

**MOORE ENGINEERING COMPANY
CONSULTING ENGINEERS
LANCASTER, PENNSYLVANIA**

SHOP DRAWING AND SAMPLE REVIEW

REVIEW IS ONLY FOR CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. CONTRACTOR IS RESPONSIBLE FOR ALL QUANTITIES AND DIMENSIONS TO BE CONFIRMED AND CORRELATED AT THE JOB SITE; FOR INFORMATION THAT PERTAINS SOLELY TO THE INSTALLATION PROCESSES AND TO THE TECHNIQUES OF CONSTRUCTION; AND FOR COORDINATION OF THE WORK OF ALL TRADES. CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE WITH CONTRACT DOCUMENTS. ANY EQUIPMENT SUBSTITUTIONS AS WELL AS ANY ADDITIONAL LABOR OR MATERIALS REQUIRED AS A RESULT OF A SUBSTITUTION.

- | | |
|---|--|
| <input type="checkbox"/> APPROVED | <input type="checkbox"/> NOT APPROVED |
| <input checked="" type="checkbox"/> APPROVED AS NOTED | <input type="checkbox"/> REVISE AND RESUBMIT |
| <input type="checkbox"/> APPROVED AS NOTED (RESUBMITTAL REQUIRED) | |

BY: DF DATE: 3/6/2017

**Project Name: Lebanon School
District- NWES
MEC Project No.: 11021**

**Submittal Name: Telecommunications
Spec. Section: 271400
Pagoda EC Submittal # 4-R
4th submittal**

General Comments:

- 1) Install per manufactures requirements.
- 2) Coordinate/verify site sign requirements/installation with Owner.
- 3) Review/coordinate installations with Owner and Engineers office.



SUBMITTAL COVER SHEET

PROJECT NAME & NUMBER: Northwest Elementary School & District Warehouse Project - 7164
ARCHITECT: Beers & Hoffman
ENGINEER: Moore Engineering
PRIME CONTRACTOR: Pagoda Electric
SUBCONTRACTOR/SUPPLIER:
MANUFACTURER:
ITEM SUBMITTED: Telecommunications SUBMITTAL NO: 4R
SPEC. SECTION NO: 271400 PARAGRAPH NO:
DRAWING REFERENCE:
SUBMITTED BY: R. Scott Cromwell

PAGODA ELECTRICAL, INC. REVIEW STAMP		
Date:	Job No:	By:
3/6/17	7164	RSC
Reviewed as to type and/or design except as noted		
Subject to Approval of Owner or Architect		X
Rejected/Resubmit		



- Supported by the Hubbell Mission Critical[®] 25-Year Warranty
- Laser Optimized, High Macro Bend Performance, 100% Backward Compatible
- 10 GbE Application Assurance for all Standards-Supported Lengths
- RoHS Compliant, Flame-Retardant Cable, Manufactured Locally

FEATURES

- Laser optimized, high bandwidth, low bend radius for optimum transmission performance
- Premium bend-insensitive fiber for enhanced durability and maximum testing headroom
- Fibers supported: OM1, OM2, OM3, OM4, OS2
- Low dispersion, extended distance OM3 and OM4 performance at 10G/40G/100G data rates
- E-Z strip buffer with new dash style color stripes for contractor-friendly termination
- High performance fiber minimizes cable contribution to overall link loss budgets

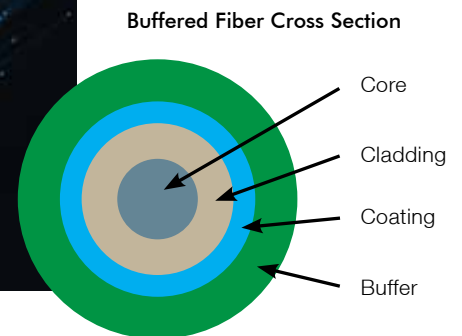
SPECIFICATIONS

- OM1 and OM2 core: legacy graded index
- OM3 and OM4 core: graded, laser optimized
- OS2 core: step index
- Tensile proof stress: ≥ 100 kpsi
- Fiber coating: acrylate
- Buffer layer: flame retardant PVC
- Temperature test range: -60° C to +85° C
- Dimensional specifications: see chart
- Performance specifications: see chart

