Fiber Optic Cables

Edition 2015

HUBER+SUHNER

Excellence in Connectivity Solutions

Optimize your data communication

Your partner for system solutions

HUBER+SUHNER is a leading international producer and supplier of electrical and optical interconnectivity components and systems. Core capabilities in radio frequency, fiber optic and low frequency technology are united under a single roof.

HUBER+SUHNER offers a wide range of fibre optical cables, optimized for fix or mobile applications at indoor and outdoor areas. Due to new market demands innovative products are developed and tested according to international standards, which fulfil high mechanical and thermal conditions as well as fire requirements.

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Content

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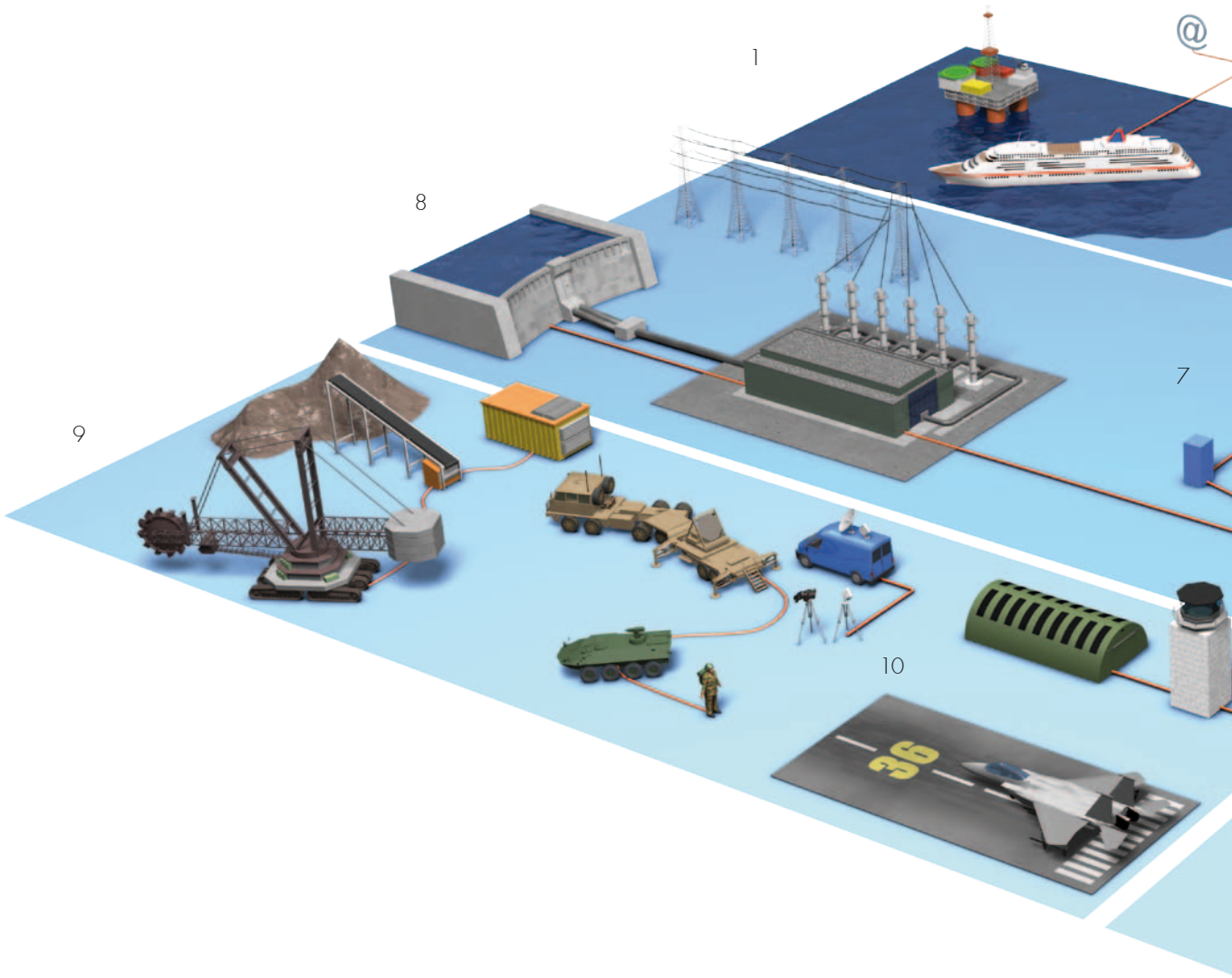
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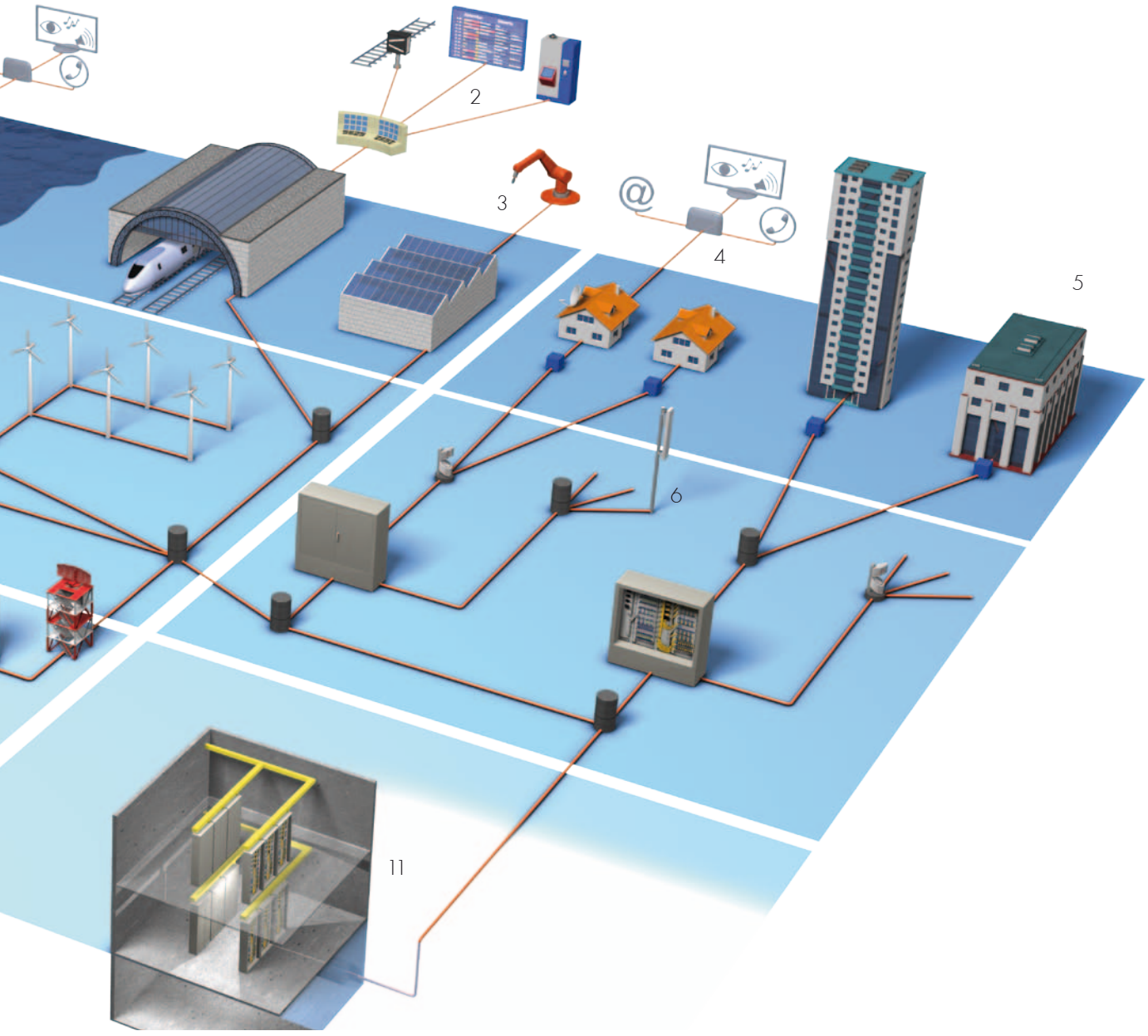
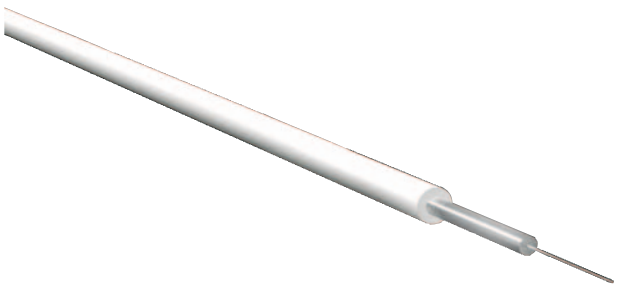
Application areas

HUBER+SUHNER offers a range of different fiber optic cables, that are used in various applications.

