel-mount, black anodized

#### F-LINK Shell Size 22 (17 Channel)

PART NUMBER	CONFIGURATION	PRODUCT DESCRIPTION
HGANNNNNB130D	Plug, w/backshell	17 CH (blank¹), plug, male, backshell, black anodized, 0.316–0.342" cable O.D.
HGBNNNNNB130D	Plug, w/backshell	17 CH (blank¹), plug, female, backshell, black anodized, 0.316-0.342" cable O.D.
HGANNNNNB130G	Plug, w/backshell	17 CH (blank¹), plug, male, backshell, black anodized, 0.422–0.462" cable O.D.
HGBNNNNNB130G	Plug, w/backshell	17 CH (blank¹), plug, female, backshell, black anodized, 0.422-0.462" cable O.D.
HGCNNNNNB130D	Recpt., in-line w/backshell	17 CH (blank¹), in-line recpt., male, backshell, black anodized, 0.316–0.342" cable O.D.
HGDNNNNNB130D	Recpt., in-line w/backshell	17 CH (blank¹), in-line recpt., female, backshell, black anodized, 0.316–0.342" cable O.D.
HGCNNNNNB130G	Recpt., in-line w/backshell	17 CH (blank¹), in-line recpt., male, backshell, black anodized, 0.422–0.462" cable O.D.
HGDNNNNNB130G	Recpt., in-line w/backshell	17 CH (blank¹), in-line recpt., female, backshell, black anodized, 0.422–0.462" cable O.D.
HGENNNNNB100	Receptacle, panel-mount	17 CH (blank¹), panel-mount receptacle, male, black anodized
HGFNNNNNB100	Receptacle, panel-mount	17 CH (blank¹), panel-mount receptacle, female, black anodized
HGQNNNNNB100	Recpt., jam nut, internal	17 CH (blank¹), receptacle, jam nut, internal, male, black anodized
HGRNNNNNB100	Recpt., jam nut, internal	17 CH (blank¹), receptacle, jam nut, internal, female, black anodized
HGGNNNNNB100	Plug, panel-mount	17 CH (blank¹), plug, panel-mount, male, black anodized
HGHNNNNNB100	Plug, panel-mount	17 CH (blank¹), plug, panel-mount, female, black anodized
HGUNNNNNB100	Plug, panel-mount	17 CH (blank¹), plug, panel-mount, male, black anodized
HGVNNNNNB100	Plug, panel-mount	17 CH (blank¹), plug, panel-mount, female, black anodized
HGJNNNNNB001	Dust cap	SS22, dust cover, metal, plug, black anodized
HGJNNNNNH001	Dust cap	SS22, dust cover, plastic, plug, black anodized
HGJNNNNNB002	Dust cap	SS22, dust cover, metal, receptacle, int. jam nut, black anodized
HGJNNNNNB003	Dust cap	SS22, dust cover, metal, receptacle, ext. jam nut, black anodized
HDJNNNNNB004	Dust cap	SS16, dust cover, metal, receptacle, panel-mount, black anodized

#### **NOTES**

"Blank" refers to an untapped cavity that can be modified (drilled or molded) to accommodate fiber optic pin, fiber optic socket, electrical pin or electrical socket.



(10.1) F-LINK™ Inter-Connect Solution – Ordering Information

#### F-LINK Shell Size 28 (33 Channel)

PART NUMBER	CONFIGURATION	PRODUCT DESCRIPTION
HJANNNNNB130D	Plug, w/backshell	33 CH (blank¹), plug, male, backshell, black anodized, 0.316–0.342" cable O.D.
HJBNNNNNB130D	Plug, w/backshell	33 CH (blank¹), plug, female, backshell, black anodized, 0.316–0.342" cable O.D.
HJANNNNNB130K	Plug, w/backshell	33 CH (blank¹), plug, male, backshell, black anodized, 0.550–0.589" cable O.D.
HJBNNNNNB130K	Plug, w/backshell	33 CH (blank¹), plug, female, backshell, black anodized, 0.550–0.589" cable O.D.
HJCNNNNNB130D	Recpt., in-line w/backshell	33 CH (blank¹), in-line recpt., male, backshell, black anodized, 0.316–0.342" cable O.D.
HJDNNNNNB130D	Recpt., in-line w/backshell	33 CH (blank¹), in-line recpt., female, backshell, black anodized, 0.316–0.342" cable O.D.
HJCNNNNNB130K	Recpt., in-line w/backshell	33 CH (blank¹), in-line recpt., male, backshell, black anodized, 0.550–0.589" cable O.D.
HJDNNNNNB130K	Recpt., in-line w/backshell	33 CH (blank¹), in-line recpt., female, backshell, black anodized, 0.550–0.589" cable O.D.
HJENNNNNB100	Receptacle, panel-mount	33 CH (blank¹), panel-mount receptacle, male, black anodized
HJFNNNNNB100	Receptacle, panel-mount	33 CH (blank¹), panel-mount receptacle, female, black anodized
HJQNNNNNB100	Recpt., jam nut, internal	33 CH (blank¹), receptacle, jam nut, internal, male, black anodized
HJRNNNNNB100	Recpt., jam nut, internal	33 CH (blank¹), receptacle, jam nut, internal, female, black anodized
HJGNNNNNB100	Plug, panel-mount	33 CH (blank¹), plug, panel-mount, male, black anodized
HJHNNNNNB100	Plug, panel-mount	33 CH (blank¹), plug, panel-mount, female, black anodized
HJUNNNNNB100	Plug, panel-mount	33 CH (blank¹), plug, panel-mount, male, black anodized
HJVNNNNNB100	Plug, panel-mount	33 CH (blank¹), plug, panel-mount, female, black anodized
HJJNNNNNB001	Dust cap	SS28, dust cover, metal, plug, black anodized
HJJNNNNNH001	Dust cap	SS28, dust cover, plastic, plug, black anodized
HJJNNNNNB002	Dust cap	SS28, dust cover, metal, receptacle, int. jam nut, black anodized
HJJNNNNNB003	Dust cap	SS28, dust cover, metal, receptacle, ext. jam nut, black anodized
HDJNNNNNB004	Dust cap	SS16, dust cover, metal, receptacle, panel-mount, black anodized

## F-LINK Fiber Optic Termini and Electrical Contacts

PART NUMBER	CONFIGURATION	PRODUCT DESCRIPTION
TP2042DD01 Termini, fiber optic Termini, fiber optic, genderless, pin, 1.25 ceramic ferrule, 126µm		Termini, fiber optic, genderless, pin, 1.25 ceramic ferrule, 126µm
UV164016AA	Contact, electrical	Contact, pin, electrical, 16# AWG
UV165016AA	Contact, electrical	Contact, pin, electrical, 16# AWG, long (ground)
UV164116AA	Contact, electrical	Contact, socket, electrical, 16# AWG
PA35395-99-01	Crimp sleeve	Crimp sleeve, brass, 0.114 O.D.

<sup>1</sup> "Blank" refers to an untapped cavity that can be modified (drilled or molded) to accommodate fiber optic pin, fiber optic socket, electrical pin or electrical socket.

All F-LINK connectors can be utilized in any pre-terminated turnkey assemblies.







(10.1) F-LINK™ Inter-Connect Solution – Provisioning Guidelines

### Fiber Optic Only

- 1) Select the appropriate shell size to accommodate the fiber optic channel count.
- 2) Select the connector configurations that meet the intent of the application. Most fiber optic applications require male plugs with backshell to support connectivity with female receptacles. Receptacles are selected based on internal, external jam nut or panel-mount options.
- 3) Identify the number of termini required to support the fiber count.
- 4) Apply one (1) crimp sleeve to each terminus when using receptacle configurations without backshells. Receptacles are typically provisioned with Simplex 2.0mm loose tube fiber optic cable and Simplex connectors (e.g., SC, LC, ST, FC) to form pigtails.
- 5) See section insert provisioning to specify the hole pattern portion of the final part number by completing the NNNNN portion of each connector configuration (ex: HJVNNNNNBU00 becomes HJV00024BU00 for a 24 CH fiber optic application).

#### Hybrid (Combination of Electrical and Fiber Optic)

- 1) Select the appropriate shell size to accommodate the fiber optic and electrical channel count.
- 2) Select the connector configurations that meet the intent of the application. Most hybrid applications require the source of electricity to be protected from hazardous shock along the path of inter-connect. F-LINK supports this requirement through interchangeable pin/socket insert caps as well as in-line receptacles with backshell and panel-mounted plugs.
- 3) Receptacle options include in-line internal, external jam nut, in-line or panel-mount and can be provisioned as female or male to protect from hazardous shock. Backshells are typically used with in-line receptacles.
- Plug options include standard plug or panel-mounted plug provisioned as female or male to protect from hazardous shock.
   Backshells are typically used with plugs.
- 5) Identify the number of termini required to support the fiber count.
- 6) Apply one (1) crimp sleeve to each terminus when using receptacle configurations without backshells. Receptacles are typically provisioned with Simplex 2.0mm loose tube fiber optic cable and Simplex connectors (e.g., SC, LC, ST, FC) to form pigtails.
- Identify the number of 16#AWG pin contacts to support male plug or male receptacle configurations.
- 8) Identify the number of 16#AWG socket contacts to support female plug or female receptacle configurations.
- 9) For applications greater than 16#AWG, larger gauge wire can be supported by splitting stranded wire between two 16#AWG contacts or with custom F-LINK applications using 10#AWG contacts. Contact OCC Technical salesperson for additional information.
- 10) For applications that require ground fault detection, a long pin (UV165016AA) is applied to the center hole of the male insert body, making first contact with the mating socket (also located in the center hole), prior to full connector engagement.
- 11) See section insert provisioning to specify the final part number by completing the NNNNN portion of each connector configuration (e.g., HJVNNNNNB100 becomes HJV20324B100 for a three electrical + 24 CH fiber optic with long ground pin).

### **Plating Options**

All F-LINK™ configurations are supplied with black anodized as standard plating. Additional plating options are available by designating the ninth-digit position of the part number (e.g., HDUNNNNNBU00) with a choice of plating /alternate materials as listed:

- "A" Electroless nickel plating, Mil-C-26074, 3mil (±0.5mil)
- "B" Black anodized, Mil-A-8625 TYPE 2 CLASS 2
- "D" 303 stainless-steel, passivation per QQ-P-35/ASTMA967
- "E" 316 stainless-steel, passivation per QQ-P-35/ASTMA967
- "G" Naval brass, C 46400 H02 Half Hard ASTMB 21/B21M

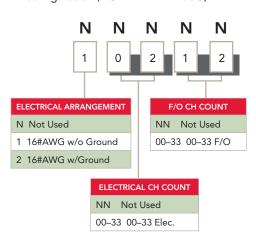
KEYING OPTIONS: All F-LINK plug/receptacles are supplied with KEY 1 mechanical key options. Alternate keying options are available upon request. Contact your OCC Technical salesperson for additional information.



(10.1) F-LINK™ Inter-Connect Solution – Insert Arrangement Provisioning Guidelines

#### **Insert Arrangement and Provisioning**

The F-LINK™ family of connectors features an advanced means of provisioning fiber optic and hybrid (fiber optic and electrical) insert arrangements. All F-LINK™ pin and socket insert caps are manufactured as blank, then drilled or injection molded according to the desired hole pattern and termini/contact arrangement. Hole patterns can be custom drilled for fast prototype assemblies. Hole patterns and termini/contact assignment are designated by the "NNNNN" scheme within the core part number of any plug or receptacle configuration (HGDNNNNNB130G).

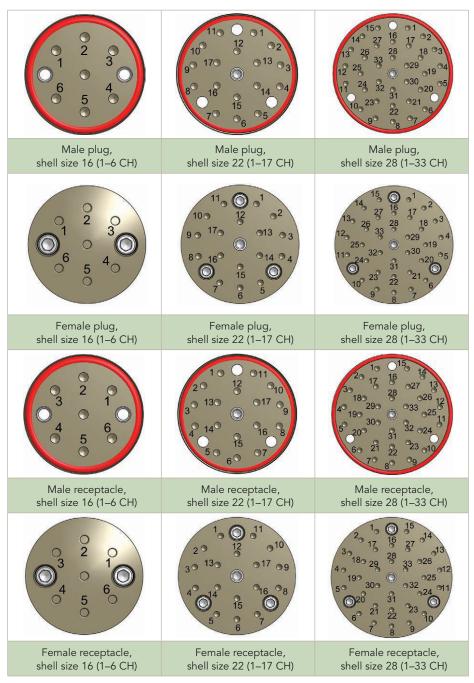


#### NOTES

- (1) If no electrical contacts are necessary, select (N) for the first digit. "1" is selected if no "center ground" pin/socket is necessary. "2" is selected if ground detection (Make-Before-Contact) is required.
- (2) Selection of option "2" will place the ground pin/socket in the center of the PIN or SOCKET insert body. This will void the use of the Insert Cap removal tool.
- (3) The maximum number of fiber optic contacts ranges from "00" to "33" (6 for SS#16, 17 for SS#22 and 33 for SS#28).
- (4) The maximum number of electrical contacts ranges from "00" to "33" (6 for SS#16, 17 for SS#22 and 33 for SS#28).
- Any combination of 33 fiber optic or electrical contacts/termini can be applicable.
- F-LINK<sup>™</sup> can be used as an "all electrical" connector.

#### Hole Pattern and Channel Designation

Identification of hole patterns and channel designation for each family member is identified in the following table.





(10.2) OCC Pierside Family – 6 and 12 CH Hermaphroditic Fiber Optic Connectors



### **OCC Pierside Family**

#### Overview

The **OCC Pierside** family of fiber optic connectors is designed to meet stringent performance characteristics established by the U.S. Navy in accordance with NAVSEA 7379171 and 7379172 drawings. Conceived in 1997, these standards governed the requirements for a durable, high-quality 6- to 12-channel fiber optic hermaphroditic connector system to be concatenated when connecting naval vessels to network interfaces located at docks or piers.

The OCC Pierside style of connector is designed to enable "genderless" mating capabilities, without regard for male or female gender configuration of the interfacing connector to which it is mated. The coupling nut of hermaphroditic plug connectors can be selectively adjusted to convert the plug connector to a male or female coupling thread, allowing a hermaphroditic plug to couple to another plug configured in the opposite gender. This genderless characteristic allows cable assemblies with hermaphroditic plugs on both ends to be deployed without concern for orientation (male or female) when used in a "daisy-chained" configuration. Another benefit of cable assemblies using hermaphroditic plug connectors is that multiple identical cable assemblies can be linked together as needed (limited only by system link budget [dBm]). This "genderless" characteristic provides extreme flexibility in deployable system architectures and eliminates the gender orientation and logistics of deployment, redeployment or field system reconfiguration. This series of connectors uses MIL-PRF-29504/14 pins and MIL-PRF-29504/15 sockets with a unique captive alignment sleeve in a Detachable Socket Insert (DSI) [wedge-shaped removable insert cap]. Unlike competitive products, OCC plugs are fitted with a tethered hermaphroditic dust cap, and receptacles are fitted with tethered female dust caps.

The OCC Pierside family of fiber optic connectors affords users the most comprehensive complement of connector options available, including replacement dust caps, strain-relief receptacles and 90° plugs, etc. Available in either single-mode, multimode or a combination of both, the design is compliant to the Commercial Item Description (CID) standard issued by the Naval Sea Command.

#### **Applications**

- Ship-to-Shore Communications Umbilical Connect
- Mobile Emergency Telecommunications Stations
- Mobile Tactical Shelters
- U.S. Army, Navy, and Marine Corps Military Tactical Deployments
- Broadcast
- Oil and Gas Industries



All Pierside connectors can be utilized in any pre-terminated turnkey assemblies.



(10.2) OCC Pierside Family – Features and Benefits

FEATURES		BENEFITS
Interoperable with other competitive connectors		End users are not limited to single-source or limited-source products.
Interchangeable detachable socket insert (DSI), M29504/14 and M29504/15 termini		Interchangeable detachable socket insert (DSI) and termini enable end users to purchase replacement components to be used with OCC or other manufacturers' products.
Replacement dust cap options		OCC offers replacement dust cap kits in male, female or hermaphroditic options.
Enhanced Kevlar™ retention system		Product supports tactical cable retention without degradation of optical signal.
Field convertible hermaphroditic design		Plug-to-plug assembly on a reel can be instantly provisioned for male (daisy chain) or female connectivity.
Variety of connector configuration options		A complete complement of connector options, including replacement dust caps, strain-relief receptacles and 90° plugs are available.
Full complement of replacement components	(1) O 3J	All components designed to meet the scope of NAVSEA 7379171 and 7379172 for form, fit and function.