STANDARDS

- TIA-492AAAA-A: OM1 Optical Fiber Standard
- TIA-492AAAB-A: OM2 Optical Fiber Standard
- TIA-492AAAC-B: OM3 Optical Fiber Standard
- TIA-492AAAD: OM4 Optical Fiber Standard
- TIA-492CAAA: OS2 Optical Fiber Standard
- IEC 60793-2-10: Multimode Fiber Specifications
- IEC 60793-2-50: Singlemode Fiber Specifications
- ITU-T-G651.1: Multimode Fiber Specifications
- ITU-T-G652D: Singlemode Fiber Specifications
- TIA-568-C.3: Optical Fiber Cabling Standard

HUBBELL **OptiChannel** Optical Fiber Specifications for **Hubbell HFCD Series Cable**



Optical fiber used in Hubbell's OptiChannel HFCD Series cable delivers high bandwidth optical network performance and reliability. Featuring high performance laser optimized OM3 and OM4 fiber, with ease of termination, all HFCD series fiber cables are supported by the Hubbell Mission Critical[®] 25-year warranty. Premium quality OM3, OM4 and OS2 fibers provide maximum durability and tight bend transmission performance. Tight bend rated fibers enhance cable performance, adding headroom to certification test results. Hubbell also remains committed to supporting legacy OM1 and OM2 fibers.

FIBER PAIRING AND BUFFER COLOR SEQUENCE

- 1-Blue, 2-Orange, 3-Green, 4-Brown, 5-Slate, 6-White
- 7-Red, 8-Black, 9-Yellow, 10-Violet, 11-Rose, 12-Aqua
- 13-Blue/Black, 14-Orange/Black, 15-Green/Black, 16-Brown/Black
- 17-Slate/Black, 18-White/Black, 19-Red/Black, 20-Black/White
- 21-Yellow/Black, 22-Violet/Black, 23-Rose/Black, 24-Aqua/Black
- Repeat colors 1 through 12 for each subunit cable

APPLICATIONS

- Indoor building LAN, backbone, and horizontal fiber cabling
- Data Center and Storage Area Network cabling
- Bandwidth-intensive, high speed data and video transmission
- Extended distance, non-conductive data links
- Indoor/Outdoor duct and campus cabling
- Commercial, medical, government and education facilities



OPTICAL FIBER CABLE ORDERING INFORMATION

Optical fiber described in this specification is supplied in the following Hubbell HFCD Series tight buffered cables:

- HFCD1 Series: Indoor Distribution
- HFCD1M Series: Indoor Distribution, Multi-Unit
- **HFCD15 Series: Indoor Distribution, Armored**
- **HFCD14 Series: Indoor/Outdoor**
- HFCD19 Series: Indoor/Outdoor Armored

CABLE DELIVERY

Refer to the HFCD series cable product literature for details. All HFCD Series fiber cables are priced and delivered in feet. Spool size and weight varies by cable and length ordered. Specify cable put-up lengths on purchase order. MOQ for non-stocked cables is 1,640 feet. MOQ for stocked cables is 500 feet. Contact Hubbell Premise Wiring for availability. Length ordered may be subject to a +/-10% production tolerance. Cut charges may apply to multi-reel orders.

OPTICAL FIBER PERFORMANCE SPECIFICATIONS

Fiber Type	Max Attenuation (dB/km)		Laser-Based EMB (MHz·Km)		1 Gb/s Link Distance (meters)		10 Gb/s Link Distance (meters)		40/100 Gb/s Link Distance (meters)	
	850 nm	1300 nm	850 nm	1300 nm	850 nm	1300 nm	850 nm	1300 nm	850 nm	1300 nm
OM1	≤ 2.9	≤ 0.6	220	n/a	300	550	26	n/a	n/a	n/a
OM2	≤ 2.3	≤ 0.6	950	n/a	750	550	150	n/a	n/a	n/a
OM3	≤ 2.3	≤ 0.6	2000	n/a	1,000	550	300	n/a	140	n/a
OM4	≤ 2.3	≤ 0.6	4700	n/a	1,100	550	550	n/a	170	n/a
	1310 nm	1550 nm	1310 nm	1550 nm	1310 nm	1550 nm	1310 nm	1550 nm	1310 nm	1550 nm
OS2	≤ 0.35	≤ 0.20	n/a	n/a	n/a	n/a	10,000	40,000	10,000	n/a

Note: All link distance limits are based on 1.0 dB max connector loss and 3.0 dB/km max cable loss.
 OM2, OM3, OM4, and OS2 are bend-insensitive versions, optimized for tight macro-bending performance.
 See Hubbell cable literature for standard IEEE 802.3 application distances.

