Proterial Cable America, Inc.
Wireless Catalog

WIRELESS

www.usa.proterial.com

Rev.1.5.24

WIRELESS

Where building structures, environmental conditions or large numbers of users pose a challenge to cellular service or local wireless networks, a Distributed Antenna System (DAS) can be deployed. A DAS is an onsite customizable antenna system that enables the extension of a multitude of technologies, including 4G LTE, 5G, and emerging 6G high-speed data to all the desired users. Stadiums, campuses, large manufacturing facilities or high-rise buildings can benefit from a DAS. Such a system allows the owner to meet user expectations by populating areas with sufficient antennas to accommodate the number of anticipated users.

To support this growth Proterial Cable America (PCA) manufactures a wide selection of cables that meet the demands of wireless technologies, such as DAS, Fiber to the Antenna (FTTA), and PoE. **PCA is well positioned to support your specific needs.**

Fiber Optic Cable

PCA has a long history of designing carefully engineered fiber optic cable for best-in-class performance, ease of use and flexibility. From simplex constructions to large, armored multi-fiber indoor/outdoor, indoor/outdoor composite, and furcation tubing solutions.

Common configurations include:

- Singlemode (SM) and Multimode (MM) fibers
- A1, A2 and B3 900 micron tight buffer and 250 micron colorized fibers
- Aramid or fiberglass strength members
- 12 to 144 fibers with 12 fibers per subunits
- Standard fiber inner jacketing options (PVC, PVDF, TPE and LSZH) with water blocked aramid yarn, outer PVC jacket, Low Smoke Zero Halogen available, TPE and PVDF
- Indoor / outdoor plenum and riser rated cable
- UL approved hybrid multi-bundles
- Proudly utilizing Corning Optical Fiber as our standard optical fiber.

Direct Current (DC) Power Components

PCA has invested significantly in sophisticated equipment and technologies that have enabled us to provide not only quality components that go into hybrid bundles, but also complex bundles necessary for cellular applications. Our clear understanding of the component manufacturing process and the subtleties of incorporating those components into a hybrid cell bundle makes PCA the ideal choice as a cable partner. **We provide our customers high quality components for whatever the need.**

Direct current power wires used in cell tower constructions are 14 American Wire Gauge (AWG) to 4 AWG, stranded discrete wires. These are 600 volt (UL rated) DC wires THHN, THWN, THWN-2 constructions.

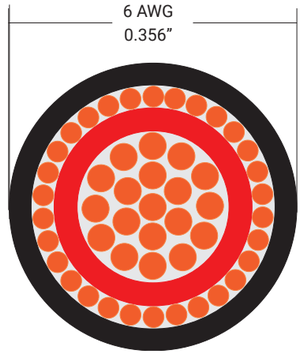
	THHN Wire	THWN Wire	THWN-2 Wire
Conductor Size	14 AWG to 4 AWG	14 AWG to 4 AWG	14 AWG to 4 AWG
Conductor Type	Stranded	Stranded	Stranded
Conductor Material	Bare or Tinned Copper	Bare or Tinned Copper	Bare or Tinned Copper
Insulation Material	Polyvinylchloride (PVC) with Nylon Jacket	Polyvinylchloride (PVC) with Nylon Jacket	Polyvinylchloride (PVC) with Nylon Jacket
Max. Temperature	194°F (90°C) dry locations	194°F (90°C) dry locations, 167°F (75°C) wet locations	194°F (90°C) dry locations, 194°F (90°C) wet locations
Voltage Rating	600V	600V	600V

Low Inductance Wire (LIW)

Low Inductance Wire utilizes (UL) Approved THHN/THWN-2 PVC/Nylon core with an outer concentric conductor comprised of single-end Cu strands, served around the insulated core, with an overall PVC Jacket. High Inductance poses a challenge at the frequencies associated with 5G. In this approach, the center conductor & outer concentric conductor have the same circular mil conductance area. The spacing between the two is reduced, which yields a lower inductance & a smaller footprint vs. two (2) individual PVC/Nylon DC wires.

These are available in 4, 6 and 8 AWG, 19-strand constructions.

LIW Wire Typical Constructions			
Conductor Size	8 AWG	6 AWG	4 AWG
Conductor Type	Stranded	Stranded	Stranded
Conductor Material	Bare or Tinned Copper	Bare or Tinned Copper	Bare or Tinned Copper
Core Insulation Material	Polyvinylchloride (PVC) inner with Nylon Jacket UL THWN-2	Polyvinylchloride (PVC) inner with Nylon Jacket UL THWN-2	Polyvinylchloride (PVC) inner with Nylon Jacket UL THWN-2
Outer Concentric Conductor Material	Bare Copper	Bare Copper	Bare Copper
Outer Jacket	PVC	PVC	PVC
Max. Temperature	194°F (90°C) dry and wet locations	194°F (90°C) dry and wet locations	194°F (90°C) dry and wet locations
Outer Diameter	0.299 inches (7.59 mm)	0.356 inches (9.22 mm)	0.443 inches (11.25 mm)
Voltage Rating	600V	600V	600V
Inductance	0.230uH max	0.190uH max	0.165uH max



Alarm Wire Components

Alarm wire used in cell tower cable is frequently Thermoplastic Flexible Fixture (TFFN) wire or Machine Tool Wire (MTW). TFFN is a universal building wire most commonly used as “fixture” or “lighting” wire, while MTW is used for machine tools, appliances and control cabinets. MTW wire offers a high strand count, yielding a more flexible option than TFFN. Both styles are rated to 600 volts.