(10.2) OCC Pierside Family – Performance Specifications

## **Performance Specifications**

DESCRIPTION	METRIC	PARAMETERS
Insertion loss (multimode)	EIA/TIA-455-171	0.30dB – typical, 0.75dB – max.
Insertion loss (single-mode)	EIA/TIA-455-171	0.40dB – typical, 0.75dB – max.
Back reflection (single-mode UPC polish)	EIA/TIA-455-60	-50dB – typical, -40dB – max.
Operating temperature	EIA/TIA-455-5	-54°C to + 85°C
Storage temperature	EIA/TIA-455-5	-65°C to + 85°C
Temperature cycling	EIA/TIA-455-3	-54°C to + 85°C
Mating durability	EIA/TIA-455-21	1000 cycles min.
Impact	EIA/TIA-455-2	EIA/TIA-455-2
Twist	TIA-455-36	±90° rotation, 1 cycle/5 sec., 1000 cycles
Cable sealing flex	MIL-STD-1344, method 2017	100 cycles
Cable retention	TIA-455-6	400 lbs. min.
Crush resistance	TIA-455-26	450 lbs.
Physical shock	TIA-455-14	Condition C
Vibration	MIL-STD-1344	Method 2005.1
Temperature humidity	EIA/TIA-455-5C	Method b
Fluid immersion	EIA/TIA-455-12	24 hours per fluid
Water pressure		25 PSI, 24 hrs.
Ozone exposure	ATSM-D-1149	100-150 PPM for 2 hrs.
Flammability		MIL-STD-1344, method 1012
Corrosion resistance	EIA/TIA-455-16	500 hours salt spray
Thermal shock	EIA/TIA-455-71	Condition B-0 except 10 cycles, @ 85°C and -62°C





(10.2) OCC Pierside Family – Ordering Information

## **Ordering Information**

PART NUMBER	CONFIGURATION	PRODUCT DESCRIPTION
CCPA10C11CB	Plug, with dust cap	6 CH plug, hermaphroditic, w/hermaphroditic dust cap cable O.D. 0.240–0.279"
CCPA10F11CB	Plug, with dust cap	12 CH plug, hermaphroditic w/hermaphroditic dust cap cable O.D. 0.240–0.279"
CCPA10F11CF	Plug, with dust cap	12 CH plug, hermaphroditic w/hermaphroditic dust cap cable O.D. 0.380–0.423"
CCPA10F11CH	Plug, with dust cap	12 CH plug, hermaphroditic w/hermaphroditic dust cap cable O.D. 0.466–0.515"
CCPA30F11CB	Plug, with dust cap	12 CH plug, hermaphroditic w/male dust cap cable O.D. 0.240–0.279"
CCPA30F11CH	Plug, with dust cap	12 CH plug, hermaphroditic w/male dust cap cable O.D. 0.466–0.515"
CCPA30F11CK	Plug, with dust cap	12 CH plug, hermaphroditic w/male dust cap cable O.D. 0.550–0.589"
CCPM10F1ACB	Plug, with dust cap	12 CH plug, 90°, w/hermaphroditic dust cap cable O.D. 0.240–0.279"
CCPC22C11C	Receptacle, jam nut, external	6 CH jam nut receptacle, external jam nut w/female dust cap
CCPC22F11C	Receptacle, jam nut, external	12 CH jam nut receptacle, external jam nut w/female dust cap
CCPF22C11CB	Strain-relief receptacle	6 CH jam nut, strain-relief receptacle, external jam nut w/female dust cap, cable O.D. 0.240–0.279"
CCPF22F11CB	Strain-relief receptacle	12 CH jam nut, strain-relief receptacle, external jam nut w/female dust cap, cable O.D. 0.240–0.279"
CCPF22F11CH	Strain-relief receptacle	12 CH jam nut, strain-relief receptacle, external jam nut w/female dust cap, cable O.D. 0.466–0.515"
CCPH0WC11C	Accessory	Replacement detachable socket insert – DSI (wedge) 3 – ceramic alignment sleeves
CCPH0WF11C	Accessory	Replacement detachable socket insert – DSI (wedge) 6 – ceramic alignment sleeves
CCPH10F100	Dust cap	Replacement dust cap, hermaphroditic, 6 CH or 12 CH
CCPH20F100	Dust cap	Replacement dust cap, female, 6 CH or 12 CH
CCPH30F100	Dust cap	Replacement dust cap, male, 6 CH or 12 CH
TC1440CA	Termini	COTS M29504/14 pin 2.0mm ceramic ferrule, 126µm I.D.
TC1549DA	Termini	COTS M29504/15 socket without captive sleeve
TC0339AA	Termini	Dummy termini (fits either pin or socket)
TC1546EA	Termini	Replacement captivator guide bushing for DSI
PA35395-99-017	Crimp sleeve	Crimp sleeve, brass, 114 O.D.



**3** 

(10.3) EZ-MATE Connectors



# EZ-MATE Connectors – The Complete Family of Multi-Channel Fiber Optic Connectors for Harsh Environment Deployable Systems

#### **Overview**

The OCC EZ-MATE family of hermaphroditic-style fiber optic connectors provides the most comprehensive solution to fiber inter-connect in harsh, deployable or mobilized communications systems. The EZ-MATE family of fiber optic deployable inter-connect provides end users with the same proven technology used in advanced military communication systems but with simplified (EZ-MATE) mating interfaces capable of "blind mate" and/or applications that require thousands of mating cycles.

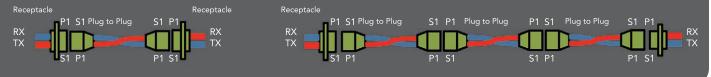
In addition to the EZ-MATE user-friendly interface, the connector system is designed to resist extreme harsh mechanical and environmental conditions, including high vibration, mechanical and thermal shock, and fluid immersion, and will continue to operate under extreme tension loading (with use of OCC tactical cable). Integrators can select from four different families (channel counts), which allows end users maximum flexibility when selecting the correct channel count for the application. Each of the four families features a diverse set of receptacle configurations designed to solve almost any panel or enclosure application.

#### **Applications**

- Ship-to-Shore Communications Umbilical Connect
- Mobile Emergency Telecommunications Stations
- Mobile Tactical Shelters
- U.S. Army, Navy, and Marine Corps Military Tactical Deployments
- Mobile or Remote Broadcast
- Oil and Gas Industries (Brass and Stainless-Steel Material Options)

### Why Hermaphroditic?

Hermaphroditic connectors are designed for quick deployment and gender-independent connectivity, allowing the end user to unreel fiber cable without regard for identification of the male or female ends. The hermaphroditic design enables the transmission path to maintain polarity even with multiple cable segments daisy-chained together to extend the distance of the deployable system.





#### (10.3) EZ-MATE Connectors – Features and Benefits

FEATURES			BENEFITS
Field-convertible hermaphroditic plug design			A plug-to-plug assembly on a reel can be instantly provisioned for male (daisy-chain) or female connectivity.
Field-convertible hermaphroditic plug dust cap design			The hermaphroditic plug dust cap can be instantly provisioned to allow mating with other dust caps in a plug-to-plug configuration. This keeps dust caps clean.
Retentive ceramic split sleeves	2.5mm split sleeve retained in 4 CH and 12 CH insert cap	2.0mm split sleeve retained in 6 CH and 24 CH insert cap	Ceramic split sleeves are retained by inserting the cap, preventing sleeves from becoming misplaced during routine maintenance.
Enhanced Kevlar™ retention system			System supports tactical cable retention without degradation of optical signal.
Sealed termini design			4 CH, 6 CH, 12 CH, and 24 CH systems utilize sealing and environmental resistance to meet IP-68 requirements.
Easy termination capability	TC1640CA used in 4 CH and 12 CH	TC1440CA used in 6 CH and 24 CH	EZ-MATE integrated "push-pull" system allows operators to terminate EZ-MATE plugs and receptacles in an efficient, simple format.



(10.3) EZ-MATE Connectors – Standard Configurations, Options and Modifications Available



CCCA10B11CA

EZ-MATE 2–4 CH hermaphroditic fiber optic plug and dust cap, cable dia. 0.190–0.239"



CCCB22B11C

EZ-MATE 2–4 CH jam nut fiber optic receptacle and female dust cap



CCCA10C11CB

EZ-MATE 4–6 CH hermaphroditic fiber optic plug and dust cap, black anodized, cable dia. 0.240–0.279"



CCCB22C11C

EZ-MATE 4–6 CH jam nut fiber optic receptacle and dust cap, black anodized, cable dia. 0.240–0.279"



CCCA10F11CB

EZ-MATE 8–12 CH hermaphroditic fiber optic plug and dust cap, black anodized, cable dia. 0.240–0.279"



CCCB22F11C

EZ-MATE 8–12 CH jam nut fiber optic receptacle and female dust cap, black anodized



CCCA10M11CD

EZ-MATE 18–24 CH hermaphroditic fiber optic plug and dust cap, black anodized, cable dia. 0.316–0.346"



CCCB22M11C

EZ-MATE 18-24 CH jam nut fiber optic receptacle and female dust cap, black anodized



(10.3) EZ-MATE Connectors – Performance Specifications

## **Performance Specifications**

PERFORMANCE	SPECIFICATION	PARAMETER
Insertion loss (multimode)	EIA/TIA-455-171	0.50dB – typical, 0.75dB – max.
Insertion loss (single-mode)	EIA/TIA-455-171	0.40dB – typical, 0.75dB – max.
Back reflection (single-mode UPC polish)	EIA/TIA-455-107	-50dB – typical, -40dB – max.
Operating temperature	TIA/EIA-455-5	-54°C to + 71°C
Storage temperature	TIA/EIA-455-5	-57°C to + 85°C
Mating durability	TIA-455-21	1000 cycles
Impact	TIA/EIA-455-2	Method B, omit wall pipe
Twist	TIA-455-36	±90° rotation, 1 cycle/5 sec., 1000 cycles
Cable sealing flex	EIA/TIA-455-1	Procedure I
Cable retention	TIA-455-6	400 lbs. min.
Crush resistance	TIA-455-26	450 lbs.
Temperature life	TIA/EIA-455-4	250 hrs., 85 ± 2°C
Thermal shock	TIA-455-71	Condition B-0 except 10 cycles, @ 85°C and -62°C
Physical shock	EIA/TIA-455-14A	Condition C, 5 shocks/axis
Vibration	EIA/TIA-455-11B	Condition III and VI Condition C for 1.5 hrs., Except III
Humidity	EIA/TIA-455-5C	Method B
Salt spray <sup>1</sup>	EIA/TIA-455-16	Condition C
Fluid immersion	EIA/TIA-455-12	All fluids subject to 24 hrs.
Water submersion	EIA/TIA-455-98	Method A, Procedure 1, 1m for 24 hrs.; bulkhead mounted in watertight cube
Flammability	EIA-364-8	
Mud test	M83526, paragraph 4.8	5 min. immersion, 10 cycles
Electromagnetic effects	IEEE-299	20kHz, 150kHz, 14MHz, 400MHz, 600MHz, 1GHz, 2GHz, 8GHz, 10GHz, vert. and horiz., <-60dB

#### **Materials**

PART NUMBER	CONFIGURATION
Ferrule	2.5mm diameter ceramic ferrule
Exterior parts	Aluminum anodized
	Stainless-steel 303, 316 and naval brass options
Interior parts	Aluminum-anodized/chemfilm
Hardware	Stainless-steel, passivated
Seals	Nitrile
Boot	Selastic
Alignment sleeves	Ceramic split sleeve

<sup>1</sup> Applies to ZiNi plating only





(10.3) EZ-MATE Connectors – Ordering Information

# **EZ-MATE 2–4 CH Connector Family**

PART NUMBER	CONFIGURATION	PRODUCT DESCRIPTION
CCCA10Bk1CA	Plug, with dust cap	EZ-MATE 2–4 CH hermaphroditic fiber optic plug and dust cap, cable dia. 0.190–0.239"
CCCA10Bk1CB	Plug, with dust cap	EZ-MATE 2–4 CH hermaphroditic fiber optic plug and dust cap, cable dia. 0.240–0.279"
CCCB22Bk1C	Receptacle, jam nut	EZ-MATE 2–4 CH jam nut fiber optic receptacle and female dust cap
CCCD22Bk1C	Receptacle, flange-mount	EZ-MATE 2–4 CH flange-mount receptacle fiber optic receptacle and female dust cap
CCCC22Bk1C	Receptacle, jam nut, external	EZ-MATE 2–4 CH external jam nut receptacle fiber optic receptacle and female dust cap
CCCE22Bk1CA	Strain-relief receptacle	EZ-MATE 2–4 CH jam nut strain-relief receptacle (SRR) and female dust cap, cable dia. 0.190–0.239"
CCCE22Bk1CB	Strain-relief receptacle	EZ-MATE 2–4 CH jam nut strain-relief receptacle (SRR) and female dust cap, cable dia. 0.240–0.279"
CCCG22Bk1CA	Strain-relief receptacle	EZ-MATE 2–4 CH flange-mount strain-relief receptacle (SRR) and female dust cap, cable dia. 0.190–0.239"
CCCG22Bk1CB	Strain-relief receptacle	EZ-MATE 2–4 CH flange-mount strain-relief receptacle (SRR) and female dust cap, cable dia. 0.240–0.279"
CCCF22Bk1CA	Strain-relief receptacle	EZ-MATE 2–4 CH external jam nut strain-relief receptacle (SRR) and female dust cap, cable dia. 0.190–0.239"
CCCF22Bk1CB	Strain-relief receptacle	EZ-MATE 2–4 CH external jam nut strain-relief receptacle (SRR) and female dust cap, cable dia. 0.240–0.279"

## **EZ-MATE 4–6 CH Connector Family**

PART NUMBER	CONFIGURATION	PRODUCT DESCRIPTION
CCCA10Ck1CB	Plug, with dust cap	EZ-MATE 4–6 CH hermaphroditic fiber optic plug and dust cap, cable dia. 0.240–0.279"
CCCA10Ck1CD	Plug, with dust cap	EZ-MATE 4–6 CH hermaphroditic fiber optic plug and dust cap, cable dia. 0.316–0.346"
CCCB22Ck1C	Receptacle, jam nut	EZ-MATE 4–6 CH jam nut fiber optic receptacle and female dust cap
CCCD22Ck1C	Receptacle, flange-mount	EZ-MATE 4-6 CH flange-mount receptacle fiber optic receptacle and female dust cap
CCCC22Ck1C	Receptacle, jam nut, external	EZ-MATE 4–6 CH external jam nut receptacle fiber optic receptacle and female dust cap
CCCE22Ck1CB	Strain-relief receptacle	EZ-MATE 4–6 CH jam nut strain-relief receptacle (SRR) and female dust cap, cable dia. 0.240–0.279"
CCCE22Ck1CD	Strain-relief receptacle	EZ-MATE 4–6 CH jam nut strain-relief receptacle (SRR) and female dust cap, cable dia. 0.316–0.342"
CCCG22Ck1CB	Strain-relief receptacle	EZ-MATE 4–6 CH flange-mount strain-relief receptacle (SRR) and female dust cap, cable dia. 0.190–0.239"
CCCG22Ck1CD	Strain-relief receptacle	EZ-MATE 4–6 CH flange-mount strain-relief receptacle (SRR) and female dust cap, cable dia. 0.240–0.279"
CCCF22Ck1CB	Strain-relief receptacle	EZ-MATE 4–6 CH external jam nut strain-relief receptacle (SRR) and female dust cap, cable dia. 0.240–0.279"
CCCF22Ck1CD	Strain-relief receptacle	EZ-MATE 4–6 CH external jam nut strain-relief receptacle (SRR) and female dust cap, cable dia. 0.316–0.342"



(10.3) EZ-MATE Connectors – Ordering Information

# **EZ-MATE 8–12 CH Connector Family**

PART NUMBER	CONFIGURATION	PRODUCT DESCRIPTION
CCCA10Fk1CB	Plug, with dust cap	EZ-MATE 8–12 CH hermaphroditic fiber optic plug and dust cap, cable dia. 0.240–0.279"
CCCA10Fk1CF	Plug, with dust cap	EZ-MATE 8–12 CH hermaphroditic fiber optic plug and dust cap, cable dia. 0.380–0.423"
CCCB22Fk1C	Receptacle, jam nut	EZ-MATE 8–12 CH jam nut fiber optic receptacle and female dust cap
CCCD22Fk1C	Receptacle, flange-mount	EZ-MATE 8–12 CH flange-mount receptacle fiber optic receptacle and female dust cap
CCCC22Fk1C	Receptacle, jam nut, external	EZ-MATE 8–12 CH external jam nut receptacle fiber optic receptacle and female dust cap
CCCE22Fk1CB	Strain-relief receptacle	EZ-MATE 8–12 CH jam nut strain-relief receptacle (SRR) and female dust cap, cable dia. 0.240–0.279"
CCCE22Fk1CF	Strain-relief receptacle	EZ-MATE 8–12 CH jam nut strain-relief receptacle (SRR) and female dust cap, cable dia. 0.380–0.423"
CCCG22Fk1CB	Strain-relief receptacle	EZ-MATE 8–12 CH flange-mount strain-relief receptacle (SRR) and female dust cap, cable dia. 0.240–0.279"
CCCG22Fk1CF	Strain-relief receptacle	EZ-MATE 8–12 CH flange-mount strain-relief receptacle (SRR) and female dust cap, cable dia. 0.380–0.423"
CCCF22Fk1CB	Strain-relief receptacle	EZ-MATE 8–12 CH external jam nut strain-relief receptacle (SRR) and female dust cap, cable dia. 0.240–0.279"
CCCF22Fk1CF	Strain-relief receptacle	EZ-MATE 8–12 CH external jam nut strain-relief receptacle (SRR) and female dust cap, cable dia. 0.380–0.423"