OPTICAL FIBER DIMENSIONAL SPECIFICATIONS

Fiber Type	Core Diameter (microns)	Cladding Diameter (microns)	Core-Clad Concentricity (microns)	Cladding Non-Circularity	Core Non-Circularity	Coating Diameter (microns)	Coating-Cladding Concentricity (microns)
OM1	62.5 ± 2.5 μm	125 ± 2.0 μm	≤ 1.5 μm	≤ 1.0%	≤ 5.0%	242 ± 5 μm	< 12 μm
OM2	50.0 ± 2.5 μm	125 ± 1.0 μm	≤ 1.5 μm	≤ 1.0%	≤ 5.0%	242 ± 5 μm	< 12 μm
OM3	50.0 ± 2.5 μm	125 ± 1.0 μm	≤ 1.5 μm	≤ 1.0%	≤ 5.0%	242 ± 5 μm	< 12 μm
OM4	50.0 ± 2.5 μm	125 ± 1.0 μm	≤ 1.5 μm	≤ 1.0%	≤ 5.0%	242 ± 5 μm	< 12 μm
OS2	8.2 μm**	125 ± 0.7 μm	≤ 0.5 μm	≤ 0.7%	n/a	242 ± 5 μm	< 12 μm

**OS2 Mode field diameter at 1310 nm: 9.2 ± 0.4 μm; OS2 Mode field diameter at 1550 nm: 10.4 ± 0.4 μm.

INSTALLATION TIPS

- Verify the IEEE 802.3 application is supported for channel distance and attenuation limits (see chart above).
- During installation or operation, comply with maximum loading, minimum bend radius, and temperature limits.
- Always pull cables by the internal strength member, or fiber damage may result.
- Use proper tools for stripping and dressing out cable to avoid fiber damage.
- Adhere to best installation practices, avoiding kinks, crushing, and abrasion. Always use proper cable supports.
- Use recognized field termination methods. Fiber terminations shall be strain relieved from any cable weight.

HUBBELL **OptiChannel** **HFCD14 Series Indoor/Outdoor Tight Buffer Fiber Cable**

- Cut, Spooled and Shipped to Order
- Universal Construction for Indoor/Outdoor Installations
- 10 GbE Application Assurance for all Standards-Supported Lengths
- RoHS Compliant, Flame-Retardant Cable, Manufactured Locally

FEATURES

- E-Z strip buffer with new dash style color stripes for contractor-friendly termination
- Multi-purpose outdoor duct to building riser and horizontal infrastructure, all with a single cable
- Premium bend-insensitive fiber for enhanced durability and maximum testing headroom
- Fibers supported: OM1, OM3, OM4, OS2
- Sold in feet, available in Riser (OFNR), and Plenum (OFNP) for all supported fibers
- Most cables stocked with low MOQs—call for stock availability, with fast delivery

SPECIFICATIONS

- Fiber count: 2, 6, 12, 24, 48 and 72 strand
- Subunits: 12 fibers/unit (48–72 strand only)
- Fiber coating: 900 micron PVC tight buffer
- Temperature range:
 - Storage: -40° F to +185° F (-40° C to +85° C)
 - Installation: 32° F to +132° F (0° C to +56° C)
 - Operation: -4° F to +185° F (-20° C to +85° C)
- Multimode attenuation: 3.5/1.5dB/km at 850/1300nm
- Singlemode attenuation: 0.5/0.4dB/km at 1310/1550nm
- Optical: see fiber specifications on page 4

STANDARDS

- Telcordia GR-409 and GR-20
- ANSI/ICEA S-87-640
- TIA-492 Series optical fiber specifications
- TIA-568-C.3 Optical fiber cabling standards
- Riser cables: UL 1666/CSA FT-4
- Plenum cables: NFPA-262/UL910/CSA FT-6



