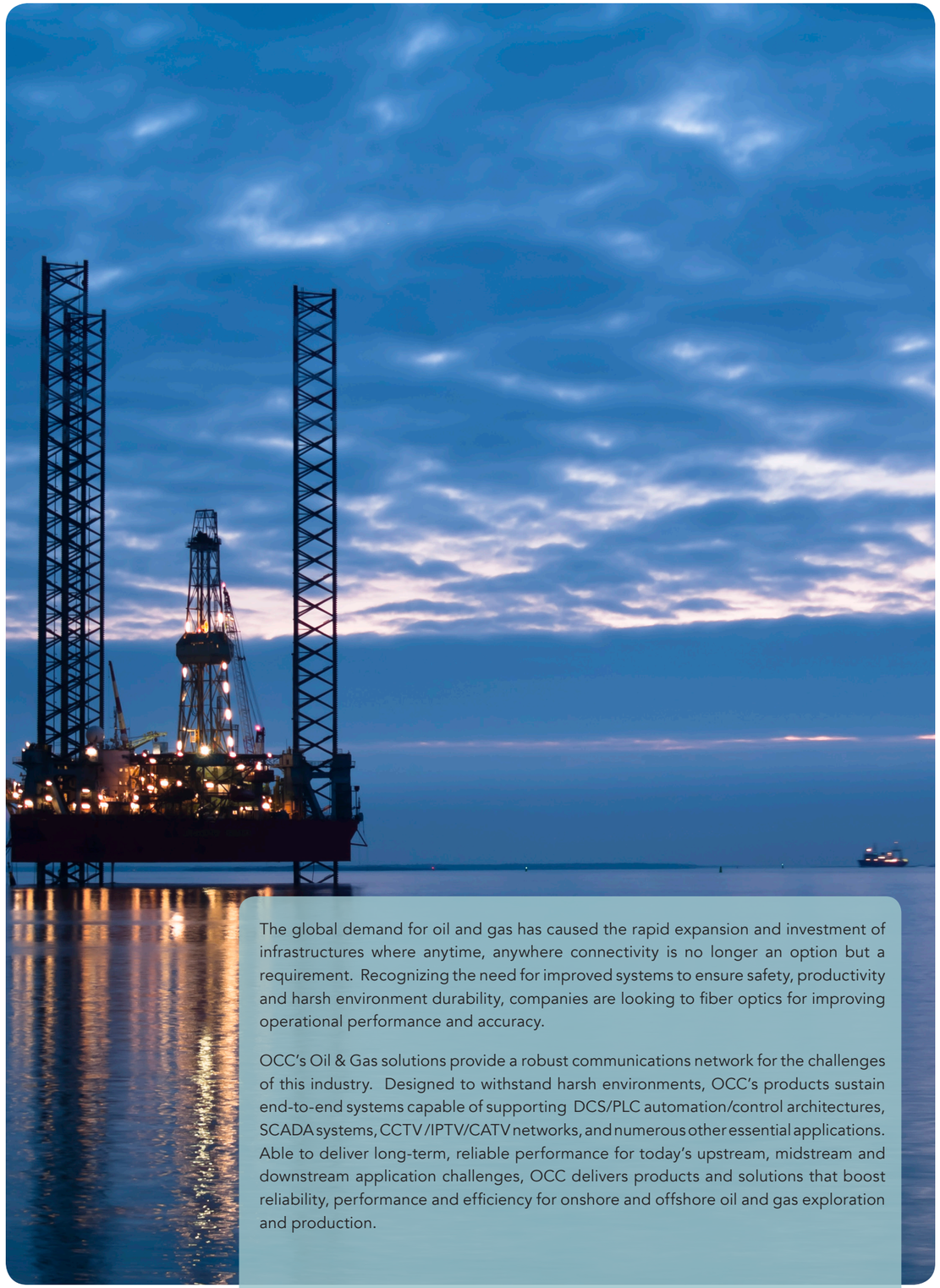
OCC®

INDUSTRY SOLUTIONS: **OIL & GAS**



The global demand for oil and gas has caused the rapid expansion and investment of infrastructures where anytime, anywhere connectivity is no longer an option but a requirement. Recognizing the need for improved systems to ensure safety, productivity and harsh environment durability, companies are looking to fiber optics for improving operational performance and accuracy.