These wires are available from 22 to 16 American Gauge Wire (AWG) discrete wires or twisted pairs for tower applications. The Nylon coating over the PVC insulation improves oil, gas and water resistance.

	MTW Wire (UL)	TFN / TFFN Wire (UL)
Conductor Size	22 to 16 AWG	18 to 16 AWG
Conductor Type	Stranded	Solid or Stranded
Conductor Material	Bare or Tinned Copper	Bare or Tinned Copper
Insulation Material	Polyvinylchloride (PVC) and optional Nylon Jacket	Polyvinylchloride (PVC) with Nylon Jacket
Max. Temperature	194°F (90°C) dry locations, 167°F (75°C) wet locations	194°F (90°C) dry locations, 167°F (75°C) wet locations
Max. Voltage	600V	600V
Resistant To	Water, Oil and Gas (only with optional nylon)	Water, Oil and Gas

Copper and Fiber Hybrid Jumpers

Hybrid jumpers are used throughout wireless networks for connecting radios to the antennas for 5G implementation. These jumpers typically use two DC power wires and fiber components to carry the signals.

Power Components:
- Please refer to page 2 for more detail on DC Power conductors

Fiber Components:
- 900 micron tight buffered or 250 micron colorized
- Singlemode (SM) and Multimode (MM) available
- Fiber components 2 and up

Standard Shielding / Armoring Configurations Include:
- 3 mil (0.076 mm) copper tape (helically applied)
- 5 mil (0.127 mm) or 10 mil (0.254 mm) bare copper tape corrugated (cigarette fold applied)
- Optional uninsulated bare copper grounding wire
- Braided shielding available: Bare or Tinned Copper, or Bronze braids, and/or Aluminum Polyester with drain wires

Jacketing Options:
- PVC, LSZH, TPE
- Thermoplastic elastomers (TPE)

Features:
- Tray cable (TC-OF), 600V
- Oil resistance
- Sunlight resistance
- FT4 Flame rating
- Power Cables: -40°F (-40°C) to 194°F (90°C) (dry/wet) operating temperature rating
- Hybrid Cables: -40°F (-40°C) to 176°F (80°C) (dry/wet) operating temperature rating
- When used with fiber the temperature rating is based on that of the fiber which is rated to 176°F (80°C)

Hybrid Jumper

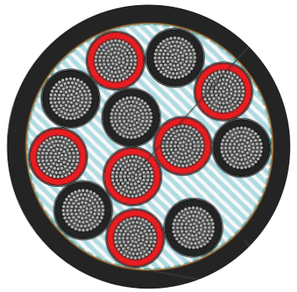
Power Jumpers

Power jumpers typically consist of 2 to 12 conductor DC wires with an optional ground wire (bare or insulated). Based on the design, we can apply shielding, drain wire(s) and armoring as needed. Shielding is important in these cables because their location in the network is different than the large hybrid trunks which typically are not shielded. Therefore, some cell providers prefer to keep the power cables separate from the communications cable and power jumper designs serve those customers.

	THHN Wire	THWN Wire	THWN-2 Wire
Conductor Size	14 AWG to 4 AWG	14 AWG to 4 AWG	14 AWG to 4 AWG
Conductor Count	2 Conductor and Up	2 Conductor and Up	2 Conductor and Up
Conductor Type	Stranded	Stranded	Stranded
Conductor Material	Bare or Tinned Copper	Bare or Tinned Copper	Bare or Tinned Copper
Insulation Material	Polyvinylchloride (PVC) with Nylon Jacket	Polyvinylchloride (PVC) with Nylon Jacket	Polyvinylchloride (PVC) with Nylon Jacket
Ground Wire	Optional - Bare or Tinned Copper	Optional - Bare or Tinned Copper	Optional - Bare or Tinned Copper
Shielding	Optional • Braided Bare or Tinned Copper • Aluminum Polyester with drain wires	Optional • Braided Bare or Tinned Copper • Aluminum Polyester with drain wires	Optional • Braided Bare or Tinned Copper • Aluminum Polyester with drain wires
Armoring	Optional: • 5 mil (0.127 mm)) corrugated • 3 mil (0.076 mm) helical copper tape • 8 mil (0.203 mm) aluminum corrugated	Optional: • 5 mil (0.127 mm)) corrugated • 3 mil (0.076 mm) helical copper tape • 8 mil (0.203 mm) aluminum corrugated	Optional: • 5 mil (0.127 mm)) corrugated • 3 mil (0.076 mm) helical copper tape • 8 mil (0.203 mm) aluminum corrugated
Max. Operating Temperature	194°F (90°C) dry locations	194°F (90°C) dry locations, 167°F (75°C) wet locations	194°F (90°C) dry locations, 194°F (90°C) dry locations
Voltage Rating	600V	600V	600V

Power Jumper

Power Cable



Copper & Fiber Hybrid Trunk Cables

Large Hybrid Trunk Cables

Hybrid trunk cables are the backbone of the wireless network.