Hubbell's OptiChannel HFCD14 Series Indoor/Outdoor Tight Buffer Cables offer a universal solution for campus networks, eliminating transition points in the building entrance. Plenum and riser ratings allow full deployment into the building backbone and horizontal spaces. Featuring ease of termination similar to distribution cable, **HFCD14 series cables are supported by the Hubbell Mission Critical® 25-year warranty.** Premium bend-insensitive fibers are used in Hubbell OM3, OM4 and OS2 fiber cables for maximum durability. Bend insensitive fibers enhance installed cable performance, adding headroom to certification test results.

CABLE JACKET AND BUFFER COLOR CODES

- Black outer jacket: all fiber types (OM1, OM3, OM4, and OS2)
- Buffer color codes and pairing sequence:
 - 1-Blue, 2-Orange, 3-Green, 4-Brown, 5-Slate, 6-White
 - 7-Red, 8-Black, 9-Yellow, 10-Violet, 11-Rose, 12-Aqua
 - 13-Blue/Black, 14-Orange/Black, 15-Green/Black, 16-Brown/Black
 - 17-Slate/Black, 18-White/Black, 19-Red/Black, 20-Black/White
 - 21-Yellow/Black, 22-Violet/Black, 23-Rose/Black, 24-Aqua/Black
- 48 strand subunit colors: Blue, Orange, Green, Brown
- 72 strand subunit colors: Blue, Orange, Green, Brown, Slate, White
- Repeat buffer colors 1 through 12 for 48 and 72 strand cable subunits

APPLICATIONS

- Inter-building duct, backbone and horizontal fiber cabling
- Campus to data center and storage area network
- High bandwidth cross-campus data and video transmission
- Extended distance, non-conductive indoor/outdoor data links
- Commercial, medical, government, and education facilities
- Not recommended for direct burial or weather exposure



INDOOR/OUTDOOR TIGHT BUFFER FIBER CABLE

Configuration _____ Catalog Number _____
xxx = Fiber count (002, 006, 012, 024, 048 or 072 strand) **HFCD14xxxrnBK**
r = 'R' for Riser, 'P' for Plenum
n = '6' for 62.5 µm OM1 Multimode
 '3' for 50 µm OM3 Multimode
 '4' for 50 µm OM4 Multimode
 'S' for 9 µm OS2 Singlemode
BK = Black jacket

HFCD14006R3BK 6st OM3 BLK
HFCD14006RSBK 6st OS2 BLK
HFCD14002R3BK 2st OM3 BLK

Example: **HFCD14012PSBK**
 Description: **CBL, Fiber, SM, 12F, I/O, P, TB, BK**
 Jacket print: **OFNP RoHS Plenum 12 Fiber Indoor/Outdoor Cable xxxFT (Date) E# (UL) C(UL) Plus Corning SMF28e+ Optical Fiber 9/125**

DELIVERY

HFCD14 Series fiber cables are priced and delivered in feet. Spool size and weight varies by cable and length ordered. Specify cable put-up lengths on purchase order. MOQ for non-stocked cables is 1,640 feet. Contact Hubbell Premise Wiring for availability. Length ordered may be subject to a +/-10% production tolerance. Cut charges may apply to multi-reel orders. Refer to next page for reel capacities, dimensions and estimated shipping weights.

Note: See Hubbell HFCD19 Series for armored indoor/outdoor tight buffered cables.

CABLE DESIGN INFORMATION

HFCD14 Series: Indoor/Outdoor Tight Buffer Riser OFNR FT-4, and Plenum OFNP FT-6

Fiber Count	Cable Diameter in (mm)	Cable Weight lb/kft	Minimum Bend Radius (Installation) in (cm)	Minimum Bend Radius (In-Service) in (cm)	Maximum Installation Pulling Load lb	Maximum Operating Tensile Load lb
2	0.17 (4.4)	12	2.6 (6.6)	1.73 (4.4)	150	45
6	0.21 (5.3)	20	3.1 (8.0)	2.1 (5.3)	150	45
12	0.25 (6.3)	35	3.7 (9.5)	2.5 (6.3)	150	45
24	0.32 (8.1)	43	4.8 (12.2)	3.2 (8.1)	300	90
48	0.61 (15.4)	146	9.1 (23.1)	6.1 (15.4)	475	145
72	0.79 (20)	238	11.8 (30)	7.9 (20)	600	180

Note: Pulling and tensile loads shall be applied only to the internal strength member.