OCC's Oil & Gas solutions provide a robust communications network for the challenges of this industry. Designed to withstand harsh environments, OCC's products sustain end-to-end systems capable of supporting DCS/PLC automation/control architectures, SCADA systems, CCTV /IPTV/CATV networks, and numerous other essential applications. Able to deliver long-term, reliable performance for today's upstream, midstream and downstream application challenges, OCC delivers products and solutions that boost reliability, performance and efficiency for onshore and offshore oil and gas exploration and production.

The OCC Commitment

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. 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, oil and gas, 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 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 cohesive services and comprehensive cabling and connectivity solutions to address your specific needs.

OCC Offers:

- Global recognition: listed on the NASDAQ Global Marketing (ticker symbol: OCC)
- Certifications: ISO 9001:2008 registered and its Roanoke and Dallas facilities are MIL-STD-790F certified, ABS and DNV certified products, UL Listed, RoHS compliant products
- Expertise: The premier manufacturer of ground tactical fiber optic cable for the US military and its allies
- Patents: Holder of numerous patents for innovative technologies widely used throughout the industry
- Technical support: OCC is available to assist with designing, deploying and maintaining systems specific to your application

The challenges of the Oil & Gas Industry

Global demand for oil, gas and petroleum-based products has reached record levels. The industry is continuing to search for ways to reduce operating costs, improve productivity through automation, increase safety precautions, and exploit new fields. In addition, increasing demands have required oil and gas exploration and production to move to harsher environments – colder, hotter, and deeper. On top of all these requirements, oil and gas operators and EPCs struggle with designing the communications infrastructures to transform aging systems into today's modern technology. Communications equipment must be reliable and able to withstand the challenges of working in this sector.

OCC's harsh environment solutions for Oil and Gas applications provide consistent communication architectures based on high-quality products that boost reliability, availability, and performance, throughout the entire life cycle of an asset. Developed on OCC's experience with extreme environments and our history of exceptional performance, our integrated solutions support DCS/PLC automation/control architectures, SCADA systems, CCTV /IPTV/CATV networks and numerous other applications essential to the oil and gas industry.

OCC's harsh environment solutions for Oil & Gas applications support:

- SCADA (for pipeline control and monitoring, and wellhead automation)
- CCTV and physical security
- LAN/WAN communication infrastructures for shore-to-platform and inter-platform connections
- Offshore rig automation
- Land-based rig automation
- Communication systems
- GEO systems
- Safety monitoring systems
- DCS/PLC automation/control systems
- Satellite uplink networks

Why Choose OCC for your Oil & Gas Communications Needs?

Industrial networks like those in the oil and gas industry require very specific cabling and connectivity requirements to ensure safety, productivity and durability in harsh environments. OCC meets the needs of industry operators by designing robust systems that are easily deployed and can address the stringent demands associated with extreme conditions. From real-time sensors for pipeline monitoring to CCTV for security, the physical and environmental challenges of onshore and offshore oil and gas exploration and production have led OCC to create unique systems engineered for today's application challenges.

As drilling moves further offshore, requirements for automation, control, and safety systems have become crucial to efficient operation. Unlike traditional copper communication systems that can not reliably handle the increased bandwidth requirements to support these systems, fiber optic technologies allows increased and improved data generation and analysis. The extensive tactical use of our fiber optic cables in the military has provided the technological platform for practical deployment into the extreme environments faced by the oil and gas industry. OCC offers a full range of industrial grade cables optimized to withstand the rigors of difficult cable pulls, high tensile loading and severe crush occurrences. They can repeatedly endure the abuse associated with the extreme demands in rapid deployment and retrieval applications with a high degree of reliability and low maintenance. Factors that make OCC cables ideal for the oil and gas industry include:

- OCC's special **Core-Locked™** jacket is extruded under high pressure directly over the cable's core, resulting in the internal surface of the cable jacket having helical cusped ridges that interlock with the subcables. This helps keep the cable cross-section circular for better crush and impact protection and superior tear resistance during installation.
- **Helical stranding** is a a time-tested cable construction design proven to provide flexibility, survival in difficult pulls and excellent mechanical protection for the optical fibers. This design ensures that no one particular element of the cable receives more stress than the other elements – thus equalizing the stress load associated with particularly tough installations.
- Our **water-blocked** fiber optic cables provide the best water protection system available by combining the inherent water tolerant features of tight-buffered and Core Locked™ tightbound cable with super absorbent polymer aramid yarn. This design provides superb water-blocking performance while retaining the termination cost advantages of totally gel-free and powder-free tight-buffered cable.
- OCC's **Ultra-Fox™** and **Ultra-Fox™ Plus** cable design features unique fiber construction consisting of a primary coating of a UV-cured acrylate material and a tight fitting secondary coating of a hard elastomeric polymer buffer.

