

# Optical Fiber Cable Reference Guide - IEC

## REFERENCE GUIDE



Optical fiber is more and more demanded thanks to the many benefits the technology provides. These benefits include high bandwidth, high transmission speed, noise immunity, enhanced data security and extended reach. The technology allows efficient automation within applications.

For enterprise and industrial automation, Belden fiber optic provides an optimal offering of fiber optic cables which include a:

- **Large choice of possible designs to enable the most valuable product selection or development.**
  - Most types of fibers and constructions
  - Flame retardant (IEC, CPR) and Fire resistance options
  - Optional protection from Rodent, Crush, Termite, Hydrocarbon, Moisture
  - Market specific approvals (Marine, Wind...)
- **Best quality-price balance thanks to**
  - Market level pricing
  - Ease of installation
  - Tailor made designs and put ups
- **Easy product design and selection:**
  - Smart part numbering system
  - Custom made designs options
- **Belden branded value and quality**
  - Proven success and experience with specifications and projects
  - More than 40 years market presence
  - Manufacturing excellence with a worldwide footprint for local demand
  - A global network of partners to advise and support you in your project

Choosing Belden is the insurance to have the best balance between quality, reliability, performance, and cost of ownership.

This Document provides an overview of the EMEA fiber optic cable capability, including the smart part numbering references for the right product selection

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### Optical Fiber Cable Construction Tables

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## Smart Part Numbering

For Central Loose Tube, Multi Loose Tube, Breakout, Distribution and Mini-Distribution → The following part number signification holds:

NNNN(N)	F	nn
Construction Reference	Fiber Type	Fiber count*

For instance GIMTD24 is following the GIMT construction with 24 OM3 multi mode fibers

\* For fiber count above 100, the last two digits are used (44 for 144 fibers, 92 for 192 fibers, 88 for 288 fibers)

For interconnect, the following part number signification holds:

NNNN	F	D	n
Construction Reference	Fiber Type	Diameter	Fiber count

For instance GIPTDA1 is a GIPT construction including 1 OM3 fiber and a diameter of 1.6mm. The diameter is included in the construction table.

## Fiber Type Table (F)

	Fiber Type Character	Fiber Type	Core/Cladding Diam	Comment
Construction Reference	1	OM1	62.5/125	
	2	OM2	50/125	
	D	OM3	50/125	
	E	OM4	50/125	
	C	OM5	50/125	
Single Mode	A	OS2 G.657A1	9/125	For Tight Buffer products; compatible to G.652D
	8	OS2 G.657A1	9/125	For Loose Tube products; compatible to G.652D
	F	OS2 G.657A2	9/125	
	I	OS2 G.657B3	9/125	

## Additional Support (embedded links)

### Select the right CPR rated cable:

- [CPR rated Fiber Cable Product listing](#)

### Select the right fiber:

- [Optical Fibres](#)
- [Fiber Properties EMEA](#)

### Installation and handling of fiber cable

- [Fiber Cable Installation Guide](#)
- [Guidelines for Re-spooling of Optical Fibre Cables](#)

### Flame behavior and rodent protection

- [Halogen-free Optical Fiber Cables for Outdoor and/or Indoor Use](#)
- [Protection of Fibre Optic Cable against Rodents](#)

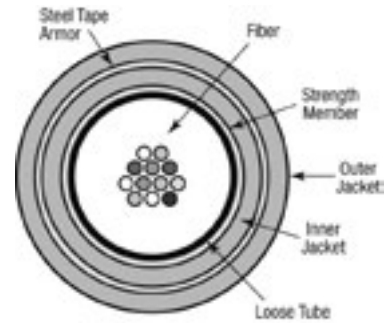
### Other relevant documentation

- [IBDN Fiber Connectivity Solutions - EMEA](#)
- [Belden Optical Fiber Catalog - AMER](#)
- [Fiber Cable for Harsh Environments -AMER](#)

# Optical Fiber Cable Construction Tables

## Central Loose Tube

- 2 to 24 Fibers
- Rodent Protected
- Standard inner Loose Tube
  - Jelly filled
  - Made of PBT
- Water blocking Glass or Aramid Yarns



