

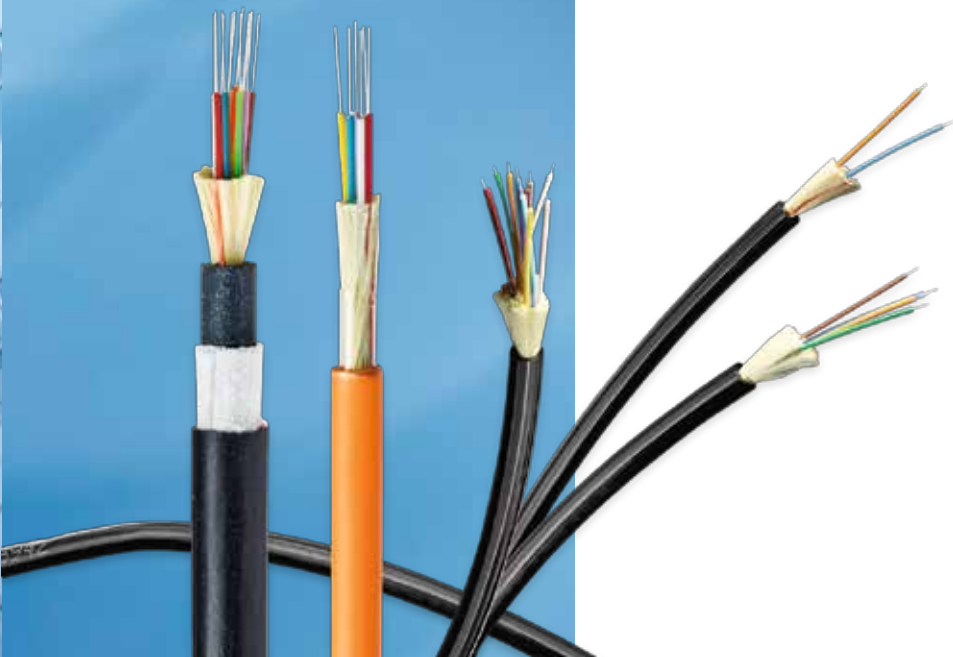
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Optical Fiber Cables

Section Table of Contents

| | |
|---|--------------|
| Optical Fiber Cables | |
| Belden Optical Fiber Cables | 68 |
| Fiber Types | 69 |
| Universal Central Loose Tube Cable with Rodent Protection, Single Jacket | 70-71 |
| Universal Mini-Breakout | 72-73 |
| Belden Warranties and Certification | 74-75 |



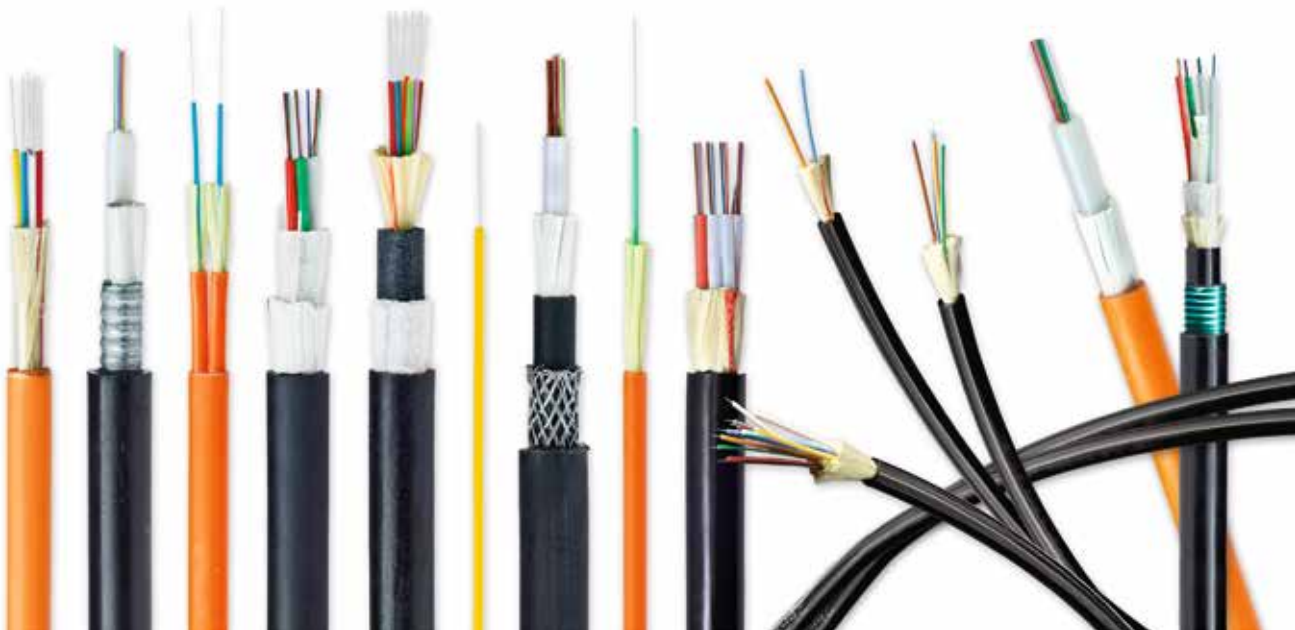
Belden Optical Fiber Cables

Reduce Complexity and Increase Flexibility

Today's advanced networks are diverse and almost always complex. The right way ahead is to future-proof these networks and to take precautions to protect them against anything that will create problems, damage or disruption. That means matching the right hardware with the right cabling to guarantee performance – and that means choosing fiber optic cable. Optical fiber cables offer many benefits: high bandwidth and transmission speed, the potential for network growth, extended reach, fault tolerance, greater data security and support for Gigabit and multi-Gigabit protocols and networked applications.