## EZ-MATE 18-24 CH Connector Family

PART NUMBER	CONFIGURATION	PRODUCT DESCRIPTION
CCCA10Mk1CD	Plug, with dust cap	EZ-MATE 18–24 CH hermaphroditic fiber optic plug and dust cap, cable dia. 0.316–0.342"
CCCA10Mk1CH	Plug, with dust cap	EZ-MATE 18–24 CH hermaphroditic fiber optic plug and dust cap, cable dia. 0.466–0.515"
CCCB22Mk1C	Receptacle, jam nut	EZ-MATE 18–24 CH jam nut fiber optic receptacle and female dust cap
CCCD22Mk1C	Receptacle, flange-mount	EZ-MATE 18–24 CH flange-mount receptacle fiber optic receptacle and female dust cap
CCCC22Mk1C	Receptacle, jam nut, external	EZ-MATE 18–24 CH external jam nut receptacle fiber optic receptacle and female dust cap
CCCE22Mk1CD	Strain-relief receptacle	EZ-MATE 18–24 CH jam nut strain-relief receptacle (SRR) and female dust cap, cable dia. 0.316–0.342"
CCCE22Mk1CH	Strain-relief receptacle	EZ-MATE 18–24 CH jam nut strain-relief receptacle (SRR) and female dust cap, cable dia. 0.466–0.515"
CCCG22Mk1CD	Strain-relief receptacle	EZ-MATE 18–24 CH flange-mount strain-relief receptacle (SRR) and female dust cap, cable dia. 0.316–0.342"
CCCG22Mk1CH	Strain-relief receptacle	EZ-MATE 18–24 CH flange-mount strain-relief receptacle (SRR) and female dust cap, cable dia. 0.466–0.515"
CCCF22Mk1CD	Strain-relief receptacle	EZ-MATE 18–24 CH external jam nut strain-relief receptacle (SRR) and female dust cap, cable dia. 0.316–0.342"
CCCF22Mk1CH	Strain-relief receptacle	EZ-MATE 18–24 CH external jam nut strain-relief receptacle (SRR) and female dust cap, cable dia. 0.466–0.515"





(10.3) EZ-MATE Connectors - Ordering Information

#### Termini for 4 CH and 12 CH EZ-MATE

PART NUMBER	CONFIGURATION	PRODUCT DESCRIPTION
TC1640DA	Termini	2.5mm, environmental-resisting, fiber optic termini, 126µm I.D.
TC1739AA	Termini	Dummy termini
PC83522/16-20-S	Crimp sleeve	Crimp sleeve, used with 3.0mm loose tube jacket
PA35395-99-017	Crimp sleeve	Crimp sleeve, used with 2.0mm loose tube jacket

#### Termini for 6 CH and 24 CH EZ-MATE

PART NUMBER	CONFIGURATION	PRODUCT DESCRIPTION
TC1440CA	Termini	COTS M29504/14 pin 2.00mm ceramic ferrule, 126µm I.D.
TC0339AA	Termini	Dummy termini
PA35395-99-017	Crimp sleeve	Crimp sleeve, used with 2.00mm loose tube jacket

#### **Provisioning Guidelines**

- 1) Select the number of dummy termini necessary to fill a connector. For example, when planning for an 8 CH application, select four dummy termini to complete a 12 CH size connector.
- 2) Crimp sleeves are recommended for use on receptacle configurations without strain-relief. Crimp sleeves are generally used with 2.0mm Simplex loose tube cable for receptacle pigtails. In addition, 4 CH and 12 CH EZ-MATE receptacles allow for the use of 3.0mm loose fiber optic cable.

### **Plating Options**

All EZ-MATE configurations are supplied with black anodized as standard plating. For the additional plating options, the "k" in the eighth digit position of the part number (e.g., CCCG22Mk1CD) is selected for the plating of choice.

- "1" Black anodized, Mil-A-8625 TYPE 2 CLASS 2
- "3" Zinc nickel plating, SAE AMS 2417G
- "4" 303 stainless-steel, passivation per QQ-P-35/ASTMA967
- "5" 316 stainless-steel, passivation per QQ-P-35/ASTMA967
- "6" Naval brass, C 46400 H02 half hard ASTMB 21/B21M



All EZ-MATE connectors can be utilized in any pre-terminated turnkey assemblies.



(10.4) Commercial COTS-83526



#### COTS-83526 – 4-, 6-, 8- and 12-Channel Hermaphroditic Fiber Optic Connectors and Assemblies

#### Overview

Optical Cable Corporation introduces the next generation of tactical fiber optic connector family based on the retired MIL-PRF-83526 performance specification. This tactical fiber optic connector system features a "field-convertible" hermaphroditic fiber optic plug component COTS-83526 PLUG connector with integrated strain-relief and tactical cable retention systems. Available in either 4-, 6- or 12-channel shell sizes (2, 4, 6, 8 and 12 CH options), this family of tactical fiber optic connectors also features specifications for a wide variety of harsh environment companion receptacles, including internal jam nut, external jam nut, and flange-mount receptacles as well as similar companion configurations with integrated strain-relief systems. At the heart of this robust family of tactical/deployable hermaphroditic fiber optic connectors is the TC1640CA environmentally sealed terminus system, which affords superior optical performance while maintaining resistance to dust, moisture or even liquid submersion. This new terminus system features a free-floating environmentally sealed capability utilizing commercially available 2.5mm ceramic ferrules and relying on the insert cap of the COTS-83526 connectors to retain the ceramic alignment sleeve. This new termini is corrosive-resistant, easily inserts at 90° angles to the termini retainer and functions as a genderless termini (can be either pin or socket) when used in the hermaphroditic design of the COTS-83526 connector system.

#### **Applications**

- Mobile Emergency Telecommunications Stations
- **Mobile Tactical Shelters**
- U.S. Army, Navy, and Marine Corps Military **Tactical Deployments**
- Deployable Trailers for Federal Emergency Management Agency
- **Homeland Security Applications**





(10.4) Commercial COTS-83526 – Features and Benefits

FEATURES			BENEFITS
Interoperable, intermateable in accordance with the retired MIL-PRF-83526/16, /17 interface specification	4 CH COTS-83526 plug with AFSI 4 CH TFOCA-II® plug	12 CH COTS-83526 plug with AFSI 12 CH TFOCA-II® plug	Connectors are backward compatible with most fielded M83526 4 CH and 12 CH connectors. They essentially use the same assembly procedures and tools.
Field-convertible hermaphroditic plug design			Plug-to-plug assembly on a reel can be instantly provisioned for male (daisy chain) or female connectivity.
Field-convertible hermaphroditic plug dust cap design			The hermaphroditic dust plug cap is instantly provisioned with mating dust cap to allow dust cap coupling.
Retentive ceramic split sleeves	2.5mm split sleeve retained in 4 CH insert cap	2.5mm split sleeve retained in 12 CH insert cap	Ceramic split sleeves are retained within the insert cap, preventing sleeves from becoming misplaced during maintenance routines.
Enhanced Kevlar™ retention system			System supports tactical cable retention without degradation of optical signal.
Sealed termini design	TC1640CA used	d in 4 CH and 12 CH	4 CH, 6 CH, 12 CH, and 24 CH systems utilize sealing and environmental resistance to meet IP-68 requirements.
Easy termination capability			COTS-83526 integrated "Push-Pull" system allows operators to terminate COTS-83526 plugs and receptacles in an efficient, noncomplex format.
Dry film thread lubrication			System extends life of mating threads, self-lubricating through repeated mating cycles.



(10.4) Commercial COTS-83526 – Standard Configurations (options and modifications available)









(10.4) Commercial COTS-83526 – Performance Specifications

#### **Performance Specifications**

PERFORMANCE	SPECIFICATION	PARAMETER
Insertion loss (multimode)	EIA/TIA-455-171	0.50dB – typical, 0.75dB – max.
Insertion loss (single-mode)	EIA/TIA-455-171	0.40dB – typical, 0.75dB – max.
Back Reflection (single-mode, UPC polish)	EIA/TIA-455-107	-50dB – typical, -40dB – max.
Operating temperature	TIA/EIA-455-5	-54°C to + 71°C
Storage temperature	TIA/EIA-455-5	-57°C to + 85°C
Mating durability	TIA-455-21	2000 cycles
Impact	TIA/EIA-455-2	Method B, omit wall pipe
Twist	TIA-455-36	±90° rotation, one cycle/5 sec., 1000 cycles
Cable sealing flex	EIA/TIA-455-1	Procedure I
Cable retention	TIA-455-6	400 lbs. min.
Crush resistance	TIA-455-26	450 lbs.
Temperature life	TIA/EIA-455-4	250 hrs., 85 ± 2°C
Thermal shock	TIA-455-71	Condition B-0 except 10 cycles, @ 85°C and -62°C
Physical shock	EIA/TIA-455-14A	Condition C, 5 shocks/axis
Vibration	EIA/TIA-455-11B	Condition III and VI Condition C for 1.5 hrs. Except III
Humidity	EIA/TIA-455-5C	Method B
Salt spray <sup>1</sup>	EIA/TIA-455-16	Condition C
Fluid immersion	EIA/TIA-455-12	All fluids subject to 24 hours
Water submersion	EIA/TIA-455-98	Method A, Procedure 1, 1m for 24 hrs.; bulkhead mounted in watertight cube
Flammability	EIA-364-8	
Mud test <sup>2</sup>	M83526, paragraph 4.8	5 min. immersion, 10 cycles
Electromagnetic effects <sup>1,3</sup>	IEEE-299	20kHz, 150kHz, 14MHz, 400MHz, 600MHz, 1GHz, 2GHz, 8GHz, 10GHz, vert. and horz., <-60dB

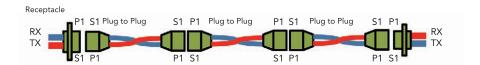
#### **NOTES**

- <sup>1</sup> Applies to ZiNi plating only
- <sup>2</sup> Sand/topsoil substituted for Potter's Clay
- <sup>3</sup> 12 CH receptacle requires application of SRR configurations

#### Why Hermaphroditic?

Hermaphroditic connectors are designed for quick deployment and gender-independent connectivity, allowing the end user to unreel fiber cable without regard for identification of the male or female ends. The hermaphroditic design enables the transmission path to maintain polarity even with multiple cable segments daisy-chained together to extend the distance of the deployable system.







(10.4) Commercial COTS-83526 – Ordering Information

## COTS-83526 2-4 CH Connector Family

PART NUMBER	CONFIGURATION	PRODUCT DESCRIPTION
CCTA10B31CA	Plug, with dust cap	COTS-83526 2–4 CH hermaphroditic fiber optic plug and dust cap, cable dia. 0.190–0.239"
CCTA10B31CB	Plug, with dust cap	COTS-83526 2–4 CH hermaphroditic fiber optic plug and dust cap, cable dia. 0.240–0.269"
CCTB21B31C	Receptacle, jam nut	COTS-83526 2–4 CH Jam nut fiber optic receptacle and female dust cap, EMI
CCTD21B31C	Receptacle, flange-mount	COTS-83526 2–4 CH flange-mount receptacle fiber optic receptacle and female dust cap, EMI
CCTC21B31C	Receptacle, jam nut, external	COTS-83526 2–4 CH external jam nut receptacle fiber optic receptacle and female dust cap, EMI
CCTE21B31CA	Strain-relief receptacle	COTS-83526 2–4 CH jam nut strain-relief receptacle (SRR) and female dust cap, EMI, cable dia. 0.190–0.239"
CCTE21B31CB	Strain-relief receptacle	COTS-83526 2–4 CH jam nut strain-relief receptacle (SRR) and female dust cap, EMI, cable dia. 0.240-0.269"
CCTG21B31CA	Strain-relief receptacle	COTS-83526 2–4 CH flange-mount strain-relief receptacle (SRR) and female dust cap, EMI, cable dia. 0.190–0.239"
CCTG21B31CB	Strain-relief receptacle	COTS-83526 2–4 CH flange-mount strain-relief receptacle (SRR) and female dust cap, EMI, cable dia. 0.240–0.269"
CCTF21B31CA	Strain-relief receptacle	COTS-83526 2–4 CH external jam nut strain-relief receptacle (SRR) and female dust cap, EMI, cable dia. 0.190–0.239"
CCTF21B31CB	Strain-relief receptacle	COTS-83526 2–4 CH external jam nut strain-relief receptacle (SRR) and female dust cap, EMI, cable dia. 0.240–0.269"





(10.4) Commercial COTS-83526 – Ordering Information

# COTS-83526 8-12 CH Connector Family

PART NUMBER	CONFIGURATION	PRODUCT DESCRIPTION
CCTA10F31CB	Plug, with dust cap	COTS-83526 8-12 CH hermaphroditic fiber optic plug and dust cap, cable dia. 0.240–0.269"
CCTA10F31CF	Plug, with dust cap	COTS-83526 8-12 CH hermaphroditic fiber optic plug and dust cap, cable dia. 0.380–0.423"
CCTB21F31C	Receptacle, jam nut	COTS-83526 8-12 CH jam nut fiber optic receptacle and female dust cap, EMI
CCTD21F31C	Receptacle, flange-mount	COTS-83526 8-12 CH flange-mount receptacle, fiber optic receptacle and female dust cap, EMI
CCTC21F31C	Receptacle, jam nut, external	COTSM83526 8-12 CH external jam nut receptacle, fiber optic receptacle and female dust cap, EMI
CCTE21F31CB	Strain-relief receptacle	COTS-83526 8-12 CH jam nut strain-relief receptacle (SRR) and female dust cap, EMI, cable dia. 0.240–0.269"
CCTE21F31CF	Strain-relief receptacle	COTS-83526 8-12 CH jam nut strain-relief receptacle (SRR) and female dust cap, EMI, cable dia. 0.380–0.423"
CCTG21F31CB	Strain-relief receptacle	COTS-83526 8-12 CH flange-mount strain-relief receptacle (SRR) and female dust cap, EMI, cable dia. 0.240–0.269"
CCTG21F31CF	Strain-relief receptacle	COTS-83526 8-12 CH flange-mount strain-relief receptacle (SRR) and female dust cap, EMI, cable dia. 0.380–0.423"
CCTF21F31CB	Strain-relief receptacle	COTS-83526 8-12 CH external jam nut strain-relief receptacle (SRR) and female dust cap, EMI, cable dia. 0.240–0.269"
CCTF21F31CF	Strain-relief receptacle	COTS-83526 8-12 CH external jam nut strain relief receptacle (SRR) and female dust cap, EMI, cable dia. 0.380–0.423"

#### Termini for 4 CH and 12 CH COTS-83526

PART NUMBER	CONFIGURATION	PRODUCT DESCRIPTION
TC1640DA	Termini	2.5mm, environmental-resisting, fiber optic termini, 126µm l.D.
TC1739AA	Termini	Dummy termini
PC83522/16-20-S	Crimp sleeve	Crimp sleeve, used with 3.0mm loose tube jacket
PA35395-99-017	Crimp sleeve	Crimp sleeve, used with 2.0mm loose tube jacket



(10.4) Commercial COTS-83526 - Provisioning Guidelines

#### **Provisioning Guidelines**

- 1) Select the number of dummy termini necessary to fill a connector. For example, when planning for an 8 CH application, select four dummy termini to complete a 12 CH size connector
- 2) Crimp sleeves are recommended for use on receptacle configurations without strain-relief (SRR). Crimp sleeves are generally used with simple loose tube cable for receptacle pigtails. In addition, 4 CH and 12 CH receptacles can accommodate 3.0mm loose cable.

#### **EMI/Non-EMI Options**

EMI-conductive O-rings and/or gaskets are typically provisioned with all COTS 83526-style receptacles, but add additional cost to each component. Non-EMI options are available by simply ordering a receptacle part number with a "2" in the sixth-digit position (e.g., CCTG22B31CD) of part number inclusive of CCTB, CCTC, CCTD, CCTE, CCTF and CCTG configurations.

#### **Plating Options**

Most COTS-83526 component configurations are supplied with zinc nickel plating with olive drab coloring. For the additional plating options, the eighth-digit position of the part number (e.g., CCTG22F\_1CD) is selected for the plating/material of choice.

- Black anodized, Mil-A-8625 TYPE 2 CLASS 2
- "3" Zinc nickel plating, SAE AMS 2417G
- "4" 303 stainless-steel, passivation per QQ-P-35/ASTMA967
- **"5"** 316 stainless-steel, passivation per QQ-P-35/ASTMA967
- "6" Naval brass, C 46400 H02 half hard ASTMB 21/B21M



All COTS-83526 connectors can be utilized in pre-terminated turnkey assemblies.