- Base Station
- Massive MIMO LTE-Pro and 5G Network
- Metro Core Network
- Metro Cell Network
- Outdoor Small Cell Network
- Urban Micro-cell network

We have made significant investments in extrusion technology as well as dedicated planetary cabling equipment, critical for neutralizing sub-components within a cable. Such neutralization helps to eliminate cable back-twist which can impact manufacturing quality and cable performance during final assembly installation. All of our armoring and jacketing is completed on site and we offer a wide variety of material options and technical expertise to ensure that the end product repeatedly meets our stringent customer requirements.

Cable Armoring / Grounding

Armoring provides a physical barrier of protection and a ground path for protection against lightning strikes. It also protects the cable from impact damage and improves crush resistance.

Standard configurations include:
- 3 mil (0.076 mm) bare copper tape (helically applied)
- 5 mil (0.127 mm) or 10 mil (0.254 mm) bare copper tape corrugated (cigarette fold applied)
- 8 mil (0.203 mm) aluminum tape corrugated (cigarette fold applied)
- Insulated and Uninsulated large diameter copper grounding wires

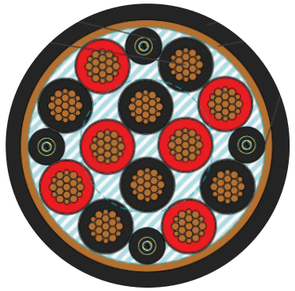
Outer Jacketing

We specialize in providing specialty materials and extrusions that are durable and offer protection in some of the harshest of environments. For cellular applications it is especially important to select jacket materials that provide resistance against the elements and high strength to prevent damage during installation and use.

We offer:
- Multiple grades of PVC, including direct burial
- Low smoke zero halogen (LSZH); Flame retardant polyolefins
- Thermoplastic elastomers (TPE)

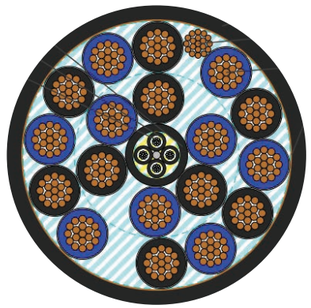
Features:
- RoHS Compliant
- Oil and sunlight resistant
- FT4 Flame rating and -40°F (-40°C) to 176°F (80°C) operating temperature
- Ability to jacket diameters as large as 2 inches (50.8 mm)
- Jacketing identification per customer specifications
- Tray Cable (TC-OF, TC-ER-OF) and FT4, 600V
- A wide variety of fiber components available (please refer to the fiber optic components section for more details)

Large Hybrid Trunk Cable



Large Hybrid Trunk Cable

Large Hybrid Trunk Cable



Distributed Antenna System (DAS) / Small Cell Cable

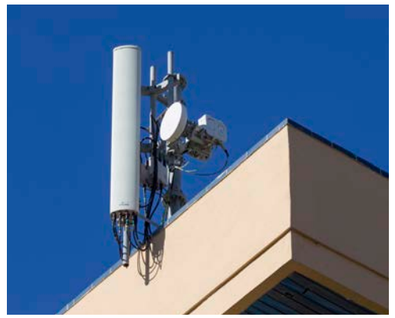
Distributed Antenna and Cellular networks are growing at an exceptional rate given the expanding usage of cell phones and the demand for high speed data with a greater bandwidth and improved cellular coverage.

PCA cables are ideal for cell tower installation, building infrastructure, security systems, light poles and virtually anywhere that an antenna may reside close to users. The improved throughput of these systems will be beneficial to several emerging technologies, faster download speeds, vastly improved streaming, uninterrupted gaming and lower latency. Latency is critical to autonomous vehicles and has the potential for improving traffic flow and driver safety.

Contact PCA to learn more about our cables for wireless technologies. Let us provide you a custom solution that precisely meets your needs.

Wireless network benefits can include:
- Improved network access and improved customer service
- Increased security and corporate data collection
- Increased employee productivity

Cable design options include:
- Rugged, harsh environment constructions
- Plenum and Riser 300V rated category cable available
- UL rated Indoor / Outdoor constructions
  - Plenum CMP-OF, CL2P-OF and CL3P-OF, 300V for DAS
- Sunlight Resistant for Indoor / Outdoor
- Designs for Small Cell
- Copper and Fiber hybrid bundles (Singlemode and Multimode)
- Low smoke zero halogen (LSZH) or PVC insulations available for Small Cell solutions
- Capable of power and data over long distances
- A wide variety of gauge sizes and cable constructions available



Power+ Composite Indoor / Outdoor

Fiber Optic Cable

Power+™ composite indoor/outdoor plenum cables are the solution for applications where remote power and network connectivity are required and distance may be a factor.

Power+™ composite cables utilize fiber optic strands to provide the link to the network and a pair of stranded copper conductors to deliver power. The different constructions of Power+™ composite cables address the variety of applications on the market. Power+™ composite cables are ideal for long distance PTZ camera installations, Distributed Antenna Systems (DAS), and Passive Optical Networks (PON). Power+™ composite cables are available with a plenum rating (CMP-OF), (CL3P-OF) or (CL2P-OF) which makes them suitable for a wide variety of environments.