1 On ships and offshore platforms
2 On railway infrastructures
3 In machinery and automation
4 In homes FTTH/FITH
5 In office buildings/LAN
6 Cables for antennas (FTTA)
7 In wind turbines and wind farms
8 In technical building, power plants and power transmission stations
9 For mining and construction sites
10 In mobile vehicles and equipment
11 In central offices, data center



Fiber specification singlemode fiber



E9/125/245 µm

Optical characteristics singlemode fiber

Conditions			E9/125	E9/125 A1 [1]	E9/125 A2	E9/125A3
Standards according ITU-T			G.652.D	G.657.A1 [1]	G.657.A2	G.657.A2/B3
Attenuation typical (in cable)	1310 nm	dB/km	≤ 0.33	≤ 0.32	≤ 0.35	≤ 0.35
	1383 nm	dB/km	≤ 0.33	≤ 0.32	≤ 0.35	≤ 0.35
	1550 nm	dB/km	≤ 0.20	≤ 0.20	≤ 0.21	≤ 0.21
	1625 nm	dB/km	≤ 0.22	≤ 0.22	≤ 0.23	≤ 0.23
Attenuation maximum (in cable)	1310 nm	dB/km	≤ 0.40	≤ 0.40	≤ 0.40	≤ 0.40
	1383 nm	dB/km	≤ 0.40	≤ 0.40	≤ 0.40	≤ 0.40
	1550 nm	dB/km	≤ 0.25	≤ 0.25	≤ 0.25	≤ 0.25
	1625 nm	dB/km	≤ 0.25	≤ 0.25	≤ 0.25	≤ 0.25
Cable cut-off wavelength λ_{cc}	standard	nm	≤ 1260	≤ 1260	≤ 1260	≤ 1260
Chromatic dispersion	1285 - 1330 nm	ps/nm × km	≤ 3.50	≤ 3.50	≤ 3.50	≤ 3.50
	1550 nm	ps/nm × km	≤ 18	≤ 18	≤ 18	≤ 18
Zero dispersion wavelength λ_o			1300 - 1324	1300 - 1324	1300 - 1324	1300 - 1324
Zero dispersion slope S_0 at λ_o			≤ 0.092	≤ 0.092	≤ 0.092	≤ 0.092
Polarization mode dispersion	link value	ps/√km	≤ 0.06	≤ 0.04	≤ 0.06	≤ 0.06
	individual	ps/√km	≤ 0.20	≤ 0.10	≤ 0.20	≤ 0.20
Mode-field diameter	1310 nm	nm	9.2 ± 0.4	9.2 ± 0.4	8.4 - 9.5	8.2 - 9.5
	1550 nm	nm	10.3 ± 0.4	10.3 ± 0.4	9.3 - 10.5	9.2 - 10.5
Group index of refraction typical	1310 nm		1.466	1.466	1.466	1.466
	1550 nm		1.467	1.467	1.467	1.467
Macrobending loss r = 5.0 mm, 1 turn	1550 nm	dB	-	-	-	≤ 0.15
	1625 nm	dB	-	-	-	≤ 0.45
Macrobending loss r = 7.5 mm, 1 turn	1550 nm	dB	-	-	≤ 0.50	≤ 0.08
	1625 nm	dB	-	-	≤ 1.0	≤ 0.25
Macrobending loss r = 10 mm, 1 turn	1550 nm	dB	-	≤ 0.75	≤ 0.1	≤ 0.03
	1625 nm	dB	-	≤ 1.50	≤ 0.2	≤ 0.1
Macrobending loss r = 15 mm, 10 turn	1550 nm	dB	-	≤ 0.10	≤ 0.03	≤ 0.02
	1625 nm	dB	-	≤ 0.50	≤ 0.1	≤ 0.05

Singlemode fibers used for preterminated indoor cable fulfils standard ITU-G.652.D and ITU-G.657.A1.