Category	Tube	Tube	ITS (N)	Universal (Indoor/Outdoor) - LSZH jacket				Outdoor Construction PE jkt
	Protection Design	Diam.(mm)		Construction Reference	CPR	IEC Bundle flame test	Fire Resistance	
Unarmored	GY	3.3	1500	GUSN	Dca s2 d1 a1			GOSN
	GY	3.3	1500	GUSNC	Cca s1a d1 a1			
	GY	3.3	1500	GUSNB	B2ca s1a d1 a1			
	GY	3.3	3150	GURN	Dca			GORN
	GY	3.3	3150	GURNC	Cca s1a d1 a1			
	GY	3.3	3150	GURNB	B2ca s1a d1 a1			
	GY	3.3	4500	GUVN	Dca s2 d1 a1			GOVN
Dielectric Armor	FRP	3.3	6000	GUFN	Eca			GOFN
	GY+DJ(GY)	3.3	2400	GRRN	Eca	60332-3-22		GPRN
Metallic Armor, Single Jacket	GY+CST	3.3	2400	GUCN	Dca s1 d1 a1		60331-25-E120 Annex E	GOCN
	GY+CST	3.3	2400	GUCNC	Cca s1a d1 a1		60331-25-E120 Annex E	
	GY+CST	3.3	2400	GUCNB	B2ca s1a d1 a1		60331-25-E120 Annex E	
	GY+CST	3.3	2400	GQCN	Eca	60332-3-22	60331-25-E120	
	GY+CST	4.2	4500	GUCB	Dca s2 d1 a1	60332-3-22	60331-25-E120	
	GY+CST	4.2	4500	GUCBC	Cca s1a d1 a1		60331-25-E120	
	GY+CST	4.2	2400	GQCB	Eca	60332-3-22	60331-25-E120	
Metallic Armor, Double jacket	GY+DJ(SWA)	3.3	1500	GUWN	Dca s1 d2 a1			GOWN
	GY+DJ(SWA)	3.3	1500	GUWNC	Cca s1a d1 a1	60332-3-24		
	GY+DJ(SWA)	3.3	1500	GUWNB	B2ca s1a d1 a1	60332-3-24		
	GY+DJ(SWA)	3.3	1500	GQWN	Eca	60332-3-22		
	GY+DJ(SWB)	3.3	1500	GUHN	Eca	60332-3-25		GOHN
	GY+DJ(CST)	3.3	2400	GUDN	Dca s1 d1 a1			GODN
	GY+DJ(CST)	3.3	2400	GUDNC	Cca s1a d1 a1			
	GY+DJ(CST)	3.3	2400	GUDNB	B2ca s1a d1 a1			
	GY+DJ(CST)	3.3	2400	GQDN	Eca	60332-3-22		
Termite Protected	GY+DJ(TP)	3.3	1500	GUEN	Eca			GOEN
	GY+DJ(TP)	3.3	3150					GOGN
Termite Protected, Armor	FRP+ DJ(TP)	3.3	6000	GUUN	Eca	60332-3-22		GOUN
	GY+DJ(TP+SWA)	3.3	1500	GUIN	Eca	60332-3-25		GOIN
	GY+CST+DJ(TP)	3.3	2400	GUKN	Eca	60332-3-22	60331-25-E120	GOKN
	GY+CST+DJ(TP)	4.2	4500	GUKB	Eca	60332-3-22	60331-25-E120	
DNV Marine Approved	GY	3.3	1500	GUSNV	Eca			
	GY+CST	3.3	2400	GUCNV	Eca		60331-25-E120 Annex E	
Railway LuL Approved	GY	3.3	1500	GUSL	Dca s2 d1 a1	60332-3-25	LULtd rated: TFL-S1085.A4	

	Feature Acronyms		Design Acronyms		Protection Acronyms		Armor Acronyms
SM	Strength Member	HIT	High Temperature	DJ	Double Jacket	FRP	Fiber Reinforced Plastic
WB	Water Blocking	JF	Jelly Filled	GY	Glass Yarn	CST	Corrugated Steel Tape
ITS	Installation Tensile Strength	DC	Dry Core	AY	Aramid Yarns	SWA	Steel Wire Armor
TD	Tube Diameter			TP	Termite Protection	SWB	Steel Wire Braid

## Multi Loose Tube

- GRP Central strength member
- Products are dry core (water blocking material)
- Jelly filled and PBT made standard inner Loose Tube