Involved in the development of optical fiber components for over 40 years, Belden is a leading supplier of high-quality, cost-effective optical fiber cabling systems. Belden's fiber cabling range is the culmination of our experience and expertise in a variety of applications, including data centers, premise and campus network backbone infrastructures, fiber-to-the-desk (FTTD) applications, horizontal and centralized cabling systems. Belden's fiber cables are designed to offer reduced complexity, increased flexibility, and rapid installation for maximum cost effectiveness.

This catalog will provide you with comprehensive information about our optical fiber cabling portfolio – from buffered fiber cables right through to central and multi loose tube variations for several applications. The upcoming pages contain all the key technical data and ordering information about the products to help you with configuring the right fiber backbone for your next mission critical application.



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Fiber Types

Tight Buffer Optical Characteristics

| European Part Number Coding, Position 5 | Fiber-Type | Mode-Field/Cladding Diameter (μm) | Wave-length (nm) | Attenuation Average/max. (dB/km) | Dispersion (ps/nm-km) | PMD (ps/km) | Cable Cut-off Wave-length (nm) | Min. Bending Radius (mm) |
|---|------------|-----------------------------------|------------------|----------------------------------|-----------------------|-------------|--------------------------------|--------------------------|
|---|------------|-----------------------------------|------------------|----------------------------------|-----------------------|-------------|--------------------------------|--------------------------|

Characteristics (cabled) Single-Mode • Matched-Cladded Optical Fibers according to ITU

| | | | | | | | | |
|---|-------------|-------------|--------------|----------------------|--------|--------------------|--------|-----|
| A | 9/125 | 8.9 ± 0.4 | 1310 | 0.35/0.4 | ≤ 3.5 | ≤ 0.2 ^A | ≤ 1260 | 10 |
| | G.657A1 OS2 | 125.0 ± 0.3 | 1550 1625 | 0.21/0.3 0.24/0.4 | ≤ 18.0 | | | |
| F | 9/125 | 8.9 ± 0.4 | 1310 | 0.35/0.4 | ≤ 3.5 | ≤ 0.2 ^A | ≤ 1260 | 7.5 |
| | G.657A2 OS2 | 125.0 ± 0.3 | 1550 1625 | 0.21/0.3 0.24/0.4 | ≤ 18.0 | | | |
| I | 9/125 | 8.8 ± 0.4 | 1310 | 0.35/0.4 | ≤ 3.5 | ≤ 0.2 ^A | ≤ 1260 | 5.0 |
| | G.657B3 OS2 | 125.0 ± 0.3 | 1550 1625 | 0.22/0.3 0.24/0.4 | ≤ 18.0 | | | |

| European Part Number Coding, Position 5 | Fiber-Type | Core/Cladding Diameter (μm) | Wave-length (nm) | Attenuation Average/max. (dB/km) | Bandwidth (MHz/km) | Ethernet Performance (m) | | Num. Apert. (μm) | Min. Bending Radius (mm) |
|---|------------|-----------------------------|------------------|----------------------------------|--------------------|--------------------------|--------|------------------|--------------------------|
| | | | | | | 1 GBE | 10 GBE | | |

Characteristics (cabled) Multi-Mode • Graded-Index Optical Fibers according to IEC 60793

| | | | | | | | | | |
|---|-----------------|-------------|------|---------|--------|-----|-----|---------------|-----|
| 1 | 62.5/125 OM1 | 62.5 ± 2.5 | 850 | 2.7/3.2 | ≥ 200 | 275 | 33 | 0.275 ± 0.015 | 25 |
| | | 125.0 ± 1.0 | 1300 | 0.6/1.1 | ≥ 600 | 550 | 300 | | |
| 2 | 50/125 OM2 | 50.0 ± 2.5 | 850 | 2.4/3.0 | ≥ 500 | 600 | 82 | 0.200 ± 0.015 | 25 |
| | | 125.0 ± 1.0 | 1300 | 0.7/1.0 | ≥ 500 | 600 | 300 | | |
| 3 | 50/125 OM3 | 50.0 ± 2.5 | 850 | 2.5/3.0 | ≥ 1500 | 900 | 300 | 0.200 ± 0.015 | 25 |
| | | 125.0 ± 1.0 | 1300 | 0.5/1.0 | ≥ 500 | 550 | 300 | | |
| D | 50/125 OM3 Flex | 50.0 ± 2.5 | 850 | 2.5/3.0 | ≥ 1500 | 900 | 300 | 0.200 ± 0.015 | 7.5 |
| | | 125.0 ± 1.0 | 1300 | 0.5/1.0 | ≥ 500 | 550 | 300 | | |
| 6 | 50/125 OM4 | 50.0 ± 2.5 | 850 | 2.5/3.0 | ≥ 6000 | 900 | 550 | 0.200 ± 0.015 | 25 |
| | | 125.0 ± 1.0 | 1300 | 0.5/1.0 | ≥ 500 | 550 | 300 | | |
| E | 50/125 OM4 Flex | 50.0 ± 2.5 | 850 | 2.5/3.0 | ≥ 6000 | 900 | 550 | 0.200 ± 0.015 | 7.5 |
| | | 125.0 ± 1.0 | 1300 | 0.5/1.0 | ≥ 500 | 550 | 300 | | |