Safety Extra Low Voltage (SELV) 48Vdc PSE / 43Vdc PD

	Powered Device at Load (Watts)				
	6.49W	12.95W	25.5W	51W	71W
AWG	Remote Power Distance (feet)				
20	1,574	789	401	200	144
18	2,500	1,253	636	318	229
16	3,974	1,992	1,011	506	363
14	6,339	3,177	1,683	807	579
12	10,047	5,035	2,557	1,279	918

Safety Extra Low Voltage (SELV) 56Vdc PSE / 48Vdc PD

Powered Device at Load (Watts)				
6.49W	12.95W	25.5W	51W	71W
Remote Power Distance (feet)				
2,915	1,461	742	371	266
4,630	2,320	7,178	589	423
7,359	3,688	1,873	936	673
11,740	5,883	2,988	1,498	1,073
18,606	9,325	4,735	2,368	1,701

Power+ Composite Indoor / Outdoor

Fiber Optic Cable

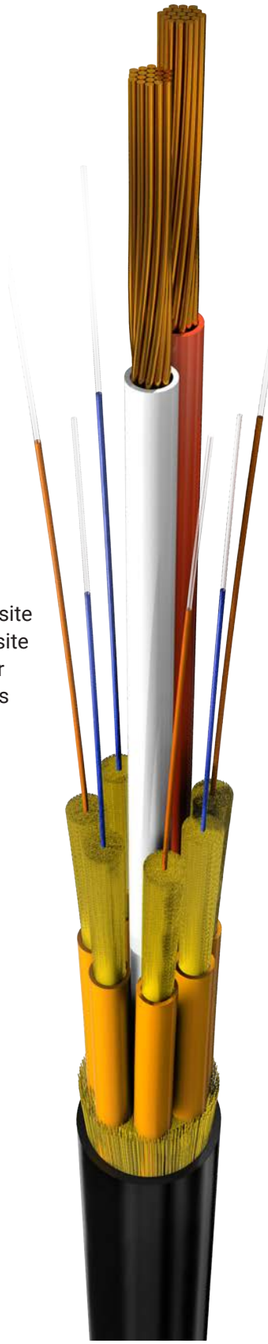
Designed for Long Distance Power

- Singlemode (SM) and Multimode (MM) glass available (2, 6 & 12 fiber)
- Two DC power wires (choose from 12, 14, 16, 18 & 20 AWG)
- Stranded copper conductors (19 strands) offer greater cable flexibility
- Supports a wide range of powering delivery

Cable Design allows Easy Termination and Wide Use

- UL Listed CMP-OF and CL3P-OF, 300V rated for use in plenum spaces
- Indoor / outdoor plenum rating
- Small outside diameters assist in installation
- Tight buffered (900 micron) optical fibers reside inside individual aramid yarn filled subunits or separate
- Compatible with all LC and SC fiber optic connectors

For all wireless applications, power to and signal from the antenna are necessary. This results in a need for copper cables for power, and with growing frequency, fiber optic cables for signal. Composite cables, cables that contain both copper and fiber optic components, are the ideal solution. Composite cables simplify installation by combining both media inside one jacket. Additionally, the use of fiber optic strands allows greater bandwidth between the antenna and the associated electronics. This is imperative for 5G applications.



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PROTERIAL

Power +™ Composite Fiber Cable

Indoor Outdoor Plenum
(UL) OFCP c(UL) OFCP FT6

FEATURES & BENEFITS

- RoHS 3 compliant
- Made in U.S.A.
- Extending PoE and Limited Power SELV data transmission beyond 100 meters.
- Provides immunity from electro magnetic and radio frequency interference.
- Choice of separate power conductors heat generation and length derating calculations as required by TIA 568 and NEC.
- Plenum and outdoor rating permits
- Dry, super absorbent polymers (SAPs)
- Suitable for lashed aerial, duct
- All multimode and singlemode cables
- (except OM1) utilize bend-insensitive optical fibers.

OPTIONS

- Available with 2, 6 or 12 strands of fiber.
- Available with 1 pair of 12, 14, 16, 18, or 20 AWG stranded conductors.

APPLICATIONS

- High noise areas and extended
- distance.
- Security CCTV Cameras.
- Wireless Access Points.
- Distributed Antenna Systems (DAS).

STANDARDS

- NEC CL2P-OF, CL3P-OF and CMP-OF rating, compliant with
- Class 2 SELV (Safety Extra Low Voltage).
- NFPA 262.
- ANSI/TIA 568-D.3

TEMPERATURE RANGE

- **Storage Temperature**
  -40°C to +70°C
  (-40°F to +158°F)
- **Installation Temperature**
  0°C to +60°C
  (+32°F to +140°F)
- **Operation Temperature**
  -40°C to +70°C
  (+32°F to +158°F)

Proterial Cable America, Inc. is continuously improving the performance of our products and the accuracy of the information provided. Due to this, we reserve the right to modify, revise, correct, or change products without notice. Thank you for your understanding.