CABLE APPLICATION GUIDELINES: DISTANCE AND CHANNEL ATTENUATION LIMITS

IEEE 802.3 Fiber Ethernet Application	Transmitter Wavelength nm	Maximum Supportable Distance (m)					Maximum Channel Attenuation (dB)				
		Multimode				Single-mode OS2	Multimode				Single-mode OS2
		62.5/125 OM1	50/125 OM2	50/125 OM3	50/125 OM4		62.5/125 OM1	50/125 OM2	50/125 OM3	50/125 OM4	
10/100BASE-SX	850	300	300	300	300	NST	4.0	4.0	4.0	4.0	NST
1000BASE-SX	850	220	550	1000	1100	NST	2.6	3.6	4.5	4.8	N/A
1000BASE-LX	1300	550	550	550	550	NST	2.3	2.3	2.3	2.3	4.7
10GBASE-S	850	26	82	300	550	NST	2.6	2.3	2.6	3.1	NST
10GBASE-L	1310	NST	NST	NST	NST	10,000	NST	NST	NST	NST	6.0
10GBASE-E	1550	NST	NST	NST	NST	40,000	NST	NST	NST	NST	11.0
10GBASE-LX4	1300	300	300	300	550	NST	2.5	2.0	2.0	2.0	NST
10GBASE-LR4	1310	N/A	N/A	N/A	N/A	10,000	N/A	N/A	N/A	N/A	6.6
40GBASE-SR4	850	N/A	N/A	100	150	NST	N/A	N/A	1.9	1.5	NST
100GBASE-SR10	850	N/A	N/A	100	150	NST	N/A	N/A	1.9	1.5	NST
40GBASE-LR4	1310	NST	NST	NST	NST	10,000	N/A	N/A	N/A	N/A	6.7
100GBASE-LR4	1310	NST	NST	NST	NST	10,000	N/A	N/A	N/A	N/A	6.3

*Note: S = Short wavelength, L = Long wavelength, E = Extended wavelength
 SR4 = Short Range, 4-Channels (4 x 10G pairs), SR10 = Short Range, 10-Channels (10 x 10G pairs)
 LX4 = Multiplex (4) Multimode Wavelengths, LR4 = Multiplex (4) Singlemode Wavelengths
 NST = Non-standard, N/A = Not applicable*

INSTALLATION REQUIREMENTS

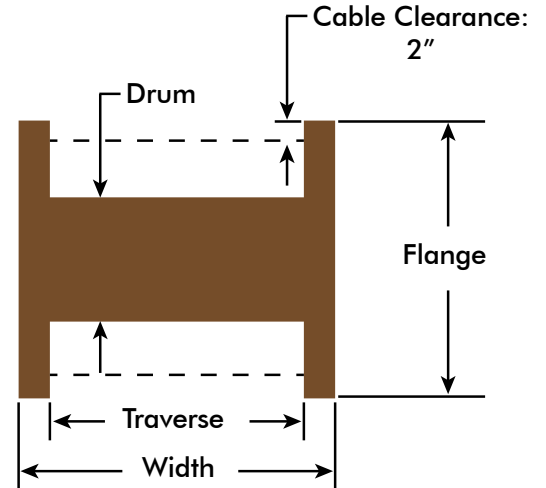
- Verify the IEEE 802.3 application is supported for channel distance and attenuation limits (see chart above).
- During installation or operation, comply with maximum loading, minimum bend radius, and temperature limits.
- Always pull cables by the internal strength member, or fiber damage may result.
- Use proper tools for stripping and dressing out cable to avoid fiber damage.
- Adhere to best installation practices, avoiding kinks, crushing, and abrasion. Always use proper cable supports.
- Use recognized field termination methods. Fiber terminations shall be strain relieved from any cable weight.