Loose Tube Optical Characteristics

| European Part Number Coding, Position 5 | Fiber-Type | Mode-Field/Cladding Diameter (μm) | Wave-length (nm) | Attenuation average/max. (dB/km) | Dispersion (ps/nm-km) | PMD (ps/km) | Cable Cut-off Wave-length (nm) |
|---|------------|-----------------------------------|------------------|----------------------------------|-----------------------|-------------|--------------------------------|
|---|------------|-----------------------------------|------------------|----------------------------------|-----------------------|-------------|--------------------------------|

Characteristics (cabled) Single-Mode • Matched-Cladded Optical Fibers according to ITU

| | | | | | | | |
|---|-------------|-------------|------|-----------|-----------|--------------------|--------|
| 8 | 9/125 | 9.2 ± 0.4 | 1310 | 0.32/0.40 | ≤ 3.5 | ≤ 0.2 ^A | ≤ 1260 |
| | G.652D OS2 | 125.0 ± 0.7 | 1550 | 0.19/0.22 | ≤ 18.0 | | |
| 7 | 9/125 | 8.4 ± 0.6 | 1550 | 0.25/0.30 | 3.5 – 8.5 | ≤ 0.1 ^A | ≤ 1260 |
| | G.655 C & D | 125.0 ± 1.0 | | | | | |

| European Part Number Coding, Position 5 | Fiber-Type | Core/Cladding Diameter (μm) | Wave-length (nm) | Attenuation average/max. (dB/km) | Bandwidth (MHz/km) | Ethernet Performance (m) | | Num. Apert. (μm) | Num. Apert. (μm) |
|---|------------|-----------------------------|------------------|----------------------------------|--------------------|--------------------------|--------|------------------|------------------|
| | | | | | | 1 GBE | 10 GBE | | |

Characteristics (cabled) Multi-Mode • Graded-Index Optical Fibers according to IEC 60793

| | | | | | | | | | |
|---|--------------|-------------|------|---------|--------|-----|-----|---------------|-------|
| 1 | 62.5/125 OM1 | 62.5 ± 2.5 | 850 | 2.7/3.2 | ≥ 200 | 275 | 33 | 0.275 ± 0.015 | 1.495 |
| | | 125.0 ± 1.0 | 1300 | 0.6/1.1 | ≥ 600 | 550 | 300 | | 1.490 |
| 2 | 50/125 OM2 | 50.0 ± 2.5 | 850 | 2.4/3.0 | ≥ 500 | 600 | 82 | 0.200 ± 0.015 | 1.481 |
| | | 125.0 ± 1.0 | 1300 | 0.7/1.0 | ≥ 500 | 600 | 300 | | 1.476 |
| 3 | 50/125 OM3 | 50.0 ± 2.5 | 850 | 2.5/3.0 | ≥ 1500 | 900 | 300 | 0.200 ± 0.015 | 1.482 |
| | | 125.0 ± 1.0 | 1300 | 0.5/1.0 | ≥ 500 | 550 | 300 | | 1.477 |
| 6 | 50/125 OM4 | 50.0 ± 2.5 | 850 | 2.5/3.0 | ≥ 6000 | 900 | 550 | 0.200 ± 0.015 | 1.482 |
| | | 125.0 ± 1.0 | 1300 | 0.5/1.0 | ≥ 500 | 550 | 300 | | 1.477 |

Note A: Link design value



Universal Central Loose Tube Cable with Rodent Protection, Single Jacket

GUSN, GUSL, GURN, GUVN

A/I-DQ(ZN)BH



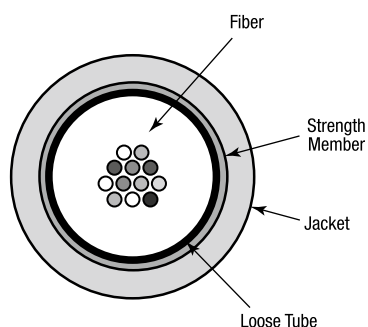
Applications

- For outdoor and indoor use in structured (data) wiring systems such as campus backbone
- Easy to install in ducts, tunnels and trenches by means of compressed air or pulling wire
- Suitable for direct burial

Features & Benefits

- Available in sizes from 2 to 24 fibers
- Jelly filled (non-dripping and silicon-free) loose tube with primary coated optical fibers ($\varnothing 250 \pm 15 \mu\text{m}$)
- Full dielectric construction, no grounding required
- Rodent protected by means of Glass Yarn Strength Elements
- Length marking in meters for easy determination of the cable length

Cross Section



Specifications

| IEC 60794-1-2 | |
|--------------------------------|--------------------|
| Crush Resistance (E3): | 15 kN/m |
| Min. Bend Radius dynamic (E6): | 15 x \varnothing |
| Min. Bend Radius static (E11): | 10 x \varnothing |
| Min. Bend Radius fibers: | 25 mm |
| Temperature Range (F1): | |
| – Transport/Storage | -30°C to +70°C |
| – Installation | -5°C to +50°C |
| – Operation | -30°C to +70°C |
| Watertightness (F5): | Pass |
| Other | |
| Flame Retardant: | |
| – GUSN, GURN, GUVN | IEC 60332-1 |
| – GUSL | IEC 60332-3-25 |
| Halogen Free: | IEC 60754-1 |
| Non Corrosive: | IEC 60754-2 |
| Smoke Density: | IEC 61034-2 |