(10.5) R-Jack® Solution



#### R-Jack<sup>®</sup> Solution

#### Overview

In today's world of high-speed communications, Ethernet has become the platform for all voice, video and data services. R-Jack® Ethernet Inter-connect Solution, OCC's ruggedized family of RJ-45 receptacles, plugs, backshells and accessories, empowers customers to extend Ethernet platforms into harsh military and industrial operating environments.

The R-Jack® Ethernet Inter-connect Solution provides an efficient, comprehensive and affordable solution to Ethernet connectivity in harsh and environmentally challenged applications. R-Jack® Ethernet components feature a smaller mechanical footprint (receptacles, dust caps, backshells), occupying less panel space, allowing higher density. R-Jack® Ethernet receptacles feature 100% transversely sealed (IP-68) configurations as a standard product design, preventing dust, water or moisture penetration, with or without dust cap or plug engagement. R-Jack® Ethernet receptacles offer comprehensive shielding and grounding effectiveness capable of sustaining higher data transmission rates as well as Electro-Magnetic Conductance (EMC) for military applications. Lastly, R-Jack® Ethernet components feature multiple pre-kitted solutions including gaskets, O-rings, mounting brackets, and hardware, making it easier for customers to procure, install and integrate these components.

## **Applications**

- DATA, VOIP, IPTV in Harsh Environments
- Railways
- Radar Systems
- Industrial Process Control
- Data Acquisition and Control
- Shelters
- Battlefield Communication Systems
- 10/100/1000 BASE-T





(10.5) R-Jack® Solution – Features and Benefits

FEATURES		BENEFITS
Conforms to MIL-DTL-38723 and MIL-DTL-38999 mechanical specifications	DIGITAL 3  DIGITAL 4	Smaller profile affords tighter panel density with ample space to remove dust cap, unlike other MIL-DTL-38999-style products (OCC configuration shown on right).
MIL-DTL-38999 form-fit receptacles available		Both MIL-DTL-38999 equivalent jam nut and flange receptacle versions are available and feature smaller dust cap profiles.
Transversely sealed: standard feature for jam nut, flange-mount and in-line receptacles		Product meets/exceeds IP-68 rating with or without dust covers engaged or when plug is engaged with receptacle.
Common cable strain relief that can accommodate both small and large cable diameters, complete with compressive fittings for shielded cable	ECRU0011UB 0.190-0.330" Cable O.D.	<ul> <li>R-Jack is designed to integrate with jam nut, flange-mount, in-line receptacles and plugs.</li> <li>Compression nut establishes 10 lbs. cable strain-relief.</li> <li>Internal conductive compression developed to interoperate with cable braid to form 360° ground plane.</li> </ul>
Pre-provisioned mounting hardware, conductive O-rings, gasket options		Mounting hardware options for flange-mount units include:  • Screws with "pressed in" pem nuts  • Screws with nylon "locking" nuts  • Screws with mounting bracket  • Self-sealing screws for "sealed" flange-mount options  • Nitrile or conductive O-ring; gaskets supplied as standard provision



(10.5) R-Jack® Solution – EMC Capability – Built for Speed, Performance

Higher data rates require proper grounding and shielding. R-Jack® plugs, receptacles, and backshells are designed to establish sufficient grounding between shielded cord sets as well as between cord set and chassis ground.

R-Jack® shielding capabilities also provide EMC/EMI shielding for applications where immunity to electromagnetic interference is critical.

Available in zinc nickel, e-nickel, nickel-teflon or stainless-steel plated options only.

FEATURES	BENEFITS	
>0.033Ω – Shielded cable to cable >0.033Ω – Shielded cable to chassis ground	Ensures grounding between cord sets with shielding on both jacks  Ensures chassis ground between receptacle, shielded RJ-45 cord sets	
Conductive O-ring		

RS103

Tested IAW MIL-STD-461F,

EMC Shroud (rear view) - conductive surface with shielded cable

EMC Shroud (front view) - conductive surface with shielded cable and

(flange-mount) options

Zinc nickel, nickel-teflon or e-nickel plating option

for receptacles



(10.5) R-Jack® Solution – Performance Specifications

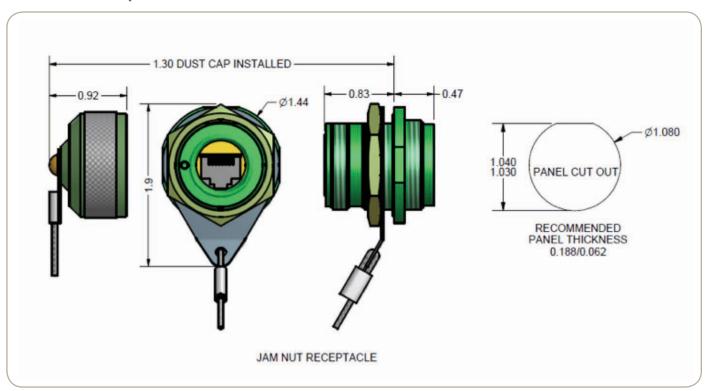
## **Performance Specifications**

SPECIFICATION	PARAMETER	RANGE
Insertion Loss	IEEE 802.3, LX	1000 BASE-T, NXT, FXT
Temperature cycling	EIA-364-32, 25 cycles	-45°C to +100°C
Temperature shock	EIA-364-32, 5 cycles	-40°C to +100°C
Humidity resistance	EIA-364-31, 21 days	43°C, 98% humidity
Water submersion	IP-68, IEC-60529	1M depth, 48 hrs.
Dust test	IP-68, IEC-60529	20mBARS air pressure, 8 hrs.
Mechanical shock	EIA-364-27B	100G, 6ms, half sine, 6 directions
Vibration	EIA-364-28	Test Condition IV, 4 hrs. per axis, 12 hrs./total
Matting durability	EIA-364-09	500 mate/demate cycles
Flammability	Per UL94	Compliant to V0, V1, 10 sec. each
Salt spray	EIA-364-26	500 hrs.
Shell-to-shell conductivity (ZiNi plating only)	EIA-364-83	1V @ 1.5VDC, 100 hrs.
Electromagnetic shielding effectiveness	IEEE-STD-299	20kHz, 150kHz, 14MHz, 400MHz, 600MHz, 1GHz, 2GHz, 8GHz, 10GHz, vert. and horz., <-60dB
Hi-pot high-voltage test	EN61010-1	600VAC-60Hz, 900uA, Ramp=10 sec., (8 channels)

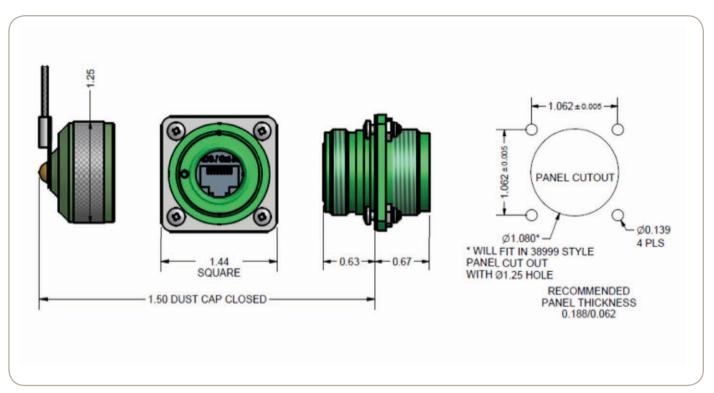


(10.5) R-Jack® Solution – Product Drawings

#### Jam Nut Receptacle



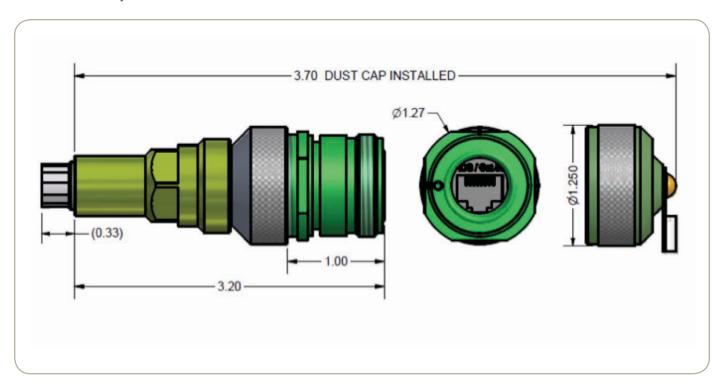
## Flange-Mount Receptacle



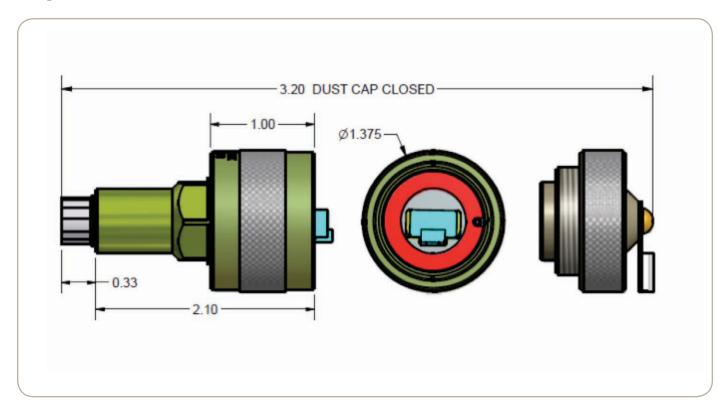


(10.5) R-Jack® Solution – Product Drawings

### **In-Line Receptacle**



# Plug





(10.5) R-Jack® Solution – Ordering Information

Part Numbering	ECR	Α	0	1	0	2	U	Α	Α	
CONFIGURATION TYPE  A* –Plug (compatible with D, F, G, J, K, H, B – Receptacle, jam nut, MIL-DTL-38999  C – Receptacle, flange-mnt., MIL-DTL-389  D – Receptacle, flange-mnt., front/rear m  F – Receptacle, flange-mnt., front/rear m  screws/l. nuts  H – Receptacle, flange-mnt., mnt. bracket  J – Receptacle, jam nut, FITS D38999/24  K – Receptacle, jam nut, small profile, rear  P – Receptacle, jam nut, small profile, rear  P – Receptacle, jam nut, special mnt.  U – Accessories (backshell, dust caps)  DUST CAP  0 – None  1 – Female, metal, collar and lanyard ECR  2 – Female, metal, collar and lanyard for j  3 – Female, metal, cyelet and lanyard for j  3 – Female, metal, crimp sleeve and lanyard	style, rear mnt. 299 style front/re nt., no mnt. hard nt., w/pem nuts a nt., w/mnt.  t and screws cutout, M83723, ar mnt.  U jam nut recept am nut recept allange-mnt. rece l for plug	ear mnt. Ilware and HDW  /60  cacle only le ptacle						(CABL 0 - No A - St 0. B - St 0. C - 90 0. D - 45 0. E - St	<b>0</b> – No (fe	otacle lation only) one male ceptacle) ft.
5 – Female, metal, crimp sleeve and lanya 6 – Female, metal, eyelet and lanyard for	MIL-DTL-38999 f	flange-mnt					NOT	USED		
7 – Female, metal, collar and lanyard for N  EMC SHIELDING 1 – EMC shielded (includes conductive ga 2 – No EMC shielding (default for dust ca	asketing) <sup>a</sup>		ot.			2 - E- 3 - Z 4 - 30	i <b>H</b> nodized <sup>1</sup> -Nickel <sup>2</sup> inc Nicke 03 Stainle 16 Stainle	el² ess²	Check o	side sales entative
INSERT SEALING  0 – Sealed transversely (IP-68 uncapped/receptacle mated to plug)  1 – Not sealed transversely (IP-68 dust caps mated to plugs/receptacle only  *If configuring a plug, "1" will be your sealing option.			:le only)			<b>7</b> – C	aval Bras AD² ickel Tefl			

#### NOTE:

<sup>a</sup> EMC configurations include ECRA, ECRD, ECRE, ECRG, ECRH, ECRJ, and ECRK; dust caps, backshells plated with zinc nickel.



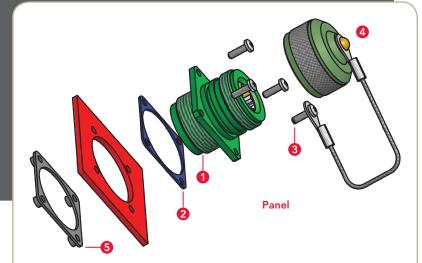
(10.5) R-Jack® Solution – Ordering Information

### Offering Fully Kitted Solutions

No longer do you have to order multiple parts to install your RJ-45 solution.

#### Notes:

- Kit example includes receptacle, dust cover, back plate, hardware
- For receptacle configurations, hardware standard screws provided are four 40 x 3/8"
- Sealed Version self-sealing screws are provided
- Non-Sealed Version regular screws are provided



- 1 Flange-mount receptacle
- 2 EMI GASKET
- **3** Four 40 x 3/8" long pan-head screws, stainless
- 4 Dust cap
- 5 Mounting flange with self-locking nuts

Example: Flange-mount receptacle with dust cap, EMI, non-sealed



(10.6) Intelligent Release Inter-Connect System (IRIS™)



### Intelligent Release Inter-Connect System (IRIS™) A Revolutionary Fiber Optic Inter-Connect System

#### **Overview**

Optical Cable Corporation (OCC®) introduces a revolutionary fiber optic inter-connect system, which disengages upon impact, for a traffic-control enclosure. IRIS™ allows for a fully restored fiber optic connection, without field repair or retermination of the fiber optic cable. Most importantly, IRIS protects the installed fiber plant from damage when the control enclosure is impacted.

Designed to sense mechanical axial and shear loads from within the traffic control enclosure, IRIS's patent-pending release technology releases and separates, thereby protecting the installed fiber plant. When the sensing ring is pulled by a horizontal force within a 360° horizon, the mechanical latch surrounding the engaged fiber optic connector is tripped. The multi-channel fiber optic connector disengages and retracts under positive pressure, thus ejecting the plug to "break away" from the receptacle in milliseconds, avoiding collateral damage by the collapsing traffic-control cabinet.

- Plug-and-play inter-connect
- Eliminates fiber maintenance points
- First completely dust-proof and waterproof system
- Pre-terminated to eliminate field installation time and cost
- Minimizes collateral damage
- Minimizes downtime
- First true reusable breakaway system
- No need for additional patch cords or panels
- True backbone fiber protection



(10.6) IRIS™ - Background

Intelligent Transportation Systems, or ITS, encompasses a broad range of wireless and fiber optic communications-based information, control and electronics technologies. When integrated into the transportation system infrastructure, these technologies help monitor and manage traffic flow; reduce congestion; provide alternate routes to travelers; enhance productivity; and save time, money and lives.

Given the emphasis of increased fiber optic inter-connect within the ITS architecture, protecting and restoring fiber connectivity within the traffic-control cabinet is critical (especially given the increased fiber count) to provide control as well as protect revenue-bearing services such as traffic violation detection. Destruction of a traffic-control cabinet results in lost synchronization, productivity and time, as well as the loss of thousands of dollars to repair multiple fiber optic cables at any given intersection. Protecting the installed fiber plant with IRIS greatly reduces the impact from both financial and out-of-service conditions.



Step 1 IRIS installed in traffic-control cabinet.



Step 2 The IRIS is armed by removing the safeguard ring (yellow item shown Step 1).



Step 3 The sensing ring (silver color) is pulled in any 360° direction by tethers from within the cabinet. The positive spring pressure ejects the plug within milliseconds.





(10.6) IRIS<sup>™</sup> – Features and Benefits

#### FEATURES

Fiber optic inter-connect system capable of surviving and restoring service after server mechanical impact



#### BENEFITS

The IRIS™ system protects the investment of the outside plant by disengaging upon mechanical impact or detonation. Fiber optic service is easily restored by rearming the iris connector installed within a new enclosure.

Environmental design



The IRIS™ inter-connect system is designed to operate within uncontrolled environments and survive temporary submersible conditions. The sealing features also prevent accumulation of dust and debris, thus extending the field maintenance lifecycles.

Mechanical detonation system



Enables fiber connector system to disengage rapidly and without damaging fiber optic contacts.