Reel Selection and Capacities for Hubbell HFCD Series Cable

HUBBELL FIBER CABLE DELIVERY POLICY

- HFCD Series fiber cables are priced and delivered in feet
- Cable orders, when permissible, are shipped on a single reel unless otherwise specified
- Multi reel put-up lengths required by the customer must be specified at the time of ordering
- Cable lengths that exceed single reel capacity must have the split approved by the customer
- MOQ for non-stocked cable is 1,640 feet
- Cables made to order are subject to a +/-10% production tolerance
- Customer order must match total length shipped
- Reel capacity values on this specification allow for a 2-inch cable-to-flange clearance as illustrated
- Refer to reel dimensions on selection and capacity charts
- Cut charges may apply to multi-reel orders



WEIGHTS, DIMENSIONS AND CAPACITIES

- Cable weight = [length ordered] X [weight per foot]
- Estimated shipping weight = [cable weight] + [reel weight] + [skid weight]
- Reel capacities on this specification allow for a 2-inch cable-to-flange clearance
- Refer to specific dimensions on the reel selection chart
- Shipping dimensions = [flange] x [flange] x [width]
- Estimated shipping width = [traverse length] + [2 inches]

STANDARD REEL SELECTIONS

Reel	Flange Diameter in	Traverse Length in	Drum Diameter in	Reel Weight lb	Skid Weight lb
A	24	15	16.5	*	n/a
B	30	24	18	30	30
C	45	24	18	115	40
D	48	24	24	120	40

*A-size reels are plastic and boxed. See charts for cable weight.

HUBBELL HFCD SERIES FIBER CABLE: MAX REEL CAPACITY CHART, PLENUM OR RISER

Cable Family	Fiber Count	Overall Jacket Diameter in (mm)	Reel A 24" Flange ft	Reel B 30" Flange ft	Reel C 45" Flange ft	Reel D 48" Flange ft	Cable Weight per Foot lb
HFCD1 Series: Indoor Distribution HFCD14 Series: Indoor/Outdoor	2 strand	0.174 (4.4)	5400	17500	n/a	n/a	0.012
	6 Strand	0.210 (5.3)	4000	12000	n/a	n/a	0.020
	12 Strand	0.250 (6.3)	2900	9000	n/a	n/a	0.035
	24 Strand	0.320 (8.1)	1600	5000	n/a	n/a	0.043
HFCD1M Series: Indoor Multi-Unit, Plenum	48 strand	0.610 (15.4)	n/a	1400	4800	n/a	0.146
	72 strand	0.790 (20)	n/a	1000	2800	n/a	0.233
HFCD14 Series: Indoor/Outdoor Multi-Unit	48 strand	0.610 (15.4)	n/a	1400	4800	n/a	0.146
	72 strand	0.790 (20)	n/a	1000	2800	n/a	0.233
HFCD15 Series: Armored Indoor HFCD19 Series: Armored Indoor/Outdoor	6 Strand	0.625 (15.9)	n/a	n/a	n/a	5000	0.165
	12 Strand	0.625 (15.9)	n/a	n/a	n/a	5000	0.170
	24 Strand	0.684 (17.4)	n/a	n/a	n/a	4000	0.188
	48 Strand	0.930 (23.5)	n/a	n/a	n/a	2100	0.365

Note: Reel capacities are approximate based on safe clearance below flange diameter. Reel size is determined by cable diameter and quantity ordered.



Optical Fiber Specifications for Hubbell HFCD Series Cables

FEATURES

- High purity glass fiber, made with advanced vapor deposition and precision draw process
- Enhanced bandwidth and distance performance
- Low bend-induced attenuation for enhanced cable operating performance
- Low dispersion, laser optimized OM3 and OM4
- Low water peak singlemode, enhanced for 1310 to 1550 nm operating wavelength range