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Characteristics

| Loose Tube | Fiber Count | Diameter (mm) | Weight (kg/km) | Tensile Strength (short term) N | Tensile Strength (permanent) N | Fire Load (kJ/m) |
|----------------------|-------------|---------------|----------------|---------------------------------|--------------------------------|------------------|
| IEC 60794-1-2 | | | | E1 | E1 | |
| GUSN*xx | 2 to 24 | 5.8 | 37 | 1500 | 700 | 550 |
| GUSL*xx | 2 to 24 | 6.5 | 47 | 1500 | 700 | 580 |
| GURN*xx | 2 to 24 | 7.1 | 55 | 3500 | 1750 | 755 |
| GUVN*xx | 2 to 24 | 7.8 | 67 | 5000 | 2500 | 928 |

Ordering Information

| Fiber Type/Count | 2 | 4 | 6 | 8 | 12 | 16 | 24 |
|------------------------------------|---------|---------|---------|--|---------|---------|---------|
| GUSN | | | | | | | |
| 62.5/125-OM1 | GUSN102 | GUSN104 | GUSN106 | GUSN108 | GUSN112 | GUSN116 | GUSN124 |
| 50/125-OM2 | GUSN202 | GUSN204 | GUSN206 | GUSN208 | GUSN212 | GUSN216 | GUSN224 |
| 50/125-OM3 | GUSN302 | GUSN304 | GUSN306 | GUSN308 | GUSN312 | GUSN316 | GUSN324 |
| 50/125-OM4 | GUSN602 | GUSN604 | GUSN606 | GUSN608 | GUSN612 | GUSN616 | GUSN624 |
| 9/125 ITU G.652D | GUSN802 | GUSN804 | GUSN806 | GUSN808 | GUSN812 | GUSN816 | GUSN824 |
| 9/125 ITU G.655 C & D | GUSN702 | GUSN704 | GUSN706 | GUSN708 | GUSN712 | GUSN716 | GUSN724 |
| GUSL | | | | | | | |
| 62.5/125-OM1 | GUSL102 | GUSL104 | GUSL106 | GUSL108 | GUSL112 | GUSL116 | GUSL124 |
| 50/125-OM2 | GUSL202 | GUSL204 | GUSL206 | GUSL208 | GUSL212 | GUSL216 | GUSL224 |
| 50/125-OM3 | GUSL302 | GUSL304 | GUSL306 | GUSL308 | GUSL312 | GUSL316 | GUSL324 |
| 50/125-OM4 | GUSL602 | GUSL604 | GUSL606 | GUSL608 | GUSL612 | GUSL616 | GUSL624 |
| 9/125 ITU G.652D | GUSL802 | GUSL804 | GUSL806 | GUSL808 | GUSL812 | GUSL816 | GUSL824 |
| 9/125 ITU G.655 C & D | GUSL702 | GUSL704 | GUSL706 | GUSL708 | GUSL712 | GUSL716 | GUSL724 |
| GURN | | | | | | | |
| 62.5/125-OM1 | GURN102 | GURN104 | GURN106 | GURN108 | GURN112 | GURN116 | GURN124 |
| 50/125-OM2 | GURN202 | GURN204 | GURN206 | GURN208 | GURN212 | GURN216 | GURN224 |
| 50/125-OM3 | GURN302 | GURN304 | GURN306 | GURN308 | GURN312 | GURN316 | GURN324 |
| 50/125-OM4 | GURN602 | GURN604 | GURN606 | GURN608 | GURN612 | GURN616 | GURN624 |
| 9/125 ITU G.652D | GURN802 | GURN804 | GURN806 | GURN808 | GURN812 | GURN816 | GURN824 |
| 9/125 ITU G.655 C & D | GURN702 | GURN704 | GURN706 | GURN708 | GURN712 | GURN716 | GURN724 |
| GUVN | | | | | | | |
| 62.5/125-OM1 | GUVN102 | GUVN104 | GUVN106 | GUVN108 | GUVN112 | GUVN116 | GUVN124 |
| 50/125-OM2 | GUVN202 | GUVN204 | GUVN206 | GUVN208 | GUVN212 | GUVN216 | GUVN224 |
| 50/125-OM3 | GUVN302 | GUVN304 | GUVN306 | GUVN308 | GUVN312 | GUVN316 | GUVN324 |
| 50/125-OM4 | GUVN602 | GUVN604 | GUVN606 | GUVN608 | GUVN612 | GUVN616 | GUVN624 |
| 9/125 ITU G.652D | GUVN802 | GUVN804 | GUVN806 | GUVN808 | GUVN812 | GUVN816 | GUVN824 |
| 9/125 ITU G.655 C & D | GUVN702 | GUVN704 | GUVN706 | GUVN708 | GUVN712 | GUVN716 | GUVN724 |
| GUSN • GURN • GUVN | | | | | | | |
| Std. plywood reel (non-returnable) | | | | Ø 800 x 475 mm, Weight 7.65 kg and Ø 1000 x 530 mm, Weight 18.0 kg | | | |
| Std. delivery length | | | | 2100 ± 100 m and 4100 ± 100 m | | | |