[1] For cables with semi-tight and tight tubes: 1310 nm ≤ 0.40 dB/km
1550 nm ≤ 0.30 dB/km
1625 nm ≤ 0.50 dB/km

Fiber specification singlemode fiber

Geometrical characteristics

		E9/125	E9/125 A1	E9/125 A2	E9/125 A3
Cladding diameter	µm	125 ± 0.7			
Coating diameter (uncoloured)	µm	242 ± 7			
Concentricity error core/cladding	µm	≤ 0.5			
Concentricity error cladding/coating	µm	≤ 12.0			
Cladding non-circularity	%	≤ 0.7			
Coating non-circularity	%	≤ 5			

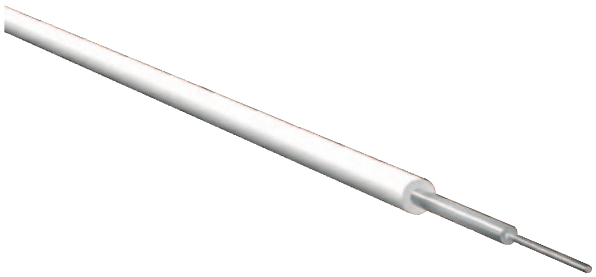
Mechanical and environmental characteristics

		E9/125	E9/125 A1	E9/125 A2	E9/125 A3
Coating-Material		acrylate			
Tensile proof test (fiber elongation ≤ 1 %)	N (Kpsi)	≥ 8.8 (100)			
Operation temperature range −60 to 85 °C 1310, 1550 and 1625 nm	Δ dB/km	≤ 0.05			
Water immersion 23 °C for 30 days 1310, 1550 and 1625 nm	Δ dB/km	≤ 0.05			

Specifications

Fiber class	E9/125	E9/125 A1	E9/125 A2	E9/125 B3
Standards	ITU G.652-D - IEC 60793-2-50 Type B1.3 - DIN VDE 0888 Part 3	- ITU G.657.A1 - IEC 60793-2-50 Type B6_a1	- ITU G.657.A2 - IEC 60793-2-50 Type B6_a2	- ITU G.657 B3 - IEC 60793-2-50 Type B6_b3

Fiber specification multimode fiber



G50/125/245 µm

Optical characteristics multimode fiber

Fiber class				G50/125		
				OM2	OM3	OM4
Fiber class available by H+S				standard	F	G
Bandwidth (overfilled launch) min.		850 nm	MHz × km	500	1500	3500
		1300 nm	MHz × km	500	500	500
1 Gigabit Ethernet 1000BASE –	SX	850 nm	m	500	1000	1500
	LX	1300 nm	m	550	550	550
10 Gigabit Ethernet 10GBASE	SX	850 nm	m	-	300	550
	LX4	1300 nm	m	-	300	300
Bending loss at 850/1300 nm	r =	37.5 mm	dB	0.5/0.5	0.1/0.2 [1]	
	r =	15.0 mm	dB	1.0/1.0	0.1/0.3 [1]	
	r =	7.5 mm	dB	-/-	0.2/0.5 [1]	
Attenuation typical (in cable)		850 nm	dB/km	2.3		
		1300 nm	dB/km	0.5		
Attenuation maximum (in cable)		850 nm	dB/km	≤ 2.7		
		1300 nm	dB/km	≤ 1.0		
Effective group index of refraction		850 nm		1.482		
		1300 nm		1.477		
Numerical aperture				0.200 ± 0.015		

[1] OM3 and OM4 BendOptimised is a HUBER+SUHNER standard

Fiber specification multimode fiber

Geometrical characteristics

Fiber class		G50/125		
		OM2	OM3	OM4
Core diameter	µm	50 ± 2.5		
Cladding diameter	µm	125 ± 2		
Coating diameter (uncoloured)	µm	245 ± 10		
Concentricity error core/cladding	µm	≤ 1.5		
Core non-circularity	µm	≤ 5		
Cladding non-circularity	%	≤ 1		
Coating non-circularity	%	≤ 6		

Mechanical and environmental characteristics

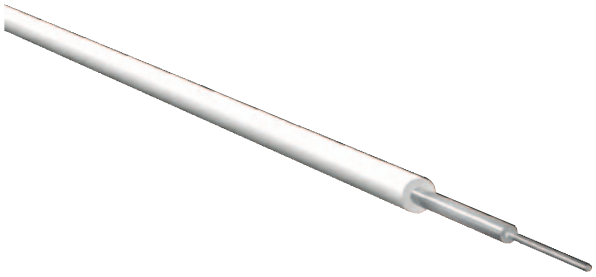
Fiber class		G50/125		
		OM2	OM3	OM4
Coating material		acrylate		
Tensile proof test at fiber elongation ≤ 1 %	N (Kpsi)	≥ 8.8 (100)		
Temperature range max. Δ 0.1 dB/km 850/1300 nm	°C	–60 to +85		
Water immersion max. Δ 0.2 dB/km 850/1300 nm		23 °C more than 30 days		