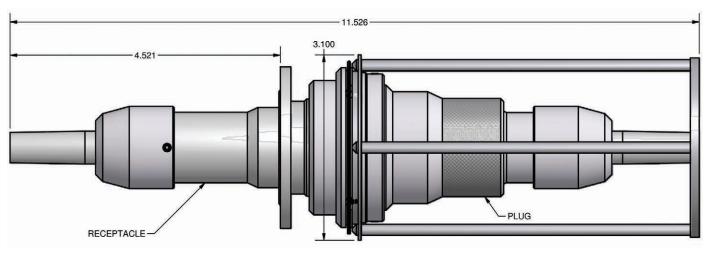


(10.6) IRIS<sup>™</sup> – Features and Benefits

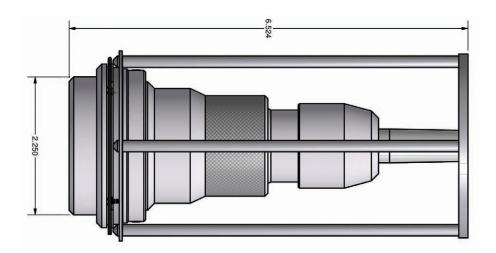
FEATURES	BENEFITS
Circular sensing ring	Allows tethering from all four quadrants within a traffic-control cabinet.
Arming ring	Allows field service personnel to safely rearm or service the system without accidently detonating the connector.
Designed for up to 12 CH single-mode (9/125µm) fiber optic connectivity	The IRIS™ system can accommodate up to 12 fiber optic channels. The plug side of IRIS features 6 ft. pigtails with choice of ST, SC or LC simplex connectors.  The receptacle side is purchased with choice of fiber count and length of blunt end.
Turnkey, pretested fiber optic assemblies	IRIS™ enables efficient installation of pretested fiber optic assemblies within minutes. Though the receptacle pigtail is spliced into the fiber plant, the plug/receptacle connectors are all pre-terminated and test verified.



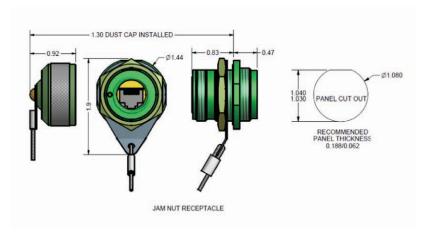
(10.6) IRIS<sup>™</sup> – Product Drawing



Mated Plug with Jam Nut Receptacle (up to 12 CH)



Plug (up to 12 CH)



Jam Nut Receptacle (up to 12 CH)



(10.6)  $IRIS^{TM}$  – Performance Specifications

# **Performance Specifications**

SPECIFICATION	PARAMETER	RANGE
Insertion loss	Single-mode (9/125um)	0.35dB – Typical, 0.50dB – max.
Temperature	Operational	-46°C to 85°C
Temperature	Storage	-62°C to 85°C
Cable retention <sup>1</sup>	TIA-455-6	200 lbs. for 10 min.
Cable seal flexing	TIA/EIA-455-1	Procedure I
Twist	EIA-455-36	100 cycles, ±90° twist
Mating durability	EIA-455-21	500 cycles
Impact <sup>2</sup>	TIA/EIA-455-2	Method B, 8 drops
Vibration	TIA/EIA-455-11C	Condition C, 1.5 hrs./axis
Mechanical shock	TIA-455-14	Condition C, 5 shocks/axis
Thermal shock	TIA-455-71	Schedule C, -62°C 85°C, 5 cycles
Temperature humidity cycling	TIA/EIA-455-4	65°C at 95% RH
Life aging	EIA/TIA-455-11	85°C, 250 hrs.
Water pressure	TIA-455-98	Method A, Prod. A, 1M–24 hrs.
Sand and dust	EIA/TIA-455-35	16 hrs.
Salt spray	TIA-455-16	Condition C, 250 hrs.

- <sup>1</sup> When tested with military-rated fiber optic cable
- <sup>2</sup> Plug, receptacle, tested open ended





(10.6) IRIS™ – Projected Cost Benefits

### No IRIS™

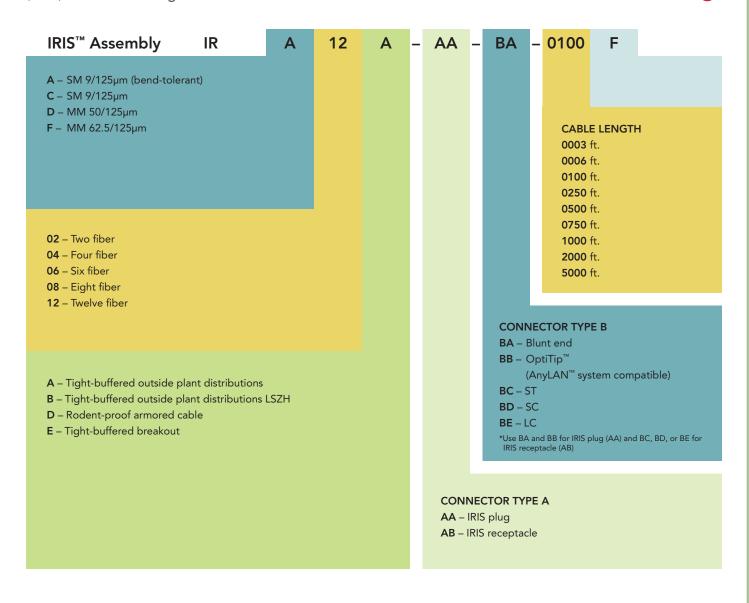
SCENARIO	COMPONENT FAILURE	RESULT OF FAILURE	ESTIMATED RESTORE TIME	ESTIMATED RESTORE COST
Vehicle hits cabinet, dislodging it from its pedestal	Patch cables do not break away	Electronics destroyed	6 hours (if electronics are in stock)	\$5,500.00
Vehicle hits cabinet, dislodging it from its pedestal	Drop cable is pulled back from splice point	Destroyed drop cable and possible damage to splice case and main fiber trunk	10 to 14 hours (if drop cable is in stock)	\$6,500.00 to \$10,000.00 (depending on extent of damage)
Vehicle hits cabinet, dislodging it from its pedestal	Patch cables break away as intended	Broken patch cables, must be replaced	4 hours (if patch cables are in stock)	\$600.00
Flood fills cabinet above fiber connection.	Connector is backfilled with muddy water	System incapable of transmission	8 hours (after flood water subsides)	\$2,750.00 (includes connector interface replacement)
Dust storm penetrates cabinet	Connector becomes contaminated with dust	System incapable of transmission	4 hours	\$450.00
ESTIMATED DAM	AGE MODEL	\$15,8	00.00 MINIMUM	

### With IRIS™

SCENARIO	COMPONENT FAILURE	RESULT OF FAILURE	ESTIMATED RESTORE TIME	ESTIMATED RESTORE COST
Vehicle hits cabinet, dislodging it from its pedestal	None – IRIS Connector trips. Backbone, drop cable and electronics stay intact	Temporary loss of signal	5 minutes (after cabinet is reset)	\$35.00
Flood fills cabinet above fiber connection	None	No loss of signal	0 hours	\$0.00
Dust storm penetrates cabinet	None	No loss of signal	0 hours	\$0.00
ESTIMATED DAMAGE MODEL			\$35.00	



(10.6) IRIS<sup>™</sup> – Ordering Information





(10.7) MHC® II Fiber Optic Connector



### MHC® II Fiber Optic Connector

### **Overview**

The requirements for today's high-speed, high-bandwidth communications systems are constantly expanding with more diverse platforms and unique environments. At the same time, smaller, lighter, more efficient packaging is being demanded to allow designers to pack more into less space.

OCC's Mini Hermaphroditic Fiber Optic/Hybrid Connector (MHC II) fills that requirement. The MHC II is designed specifically to inter-connect fiber optic channels in a small, yet effective, package. Using a bayonet-style, mechanical coupling interface, the plug connector is easily mated to receptacles by a simple twisting motion.

The MHC II 8 CH Connector system provides maximum flexibility by allowing many combinations of fiber optic termini and electrical contacts to coexist within the same hermaphroditic connector system.

The MHC II fiber optic termini feature both pin and socket configurations to accommodate 62.5/125µm, 50/125µm, 9/125µm single-mode/multimode fiber or a combination of fiber types depending upon cable construction requirements and are available in 2-, 4-, 6- and 8-CH versions. Since the connectors are hermaphroditic, two plugs can also be mated together using the same bayonet feature, allowing for end-to-end mating of multiple links, making deployments quicker.

The MHC II series hermaphroditic connector incorporates proven 1.25mm ceramic ferrule technology to achieve excellent mating durability with excellent insertion loss performance that is on par with the OCC family of connectors. The MHC II family of connectors is available in various plating/base materials to match application needs, including nickel-teflon, black anodized, marine brass and stainless-steel.

### **Applications**

- Voice/Data/Video in Harsh Environments
- Deployed Broadcast Systems
- Remote Monitoring Sites
- Robotic Arms and Robot Devices
- Industrial Monitoring





(10.7) MHC $^{\circ}$  II Fiber Optic Connector – Features and Benefits

FEATURES			BENEFITS
Rear locking couplenut feature		3	Allows easy bayonet connection and is capable of supporting excessive cable tension
Quick, easy maintenance			Removable socket cap for easy maintenance, with ceramic alignment sleeves that allow for easy field maintainability
Exceptional cable retention capability			Meets TIA-455-6 Cable Retention Spec. of 400 lbs. minimum when using military tactical fiber optic cable
Designed for retrofit applications with many more configuration options (8 fiber options include 2F + 6E, 4F + 4E, 6F + 2E)	S1	S1 0 0 S1	Same footprint as popular connectors, and fits existing panel cutouts
Small form factor that provides higher density and design/retrofit space optimization			Flange-mount connectors offer strain-relief (SRR) backshells providing TIA-455-6 cable retention





(10.7) MHC® II Fiber Optic Connector – Performance Specifications

### **Performance Specifications**

PERFORMANCE	SPECIFICATION	PARAMETER
Insertion loss (multimode)	EIA/TIA-455-171	0.50dB – typical, 0.75dB – max.
Insertion loss (single-mode)	EIA/TIA-455-171	0.50dB – typical, 0.75dB – max.
Back reflection (single-mode UPC polish)	EIA/TIA-455-107	-42dB – typical, -40dB – max.
Operating temperature	TIA/EIA-455-5	-54°C to + 71°C
Storage temperature	TIA/EIA-455-5	-57°C to + 85°C
Mating durability	TIA-455-21	1000 cycles
Impact	TIA/EIA-455-2	Method A
Cable retention (MILITARY TACTICAL)	TIA-455-6	400 lbs. min.
Crush resistance	TIA-455-26	Exceeds spec. (450 lbs.) and tested to 1260 lbs.
Temperature life	TIA/EIA-455-C	250 hrs., 85±2°C
Physical shock	EIA/TIA-455-14A	Condition C, 5 shocks/axis
Vibration	EIA/TIA-455-11B	Condition III and VI, Condition C for 1.5 hrs., except III
Humidity	EIA/TIA-455-5	Туре II
Dust test	IEC 60529 IP68	8 hrs. dust exposure with 20 mbar
Submersion	IEC 60529 IP68	1 m for 48 hrs.

### **Electrical Performance – Pin and Socket Contacts**

SPECIFICATION	PARAMETER
Insulation resistance	>10,000mΩ
Voltage – high	600Vrms
Voltage – low	42V AC or 60V DC
Current – high	10A
Current – low	1A
Withstand voltage	1750Vrms
Contact resistance #16 AWG contacts	$2.7$ m $\Omega$ after 2000 mating

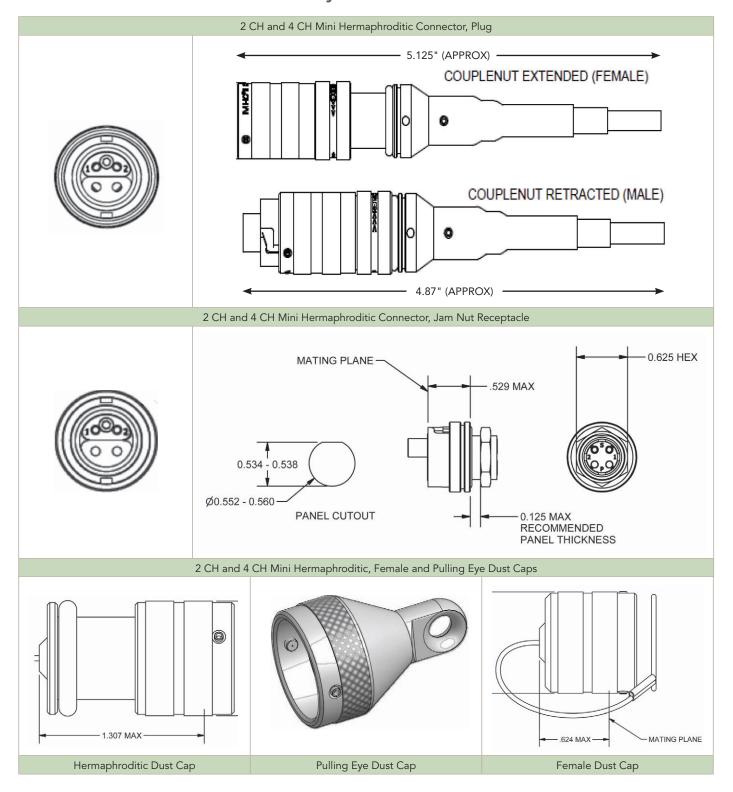
### **Materials**

SPECIFICATION	PARAMETER
Ferrule	1.25mm diameter ceramic ferrule
	Aluminum black anodized
Exterior parts	303 or 316 stainless-steel, marine brass and nickel teflon options
Interior parts	Aluminum-anodized/alodine clear/brass
Hardware	Stainless-steel, passivated
Seals	Nitrile
Boot	Polyolefin, Neoprene, Kynar
Alignment sleeves	Ceramic split sleeve



(10.7) MHC® II Fiber Optic Connector – Product Drawings

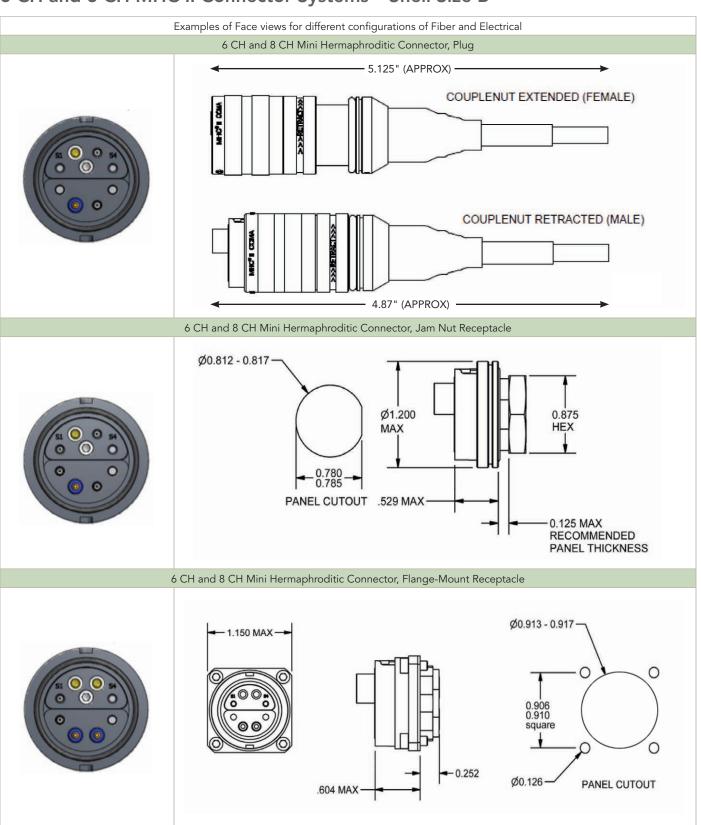
### 2 CH and 4 CH MHC II Connector Systems - Shell Size A





(10.7) MHC® II Fiber Optic Connector – Product Drawings

### 6 CH and 8 CH MHC II Connector Systems – Shell Size B



Custom accessories available; contact OCC for information.



(10.7) MHC® II Fiber Optic Connector – Ordering Information

### MHC II 2-4 CH Hermaphroditic Connectors - Shell Size A

PART NUMBER	CONFIGURATION	DESCRIPTION
CCMA00B11CA	Plug	2–4 fiber CH, plug hermaphroditic, black anodized, up to 0.315" cable O.D.
CCMB00B11C	Receptacle, jam nut, UPC	2–4 fiber CH, jam nut receptacle, internal, black anodized
CCMD00B11C	Receptacle, flange-mount, UPC	2–4 fiber CH, flange-mount receptacle, black anodized
CCMG00B11CA	Receptacle, flange-mount, SRR, UPC	2–4 fiber CH, flange-mount, strain-relief receptacle, black anodized, up to 0.315" cable O.D.