Power+ FO Cable Part Numbers 20 AWG

Fibers	Cable O.D. inches / mm	50 UM OM4	8.3 UM OS2
2	0.22" / 6.2mm	42368-4	42367-4
6	0.33" / 8.4mm	42368-8	42367-8
12	0.41" / 10.5mm	43268-14	42367-14

Power+ FO Cable Part Numbers 18 AWG

Fibers	Cable O.D.mm inches / mm	50 UM OM4	8.3 UM OS2
2	0.27" / 6.8mm	42370-4	42369-4
6	0.33" / 8.4mm	42370-8	42369-8
12	0.40" / 10.2mm	42370-14	42369-14

Power+ FO Cable Part Numbers 16 AWG

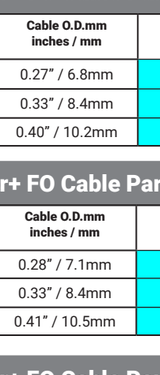
Fibers	Cable O.D.mm inches / mm	50 UM OM4	8.3 UM OS2
2	0.28" / 7.1mm	42372-4	42371-4
6	0.33" / 8.4mm	42372-8	42371-8
12	0.41" / 10.5mm	42372-14	42371-14

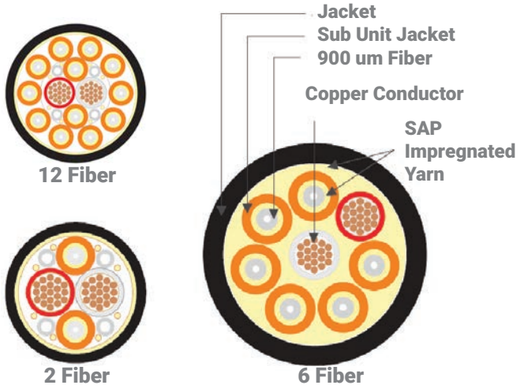
Power+ FO Cable Part Numbers 14 AWG

Fibers	Cable O.D.mm inches / mm	50 UM OM4	8.3 UM OS2
2	0.29" / 7.4mm	42378-4	42373-4
6	0.36" / 9.2mm	42378-8	42373-8
12	0.43" / 10.8mm	42378-14	42373-14

Power+ FO Cable Part Numbers 12 AWG

Fibers	Cable O.D.mm inches / mm	50 UM OM4	8.3 UM OS2
2	0.30" / 7.7mm	42379-4	42376-4
6	0.40" / 10.1mm	42379-8	42376-8
12	0.44" / 11.3mm	42379-14	42376-14





PROTERIAL

Power +™ Composite Fiber Cable

Indoor Outdoor Plenum
(UL) OFCP c(UL) OFCP FT6

Safety Extra Low Voltage (SELV) 48Vdc PSE / 43Vdc PD

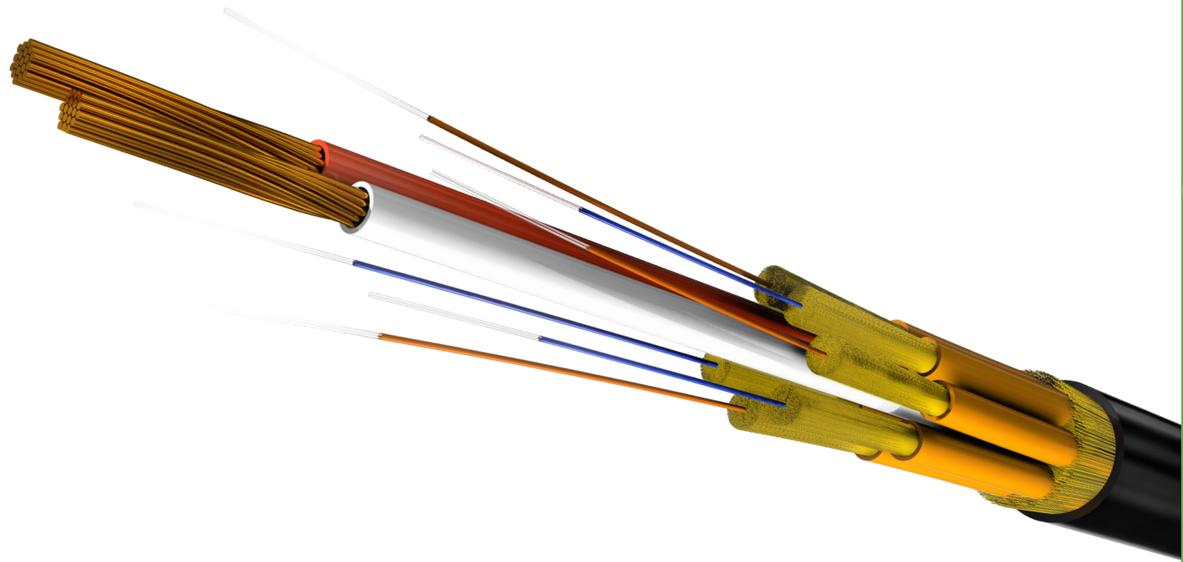
	Powered Device at Load (Watts)				
	6.49W	12.95W	25.5W	51W	71W
AWG	Remote Power Distance (feet)				
20	1,574	789	401	200	144
18	2,500	1,253	636	318	229
16	3,974	1,992	1,011	506	363
14	6,339	3,177	1,683	807	579
12	10,047	5,035	2,557	1,279	918