Specifications

Fiber class	G50/125		
	OM2	OM3	OM4
Standards[1)]	ITU-T G.651 IEC 60793-2-10		
	A1a.1a	A1a.2b	A1a.3b

[1)] The suffix "a" (A1a...) specifies fibers with traditional macrobund loss performance levels; the suffix "b" (A1a...b) specifies fibers with enhanced macrobund loss performance levels.

Fiber specification multimode fiber



G62.5/125/245 µm

Optical characteristics multimode fiber

Fiber class				G62.5/125	
				OM1	OM2
Fiber class available by H+S				standard	D
Bandwidth (overfilled launch) min.		850 nm	MHz × km	200	500
		1300 nm	MHz × km	500	500
1 Gigabit Ethernet 1000BASE –	SX	850 nm	m	275	550
	LX	1300 nm	m	550	550
Attenuation typical (in cable)		850 nm	dB/km	2.6	
		1300 nm	dB/km	0.5	
Attenuation maximum (in cable)		850 nm	dB/km	≤ 3	
		1300 nm	dB/km	≤ 1.0	
Effective group index of refraction		850 nm		1.496	
		1300 nm		1.491	
Numerical aperture				0.275 ± 0.015	

Fiber specification multimode fiber

Geometrical characteristics

Fiber class		G62.5/125	
		OM1	OM2
Core diameter	µm	62.5 ± 3	
Cladding diameter	µm	125 ± 2	
Coating diameter (uncoloured)	µm	245 ± 10	
Concentricity error core/cladding	µm	≤ 1.5	
Core non-circularity	µm	≤ 6	
Cladding non-circularity	%	≤ 1	
Coating non-circularity	%	≤ 6	

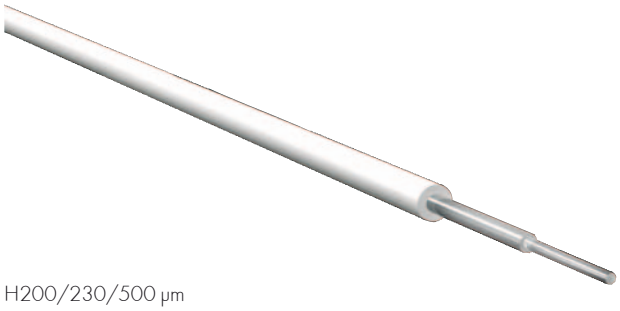
Mechanical and environmental characteristics

Fiber class		G62.5/125	
		OM1	OM2
Coating material		acrylate	
Tensile proof test at fiber elongation ≤ 1 %	N (Kpsi)	≥ 8.8 (100)	
Temperature range max. Δ 0.1 dB/km 850/1300 nm	°C	–60 up to +85	
Water immersion max. Δ 0.2 dB/km 850/1300 nm		23 °C more than 30 days	

Specifications

Fiber class	G62.5/125	
	OM1	OM2
Standards	IEC 60793-2-10 A1b	

Fiber specification multimode fiber



H200/230/500 µm

Optical characteristics multimode step index fiber (HCS)

Fiber class			H200/230/500
Bandwidth (overfilled launch)	850 nm	MHz × km	≥ 20
Attenuation typical (in cable)	850 nm	dB/km	5
Attenuation maximum (in cable)	850 nm	dB/km	10
Numerical aperture			0.37 ± 0.02

Geometrical characteristics

Fiber class		H200/230/500
Core diameter	µm	200 ± 4
Cladding diameter	µm	230 - 10
Coating diameter (uncoloured)	µm	500 ± 30
Concentricity error core/cladding	µm	≤ 5

Mechanical and environmental characteristics

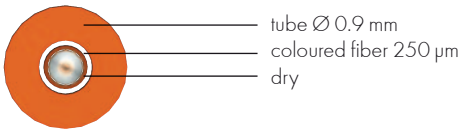
Fiber class		H200/230/500
Coating-Material		Tefzel
Tensile proof test at a fiber elongation of ≤ 1 %	N (Kpsi)	≥ 13.2 (150)
Operation temperature range max. Δ 0.1 dB/km 850/1300 nm	°C	–65 to +125