Fiber Color Coding

| No. | | No. | | No. | | No. | | No. | | No. | |
|-----|---------|-----|--------|-----|-----------|-----|----------------|-----|---------------|-----|------------------|
| 1 | Red | 5 | Green | 9 | Orange | 13 | Red + ring | 17 | Green + ring | 21 | Orange + ring |
| 2 | Natural | 6 | Violet | 10 | Turquoise | 14 | Natural + ring | 18 | Violet + ring | 22 | Turquoise + ring |
| 3 | Yellow | 7 | Brown | 11 | Pink | 15 | Yellow + ring | 19 | Brown + ring | 23 | Pink + ring |
| 4 | Blue | 8 | Black | 12 | White | 16 | Blue + ring | 20 | Grey + ring | 24 | White + ring |



Universal Mini-Breakout

GUMT
GUMS

A/I-V(ZN)H
A/I-K(ZN)H



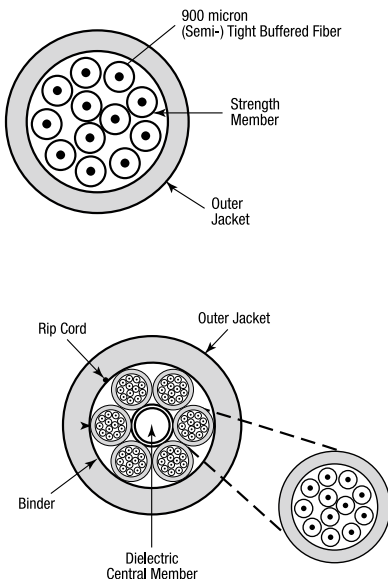
Applications

- Structured (premises) wiring systems: campus and/or building backbone (riser) and/or horizontal cabling
- Support all computer network applications such as FDDI, Gigabit Ethernet and ATM
- Easy to install in ducts, tunnels and trenches. Not recommended for direct burial

Features & Benefits

- Available in sizes from 2 to 72 fibers
- 900 µm buffered fiber allows for use of field-installable connectors
- Semi-tight buffered optical fibers are easily strippable
- Length marking in meters for easy determination of the cable length
- Full dielectric construction, no grounding required
- These cables are halogen-free (= FRNC and LSNH) and watertight and therefore suitable for internal and external use. Consequently splicing can be avoided and the installation gets more cost-effective.

Cross Section



Specifications

| IEC 60794-1-2 | |
|--------------------------------|----------------|
| Crush Resistance (E3): | 4 kN/m |
| Min. Bend Radius dynamic (E6): | 20 x Ø |
| Min. Bend Radius static (E11): | 15 x Ø |
| Min. Bend Radius fibers: | 25 mm |
| Temperature Range (F1): | |
| – Transport/Storage | -30°C to +70°C |
| – Installation | -5°C to +50°C |
| – Operation | -30°C to +70°C |
| Watertightness (F5): | Pass |
| Stripping (E5), Semi-Tight: | |
| – Secondary coating | > 30 cm |
| – Primary and Secondary | > 10 mm |
| Stripping (E5), Tight: | |
| – Secondary coating | > 10 cm |
| – Primary and Secondary | > 10 mm |
| Other | |
| Flame Retardant: | IEC 60332-3-24 |
| Halogen Free: | IEC 60754-1 |
| Non Corrosive: | IEC 60754-2 |
| Smoke Density: | IEC 61034-2 |

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Characteristics

| Tight Buffer | Semi-Tight Buffer | Fiber Count | Diameter (mm) | Weight (kg/km) | Tensile Strength (short term) N | Tensile Strength (permanent) N | Fire Load (kJ/m) |
|--------------|-------------------|-------------|---------------|----------------|---------------------------------|--------------------------------|------------------|
| GUMT*02 | GUMS*02 | 1 x 2 | 5.4 | 26 | 800 | 400 | 296 |
| GUMT*04 | GUMS*04 | 1 x 4 | 5.4 | 26 | 800 | 400 | 296 |
| GUMT*06 | GUMS*06 | 1 x 6 | 5.9 | 30 | 900 | 450 | 347 |
| GUMT*08 | GUMS*08 | 1 x 8 | 5.9 | 32 | 900 | 450 | 371 |
| GUMT*12 | GUMS*12 | 1 x 12 | 7.6 | 45 | 1000 | 500 | 622 |
| GUMT*16 | GUMS*16 | 1 x 16 | 8.6 | 53 | 1000 | 500 | 845 |
| GUMT*24 | GUMS*24 | 1 x 24 | 9.6 | 74 | 1200 | 600 | 1082 |
| GUMT*36 | GUMS*36 | 3 x 12 | 19.7 | 246 | 5400 | 2700 | 2345 |
| GUMT*48 | GUMS*48 | 4 x 12 | 19.7 | 286 | 5400 | 2700 | 2970 |
| GUMT*72 | GUMS*72 | 6 x 12 | 24.6 | 438 | 6000 | 3000 | 4290 |