	Tube		Universal (Indoor/Outdoor) - LSZH jacket				Outdoor Construction PE jkt
Category	Protection and water blocking design	Max Fiber	Construction Reference	CPR	IEC Bundle flame test	Fire Resistance	
Unarmored	GY+T	288	GCRx	Eca	60332-3-24		GBRx
	GY+T	144	GCRxC	Cca sla,d1,a1	60332-3-24		
	GY+T	144	GCRxB	B2ca sla,d1,a1	60332-3-22/-24		
	AY+T	288	GCAx	Eca	60332-3-24		GBAx
Dielectric Armor	T+DJ(AY)	288	GRAx	Eca	60332-3-24		GPAX
	T+DJ(GY)	288	GRRx	Eca	60332-3-24		GPRx
Metallic Armor, Single Jacket	GY+T+CST	288	GCCx	Eca	60332-3-22	60331-25-E120	GBCx
	GY+T+CST	144	GCCxC	Cca sla,d1,a1	60332-3-24	60331-25-E120	
	GY+T+CST	144	GCCxB	B2ca sla,d1,a1	60332-3-24	60331-25-E120	
Metallic Armor, Double Jacket	AY+T+DJ(CST)	288	GCDx	Eca	60332-3-22		GBDx
	AY+T+DJ(SWA)	144	GCWx	Eca	60332-3-22		GBWx
	GY+T+CST+DJ(CST)	144	GCYx	Eca	60332-3-22		GBYx
	GY+T+CST+DJ(SWA)	144	GCQx	Eca	60332-3-22	60331-25-E120	
Moisture Barrier	GY+T+MB	144	GTRx	Eca			GSRx
	AY+T+DJ(MB)	144	GYAx	Eca	60332-3-22		GAXx
Metallic Armor, Moisture Barrier	GY+T+MB+CST	144	GTCx	Eca			GSCx
	GY+T+MB+SWA	144	GTWx	Eca	60332-3-22		GSWx
Termite Protected	GY+T+DJ(PA)	144	GCGx	Eca	60332-3-22/-24		GBGx
	AY+T+DJ(PA)	144	GCNx	Eca	60332-3-22		GBNx
Termite Protected, Armored	GY+T+CST+DJ(PA)	144	GCKx	Eca	60332-3-22		GBKx
	AY+T+DJ(PA+CST)	144	GCLx	Eca	60332-3-22		GBLx
	AY+T+DJ(PA+SWA)	144	GClx	Eca	60332-3-22		GBIx
	GY+T+CST+DJ(PA+CST)	144	GCZx	Eca	60332-3-22	60331-25-E120	GBZx
	GY+T+CST+DJ(PA+SWA)	144	GCPx	Eca	60332-3-22	60331-25-E120	
Hydrocarbon & Termite Protected, Armor	AY+T+DJ(TRI+CST)	144	GTKx	Eca	60332-3-24		GSHx
	AY+T+DJ(TRI+SWA)	144	GTIx	Eca			GSIx
Railway LuL Approved	GY+T	96	GLRx	Eca	60332-3-24		
Aerial ADSS	AY+T	144					GAAX

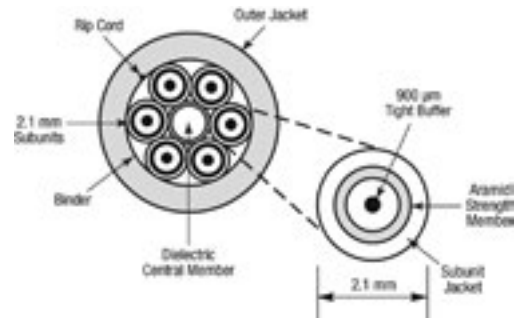
Note: GDR discontinued

Tube configuration x =	H	I	J	E	F
Max fiber count	72	96	144	192	288
Number of tubes / Max fiber per tube / Tube diameter (mm)	6 / 12 / 1.9	8 / 12 / 1.9	12 / 12 / 1.9	8 / 24 / 2.5	12 / 24 / 2.5

	Feature Acronyms		Design Acronyms		Protection Acronyms		Armor Acronyms
SM	Strength Member	HIT	High installation temperature	DJ	Double Jacket	FRP	Fiber Reinforced Plastic
WB	Water Blocking	JF	Jelly Filled	GY	Glass Yarn	CST	Corrugated Steel Tape
ITS	Installation Tensile Strength	DC	Dry Core	AY	Aramid Yarns	SWA	Steel Wire Armor
TD	Tube Diameter	GRP	Glass Reinforced Plastic	TP	Termite Protection	SWB	Steel Wire Braid
ADSS	All dielectric self-supporting cable			TRI	Termite Protection and Hydrocarbon Resistance		
				MB	Moisture Barrier (ALPOL-HPDE)		