Specifications

Fiber class	H200/230/500
Standards	IEC 60793-2-30 A3c

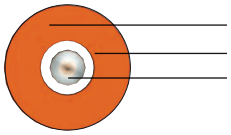
Terms and definitions

CH-tube (semi-tight tube) without jelly 0.9 mm
Standard tube for pigtails



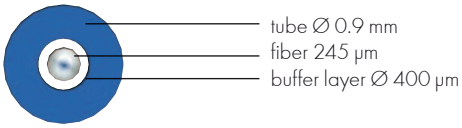
Features
- Easiest stripping up to 2 m
- No cleaning (jelly free)
- No memory effect
- High kink resistance

CW-tube (semi-tight tube) jelly-filled 0.9 mm
Standard tube for simplex, duplex and breakout cables



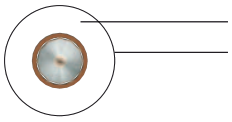
Features
- Easiest stripping up to 1 m
- Good thermal and mechanical features
- High flexibility
- Small bending radius

F-tube (tight tube) 0.9 mm
For various cable designs, e.g. riser, drag chain



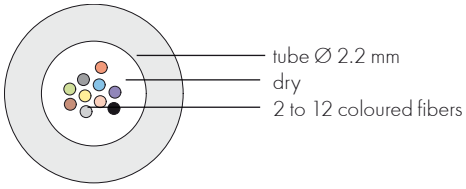
Features
- Mechanically rugged
- Easy stripping approx. 30 mm
- Wide temperature range

V-tube (tight buffered tube) 0.6 mm

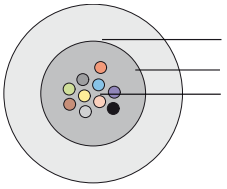


Features
- Easy stripping approx. 30 mm
- Wide temperature range

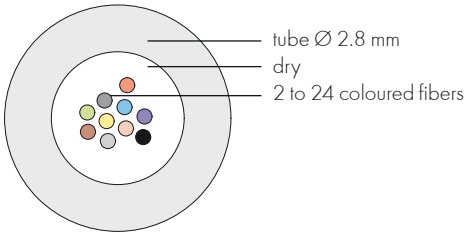
BQ Mini-multi-fiber loose tube, dry/jellyfree cable



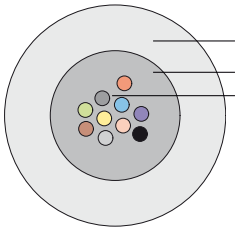
Mini-multi-fiber loose tube, jelly-filled



Q Multi-fiber loose tube, dry/jellyfree cable



Multi-fiber loose tube, jelly-filled



Cable jacket materials

Designation	Polyolefine flame retardant	Polyvinyl-chloride	Polyethylene		Polyurethane flame retardant	Polyurethane	Polybutylen-terephtalate	Thermo-plastic elastomer
Abbreviation	LSFH™	PVC	LDPE	HDPE	PUR/TPU	PUR/TPU	PBT	TPE
HUBER+ SUHNER code	H	T	Y	V	U	Z	N	X
Combustion properties								
Halogen free	yes	no	yes		yes	yes	yes	yes
Flame retardant	yes	yes	no		yes	no	no	no
Smoke emission	low	strong	medium		medium	strong	strong	medium
Corrosive gases	low	high	no		low	low	no	no
Mechanical properties								
Abrasion resistance	low	medium	med.	good	good	good	good	good
Flexibility	high	high	med.	low	high	high	low	medium
Hardness	medium	soft	med.	hard	soft	soft	hard	hard
Resistance against								
Oil/fuel [1]	good/ satisfactory [2]	satisfactory	good / satisfactory		satisfactory	good	good	good
Water	good/ satisfactory [2]	good	very good		satisfactory	good	satisfactory	satisfactory
Weathering [3]	good	good	very good		good	very good	satisfactory	good

Information given in this table is based on plastic materials used for cable jackets. Properties and resistance for cables cannot be derived from it.