Safety Extra Low Voltage (SELV) 56Vdc PSE / 48Vdc PD

Powered Device at Load (Watts)				
6.49W	12.95W	25.5W	51W	71W
Remote Power Distance (feet)				
2,915	1,461	742	371	266
4,630	2,320	7,178	589	423
7,359	3,688	1,873	936	673
11,740	5,883	2,988	1,498	1,073
18,606	9,325	4,735	2,368	1,701

TIA/EIA-568-D.3 I ISO/ IEC 11801, 2nd edition I Telcordia GR-409-CORE

Fiber Type	Max. Attenuation (dB/km)		Min OFL Bandwidth (MHz-km)		Min EMBc Bandwidth (MHz-km)		Gb Ethernet distance (m)		10 Gb Ethernet distance (m)	
	850nm (MM)	1300nm (MM)	850nm (MM)	1300nm (MM)	850nm (MM)	1300nm (MM)	850nm (MM)	1300nm (MM)	850nm (MM)	1300nm (MM)
OM4	3.0	1.0	3500	500	4700	N/A	1100	550	550	N/A
OS2	0.5	0.5	N/A	N/A	N/A	N/A	> 25,000	> 40,000	10,000 - 25,000	40,000



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Power+ Composite™

PROTERIAL

NanoCore® Interconnect Plenum

Single Jacket Indoor Loose Tube - 2 through 24 fibers

(UL) OFNP c(UL) OFNP FT6

FEATURES & BENEFITS

- RoHS 3 compliant
- Made in U.S.A.
- All multimode, and singlemode cables (except OM1) utilize bend-insensitive optical fibers
- 250 micron loose tube design allows for higher fiber strand counts in a smaller overall diameter cable
- Ideal for MPO (MTP®) style connectors
- Each fiber is color coded for easy identification
- Flexible and easy to handle
- Lightweight, flexible Aramid yarns enhance strength
- Now available with a smaller outside diameter
- When necessary, color-coded binders separate fiber strands into bundles of 12

OPTIONS

- Enhanced bend insensitive OS2 optical fiber available (ITU-T G.657.B3 & G.657.A2)
- 16 Fiber colors available
- Colored threads are used to bundle fibers
- OS2 optical fibers with enhanced bend-insensitive performance are available.
- OM4+ and OM5 Available

STANDARDS

- ANSI/TIA-568.3-D
- ISO/IEC 11801, 2nd edition
- Telcordia GR-409-CORE
- OS2 glass is compliant to ITU-T G.657.A1

TEMPERATURE RANGE

- **Storage Temperature**
  -40°C to 70°C
  (-40°F to 158°F)
- **Installation Temperature**
  0°C to 60°C
  (32°F to 140°F)
- **Operation Temperature**
  0°C to 70°C
  (32°F to 158°F)

DIELECTRIC MATERIALS

- **Plenum**
  Overall Jacket: Flame-retardant Thermoplastic

NanoCore Interconnect (Single Jacket) Micro Distribution

Fibers	Fibers / Fundle / Tube	Cable O.D. inches / mm	50 UM OM3	50 UM OM4	8.3 UM OS2
2	-	0.078" / 2.0mm	62243-2	62244-2	62239-2
2	-	0.118" / 3.0mm	61507-2	61883-2	61538-2
4	-	0.118" / 3.0mm	61507-4	61883-4	61538-4
12	-	0.078" / 2.0mm	62243-12	62244-12	62239-12
12	-	0.118" / 3.0mm	61507-12	61883-12	61538-12
12	-	0.150" / 3.8mm	62374-12	62375-12	62371-12
12 DJ	-	0.189" / 4.8mm	62449-12	62450-12	62460-12
16	-	0.118" / 3.0mm	62685-16	62686-16	62689-16
16*	8 X 2	0.118" / 3.0mm	62694-16	62695-16	62698-16
24*	12 X 2	0.118" / 3.0mm	62243-24	62244-24	62239-24
24*	12 X 2	0.150" / 3.8mm	62374-24	62375-24	62371-24
24*	12 X 2	0.177" / 4.5mm	61507-24	61883-24	61538-24
24	12	0.118" / 3.0mm 0.255" / 6.47mm	61539-24	61882-24	61547-24

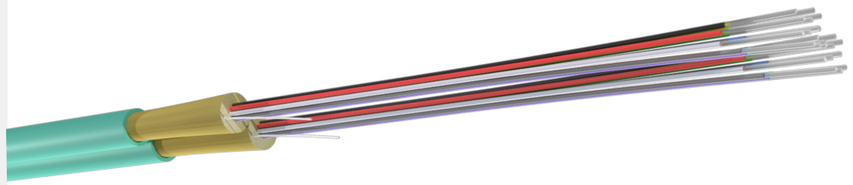
Standard Jacket Colors

OM3/OM4 | OS2

Optical Specifications TIA-568.3-D | ISO/IEC 11801, 2nd edition | Telcordia GR-409-CORE