Note: Buffer diameter 0.90 ± 0.05 mm

Ordering Information

| Fiber Type/Count | 2 | 4 | 6 | 8 | 12 | 16 | 24 | 36 | 48 | 72 | Jacket Color | |
|------------------------------------|--------------------------------|--------------------------------|---------------------------------|---------------------------------|--------------------------------|---------|---------|---------|---------|---------|-------------------------|---|
| GUMT • Tight Buffer | | | | | | | | | | | | |
| 62.5/125-OM1 | GUMT102 | GUMT104 | GUMT106 | GUMT108 | GUMT112 | GUMT116 | GUMT124 | GUMT136 | GUMT148 | GUMT172 | Orange | |
| 50/125-OM2 | GUMT202 | GUMT204 | GUMT206 | GUMT208 | GUMT212 | GUMT216 | GUMT224 | GUMT236 | GUMT248 | GUMT272 | Orange | |
| 50/125-OM3 | GUMT302 | GUMT304 | GUMT306 | GUMT308 | GUMT312 | GUMT316 | GUMT324 | GUMT336 | GUMT348 | GUMT372 | Aqua | |
| 50/125-OM3 Flex | GUMTD02 | GUMTD04 | GUMTD06 | GUMTD08 | GUMTD12 | GUMTD16 | GUMTD24 | GUMTD36 | GUMTD48 | GUMTD72 | Aqua | |
| 50/125-OM4 | GUMT602 | GUMT604 | GUMT606 | GUMT608 | GUMT612 | GUMT616 | GUMT624 | GUMT636 | GUMT648 | GUMT672 | Erika-Violet (RAL 4003) | |
| 50/125-OM4 Flex | GUMTE02 | GUMTE04 | GUMTE06 | GUMTE08 | GUMTE12 | GUMTE16 | GUMTE24 | GUMTE36 | GUMTE48 | GUMTE72 | Erika-Violet (RAL 4003) | |
| 9/125 ITU G.657A1 | GUMTA02 | GUMTA04 | GUMTA06 | GUMTA08 | GUMTA12 | GUMTA16 | GUMTA24 | GUMTA36 | GUMTA48 | GUMTA72 | Yellow | |
| 9/125 ITU G.657A2 | GUMTF02 | GUMTF04 | GUMTF06 | GUMTF08 | GUMTF12 | GUMTF16 | GUMTF24 | GUMTF36 | GUMTF48 | GUMTF72 | Yellow | |
| 9/125 ITU G.657B3 | GUMTI02 | GUMTI04 | GUMTI06 | GUMTI08 | GUMTI12 | GUMTI16 | GUMTI24 | GUMTI36 | GUMTI48 | GUMTI72 | Yellow | |
| GUMS • Semi-Tight Buffer | | | | | | | | | | | | |
| 62.5/125-OM1 | GUMS102 | GUMS104 | GUMS106 | GUMS108 | GUMS112 | GUMS116 | GUMS124 | GUMS136 | GUMS148 | GUMS172 | Orange | |
| 50/125-OM2 | GUMS202 | GUMS204 | GUMS206 | GUMS208 | GUMS212 | GUMS216 | GUMS224 | GUMS236 | GUMS248 | GUMS272 | Orange | |
| 50/125-OM3 | GUMS302 | GUMS304 | GUMS306 | GUMS308 | GUMS312 | GUMS316 | GUMS324 | GUMS336 | GUMS348 | GUMS372 | Aqua | |
| 50/125-OM3 Flex | GUMSD02 | GUMSD04 | GUMSD06 | GUMSD08 | GUMSD12 | GUMSD16 | GUMSD24 | GUMSD36 | GUMSD48 | GUMSD72 | Aqua | |
| 50/125-OM4 | GUMS602 | GUMS604 | GUMS606 | GUMS608 | GUMS612 | GUMS616 | GUMS624 | GUMS636 | GUMS648 | GUMS672 | Erika-Violet (RAL 4003) | |
| 50/125-OM4 Flex | GUMSE02 | GUMSE04 | GUMSE06 | GUMSE08 | GUMSE12 | GUMSE16 | GUMSE24 | GUMSE36 | GUMSE48 | GUMSE72 | Erika-Violet (RAL 4003) | |
| 9/125 ITU G.657A1 | GUMSA02 | GUMSA04 | GUMSA06 | GUMSA08 | GUMSA12 | GUMSA16 | GUMSA24 | GUMSA36 | GUMSA48 | GUMSA72 | Yellow | |
| 9/125 ITU G.657A2 | GUMSF02 | GUMSF04 | GUMSF06 | GUMSF08 | GUMSF12 | GUMSF16 | GUMSF24 | GUMSF36 | GUMSF48 | GUMSF72 | Yellow | |
| 9/125 ITU G.657B3 | GUMSI02 | GUMSI04 | GUMSI06 | GUMSI08 | GUMSI12 | GUMSI16 | GUMSI24 | GUMSI36 | GUMSI48 | GUMSI72 | Yellow | |
| GUMT • GUMS | | | | | | | | | | | | |
| Std. plywood reel (non-returnable) | Ø 560 x 336 mm, Weight 4.25 kg | Ø 800 x 475 mm, Weight 7.65 kg | Ø 1000 x 530 mm, Weight 18.0 kg | Ø 1000 x 530 mm, Weight 18.0 kg | Ø 1250 x 688mm, Weight 93.0 kg | | | | | | | - |
| Std. delivery length | 2100 ± 100 m | 2100 ± 100 m | 2100 ± 100 m | 650 ± 100 m | 650 ± 100 m | | | | | | | - |