All of these factors make OCC's cables a practical and reliable means of high capacity data transmission in challenging environments.

To compliment our fiber optic cables, OCC manufactures a variety of rugged multi-channel fiber optic and electro-optic connectors specifically made for deployable systems that can be picked up and relocated quickly and easily. These connectors are available in multimode and single-mode versions as well as electro-optic designs. Many of OCC's harsh environment connectors are hermaphroditic in construction. This allows cable assemblies to be daisy-chained together, making it simple to extend communication network's range without the need for gender-changing adapters. Power or control signals for equipment may be supplied using hybrid connector options that add electrical and optical signals within the same connector body. These connectors withstand extreme environmental demands with the ease of simple plug and play installation characteristics that eliminates standard laborcostsassociated with traditional fiber field installations. OCC's harsh environment connectors are specifically designed for reliable communication signals.

Applications:

- Pipeline communications
- Off-Shore communications
- Wellhead automation
- Offshore rig automation
- Smart well controls
- Land-based rig automation
- Pipeline SCADA
- Security infrastructure
- Wireless communications
- Operations control centers

In addition, OCC offers MARS, Modular Advanced Reel System, a lightweight, durable system constructed of a high impact glass enforced polymer that is easily transported and ideal for applications where cable needs to be deployed and reeled in quickly and stored efficiently. To complete the MARS system, OCC offers unique reel accessories that can be combined together for easy transportation, deployment and retrieval. From deployable axials, to transit cases to tripods and backpacks, the OCC MARS reels and accessories offer the most advanced fiber optic reeling system available.

OCC solutions connect on many levels

In the rugged business of land-based oil and gas drilling, rig automation and control is critical for efficient production, as well as environmental and life safety concerns. OCC worked with the design team of an International Drilling Company, their specified rig supplier, and the control/instrumentation systems provider to design and provide a deployable fiber optic solution to support rig automation, data collection, communications and video. Using OCC's rugged fiber optic cable and harsh environment connectors, the system was able to be factory tested, deployed and integrated in the rig control scheme with minimum effort to connect the various networks.

- Communication backbone with high crush resistance, tensile strength, and cut resistance
- Limited or no EMFI interference
- Ability to pass through various hazardous classified zones on the rig
- Ability to withstand the severe land-based drilling rig environment
- Ability to be deployed and re-deployed quickly, many times without the requirements of having a fiber optic technician

To ensure that the demands could be met three fiber optic cable backbones utilizing OCC's B-Series flame retardant tactical braided armor fiber optic cable were utilized with our EZ-MATE harsh environment fiber optic connectors to interconnect the various systems and equipment. Each of the different networks utilized a "Keyed" EZ-MATE connector system such that one network could not be inadvertently connected with a different network. The system has proven to meet and exceed the

CASE STUDIES

OCC makes the difference for tough pipeline applications

For potentially hazardous industries such as POG pipelines, reliable pipeline automation and control is critical for operation as well as environmental and life safety. In addition, the customer had a very short lead time for design and delivery. OCC worked with the design team to provide a ruggedized solution to accomplish the customers requirements and meet their timelines for design and delivery of the products.

System Requirements

- Communication backbone with high crush resistance, tensile strength, and rodent proof
- Splice enclosures that were sealed to the environment, could be installed below grade, re-enterable, could have additional cables installed or removed in the future, splice trays with good cable management

OCC Solution

To ensure that all the demands could be met, a high fiber cable backbone utilizing OCC's D-Series Distribution Braided Armor fiber optic cables and B-Series Breakout Braided Armor fiber optic cables were utilized with our Fibregaurd fiber optic cable enclosures, NEMA 4X fiber enclosures, RTS pre-loaded rack-mounted enclosures, and pigtails. Lower fiber count B-Series Breakout Braided Armor fiber optic cables with F-LINK marine grade brass fiber optic connectors were then connected to various control panels, control devices and cameras on the deployed system. The system has proven to meet and exceed the customer's expectations being rugged, reliable, easy to maintain and expandable for the future.