SPECIFICATIONS

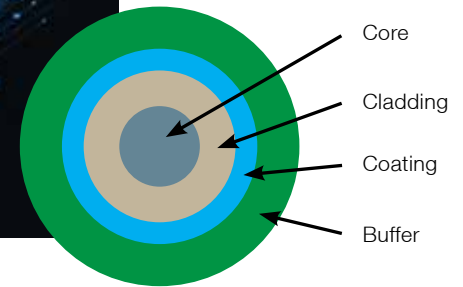
- OM1 and OM2: graded index core
- OM3 and OM4: graded index core; laser optimized
- OS2: step index core
- Tensile proof stress: ≥ 100 kpsi, tested in-process
- Fiber coating: clear acrylate
- Buffer layer: flame retardant color coded PVC
- Temperature test range: -60°C to $+85^{\circ}\text{C}$

STANDARDS

- TIA-492AAAA-A: OM1 Optical Fiber Standard
- TIA-492AAAB-A: OM2 Optical Fiber Standard
- TIA-492AAAC-B: OM3 Optical Fiber Standard
- TIA-492AAAD: OM4 Optical Fiber Standard
- ITU-T-G652d: Singlemode Fiber Specifications



Buffered Fiber Cross Section



OPTICAL FIBER DIMENSIONAL SPECIFICATIONS

Fiber Type	Core Diameter (microns)	Cladding Diameter (microns)	Core-Clad Concentricity (microns)	Cladding Non-Circularity	Core Non-Circularity	Coating Diameter (microns)	Coating-Cladding Concentricity (microns)
OM1	$62.5 \pm 2.5 \mu\text{m}$	$125 \pm 2.0 \mu\text{m}$	$\leq 1.5 \mu\text{m}$	$\leq 1.0\%$	$\leq 5.0\%$	$242 \pm 5 \mu\text{m}$	$< 12 \mu\text{m}$
OM2	$50.0 \pm 2.5 \mu\text{m}$	$125 \pm 1.0 \mu\text{m}$	$\leq 1.5 \mu\text{m}$	$\leq 1.0\%$	$\leq 5.0\%$	$242 \pm 5 \mu\text{m}$	$< 12 \mu\text{m}$
OM3	$50.0 \pm 2.5 \mu\text{m}$	$125 \pm 1.0 \mu\text{m}$	$\leq 1.5 \mu\text{m}$	$\leq 1.0\%$	$\leq 5.0\%$	$242 \pm 5 \mu\text{m}$	$< 12 \mu\text{m}$
OM4	$50.0 \pm 2.5 \mu\text{m}$	$125 \pm 1.0 \mu\text{m}$	$\leq 1.5 \mu\text{m}$	$\leq 1.0\%$	$\leq 5.0\%$	$242 \pm 5 \mu\text{m}$	$< 12 \mu\text{m}$
OS2	$8.2 \mu\text{m}^{**}$	$125 \pm 0.7 \mu\text{m}$	$\leq 0.5 \mu\text{m}$	$\leq 0.7\%$	n/a	$242 \pm 5 \mu\text{m}$	$< 12 \mu\text{m}$

**OS2 Mode field diameter at 1310 nm: $9.2 \pm 0.4 \mu\text{m}$; OS2 Mode field diameter at 1550 nm: $10.4 \pm 0.4 \mu\text{m}$.

OPTICAL FIBER PERFORMANCE SPECIFICATIONS

Fiber Type	Max Attenuation (dB/km)		Laser-Based EMB (MHz-Km)		1 Gb/s Link Distance (meters)		10 Gb/s Link Distance (meters)		40/100 Gb/s Link Distance (meters)	
	850 nm	1300 nm	850 nm	1300 nm	850 nm	1300 nm	850 nm	1300 nm	850 nm	1300 nm
OM1	≤ 2.9	≤ 0.6	220	n/a	300	550	26	n/a	n/a	n/a
OM2	≤ 2.3	≤ 0.6	950	n/a	750	550	150	n/a	n/a	n/a
OM3	≤ 2.3	≤ 0.6	2000	n/a	1,000	550	300	n/a	140	n/a
OM4	≤ 2.3	≤ 0.6	4700	n/a	1,100	550	550	n/a	170	n/a
	1310 nm	1550 nm	1310 nm	1550 nm	1310 nm	1550 nm	1310 nm	1550 nm	1310 nm	1550 nm
OS2	≤ 0.35	≤ 0.20	n/a	n/a	n/a	n/a	10,000	40,000	10,000	n/a

Note: All link distance limits are based on 1.0 dB max connector loss and 3.0 dB/km max cable loss.