Fiber Color Coding

| No. | | No. | | No. | | No. | | No. | | No. | |
|-----|--------|-----|--------|-----|-----------|-----|---------------|-----|---------------|-----|------------------|
| 1 | White | 5 | Green | 9 | Orange | 13 | White + ring | 17 | Green + ring | 21 | Orange + ring |
| 2 | Red | 6 | Violet | 10 | Turquoise | 14 | Red + ring | 18 | Violet + ring | 22 | Turquoise + ring |
| 3 | Blue | 7 | Brown | 11 | Pink | 15 | Blue + ring | 19 | Brown + ring | 23 | Pink + ring |
| 4 | Yellow | 8 | Black | 12 | Grey | 16 | Yellow + ring | 20 | Black + ring | 24 | Grey + ring |

Performance & Warranties Profile *for* Belden IBDN FiberExpress Certified System Installations

Belden will provide its authorized Certified System Vendors (CSVs), for the benefit of their end users, with both an extended Belden IBDN Component Warranty and a lifetime Application Assurance Program for all Belden IBDN FiberExpress Certified Systems installed by the CSV.

The extended Belden IBDN Component Warranty and the lifetime Application Assurance Program are offered to the CSV by Belden, in accordance with the following terms and conditions.

This Warranty and this Assurance Program apply only to Belden IBDN FiberExpress Certified Systems installed by CSV acting as an authorized Certified System Vendor (CSV) and in compliance with the CSV Agreement.

A Belden IBDN FiberExpress Certified System is a structured cabling system that has been engineered, designed and installed by the CSV acting as an authorized Belden CSV. The engineering, design and installation of the Belden IBDN System must be performed in accordance with all applicable Belden IBDN guidelines, Belden IBDN practices, and other Belden IBDN documentation in effect at the time of installation. Belden IBDN FiberExpress System installations that meet these requirements will receive a Certification Registration Number and Certification Plaque or Certificate from Belden and will then be designated as a Belden IBDN FiberExpress Certified System, eligible for the extended Belden IBDN Component Warranty and lifetime Application Assurance Program described below.

In order to maintain the validity of the extended Belden IBDN Component Warranty and the lifetime Application Assurance Program, the Belden IBDN FiberExpress Certified System must be maintained in accordance with the Belden IBDN User Manual in effect at the time of installation.

Extended Belden IBDN Component Warranty:

Belden warrants that;

i) the Belden IBDN passive components installed in the Belden IBDN FiberExpress Certified System are covered by a manufacturer's warranty against defects in material and workmanship for a period of twenty-five (25) years from the date of installation, at the original installation location.

ii) the Belden IBDN FiberExpress Certified System will meet or exceed the requirements specified by:

ANSI/TIA/EIA-568-B.1: Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements

ANSI/TIA/EIA-568-B.3: Commercial Building Telecommunications Cabling Standard, Part 3: Optical Fiber Cabling

ANSI/TIA/EIA-568-B.3-1: Addendum 1 - Additional Transmission Performance Specifications for 50/125 μm Optical Fiber Cables

Once an installed Belden IBDN passive component has been deemed defective by Belden, Belden shall repair or replace, at Belden's discretion, the defective component. The repaired or replaced component will be warranted for the balance of the original twenty-five year warranty period, or, ninety (90) days, which ever is longer.

The repair or replacement of a defective component under this warranty includes the reasonable costs of labor required to repair or replace the defective component. The decision of repair or replacement of components, and the selection of labor services to perform the repair or replacement are at the sole discretion of Belden.

Application Assurance:

In addition to the extended Belden IBDN Component Warranty, Belden also provides a lifetime Application Assurance Program for all Belden IBDN FiberExpress Certified Systems.

Belden lifetime Application Assurance Program warrants that the Belden IBDN FiberExpress Certified System, maintained in accordance with the Belden IBDN User Guide in effect and provided at the time of installation, will be capable of supporting all industry standard Applications during its entire installation life at its original installation location.

Industry standard Applications include;

- i) all Applications identified in the current (at time of installation) Belden IBDN documentation, and;
- ii) any commercially available Applications introduced at a future date that are designed to operate over ANSI/TIA/EIA-568-B.3 and ANSI/TIA/EIA-568-B.3-1 compliant optical fiber transmission channels.

In the event that the Belden IBDN FiberExpress Certified System is unable to support an existing or future industry standard Application as defined above, and such failure can be attributed to a deficiency in the Belden IBDN System, Belden will provide at its expense, reasonable expertise, Belden IBDN materials and labor as required to remedy the problem and/or resolve the claim. The decision of repair or replacement of materials, and the selection of labor services to perform the remedial services are at the sole discretion of Belden.

Limitations

Belden will not be liable for, nor pay for, any loss of use of the Belden IBDN System or products; costs of substitute goods, facilities or services; or for any other economic losses or incidental, consequential or exemplary damages.

This Extended Product Warranty and Application Assurance for the Belden IBDN Certified System does not cover any deficiencies in the System which result from failure to comply with Belden design guidelines and installation procedures.

Belden shall not be liable for damages or defects resulting from circumstances beyond its control, including but not limited to, improper installation, misuse, alteration, unauthorized repair, damages in transit, fire, floods and acts of God.

Repair or replacement of the Belden IBDN Certified System by Belden is your exclusive remedy.