## Breakout

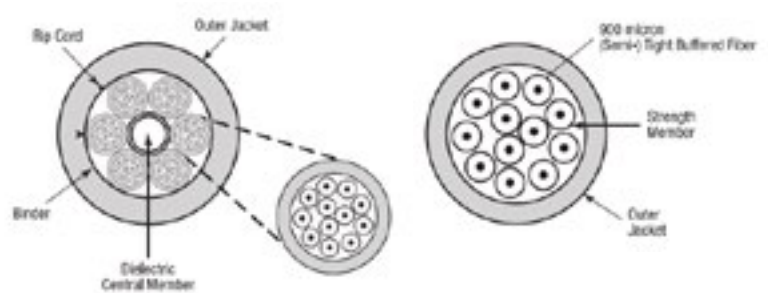
- 2 to 24 Fibers
- 900µm (Semi-) tight buffer fiber



Protection	Max Fiber	Jacket	Location	Construction	CPR rating	IEC bundle flame test
Tight Buffer	24	LSZH	Indoor	GIBT	Dca-s1,d1,a1	60332-3-24
Tight Buffer	8	LSZH	Universal	GUBT	B2ca-s1,d1,a1	60332-3-24
Tight Buffer	8	PUR	Outdoor / Tactical	GMBT		

## Distribution / Mini Breakout

- 2 to 24 Fibers
- LSZH Jacket
- 900µm (Semi-) tight buffer fiber



Protection	Max Fiber	Location	Jacket	Construction	CPR rating	IEC bundle flame test
-	72	Indoor	LSZH	GIMT	Dca-s1,d1,a1	60332-3-24
-	24	Indoor	LSZH	GIMTC	Cca-s1a,d1,a1	60332-3-24
-	24	Indoor	LSZH	GIMTB	B2ca-s1a,d1,a1	60332-3-24
-	24	Universal	LSZH	GVMT	Dca-s2,d1,a1	60332-3-24
-	24	Universal	LSZH	GVMTC	Cca-s1a,d1,a1	60332-3-24
-	24	Universal	LSZH	GVMTB	B2ca-s1,d1,a1	60332-3-24
WB	72	Universal	LSZH	GUMT	Dca-s1,d1,a1	60332-3-24
WB	24	Universal	LSZH	GUMTC	Cca-s1a,d1,a1	60332-3-24
WB	24	Universal	LSZH	GUMTB	B2ca	
WB+RP	24	Universal	LSZH	GUXT	Dca-s1,d1,a1	60332-3-24
WB+RP	24	Universal	LSZH	GUXTC	Cca-s1,d1,a1	60332-3-24
WB+RP	24	Universal	LSZH	GUXTB	B2ca-s1,d1,a1	60332-3-24
WB+CST	24	Universal	LSZH	GUMX	B2ca-s1,d1,a1	60332-3-24
WB+SWB	24	Universal	LSZH	GUMV	B2ca-s1,d1,a1	60332-3-24
WB+RP+SWA	24	Universal	LSZH	GUXW	B2ca-s1,d1,a1	60332-3-24
ACB	24	Tactical	PUR	GMTT		
ACB DJ(GY)	24	Tactical	PUR	GMRT		
AY	24	Tactical	PUR	GNMT		
	24	Tactical	PUR	GNRT		
AY	72	Tactical	PUR	GMMK		
ACB DJ(GY)	4	Tactical	PUR	GWRT	FT1 & UL1685, Wind turbine	

GUMS discontinued

	Feature Acronyms				Protection Acronyms		
WB	Water Blocking			DJ	Double Jacket		
ACB	Aramid Core bonded			GY	Glass Yarn		
RP	Rodent Protected			AY	Aramid Yarns		

## Mini Distribution

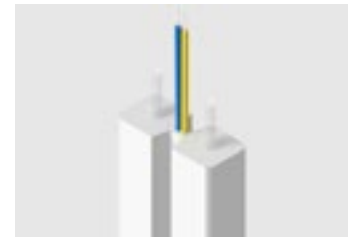
- 2 to 24 Fibers
- LSZH Jacket
- 250µm primary coated fiber
- Waterblocking AY



Protection	Max Fiber	Location	Construction	CPR rating	IEC bundle flame test
-	24	Universal	GIMK	Dca-s1,d1,a1	60332-3-24
-	24	Universal	GIMKC	Cca	
-	24	Universal	GIMKB	B2ca-s1a,d1,a1	60332-3-24

## Fiber Drop Cable

- 1-2 fibers
- LSZH Jacket
- 250µm primary coated fiber
- Waterblocking AY



Protection	Max Fiber	Location	Construction	CPR rating
SW SM	2	Universal	GUPP	Eca
AY SM	2	Universal	GUPP	