Reliable OCC products ensure safety for rig automation

For inhospitable environments such as Offshore Drilling, reliable rig automation and control is critical for safety as well as production. OCC worked with a design team which included a major International Oil Company, their engineering design firm and control/instrumentation systems provider to design and provide a deployable fiber optic solution to support a control system for equipment that would be put into service on an as needed basis for an offshore deepwater drilling rig. Using OCC's rugged ABS-approved fiber optic cable and harsh environment connectors, the system was able to be factory tested, deployed and integrated in the rig control scheme with minimum effort to connect the data network.

System Requirements

- Communication backbone with high crush resistance and tensile strength, cut resistance
- Limited or no EMFI interference
- Ability to pass through various hazardous classification on the rig
- Ability to withstand the severe offshore drilling rig environment
- Ability to be deployed and re-deployed quickly, many times without the requirements of having a fiber optic technician

OCC Solution

To ensure that all the demands could be met a high fiber cable backbone utilizing OCC's D-Series Distribution LSZH Braided Armor ABS-approved fiber optic cable was utilized with our F-LINK marine grade brass fiber optic connectors to connect to a custom Express Patch stainless steel patch panel enclosure. Lower fiber count B-Series Breakout LSZH Braided Armor ABS-approved fiber optic cables with F-LINK connectors were then connected to various control panels, control devices and cameras on the deployed system. The system has proven to meet and exceed the customer's expectations being rugged, deployable and reliable. OCC has become the fiber optic standard for cable and harsh environment connectivity for this international oil customer.

RIG APPLICATIONS

Today's stresses on onshore and offshore oil & gas production and exploration require companies to employ state-of-the-art solutions that secure reliable operation and improve productivity. Projects in these segments are typically characterized by very harsh and dangerous environments, as the demand requires exploration in more extreme climates and remote locations. Innovative solutions that meet the need for reliable communication systems in these conditions are imperative.

Offshore rigs, production platforms, FPSOs and ships rely on OCC's comprehensive product line to meet these demands. Our innovative solutions provide a reliable foundation for data communication systems that can withstand difficult and unforgiving environments while meeting exacting industry requirements. Our fiber optic cable product line, including ABS and DNV approved options, offer a high quality platform to connect mission critical applications. With a variety of deployment options and tough connector choices, OCC solutions provide a highly reliable and secure communications network that provides optimal performance and greater control of industrial processes.

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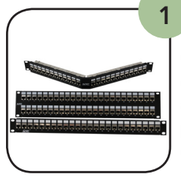