This is the only warranty on the Belden IBDN FiberExpress Certified System. There are no other warranties, express or implied, made by Belden.

Our End-to-End Expertise.
Your End-to-End Solution.



Belden IBDN Structured Cabling Systems • Belden IBDN FiberExpress Certified System Installations

Belden IBDN FiberExpress Cabling Solution

In addition to the extended Belden IBDN Component Warranty, the lifetime Application Assurance Program and full compliance with ANSI/TIA/EIA-568-B Standards, Belden IBDN FiberExpress Certified Systems that conform with the Belden IBDN FiberExpress Certified System channel configuration shown below are guaranteed to provide the following optical performance

characteristics for the duration of their installed lifetime at the original site of installation. All conditions regarding original design, installation and maintenance for Belden IBDN FiberExpress Certified Systems must be met in order to validate these optical performance characteristics.

| Belden IBDN FiberExpress System | | Max. Channel Attenuation (2 mated pair connector topology) | | Max. Supportable Distance | |
|----------------------------------|--------------------------------|---|---------|---------------------------|--------------------|
| | | 850 nm | 1300 nm | 850 nm | 1300 nm |
| FiberExpress 300 ⁽¹⁾ | 62.5 μm multimode | 3.2 dB | 4.0 dB | 300 m (985 ft) | 550 m (1805 ft) |
| FiberExpress 600 ⁽¹⁾ | 50 μm multimode | 3.9 dB | 3.5 dB | 600 m (1970 ft) | 600 m (1970 ft) |
| FiberExpress 2000 ⁽²⁾ | 50 μm multimode | 2.6 dB | — | 300 m (985 ft) | — |
| Singlemode ⁽³⁾ | Loose tube optical fiber cable | — | 4.7 dB | — | 5000 m (16,405 ft) |

1) Budget and length limitations shown are for 1 Gb/s applications including 1000Base-SX and 1000Base-LX Gigabit Ethernet. Maximum channel attenuation and maximum channel length limitations for other applications are specified in the Belden IBDN Optical Fiber Design in effect at the time of installation.

2) Budget and length limitations shown are for 10 Gb/s applications including 10Base-S Ethernet. If 10GBase-LX4 is used, the maximum channel attenuation is 2.0 dB and the maximum channel length is 300 m (985 ft). Maximum channel attenuation and maximum channel length limitations for other applications are specified in the Belden IBDN Optical Fiber Design in effect at the time of installation.

3) Singlemode tight buffer optical fiber cable is available; Budget and length limitations shown are for 1 Gb/s including 1000Base-LX Gigabit Ethernet. Maximum channel attenuation and maximum channel length limitations for other applications are specified in the Belden IBDN Optical Fiber Design Guide in effect at the time of installation.

Belden IBDN FiberExpress System Channel Backbone Configuration



* 2 mated pair connector channel topology

Belden IBDN FiberExpress System Channel Centralized / Horizontal Configuration



* 2 mated pair connector channel topology

| Belden IBDN FiberExpress System Matrix | Fiber Channel Topology | | | |
|--|--|------------------------------|-------------------------|--|
| | Fiber-to-the-Desk (FTTD) & Centralized Fiber | Fiber Backbone (In-Building) | Fiber Backbone (Campus) | FiberExpress Pre-terminated Solutions* |
| FiberExpress Cables | | | | |
| Breakout & Distribution Cable Series: MM & SM | ✓ | ✓ | | |
| Interconnect Cable Series: MM & SM | ✓ | | | |
| Loose Tube (Campus) Cable Series: MM & SM, Composite MM/SM | | ✓ | ✓ | |
| FiberExpress Ribbon Cable Series: MM & SM | ✓ | ✓ | ✓ | ✓ |
| Cross-Connect Hardware in the Telecommunications Room | | | | |
| FiberExpress Manager with FiberExpress Manager Connector Modules: MM & SM | ✓ | ✓ | ✓ | ✓ |
| FiberExpress Rack Mount Patch Panel with Universal Adapter Strips: MM & SM | ✓ | ✓ | ✓ | |
| FiberExpress Wall Mount Patch Panel with Universal Adapter Strips: MM & SM | ✓ | ✓ | ✓ | |
| FiberExpress Bar: MM & SM | ✓ | ✓ | ✓ | ✓ |
| Patch Cords in the Telecommunications Room and at the Work Area | | | | |
| FiberExpress Patch Cords: MM & SM | ✓ | ✓ | ✓ | ✓ |
| Outlets at the Work Area | | | | |
| MDVO Multimedia Outlets with MDVO Multimedia Modules | ✓ | | | |
| MediaFlex Outlets with MediaFlex Inserts | ✓ | | | |
| FiberExpress Bar: MM & SM (as MUTOA) | ✓ | | | ✓ |
| Fiber Connectivity | | | | |
| Optimax Connectors: MM & SM | ✓ | ✓ | ✓ | |
| Epoxy Field Mountable Connectors: MM & SM | ✓ | ✓ | ✓ | |
| Fiber Pigtailed: MM & SM | ✓ | ✓ | ✓ | |

MM = Multimode SM = Singlemode

* FiberExpress Pre-terminated solutions provide simple-to-install, high performance fiber channels through custom length, high precision factory terminated cables and matching optical connectivity components.

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SENDING ALL THE RIGHT SIGNALS®