### MHC II 8 CH Hermaphroditic Connectors – Shell Size B

PART NUMBER	CONFIGURATION	DESCRIPTION
CCMA00D11CB	Plug, 8f UPC	8 fiber CH, plug hermaphroditic, black anodized, up to 0.495" cable O.D.
CCMA00T11CB	Plug, 4f+4e UPC	4 fiber + 4 electrical CH, plug hermaphroditic, black anodized, up to 0.495" cable O.D.
CCMA00V11CB	Plug, 2f+6e UPC	2 fiber + 6 electrical CH, plug hermaphroditic, black anodized, up to 0.495" cable O.D.
CCMA00W11CB	Plug, 6f+2e UPC	6 fiber + 2 electrical CH, plug hermaphroditic, black anodized, up to 0.495" cable O.D.
CCMB00D11C	Receptacle, jam nut, 8f UPC	8 fiber CH, jam nut receptacle, internal, black anodized
CCMB00T11C	Receptacle, jam nut, 4f+4e UPC	4 fiber + 4 electrical CH, jam nut receptacle, internal, black anodized
CCMB00V11C	Receptacle, jam nut, 2f+6e UPC	2 fiber + 6 electrical CH, jam nut receptacle, internal, black anodized
CCMB00W11C	Receptacle, jam nut, 6f+2e UPC	6 fiber + 2 electrical CH, jam nut receptacle, internal, black anodized
CCMD00D11C	Receptacle, flange-mount, 8f UPC	8 fiber CH, flange-mount receptacle, black anodized
CCMD00T11C	Receptacle, flange-mount, 4f+4e UPC	4 fiber + 4 electrical CH, flange-mount receptacle, black anodized
CCMD00V11C	Receptacle, flange-mount, 2f+6e UPC	2 fiber + 6 electrical CH, flange-mount receptacle, black anodized
CCMD00W11C	Receptacle, flange-mount, 6f+2e UPC	6 fiber + 2 electrical CH, flange-mount receptacle, black anodized
CCMG00D11CB	Receptacle, flange-mount, SRR, 8f UPC	8 fiber CH, flange-mount receptacle with integrated strain-relief, black anodized, up to 0.495" cable O.D.
CCMG00T11CB	Receptacle, flange-mount, SRR, 4f+4e UPC	4 fiber + 4 electrical CH, flange-mount receptacle with integrated strain-relief, black anodized, up to 0.495" cable O.D.
CCMG00V11CB	Receptacle, flange-mount, SRR, 2f+6e UPC	2 fiber + 6 electrical CH, flange-mount receptacle with integrated strain-relief, black anodized, up to 0.495" cable O.D.
CCMG00W11CB	Receptacle, flange-mount, SRR, 6f+2e UPC	6 fiber + 2 electrical CH, flange-mount receptacle with integrated strain-relief, black anodized, up to 0.495" cable O.D.







(10.7) MHC® II Fiber Optic Connector - Ordering Information

### Accessories - Dust Caps

PART NUMBER	CONFIGURATION	DESCRIPTION
CCMH10BU1A	Dust cap	2 to 4 CH, hermaphroditic dust cap, black anodized
CCMH10DU1A	Dust cap	6 to 8 CH, hermaphroditic dust cap, black anodized
CCMH20BU1A	Dust cap	2 to 4 CH, female dust cap, black anodized
CCMH20DU1A	Dust cap	6 to 8 CH, female dust cap, black anodized
CCMH50BU1A	Dust cap	2 to 4 CH, female dust cap/pulling eye, black anodized
CCMH50DU1A	Dust cap	6 to 8 CH, female dust cap/pulling eye, black anodized

### Accessories – Fiber Optic Termini, Electrical Contacts

PART NUMBER	CONFIGURATION	DESCRIPTION
TC7440DA	Fiber optic pin termini	1.25mm ceramic ferrule pin fiber optic pin, no crimp tail UPC (900µm buffer fiber only)
TC7441DA	Fiber optic socket termini	1.25mm ceramic ferrule socket fiber optic socket, no crimp tail UPC (900µm buffer fiber only)
TC7439AA	Dummy termini	Dummy termini, MHC II
UV163016AA	Pin contact, electrical	Pin contact electrical 16# AWG-22#AWG
UV164116AA	Socket contact, electrical	Socket contact electrical 16# AWG–22#AWG

# Provisioning Guidelines FIBER OPTIC ONLY

#### Select the appropriate shell size to accommodate the fiber optic channel count. Shell size A allows two channel and four channel. Shell size B allows six channel and eight channel.

- 2) Select the connector configurations that meet the intent of the application. All plugs are hermaphroditic and feature an integrated backshell. Receptacles are selected based on jam nut, flange-mount or flange-mount with strain-relief receptacle options.
- 3) Identify the number of termini required to support the fiber count.
- 4) Jam nut or flange-mount receptacles utilize termini that only accommodate 900µm tight buffer fiber optic cable. Flange-mount strain-relief receptacle (SRR) utilizes distribution- or breakout-style cable and provide additional pull strength for simplex connector pigtails.

#### **HYBRID** (Combination of Electrical and Fiber Optic)

- Select shell size B to accommodate combination of fiber optic and electrical channels.
- 2) Select the connector configurations that meet the intent of the application. All plugs are hermaphroditic and feature an integrated backshell. Receptacles are selected base on jam nut, flange-mount or flange-mount with strain-relief receptacle options.
- 3) Identify the number of fiber optic termini and electrical contacts required to support the application. Two fiber, six electrical V-Series (2f+6e), four fiber, four electrical T-Series (4f+4e), six fiber, two electrical W-Series (6f+2e) are available. There are additional configurations for each of the shell sizes with the use of dummy termini, which provide greater flexibility in provisioning.
- 4) Jam nut or flange-mount receptacles utilize termini that only accommodate 900µm tight buffer fiber optic cable. Flange-mount strain-relief receptacle (SRR) utilizes distribution- or breakout-styles of composite cable and provide additional pull strength for simplex connector pigtails.



(10.7) MHC® II Fiber Optic Connector – Provisioning Guidelines



### **Plating/Material Options**

All MHC II configurations are supplied with "1" - Aluminium black anodized as standard plating. For the additional plating options, the eighth digit position of the part number (e.g., CCME00Dy1CB) is selected for the choice of plating/alternate material:

"1" - Aluminium black anodized

"4" - 303 stainless-steel, Passivation per QQ-P-35/ASTMA967

"5" - 316 stainless-steel, Passivation per QQ-P-35/ASTMA967

"6" – Marine brass

"8" - Nickel-teflon



**3** 

(10.8) MIL-C-83522 ST and ST Adapters



#### Overview

Optical Cable Corporation presents its family of QPL Military ST Connector and ST Adapter products. The OCC family of qualified M83522 products represents the most comprehensive line of military-grade products available to the industry and features nonoptical disconnect, nickel-plated brass, or stainless-steel configurations, available in both ST and ST Adapter configurations. The OCC M83522 qualified family of products features a highly durable, individually mounted connector system that withstands extreme temperature change, shock, vibration and corrosion, which are typical of the extreme environments or uncontrolled operating conditions the system is designed to operate within. Ideally suited for the harsh, unprotected environments of aircraft, spacecraft, shipboard and land-based applications, this connector meets or exceeds 100% of the requirements of military specification MIL-C-83522.

The OCC Military ST Connector is available in either a locking (ANX, ANY) or nonlocking (DNX, DNY) orientation and uses a convenient screw boot feature that eliminates the need for a cumbersome boot tool. The locking model features locking washers that prevent accidental optical disconnects, making the connector less sensitive to cable pull force or constant mechanical shock or vibration. The nonlocking connector features a higher force spring that reduces sensitivity to mechanical shock. In both connectors, a keyed bayonet latch provides easy engagement and disengagement. The zirconia ferrule is engineered to meet the requirements of MIL-C-83522/16, which ensures backward compatibility with legacy transceivers and ensures loss repeatability. A military part number identifies each connector.



(10.8) MIL-C-83522 ST and ST Adapters – Features and Benefits



FEATURES	BENEFITS
Qualified to MIL-C-83522	Ensures highest performance for single terminus (ST) connector
Nickel-plated brass	Broad selection of options to meet environmental needs
Stainless-steel	Broad selection of options to meet environmental needs
Screw-on boot	NO MORE BOOT TOOL! Easy installation
Pin body locking option	Prevents optical disconnect during high-shock, high-vibration environments
Preradius ferrule	Compatible with Legacy Systems
Enhanced Kevlar™ retention	Over 50 lb-ft. of pull strength without damage
Broad selection of cables accommodated	Accommodates 2.0mm, 2.5mm, and 3.0mm fiber cable. For 2.5mm and 3.0mm fiber cables, order crimp sleeve part number PC83522/16-20-S











(10.8) MIL-C-83522 ST and ST Adapters – Performance Specifications

# **Performance Specifications**

SPECIFICATION	PARAMETER	RANGE	DNX	DNY	ANX	ANY	COTS	NY
Insertion loss	Multimode (50, 62.5/125µm)	0.35dB typical, 0.75dB max.	Х		X		X	X
Insertion loss	Single-mode (9/125µm)	0.40dB typical, 0.75dB max.		Х		Х	X	Х
Return loss	Single-mode (9/125µm)	-50dB typical, -40dB max.		X		Х	X	X
Weight	Nonterminated	< 20 GR.	X	X	Х	Х	X	Х
Temperature	Operational	-46°C to 85°C	X	X	Х	Х	X	Χ
Temperature	Storage	-62°C to 85°C	Х	X	Х	Х	X	Х
Tensile loading <sup>1</sup>	MIL-STD-1344A	Method 2009 at 180N	X	X			X	X
Tensile loading <sup>2</sup>	MIL-STD-1344A	Method 2009 at 230N	X	Х	Х			
Flex life	MIL-STD-1344A, M2017	Method 2017, 1000 cycles each	X	X	X	X	X	X
Twist	EIA-455-36	1000 cycles, ±90° twist	X	Х	Х	Х	X	Х
Mating durability	EIA-455-21	500 cycles	X	Х	Х	Х	X	X
Impact	TIA/EIA-455-2, Method B	8 drops	X	Х	Х	Х	X	X
Vibration	TIA/EIA-455-11C, Cond. C	Condition II and VII, 10 GS, 1.5 hrs./axis	X	X	X	X		X
Vibration <sup>3</sup>	TIA/EIA-455-11C, Cond. VI	Condition F, 1.5 min./axis	X	Х	Х	Х		X
Mechanical shock <sup>4</sup>	MIL-S-901, Grade A, Type A	Class 1, 3 blows, each axis	X	X	Х	Х		X
Thermal shock	DOD-STD-1678	Method 4020, -62°C to 85°C	Х	Х	X	X	X	X
Temperature humidity cycling	DOD-STD-1678	Method 4030, 65°C at 95% RH	X	X	X	X	X	X
Temperature cycling	EIA/TIA-455-3	4 cycles at 14 hrs./cycle	X	Х	Х	Х	X	Х
Life aging	MIL-STD-202	Method 108, 240 hrs.	X	X	Х	X	X	X
Pressure altitude	MIL-STD-810	Method 500, 2000 ft./min.	X	Х	Х	Х	Х	X
Sand and dust	MIL-STD-202	Method 110	X	Х	Х	Х	Х	X
Salt spray	MIL-STD-1344A	Method 1001, cond. A	Х	Х	Х	Х	Х	Х
Flammability	MIL-STD-1344A	Method 1012, cond. C	Х	X	Х	Х	X	X
Fungus resistance	MIL-STD-810	Method 508, 28 days	X	Х	Х	Х	X	Х

#### **NOTES**

- <sup>1</sup> Discontinuity allowed during tensile loading.
- <sup>2</sup> Discontinuity not allowed during tensile loading.
- <sup>3</sup> Typical for launch conditions onboard ship.
- $^4$   $\,$  Less than 50% reduction in transmittance for <50  $\mu sec.$



(10.8) MIL-C-83522 ST and ST Adapters – Ordering Information

### **Nickel-Plated Brass Products**

PART NUMBER	PRODUCT DESCRIPTION	
M83522/16-DNX-B	MIL-ST, screw-on boot, nonlocking, multimode, N.P.B.	
M83522/16-DNY-B	MIL-ST, screw-on boot, nonlocking, single-mode, N.P.B.	
M83522/16-ANX-B	MIL-ST, screw-on boot, locking, multimode, N.P.B.	
M83522/16-ANY-B	MIL-ST, screw-on boot, locking, single-mode, N.P.B.	
SVST6011AL	COTS-ST, screw-on boot, nonlocking, multimode, N.P.B.	
SVST6021AL	COTS-ST, screw-on boot, nonlocking, single-mode, N.P.B.	
SVST5011AL	COTS-ST, screw-on boot, locking boot, multimode, N.P.B.	
SVST5021AL	COTS-ST, screw-on boot, locking boot, single-mode, N.P.B.	
M83522/17-NY-B	MIL-ST adapter, multi- or single-mode, N.P.B.	
SVSTB21A0	N.P.B. COTS-ST adapter, ceramic split sleeve	
SVSTP21A0	N.P.B. metal ST dust cover with lanyard	
SVSTQ21A0	N.P.B. metal ST adapter dust cover with lanyard	

### **Stainless-Steel Products**

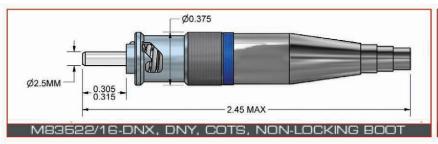
PART NUMBER	PRODUCT DESCRIPTION	
M83522/16-DNX-S	MIL-ST, screw-on boot, nonlocking, multimode, S.S.	
M83522/16-DNY-S	MIL-ST, screw-on boot, nonlocking, single-mode, S.S.	
SVST6012AL	COTS-ST, screw-on boot, multimode, S.S.	
SVST6022AL	COTS-ST, screw-on boot, single-mode, S.S.	
SVST5012AL	COTS-ST, screw-on boot, locking boot, multimode, S.S.	
SVST5022AL	COTS-ST, screw-on boot, locking boot, single-mode, S.S.	
M83522/17-NY-S	MIL-ST adapter, multi- or single-mode, S.S.	
SVSTB22A0	S.S. COTS-ST adapter, ceramic split sleeve	
SVSTP22A0	S.S. metal ST dust cover with lanyard	
SVSTQ22A0	S.S. metal ST adapter dust cover with lanyard	

### MIL-C-83522 ST and ST Adapters

CRIMP SLEEVE P/N PRODUCT DESCRIPTION		KIT PROVISION
PA35395-99-017	A35395-99-017 Accommodates 2.0–2.1mm cable O.D.	
PM83522/16-05-99B	Accommodates 2.0–2.4mm cable O.D.	Included in all MIL-ST kits
PC83522/16-22 Accommodates 2.5mm cable O.D.		Ordered separately
PC83522/16-20-S	Accommodates 3.0mm cable O.D.	Ordered separately

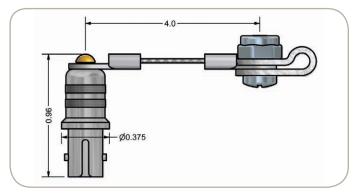


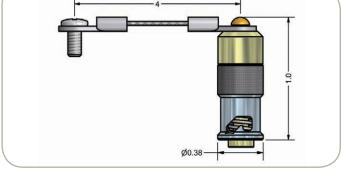
(10.8) MIL-C-83522 ST and ST Adapters – Product Drawings











SVSTP21A0 AND SVSTP22A0

SVSTQ21A0 AND SVSTQ22A0



(10.9) Military Specified (QPL) M29504/14 and M29504/15 Fiber Optic Termini



### Military Specified (QPL) M29504/14 and M29504/15 Fiber Optic Termini

### Overview

Optical Cable Corporation's (OCC®) family of MIL-PRF-29504/14 and /15 fiber optic termini is designed to achieve exceptional optical performance at extreme environments, including arctic, desert, seawater, high temperature and high pressure. The MIL-PRF-29504/14 and /15 were pioneered for integration into the MIL-C-28876 connector family and are the most accepted fiber optic termini for harsh or environmentally challenging applications. OCC incorporates several enhancements over the current MIL-PRF-29504/14 and /15 design, which include accommodation of MIL-STD-2042B cut template, serrations on the external buffer guide to improve Kevlar<sup>™</sup> retention and use of Beryllium-free alloys in the composition of the termini. OCC in-process quality assurance system ensures that all manufactured termini conform to intermatability fit criteria set forth in MIL-PRF-28876. These improvements result in the best MIL-PRF-29504/14 and /15 available on the market and ensure compatibility with similar products.

#### Features

- Intermatable and interchangeable with other M29504/14- and /15-style termini
- Enhanced Kevlar™ retention
- Complies with MIL-STD-2042B cable template
- Superior optical performance
- Short body option
- Variety of fiber optic O.D.
- Single-mode, multimode

### **Applications**

- Aerospace/Airborne
- U.S. Navy Shipboard and Submarine
- Foreign Military Shipboard
- Mission Critical Combat Systems
- **Mobile Tactical Shelters**
- **Battlefield Electronic Networks**
- Mobile Emergency Telecommunication Stations
- **Broadcast and Deployable Outdoor Applications**
- Petro-Chemical, Well Completion
- **Energy and Exploration**





(10.9) Military Specified (QPL) M29504/14 and M29504/15 Fiber Optic Termini – Product Specifications

### Performance Specifications – M29504/14 Pins and M29505/15 Sockets

METRIC	PARAMETERS	
Operating temperature	-65°C to +150°C (dependent on epoxy and cable)	
Thermal cycling	-54°C to +65°C	
Thermal shock	-55°C to +85°C	
Temperature life	+110°C for 240 hrs.	
Vibration	68 G random	
Physical shock	500 G	
Mating durability	500+ cycles	
Salt spray	500 hrs.	
Pressure sealing	32psi, (2,000 psi with wiper seal option)	
Terminus mating force	5 lbs. [22.2 N] nominal	
Terminus retention force	22 lbs. [97.9 N]	
Cable retention force	25 lbs. [111.2 N] (dependent on cable construction)	
Weight	0.7 g max.	