Fiber Type	Max Attenuation (dB/km)		Min OFL Bandwidth (MHz-km)		Min EMBc Bandwidth (MHz-hm)		Gb Ethernet Distance (m)		10 Gb Ethernet Distance (m)	
	850nm (MM)	1300nm (MM)	850nm (MM)	1300nm (MM)	850nm (MM)	1300nm (MM)	850nm (MM)	1300nm (MM)	850nm (MM)	1300nm (MM)
OM1	3.5	1.0	200	500	220	N/A	300	550	33	N/A
OM2	3.0	1.0	700	500	950	N/A	750	550	150	N/A
OM3	3.0	1.0	1500	500	2000	N/A	1000	550	300	N/A
OM4	3.0	1.0	3500	500	4700	N/A	1100	550	550	N/A
OM5*	3.0	1.0	3500	500	4700	N/A	1100	550	550	N/A
	1310nm (SM)	1550nm (SM)	1310nm (SM)	1550nm (SM)	1310nm (SM)	1550nm (SM)	1310nm (SM)	1550nm (SM)	1310nm (SM)	1550nm (SM)
OS2	0.5	0.5	N/A	N/A	N/A	N/A	> 25,000	> 40,000	10,000 - 25,000	40,000

*OM5 optical fiber tested by glass manufacturer and exceeds the requirements of all applicable industry standards.



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PROTERIAL

NanoCore® Interconnect Plenum

Single Jacket Indoor Loose Tube - 2 through 24 fibers

(UL) OFNP c(UL) OFNP FT6

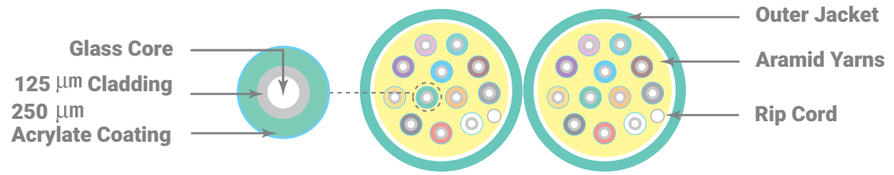
Specifications by Fiber Count

Fibers	Max Install Load Lbs.	Max Install Load Newtons	Operating Max Load Lbs	Operating Max Load Newtons	Compression N/cm	Impact N-m	Cable Weight lbs/kft	Cable Weight Kg/Km
2	50	222	15	67	35	0.74	2.5	3.7
2	100	445	30	134	100	0.74	5.5	8.2
4	100	445	30	134	100	0.74	5.6	8.3
12	50	222	15	67	35	0.74	2.9	4.4
12	100	445	30	134	100	0.74	5.9	8.8
12	150	668	45	200	35	2.94	9.1	13.6
12 DJ	150	668	45	200	35	2.94	14.5	21.6
16	150	668	45	200	100	0.74	5.2	7.7
16*	150	668	45	200	100	0.74	5.2	7.7
24*	150	668	45	200	100	0.74	5.7	8.5
24*	150	668	45	200	35	2.94	9.7	14.5
24*	150	668	45	200	100	2.94	13.1	19.5
24	128	569	38	171	128	2.94	11.4	17.0

*These cable designs utilize color-coded binders to separate subunits.
DJ: Dual jacket design.

MECHANICAL SPECS

- Bend radius, no load
  = 10x cable overall diameter
- Bend radius, load
  = 15x cable overall diameter



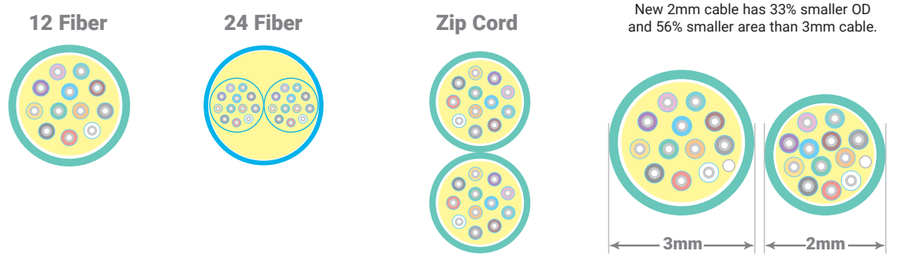


Diagram scale approx. 5:1

Photo is for representation purposes only.

NanoCore®

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PROTERIAL

NanoCore® Micro Distribution Plenum

Mult-Unit Indoor Loose Tube - 24 through 144 fibers

(UL) OFNP c(UL) OFNP FT6

FEATURES & BENEFITS

- RoHS 3 compliant
- Made in U.S.A.
- All multimode, and singlemode cables (except OM1) utilize bend-insensitive optical fibers
- Small, lightweight construction suitable for installations where space is at a premium
- Ideal for MPO (MTP®) style connectors
- Each fiber is color coded for easy identification
- Flexible and easy to handle

OPTIONS

- 8 fibers per tube available upto 96 & 16 fibers per tube up to 144
- 16 Fiber colors are available
- OS2 optical fibers with enhanced bend-insensitive performance are available.
- OM4+ and OM5 Available

APPLICATIONS

- Ideal for high-density installations like data centers, central offices and overall premise applications where current or future data rates include 40 and 100 gigabits per second

STANDARDS

- ANSI/TIA-568.3-D
- ISO/IEC 11801, 2nd edition
- Telcordia GR-409-CORE
- OS2 glass is compliant to ITU-T G.657.A1

TEMPERATURE RANGE

- **Storage Temperature**
  -40°C to 70°C
  (-40°F to 158°F)
- **Installation Temperature**
  0°C to 60°C
  (32°F to 140°F)
- **Operation Temperature**
  0°C to 70°C
  (32°F to 158°F)