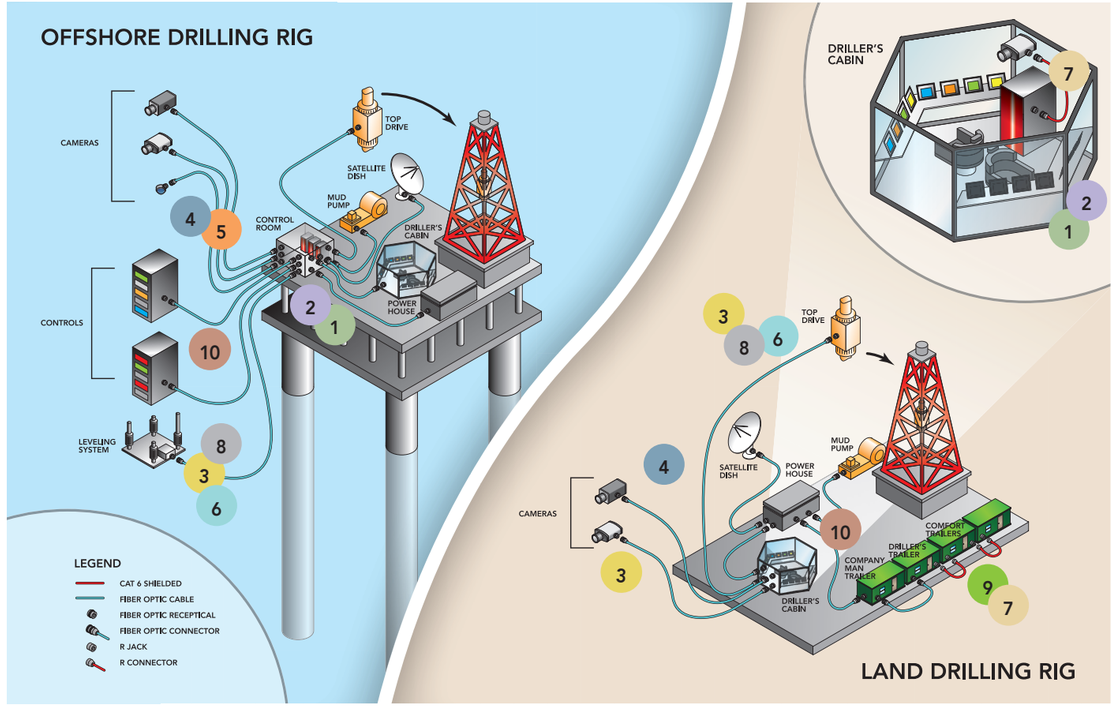
Copper patch panels

OCC's Copper patch panels offers a high-density solution for 10GBASE-T Ethernet applications. Our UTP and FTP Cat 6A 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.

2

Data cabinet

With OCC's complete line of free-standing cabinets, customers can provide seamless, upscale integration for any size network installation. Our 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.



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MHC® II connector

OCC's MHC® II is designed specifically to inter-connect fiber optic channels in a small, yet effective, package. Using a bayonet-style coupling interface, the connector is easily mated by a simple motion. The MHC II fiber optic connector features both pin and socket configurations to accommodate a number of fiber types and is available in two, four, six and eight channel versions in a variety of metals and finishes to fit specific applications.

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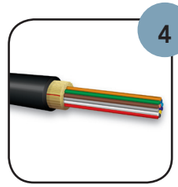

D-Series distribution LSZH cable

OCC's D-Series distribution LSZH ABS approved marine and offshore tight-buffered cable design is for use in installations requiring a flame-retardant, low-smoke and zero-halogen cable intended for single point terminations. It can be used in applications requiring ABS-approved fiber optic cables, and is UV, fungus and moisture resistant.

5

DNV-certified shipboard cable

DNV-Certified shipboard cable is ideal for 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) and Liquefied Natural Gas (LNG).

6

EZ-MATE connector

The OCC EZ-MATE family of hermaphroditic-style connectors provides a comprehensive solution for deployable or mobilized communications systems. EZ-MATE provides the same proven technology used in military communication systems, but with simplified interfaces for applications that require repeated or blind matings. EZ-MATE connectors allow for quick deployment and gender-independent connectivity, permitting the end user to unreel fiber cable without regard for male or female ends. EZ-MATE is available in a variety of metals and finishes to fit specific applications.

7

Cat 6A U/FTP copper cable

OCC's Category 6A U/FTP copper cables are tested from 1 to 600 MHz and offer guaranteed headroom to TIA 568-C.2 Category 6A cable requirements The components are twisted into pairs with varying left-hand lays to minimize cross-talk and are both PoE+ and RoHS compliant. The cable is compatable with OCC Cat 6A jacks and patch panels for optimal system performance and is available in both Riser and Plenum.

8

F-LINK™ connector

The F-LINK™ Inter-Connect platform was born out of the proven performance of MIL-SPEC cylindrical components, and is a cost-effective solution for commercial, industrial and military applications. F-LINK components were designed to solve a multitude of fiber optic applications, as well as hybrid inter-connect systems (the combination of fiber optic and electrical power). F-LINK is available in a variety of metals and finishes to fit

9

R-JACK™ connector

R-JACK™ connectors provide an efficient solution to ethernet connectivity in harsh environments. R-JACK components occupy less panel space for higher density. R-JACK 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 is available in a variety of metals and finishes to fit specific applications.

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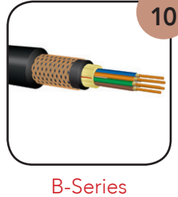

B-Series breakout LSZH braided cable

OCC's B-Series breakout LSZH braided armor ABS-approved cables are ideal for marine and offshore applications requiring a flame-retardant, low-smoke and zero-halogen cable incorporating individual subcables for direct termination. The cable is suitable for both indoor and outdoor applications and is UV, fungus and moisture resistant. Includes ripcord for easy outer jacket removal.

PIPELINE APPLICATIONS

Big investments are being made into pipeline, LNG and refinery operations to support the global demand for oil, gas and petrochemical byproducts. Companies are looking to streamline their operations while increasing productivity and maintaining safety and security. They want critical data for every day operations quickly and reliably. By utilizing evolving fiber optic communication technologies, facilities can generate faster, more flexible, and more economical information flow. They can demand reliable data communications equipment that can operate under aggressive conditions and over longer distances, to assure safe and efficient operations.