OM2, OM3, OM4, and OS2 are bend-insensitive versions, optimized for tight macro-bending performance.



Indoor Armored Distribution

HFCD15



Hubbell OPTICHANNEL HFCD15 Series Armored Indoor Tight Buffer Cables are a cost effective solution that eliminates protected pathways and inner duct, featuring aluminum interlock armor for resistance to crushing, abrasion and rodents.

Features

- E-Z strip buffer with new dash style color stripes for contractor-friendly termination
- Compact cable diameter reduces congestion in shared or restricted pathways
- Premium bend-insensitive fiber for enhanced durability and maximum testing headroom
- Fiber supported: OM1, OM3, OM4 and OS2
- Sold in feet, available in Riser (OFNR) and Plenum (OFNP) for all supported fibers

Specifications

- Fiber count: 6, 12, 24 and 48 strand
- 48-strand cable subunits: 12 fibers per unit
- Fiber coating: 900 micron PVC tight buffer
- Armor: aluminum interlocking spiral wrap
- Temperature range:
 - Storage: -40° F to +176° F (-40° C to +80° C)
 - Installation: 32° F to +132° F (0° C to +56° C)
 - Operation: -4° F to +158° F (-20° C to +70° C)
- Multimode attenuation: 3.5/1.5dB/km at 850/1300nm
- Singlemode attenuation: 0.5/0.4dB/km at 1310/1550nm
- Optical: see fiber data sheet

Standards

- Telcordia GR-409 and GR-20
- ANSI/ICEA S-83-596
- TIA-492 Series optical fiber specifications
- TIA-568.3 optical fiber cabling standards
- Riser cables: UL 1666/CSA FT-4
- Plenum cables: NFPA-262/UL910/CSA FT-6

Ordering Information

Strand	Micron	Riser Catalog No.	Plenum Catalog No.
6	62.5 OM1	HFCD15006R6	HFCD15006P6
	50 OM3	HFCD15006R3	HFCD15006P3
	50 OM4	HFCD15006R4	HFCD15006P4
	OS2	HFCD15006RS	HFCD15006PS
12	62.5 OM1	HFCD15012R6	HFCD15012P6
	50 OM3	HFCD15012R3	HFCD15012P3
	50 OM4	HFCD15012R4	HFCD15012P4
	OS2	HFCD15012RS	HFCD15012PS
24	62.5 OM1	HFCD15024R6	HFCD15024P6
	50 OM3	HFCD15024R3	HFCD15024P3
	50 OM4	HFCD15024R4	HFCD15024P4
	OS2	HFCD15024RS	HFCD15024PS
48	62.5 OM1	HFCD15048R6	HFCD15048P6
	50 OM3	HFCD15048R3	HFCD15048P3
	50 OM4	HFCD15048P4	HFCD15048P4
	OS2	HFCD15048RS	HFCD15048PS

Reel Capacity Chart, Plenum or Riser

HFCD15 Series: Armored Indoor

Fiber Count	Diameter in (mm)	48" Flange ft	Weight lb/ft
6 strand	0.625 (15.9)	5400	0.165
12 strand	0.625 (15.9)	5400	0.170
24 strand	0.684 (17.4)	4500	0.188
48 strand	0.930 (23.5)	2200	0.365

Cable Jacket and Buffer Color Codes

- OM1 Multimode: Orange jacket
- **OM3 and OM4 Multimode: Aqua jacket**
- **OS2 Singlemode: Yellow jacket**
- Buffer color codes and pairing sequence:
 - 1-Blue, 2-Orange, 3-Green, 4-Brown, 5-Slate, 6-White
 - 7-Red, 8-Black, 9-Yellow, 10-Violet, 11-Rose, 12-Aqua
 - 13-Blue/Black, 14-Orange/Black, 15-Green/Black, 16-Brown/Black
 - 17-Slate/Black, 18-White/Black, 19-Red/Black, 20-Black/White
 - 21-Yellow/Black, 22-Violet/Black, 23-Rose/Black, 24-Aqua/Black
- 48-strand subunit colors: Blue, Orange, Green, Brown
- Repeat buffer colors 1 through 12 for subunits in 48-strand cable