### Standard Materials and Finishes

DESCRIPTION	MATERIAL	FINISH	
Terminus body	Stainless-steel	Passivated	
Alignment sleeve	Zirconia	None	
Alignment sleeve hood	Beryllium-free material	Nickel-plated	
Ferrule (bushing)	Zirconia	None	
Retaining clip	Beryllium-free material	None	
Belleville springs Beryllium-free material		None	
O-ring seal Fluorosilicone		None	

### **Optical Performance**

FIBER SIZE INSERTION LOSS (MAX.)		INSERTION LOSS (TYPICAL)
9/125	*-0.75dB	*-0.35dB
62.5/125	*-0.75dB	*-0.25dB

<sup>\*</sup>EIA/TIA-455-171A

### Back Relection (BR) – Single-Mode

FIBER TYPE	BACK REFLECTION (DB)	TYPE OF POLISH
Single-mode	≤-40dB	PC finish
Single-mode	≤-50dB	UPC finish



(10.9) Military Specified (QPL) M29504/14 and M29504/15 Fiber Optic Termini – Ordering Information



### Ordering Information - M29504/14 Pins and M29505/15 Sockets

QUALIFIED PARTS LIST	OCC P/N	PRODUCT DESCRIPTION	FIBER SIZE
M29504/14-4131	TC1440CA	Pin termini*	62.5/125µm
M29504/14-4141	TC1440CA	Pin termini*	9/125µm
M29504/14-4131C	TC1440CE	Pin termini*	62.5/125µm
M29504/14-4141C	TC1440CE	Pin termini*	9/125µm
M29504/15-4171	TC1541CA	Socket termini*	62.5/125µm
M29504/15-4181	TC1541CA	Socket termini*	9/125µm
M29504/15-4171C	TC1440CE	Socket termini*	62.5/125µm
M29504/15-4185C	TC1440CE	Socket termini*	9/125µm
M29504/3-4038	TC0339AA	Dummy termini	N/A
(not listed)	TC1549DA	Socket w/o captivator	N/A
(not listed)	TC1546AA	Captivator bushing	N/A

<sup>\*</sup> Short versions available

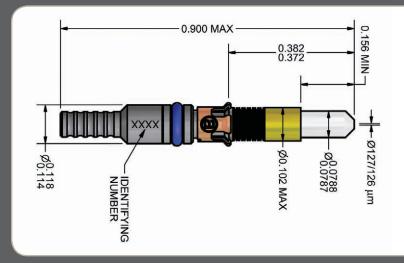
### Crimp Sleeve for All Sizes Cable Jacket

OCC P/N	PRODUCT DESCRIPTION	CABLE JACKET DIAMETER
PA35395-99-017	Crimp sleeve	2.0mm O.D.
PM83522/16-05-99B	Crimp sleeve	2.5mm O.D.

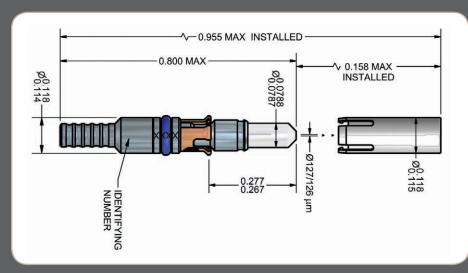


(10.9) Military Specified (QPL) M29504/14 and M29504/15 Fiber Optic Termini – Product Drawings

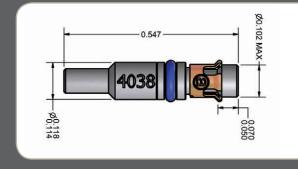
### **Crimp Sleeve for All Sizes Cable Jacket**



Pin Termini



Socket Termini



Dummy Termini



# 11.0 Military/Harsh Environment Deployable Systems

11.1	Modular Advanced Reel Systems (MARS) – Features and Benefits	34ć
11.2	Modular Advanced Reel Systems (MARS) – Options	348
11.3	Modular Advanced Reel Systems (MARS) – Performance Specifications	35C
11.4	Modular Advanced Reel Systems (MARS) – Cartridge System	351

### **Overview**

OCC is pleased to introduce the Modular Advanced Reel System (MARS), the industry's first lightweight cable deployment reel system designed specifically for the demanding needs of harshenvironment fiber optic installations. Unlike traditional metal-style reels, MARS is a lightweight, modular system constructed of a high-impact glass-enforced polymer that is easily transported and is ideal for applications where cable needs to be deployed and reeled in quickly and stored efficiently. In addition, MARS offers a variety of deployment options, including optional frames, backpacks, shipping cases, and cable acquisition platforms throughout. This enables customers to meet the demands of diverse markets with one modular reel and accessories platform. The OCC MARS reel can be used with simple deployable axials ("broom sticks") or

### **Applications**

- Mobile Emergency Telecommunications Stations
- Mobile Tactical Shelters
- U.S. Army, Navy, and Marine Corps Military Tactical Deployments
- Broadcast
- Emergency Restoration and Deployable Communications

with integrated A-frames, cable acquisition cradles, transit case systems, tripods, bumper mounts, backpacks and backpacks with fiber optic slip rings. The MARS reel itself incorporates options for fiber optic cleaning kits: flip-out handle, 30-ft. built-in divider, connector cradle design, and stackable features. All these features (with a lower weight than common reel systems) make MARS the most advanced fiber optic reeling system available in today's market!



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(11.1) Modular Advanced Reel System (MARS) – Features and Benefits

# FEATURES BENEFITS Fabricated with Provides durability and strength while affording high-impact glass-reinforced lightweight benefits. polymer material Eliminates rust resulting from field operation. Integrated Enables operator to deploy small cable payout and lengths of fiber cable without having to unspool the entire storage area payload. Payout area does not impact cable volume. Interlocking Enables reels to be stacked and interlocked during transit. stacking system Affords multi-channel cylindrical Integrated connector storage connectors to be stored and locked in place for transit. Accommodates 0.50" to 2.1" diameter connectors. Molded hand openings Allows for easy hand transportation and deployment.

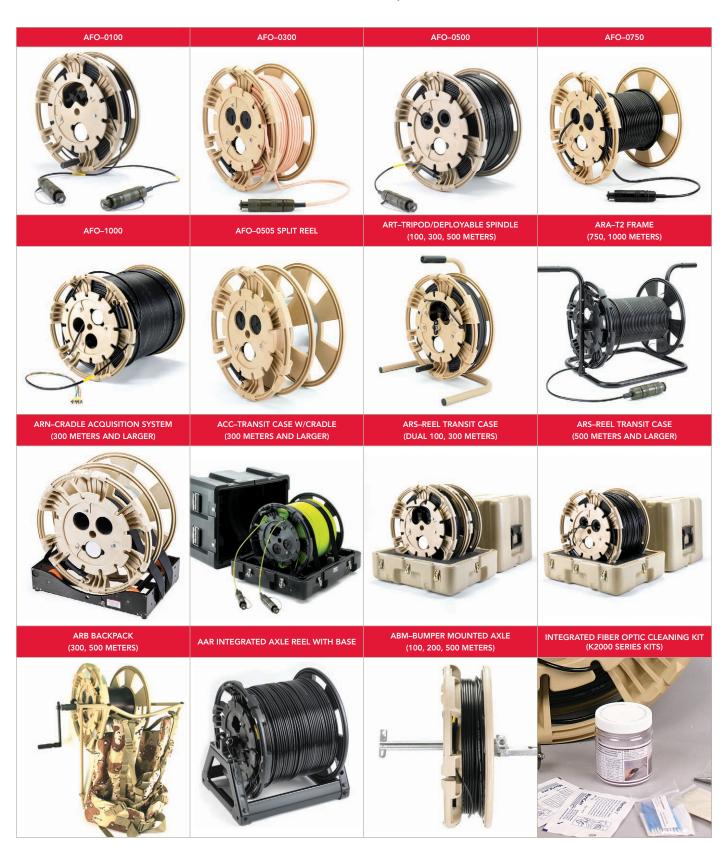


(11.1) Modular Advanced Reel System (MARS) – Features and Benefits

FEATURES			BENEFITS
Integrated cleaning kit compartment	K Wang or Hard State of the Sta	22000 Series Cleaning Kits	Built-in fiber optic connector cleaning kit allows operators to maintain connectors during deployable situations.
Lightweight retractable crank-and-handle system			Allows operators to easily rotate reel in deployment or take-up situations and store handle during transit.
Square flange option			AFO-style reels can be provisioned with either 1" diameter round hole or 1" square axle hole.
Comprehensive inventory of integrated accessories and options			Options include integrated transit cases, deployable "T" frames, backpacks and more.



(11.2) Modular Advanced Reel System (MARS) – Options



OCC's MARS meets the challenge of today's harsh environment by offering an integrated solution to clean and maintain multi-channel cylindrical fiber optic connectors in the field. MARS can be provisioned with a variety of cleaning kits that correspond to popular connector styles, including MIL-DTL-83526, MIL-PRF-28876, MIL-DTL-38999, NAVSEA Pierside, MIL-C-83526 (TFOCA), F-LINK™ and TFOCA-II®. Cleaning Kits and Restoration Kits are available for 4-, 6-, 8-, 1-2, 18- and 24-channel-style connectors. MARS has been tested in accordance with military specifications for cable reels.



(11.2) Modular Advanced Reel System (MARS) - Options

Reel Part Numbering	AFO	-0100	-T	-M	-1		
CONFIGURATION TYPE  ACR Reel type commercial (black only)  AFO Reel type military (desert tan/carc green	only)				<b>1</b> 1"	<b>TYPE</b> Round Axle Hole Square Axle Hole	
REEL SIZE/CAPACITY (@ 5.5MM DIAMETER COOLOGY	ABLE)			A 4/ B Ex E 4/ F F- H Ho	(12 CH M83 opanded be (12 CH EZ-N LINK Style ( ermaphrodi (24 CH EZ-N	am MATE™ Connectors tic/SMPTE ferrule connectors Mate™	
REEL COLOR T Desert Tan G Carc Green B Black Custom colors available.				P N. Q 2. S 1. T 2 U 1.	P NAVSEA Pierside ferrule connectors Q 2.5mm ferrule connectors S 1.6-2.0mm ferrule connectors T 2 CH TFOCA U 1.25mm ferrule connectors		

#### **ART Accessory Part Number** -0100 -X -X **CONFIGURATION TYPE** COLOR ARN Reel acquisition cradle system (300, 500, 750, 1000 meters) (TRIPOD/CASE/T2-FRAME) ART Tripod, deployable (100, 300, 500 meters) X N/A ATB Tripod, deployable w/brake (100,300, 500 meters) T Desert Tan ARB Backpack (300, 500 meters) **G** Carc Green ARR Backpack w/FO/electrical slip ring (500 meters) Black ARS Transit case reel storage, (100, 2100 [dual-100m], 300, 500, 750, 1000) ACC Transit case w/acquisition cradle, (500, 750, 1000 meters) ARA T2-frame, deployable (750, 1000 meters) ABF T2-frame, deployable w/brake (750, 1000 meters) ARI Field installed braking system for tripod (100, 300, 500 meters) ARC Field installed braking system for T2-frame (750, 1000 meters) ACD Modular, deployable cartridge system w/caster wheels (500, 750, 1000 meters) ABM Bumper-mounted axle (100, 300, 500 meters) AAR Integrated axle reel (700, 1000 meters) AAB Base for integrated axle reel (700, 1000 meters) **REEL SIZE/CAPACITY (@ 5.5MM DIAMETER CABLE) 0100** 100 meters **0300** 300 meters **0500** 500 meters **0750** 750 meters **1000** 1000 meters

Custom accessories available; contact OCC for information.



(11.3) Modular Advanced Reel System (MARS) – Performance Specifications

PERFORMANCE SPECIFICATIONS					
SPECIFICATION	PARAMETER	RANGE			
Operating temperature	MIL-STD-810C, method 501, 502	-0°C to +80°C			
Storage temperature	MIL-STD-810C, method 501, 502	-45°C to +85°C			
Temperature-humidity cycling	DOD-STD-1678, method 4030	43°C, 98% humidity			
Drop test	MIL-R-3241E, 3.5ft. drop, 6 sides, 2 in. fir wood on concrete	1000m reel with cable, no degradation to operation			
Vibration	EIA-364-28	3 axis, 10 to 33Hz, Hor. 0.020A (in.), Ver., 0.030A (in.)			

# **Ordering Specifications**

PART NO.	FLANGE DIAMETER	HUB DIAMETER	WIDTH	WEIGHT	CAPACITY 5.5MM OD CABLE	CAPACITY 7.2MM OD CABLE
***-0100-X-Y	17"	10"	5"	9.5 lbs.	100m	75m
***-0300-X-Y	17"	8"	7.75"	11 lbs.	300m	200m
***-0500-X-Y	17"	8"	10.75"	11.5 lbs.	500m	350m
***-0750-X-Y	17"	8"	14.75"	12 lbs.	750m	500m
***-1000-X-Y	17"	8"	18.75"	13 lbs.	1000m	700m

REPLACEMENT – INTEGRATED CLEANING KITS					
K2000-KAC00x	4/12 CH M83526				
K2000-KBC00x	Expanded beam				
K2000-KEC00x	4/12 CH EZ-MATE™				
K2000-KFC00x	F-LINK Style Connectors				
K2000-KHC00x	Hermaphroditic/SMPTE				
K2000-KJC00x	6/24 CH EZ-MATE™				
K2000-KNC00x	M28876				
K2000-KPC00x	NAVSEA Pierside				
K2000-KQC00x	2.5mm ferrule				
K2000-KSC00x	1.6–2.0mm ferrule				
K2000-KTC00x	2 CH TFOCA				
K2000-KUC00x	1.25mm ferrule				



For AFO/ACR-0100, x =1 For AFO/ACR-0300 or greater, x=2



(11.4) Modular Advanced Reel System (MARS) - Cartridge System

### The most advanced, self-contained fiber optic reeling system available.

Introducing Optical Cable Corporation's MARS™ Cartridge System, another accessory member of Modular Advanced Reel System specifically designed for fiber optic cable. The MARS Cartridge System offers the most advanced, selfcontained fiber optic reeling system for broadcast, military or deployable communication environments. MARS reels are designed to interoperate across a full family of reel accessories. The MARS Cartridge System employs many of the same cradle features found in the MARS Cradle System (reel release knob and roller reels), allowing multiple reels to be exchanged within one platform.

### Features & Benefits:

- Self enclosed metal case eliminates the need for shipping containers
- Gravity latch lid automatically holds the open lid in upright position
- Flip lid/tote handle and wheeled luggage capability allow for easy transport of cartridge system through airports, stages and other venues
- Reel roller elements and release knob allow reels to be interchanged or removed from cartridge
- Stackability/interlock feature allows for easy storage and transport of multiple cartridge systems; wheels and floor mounts protrude into the lid to form an interlocking system; a lock pin is used to interlock two or more cartridges together, and they are designed to sustain 600 lbs. of cargo
- Built-in tool box stores critical tools and fixtures during transport











(11.4) Modular Advanced Reel System (MARS) – Cartridge System

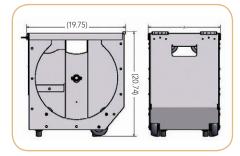










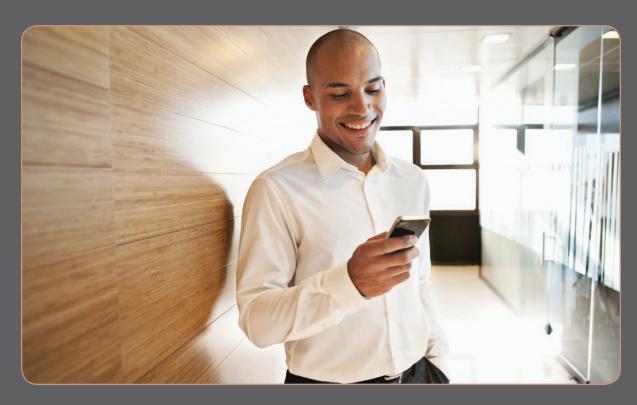


# **Performance Specifications**

PART NUMBER	DESCRIPTION	
Temperature–humidity cycling	EIA/TIA-455-5C, 240 hrs.	-40°C to 85°C, 95% RH
Storage testing	EIA/TIA-455-5C	-40°C to 85°C
Vibration	Frequency = 10 to 33Hz, Amplitude = horizontal 0.020", vertical = 0.030"	Duration = 6 hours
Drop test	3.5 ft. drop onto concrete floor, full load	3 sides

# Ordering Information

PART NUMBER	DESCRIPTION	HEIGHT	WIDTH	DEPTH	WEIGHT	
ACD-0500-X-X-y	Modular, deployable cartridge system with wheels, 500m	20.74"	19.75"	14.5"	23 lbs.	
ACD-0750-X-X-y Modular, deployable cartridge system with wheels, 750m		20.74"	19.75"	18.5"	28 lbs.	
ACD-1000-X-X-y Modular, deployable cartridge system with wheels, 1000m		20.74"	19.75"	22.5"	33 lbs.	
Replace "y" for cartridge system color – $\mathbf{T}$ = desert tan, $\mathbf{B}$ = black, $\mathbf{G}$ = carc green.						