## Interconnect

- 1-2 fibers
- LSZH Jacket
- 900µm (Semi-) tight buffer fiber
- Waterblocking AY

Buffered Fiber



Simplex



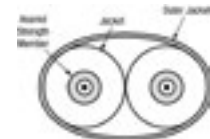
Duplex Zip



Duplex Round



Heavy Duplex DJ



Location	Subunit Fiber		0.9mm	1.6mm	1.8mm	2.0mm	2.1mm	2.4mm	2.8mm	3.0mm
Indoor	TB	Buffered fiber	GIOTxG1 GIOTxO1							
Indoor	TB	Buffered fiber	GIOTxG1 GIOTxO1							
Indoor	TB	Simplex		GIPTxA1	GIPTxB1	GIPTxC1	GIPTxH1	GIPTxD1	GIPTxE1	GIPTxF1
Indoor	STB	Simplex		GIPSxA1	GIPSxB1	GIPSxC1	GIPSxH1	GIPSxD1	GIPSxE1	GIPSxF1
Universal	TB	Simplex		GUPTxA1						
Indoor	TB	Duplex zip		GIPTxA2	GIPTxB2	GIPTxC2	GIPTxH2	GIPTxD2	GIPTxE2	GIPTxF2
Indoor	STB	Duplex zip		GIPSxA2	GIPSxB2	GIPSxC2	GIPSxH2	GIPSxD2	GIPSxE2	GIPSxF2
Indoor	TB	duplex round							GIPTxER	GIPTxFR
Indoor	STB	duplex round							GIPSxER	GIPSxFR
Indoor	TB	heavy duplex DJ		GIPTxAH	GIPTxBH	GIPTxCH	GIPTxHH	GIPTxDH	GIPTxEH	GIPTxFH
Indoor	STB	heavy duplex DJ		GIPSxAH	GIPSxBH	GIPSxCH	GIPSxHH	GIPSxDH	GIPSxEH	GIPSxFH

## Hybrid Fiber

The below tables show examples of possible designs. Specific requests can be requested via our “Request For Special” (RFS) Process.

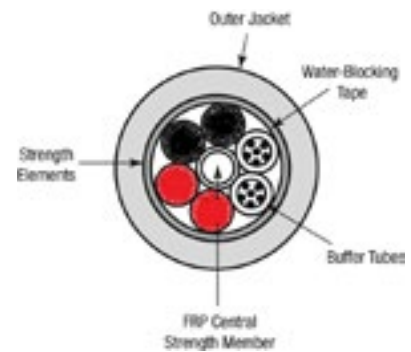
### Hybrid Central Loose Tube

- Basic fiber product: CLT (GOSN) 2 – 24 fibers
- Copper wires, stranded around the CLT
- Red/Black wires can make:
  - 2 x 16mm<sup>2</sup> (cable ø 15.0mm)
  - 2 x 10mm<sup>2</sup> (cable ø 14.3mm)
  - 2 x 6mm<sup>2</sup> (cable ø 13.5mm)
  - 2 x 4mm<sup>2</sup> (cable ø 13.5mm)
  - 2 x 2.5mm<sup>2</sup> (cable ø 13.5mm)



### Hybrid Multi Loose Tube

- Basic fiber cable: MLT (GBAD) (cable ø 12.2mm)
- 6 positions for tubes or copper wires
- Tubes consist of maximum 12 fibers
- Examples:
  - 2 x 2.5mm<sup>2</sup> + 2 x 12 SM (2 fillers)
  - 2 x 1.5mm<sup>2</sup> + 4 x 12 SM (0 fillers)
  - 4 x 2.5mm<sup>2</sup> + 2 x 12 SM (0 fillers)
  - 2 x 4mm<sup>2</sup> (cable ø 13.5mm)
  - 2 x 2.5mm<sup>2</sup> (cable ø 13.5mm)



### Hybrid Tactical

- Basic fiber cable: GMTT (Tactical distribution cable, for mobile applications)
- Copper wires are stranded around the tactical fiber cable
- Extra braid is third conductor (to be of equal copper content as the insulated conductors)
- Examples:
  - HS2CA08: 3 x 1.5mm<sup>2</sup> copper + GMTTA08
  - HS3CA08: 3 x 2.5mm<sup>2</sup> copper + GMTTA08



### Hybrid Breakout

- Combination of Simplex fiber cable with copper wires under one jacket.
- 2 fibers and 2 copper wires
- Copper size to be selected (AWG12 – AWG20)
- Examples:
  - 2 x AWG12 + 2 x 3mm Simplex SM