DIELECTRIC MATERIALS

- **PLENUM**
  Overall Jacket: Flame-retardant Thermoplastic

NanoCore Multi-Unit Micro Distribution (Plenum)

Fibers	Fibers Per Tube	Tube O.D. inches / mm	50 UM OM3	50 UM OM4	8.3 UM OS2
24	12	0.079" / 2.0mm	62216-24	62218-24	62205-24
36	12	0.079" / 2.0mm	62216-36	62218-36	62205-36
48	12	0.079" / 2.0mm	62216-48	62218-48	62205-48
72	12	0.079" / 2.0mm	62216-72	62218-72	62205-72
96	12	0.079" / 2.0mm	62216-96	62218-96	62205-96
144	12	0.079" / 2.0mm	62216-144	62218-144	62205-144

Standard Jacket Colors

OM3/OM4 | OS2

Optical Specifications TIA-568.3-D | ISO/IEC 11801, 2nd edition | Telcordia GR-409-CORE

Fiber Type	Max Attenuation (dB/km)		Min OFL Bandwidth (MHz-km)		Min EMBc Bandwidth (MHz-hm)		Gb Ethernet Distance (m)		10 Gb Ethernet Distance (m)	
	850nm (MM)	1300nm (MM)	850nm (MM)	1300nm (MM)	850nm (MM)	1300nm (MM)	850nm (MM)	1300nm (MM)	850nm (MM)	1300nm (MM)
OM1	3.5	1.0	200	500	220	N/A	300	550	33	N/A
OM2	3.0	1.0	700	500	950	N/A	750	550	150	N/A
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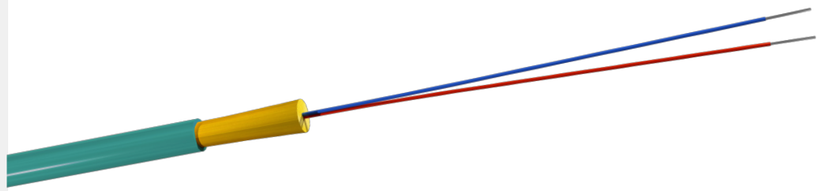
OM4	3.0	1.0	3500	500	4700	N/A	1100	550	550	N/A
OM5*	3.0	1.0	3500	500	4700	N/A	1100	550	550	N/A
	1310nm (SM)	1550nm (SM)	1310nm (SM)	1550nm (SM)	1310nm (SM)	1550nm (SM)	1310nm (SM)	1550nm (SM)	1310nm (SM)	1550nm (SM)
OS2	0.5	0.5	N/A	N/A	N/A	N/A	> 25,000	> 40,000	10,000 - 25,000	40,000

*OM5 optical fiber tested by glass manufacturer and exceeds the requirements of all applicable industry standards.



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PROTERIAL

NanoCore® Micro Distribution Plenum

Mult-Unit Indoor Loose Tube - 24 through 144 fibers

(UL) OFNP c(UL) OFNP FT6

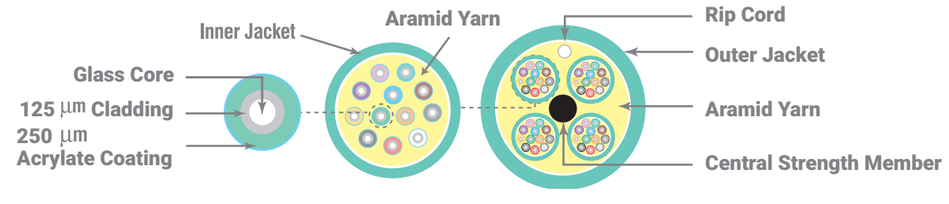
Specifications by Fiber Count

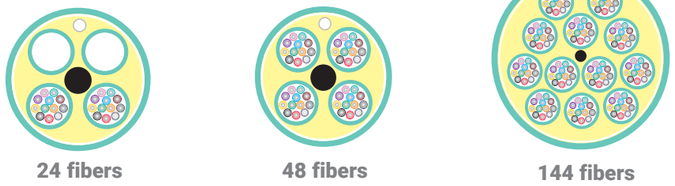
Fibers	Tube Layout	Cable O.D. inches / mm	Install Max Load Pounds	Install Max Load Newtons	Operating Max Load Pounds	Operating Max Load Newtons	Cable Weight lbs/kft	Cable Weight Kg/Km
24	2+2FxCSM	0.296" / 7.5mm	150	668	45	200	36.4	54.2
36	3+1FxCSM	0.296" / 7.5mm	150	668	45	200	37.4	55.7
48	4xCSM	0.296" / 7.5mm	150	668	45	200	38.3	57.0
72	6xCSM	0.355" / 9.0mm	150	668	45	200	48.3	71.9
96	8xCSM	0.433" / 11mm	150	668	45	200	83.8	124.7
144	9x3xCSM	0.458" / 11.6mm	150	668	45	200	88.9	132.3

*These cable designs utilize color-coded binders to separate subunits
CSM = Central Strength Member
F = Filler

MECHANICAL SPECS

- Bend radius, no load
  = 10x cable overall diameter
- Bend radius, load
  = 15x cable overall diameter





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