## 12.0 Wireless Systems

Cellular Distribution System	354
CDS – Dual Band Systems	356
CDS – 1900MHz Systems	357
CDS – 850MHz Systems	358
CDS – Ordering Information	359
CDS – Improved In-Building Cell Service	360

#### Overview

OCC's patent-pending Cellular Distribution System® (CDS) is a signal-booster system designed to provide a simple solution for eliminating in-building cellular dead zones. The CDS kit improves localized cellular coverage within a building that experiences low signal strength where

# **Active Hardware Specifications**

- Gain 65 dBMax Output Power up to 3 watts
- Max RF + 30 dBm /+ 30 dBm
- Noise Figure 3 dB nominal
- Flatness ± 2.5 dB
- Isolation > 90 dB
- Power Requirements 120 V AC 3/6 A max (Single/Dual Band System)
- Connectors N-Female 50 ohms

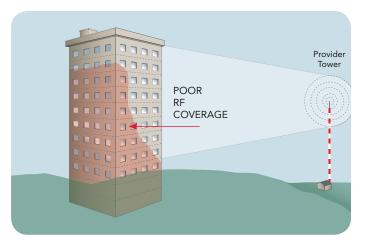
service provider coverage is acceptable at a nearby outdoor location. The CDS solution applies structured cabling concepts to support wireless communications within a building, using newly installed coaxial cable to distribute wireless signals. This is accomplished using a unique distributed antenna technology. Four antennas are cabled to the rack-mount CDS panel, creating signal pathways to an external omni-directional antenna for signals that otherwise would experience heavy propagation losses. Materials that cause such losses include external metal siding, concrete and rebar, which seriously inhibit cellular propagation inside your building. These materials are bypassed using the easy-to-install CDS Installation Kit, making the cell phone coverage inside your building as good as the coverage you get outside. Each kit includes all the components required, with easy-to-follow, explicit instructions for fast installation to improve your indoor cellular service.

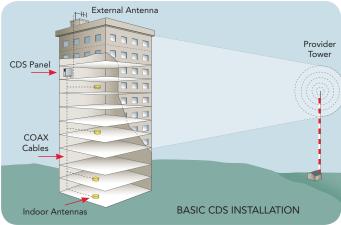
## **Applications**

Ideal for building applications where cellular service is readily available at an external location outside the building yet coverage is poor when the mobile user enters the facility. Typical structures that may benefit from the CDS system are buildings with metal walls or heavy rebar or underground or basement locations.



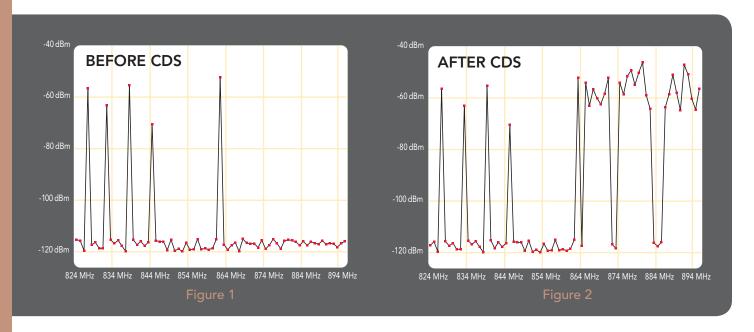
(12.1) Cellular Distribution System®





#### **Coverage Areas**

- Coverage is highly dependent on the signal strength at the single external antenna location of each provider
- Open space installations: ~60,000 sq. ft. per panel coverage established\*
- Office space installations: ~30,000 sq. ft.\*
- Open-space coverage is easier to obtain than closed and walled space
- Materials such as metal and reinforced concrete reduce effective range
- · The longer the coaxial cable runs to both the external and internal antennas, the less coverage range
- With 100 ft. of LMR from the panel to the internal antennas, approximately 100 ft. of functional range will occur dependent on the signal strength at the external antenna location
- Antenna placement in the facility is key to successful deployment

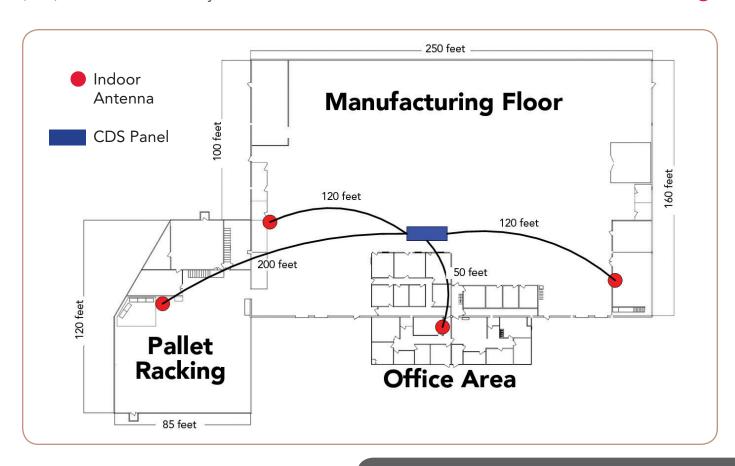


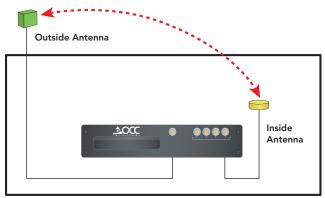
## **Performance Graphs**

Site survey for provider strength is a gauge for the effectiveness a CDS system will have when installed for a specific building. The graphs above illustrate the effectiveness of CDS in providing a signal pathway between an internal location of a mixed office/manufacturing building and the outside. In figure 2, the RF traffic from the tower can be seen to be approximately -75 dBm of power after the installation of a CDS unit, whereas prior to the installation, as seen in the first plot, the power level was below the -110 dBm measurement threshold.

\*Coverage area estimates are based on excellent provider signal strength (-40dBm) at the outside antenna location. If signal strength is not weaker, actual coverage area will be respectively less.

(12.1) Cellular Distribution System®





#### **TESTING ANTENNA-TO-ANTENNA ISOLATION**

Electrical isolation between the external antenna and the internal antennas should be at least -85 dB.

#### **Installation Considerations**

- Location of the external donor antenna should be as high as possible, with cellular provider power levels as high as locally
- Cable lengths should be kept to a minimum for all segments. Increased cable length results in less range from the internal antennas.
- Low loss cable should be used. If long cable runs in excess of the recommended 140 ft. from the external antenna and greater than 100 ft. from the panel to the internal antennas, the lowest loss cable available should be considered for the install.
- An omni-directional antenna should be used to achieve maximum external coverage for multiple bands. However, a high-gain antenna can be used for a single-band provider.
- For optimal cellular coverage, system specifications should be matched to the frequency range used by your provider.
- Internal antennas should be mounted in high locations whereby a line of sight to the antenna is probable, such as the center of open spaces and at the center of corridor junctions.
- Line of sight is always the optimal situation.

# **WIRELESS SYSTEMS**



(12.2) CDS Dual Band Systems





CDS8V/19-50-4D  $\mid$  824–896MHz and 1840–1990MHz Distributed Antennas System

824–896 AND 1840–1990MHZ	FEATURES AND BENEFITS
	Improves cell service in buildings where service is poor or nonexistent and is good at a nearby outside location
•	824–896MHz and 1840–1990MHz simultaneous provider band support
	Easy to install – no software configuration
•	1 external low-profile dual-band omni-directional 3dBi gain antenna, 4 internal omni-directional broadband ceiling-mount dome antennas
	Utilizes low-loss coaxial cable to distribute cellular provider signals throughout a building
•	Requires strong cellular service provider signal at the external antenna location
	iDEN (800MHz) CDMA TDMA and GSM (1900MHz) compatible, including high-speed data and 3G Internet services
•	CDMA, TDMA and GSM compatible, including high-speed data and 3G Internet services
	Does not support 800MHz iDEN and 824–896MHz simultaneously
•	Does not support 800MHz iDEN
	Complete kit – installer only needs coaxial cable
•	3RU form factor

824–896 AND 1840–1990MHZ	APPLICATIONS/SUPPORT SPECIFICATIONS
	65 dB gain for both 806–866MHz and 1840–1990MHz bands simultaneously
	65 dB gain for both 824–896MHz and 1840–1990MHz bands simultaneously
•	Utilizes standard 50 ohm N connectors for all connectivity
•	Automatic gain adjustment
	Maximum 3W power output
•	+30 dBm RF uplink, +30 dBm RF downlink maximum
-	FCC part 22 compliant as a low-power cellular accessory
•	18 lbs. panel weight, 4.75" x 17.50" x 8.195"
-	13.75" external antenna length
	Utilizes in-line coaxial gas tube for lightning surge suppression
	120 VAC power supply input

System design and cabling support consulting services available upon request.

(12.3) CDS – 1900MHz Systems





CDS19-50-4D | 1840-1990MHz Distributed Antennas System

1840-1990MHZ	FEATURES AND BENEFITS
	Improves cell service in buildings where service is poor or nonexistent and is good at a nearby outside location
•	1840–1990MHz provider band support
	Easy to install – no software configuration
•	1 external low-profile dual-band omni-directional 3dBi gain antenna, 4 internal omni-directional broadband ceiling-mount dome antennas
	Utilizes low-loss coaxial cable to distribute cellular provider signals throughout a building
•	Requires cellular service provider signal at the external antenna location
	CDMA, TDMA and GSM compatible, including high-speed data and 3G Internet services
	Complete kit – installer only needs coaxial cable
-	2RU form factor

1840–1990MHZ	APPLICATIONS/SUPPORT SPECIFICATIONS
	65 dB gain for 1840–1990MHz band
	Utilizes standard 50 ohm N connectors for all connectivity
	Automatic gain adjustment
	Maximum 3W power output
	+30 dBm RF uplink, +30 dBm RF downlink maximum
	FCC part 22 compliant as a low-power cellular accessory
	13.75" external antenna length
	Utilizes in-line coaxial gas tube for lightning surge suppression
	120 VAC power supply input

System design and cabling support consulting services available upon request.

# **WIRELESS SYSTEMS**



**3** 

(12.4) CDS – 850MHz Systems





CDS8V-50-4D | 824-896MHz Distributed Antenna System

824–896MHZ	FEATURES AND BENEFITS
	Improves cell service in buildings where service is poor or nonexistent and is good at a nearby outside location
	806–866MHz provider band support
	824–896MHz provider band support
	Easy to install – no software configuration
•	1 external low-profile dual-band omni-directional 3dBi gain antenna, 4 internal omni-directional broadband ceiling-mount dome antennas
	Utilizes low-loss coaxial cable to distribute cellular provider signals throughout a building
	Requires cellular service provider signal at the external antenna location
	iDEN compatible
	CDMA, TDMA and GSM compatible, including high-speed data and 3G Internet services
	Complete kit – installer only needs coaxial cable
	2RU form factor

824–896MHZ	APPLICATIONS / SUPPORT SPECIFICATIONS
	65 dB gain for both 806–866MHz
	65 dB gain for both 824–896MHz
	Utilizes standard 50 ohm N connectors for all connectivity
	Automatic gain adjustment
	Maximum 3W power output
	+30 dBm RF uplink, +30 dBm RF downlink maximum
	FCC part 22 compliant as a low-power cellular accessory
	13.75" external antenna length
	Utilizes in-line coaxial gas tube for lightning surge suppression
	120 VAC power supply input

System design and cabling support consulting services available upon request.



(12.5) CDS Ordering Information

### **Ordering Information**

PART NO.	DESCRIPTION
CDS8V-50-4D**	Cellular distribution system kit for 824–894MHz cellular band
CDS19-50-4D**	Cellular distribution system kit for 1840–1990MHz cellular band
CDS8V/19-50-4D**	Cellular distribution system kit for 824–895MHz cellular band and 1840–1990MHz cellular band
LMR400NM-XXX*	Riser 50 ohm LMR400 coaxial cable with male "N" type connectors
LMR400NMP-XXX*	Plenum 50 ohm LMR400 coaxial cable with male "N" type connectors
* D	

<sup>\*</sup> Replace "XXX" with length of LMR 400 coaxial cable assembly

- 1 CDS panel
- 4 Standard single ceiling-mount dome antenna
- 1 Omni-directional outdoor antenna and mounting hardware

#### Warranty

Each CDS kit is backed by a one-year product warranty from OCC. The products must receive normal and proper use and due care in handling. Normal wear and tear; deterioration due to aging, or damage caused by environmental conditions, electromagnetic interference ("EMI") or radio frequency interference ("RFI") shall not constitute a defect or failure under this warranty. These warranties do not cover defects resulting from accidents, alteration, unauthorized repair, misuse, fire, flood, lightning strike damage, acts of God and or any diverse changes in temperature and climate not considered normal for an interior building infrastructure. All installation records must be updated to reflect any maintenance, movements, additions or changes, and such records shall be made available to OCC upon request.



#### ATTENTION

This CDS product (the "System") (OCC Data Product No. CDS8V-50-4D, CDS19-50-4D, CDS8V/19-50-4D), composed of one CDS panel, four faceplates (internal antennas), internal cabling and external antenna, has been verified as capable of compliance with Subpart B of Part 15 of the FCC's rules, provided that the System and each of its components are used for their intended purpose pursuant to the manufacturer's instructions and authorized vendor's installation and provided that no modifications of any nature are made to the System or any of its component parts. Operation of the System is subject to the following two conditions: (1) This device may not cause interference, and (2) This device must accept any interference, including interference that may cause undesired operation of this device. The signal booster component (FCC ID no. Pwo8013sb) manufactured by Wilson Electronics, Inc., installed in the CDS panel, is certified compliant with Part 22 of the FCC's rules.

The System is designed to cause no interference to lawful users of licensed frequencies, but this does not constitute a guarantee or warranty that no interference will occur.

<sup>\*\*</sup> Each CDS kit includes:

# **WIRELESS SYSTEMS**



**3** 

(12.6) CDS - Improved In-Building Cell Service

# Cellular Distribution System Improved In-Building Cell Service Using Structured Cabling

With the advent of 3G and 4G networks, cell phones work almost anywhere. But there are always exceptions. Trying to make a cell phone call from a Lowe's or Wal-Mart can be next to impossible.

Inside these highly reinforced or metal-clad structures—as well as large warehouses, underground spaces, parking garages or contemporary office buildings, construction materials such as massive amounts of concrete and rebar rapidly attenuate cell phone signal strength. Not only are signals from cell phone towers weakened greatly as they enter buildings, they are reflected by various objects within those buildings. Even older buildings that use metal window screens and lead in their roofing materials can effectively block signals.

The problem of diminished cell phone signal strength is compounded by today's green buildings that feature thick walls, solid foam or fiberglass insulation that incorporate foil backing into their design and energy-efficient reflective window coatings. While such construction may save on utility costs, they often leave building occupants with nonexistent signal bars on phones and personal digital assistants (PDAs).

Before now, the only redress of these dead zones was a booster system installed and leased by your cellular phone service provider. But with installation costs ranging between 40 cents and \$1 per square foot, plus additional monthly leasing fees, systems were often priced beyond the budgetary reach of many small- to medium-sized businesses.

#### Discovering a Better System

A cellular distribution system (CDS) is a new structured cabling system that allows companies with dead zones within their buildings to buy and own equipment to solve this dilemma without monthly leasing fees. What's more, a CDS costs less than a third of service provider systems while meeting all legal and Federal Communications Commission (FCC) guidelines.

The idea for this system was born of sheer necessity. Every time a cell phone rang here at work-a metal-clad office building – people were running for the door. Because I work for a cable manufacturer, I realized that by using the cable already strung within our building, we could boost the cellular signal and create an effective low-loss transmission pathway between our phones and the service provider tower. Since many others suffer from similar cellular signal limitations, it seemed only logical to develop the system.

By employing RG-6, 75 ohm (for 824 to 896 megahertz [MHz] applications) or LMR-400 coaxial cable (for 1840 to 1990MHz applications), combined with an external omni-directional antenna, internal faceplate antennas and a rack-mounted distribution panel, we were able to create a structured cable-boosting system that could be installed to provide fill-in coverage where cellular communications are deficient and that would work with the common bandwidths used by all domestic cellular communications providers.

## **Big Potential for CDS**

While CDS systems can be employed using the same lighter-weight cable used for cable television, most of the higher-frequency applications are moving to the more robust: LMR-400 coaxial cable for a cleaner signal with less attenuation. Such higher frequency bandwidth applications can utilize the CDS system with no interference to compromise communication.

The application of this technology shows promise for airports, hospitals or college and university campuses where sturdily built student centers and dormitories present safety and security challenges when emergency alerts and other wireless mass communications are critical. CDS can be used to provide fill-in coverage where communications are deficient in situations such as these.

NOTES:	<b>\$000</b>

NOTES:	<b>E O C</b>

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