Facing those challenges, OCC offers a diversified product set for midstream and downstream applications that help maintain operational integrity of LNG facilities, refineries and pipeline controls. Our tested and proven line of harsh environment products is capable of withstanding inhospitable conditions while maintaining communications integrity. We have engineered solutions that rely on the robust performance of our fiber optic cable and the quick and easy deployable features of our connections. With OCC, companies can implement integrated data communication solutions that fit specific applications and ensure a lifetime of efficiency.

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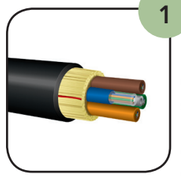
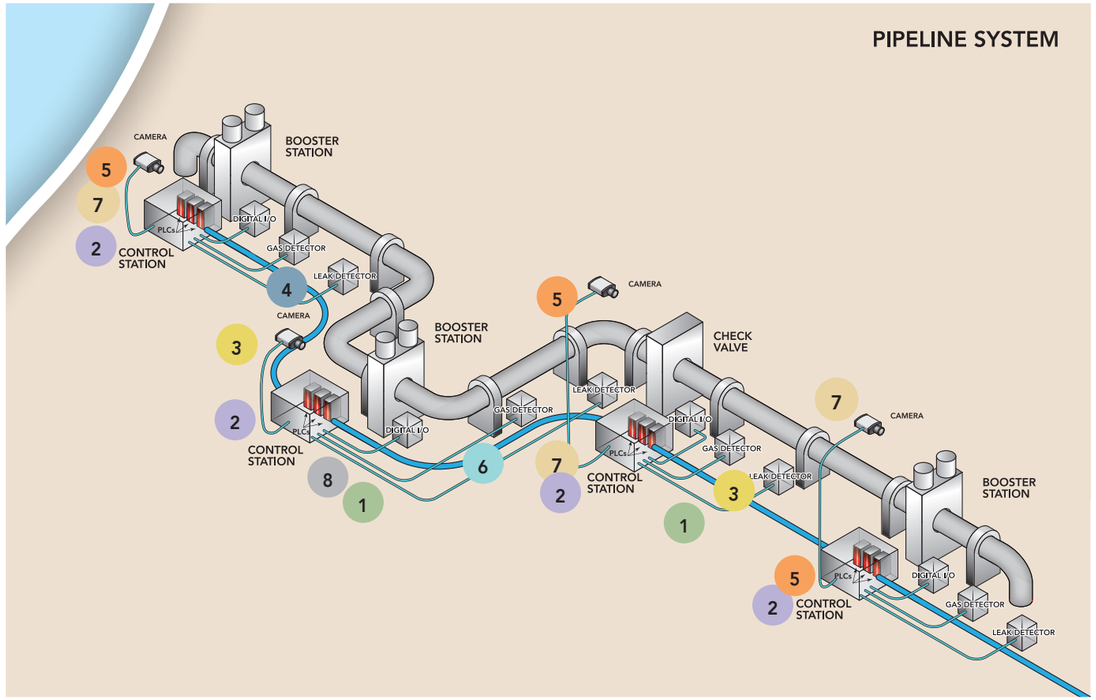


HC-series cable

The HC-series cables, featuring OCC's unique tight-buffered fiber units, are the ideal solutions for indoor-outdoor installations. The HC-series of cables combines the ruggedness of tight-buffers with high-fiber density, resulting in cables that have an outer diameter much smaller than conventional cables using buffer tubes. No other cable matches the mechanical and environmental performance while maintaining a small diameter and high-duct efficiency.

NEMA 4X enclosures

For applications where protection of components from dirt, dust, oil, or water are mandatory, OCC offers the NEMA 4X fiber optic enclosures. 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 also well suited for high and low temperature environments.



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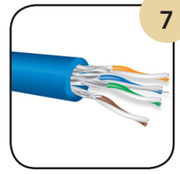

Cat 6A U/FTP copper cable

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8

Fibreguard™ enclosures

OCC's Fibreguard™ is a complete and fully accessible fiber closure solution. The Fibreguard enclosure features 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. The Fibreguard enclosure provides a connectivity solution that was specifically designed for an ever-evolving telecommunications network.

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