[1] This information is meant as decision guidance to the best of our today's knowledge, it is based on typical values. The resistance of cables has to be verified due to the wide variety of oils and fuels.
[2] Depending on the cable design different types of LSFH™ materials are used for the cable jacket.
[3] The UV resistance depends highly on the colour of the plastic used, black offers the best resistance.

Colour codes

Colour code for fiber
according to standard

Nummer	Swisscom [1]	DIN [2]	ANSI/TIA-598	IEC [3]
1	red	red	blue	blue
2	green	green	orange	yellow
3	yellow	blue	green	red
4	blue	yellow	brown	white
5	white	white	gray	green
6	violet	gray	white	violet
7	orange	brown	red	orange
8	black	violet	black	gray
9	gray	turquoise	yellow	turquoise
10	brown	black	violet	black
11	heather violet	orange	heather violet	brown
12	turquoise	heather violet	turquoise	heather violet

Multi fiber loose tube up to 24 fibers, fiber number 13 to 24 with black ring.

Note: Orders of fiber optic cables with different fiber types (combination SM/MM):
unless otherwise specified, the first colours of the colour code are assigned to the smaller fiber type.
Example of a cable with 4xE9, 8xG50: red, green, yellow, blue = E9 fiber, remaining colours = G50 fiber

Stranding
according to Swisscom [4]

Multi-fiber loose tube elements

1	red
2	green
3	white 1
4	white 2
5	white 3
...	... etc.
dummies	black

Inscription
standard according to HUBER+SUHNER

xxxxxxxx zzzzzz/yy
HUBER+SUHNER FIBEROPTIC . x ... 00000 m

xxxxxxxx	item number (8 digits)
zzzzzz	production number (7 digits)
yy	production year
. × ...	amount of fibers × fiber type
00000 m	consecutive numbering

Semi-tight tubes 0.9 mm according to HUBER+SUHNER [4]

E9/125 [5]	yellow
G50/125	orange
G62/125	blue
G50/125 OM3	turquoise
G50/125 OM4	heather violet

Single fiber cables according to HUBER+SUHNER [4]

E9/125	yellow
G50/125	orange
G62/125	orange
G50/125 OM3	turquoise
G50/125 OM4	heather violet

[1] H+S standard, unless otherwise specified
[2] DIN VDE 0888 part 3
[3] IEC 60794-2
[4] Standard, unless otherwise specified
[5] Low bend with black coloured fiber

HUBER+SUHNER cable code

XXX–											total number of optical fibers in cable, always indicated with two or three digits
	1–24										1 to 24 optical fibers per multi-fiber loose tube
		E9/									singlemode fiber 9/125/245 µm
		E9A2/									singlemode fiber low bend 9/125/245 µm A2
		E9A3/									singlemode fiber low bend 9/125/245 µm A3
		E9S/									singlemode fiber 9/125/200
		G50/									multimode fiber 50/125/250 µm
		G62/									multimode fiber 62.5/125/250 µm
		H200/									step-index fiber HCS 200/230/500 µm
			F								tight tube 0.9 mm
			V								tight tube up to 0.6 mm
			CW								semi-tight tube 0.9 mm, jelly-filled
			CH								semi-tight tube 0.9 mm, dry
			W								multi-fiber loose tube, jelly-filled Ø 2.80 mm
			Q								multi-fiber loose tube, jelly free – dry block Ø 2.80 mm
			BW								mini multi-fiber loose tube, jelly-filled Ø 2.20 mm
			BQ								mini multi-fiber loose tube, jelly free – dry block Ø 2.20 mm
			MW								micro multi-fiber loose tube, jelly-filled
			MH								micro multi-fiber loose tube, jelly-free
				J							strain relief for each separate optical fiber
				SN							central strength member, non-metallic
					DN						de-centralized strength member, non-metallic
					(ZN)						strain-relief, non-metallic (aramide)
					(ZNG)						glass roving for strain relief/rodent protection
						A–					steel wire armouring
						H–					outer jacket material LSFH™
						R–					beam crosslinked (RADOX®)
						I–					mica tape (flame barrier)
						K–					anti-termite
						N–					outer jacket material PA/PBT
						T–					outer jacket material PVC
						U–					outer jacket material PUR, flame retardant (FR)
						V–					outer jacket material PE (HD-PE)
						X–					outer jacket material TPE
						Y–					outer jacket material PE (LD-PE)
						Z–					outer jacket material PUR
						L–					anti-rodent
						A					outer jacket figure 0
							Δ				colour of outer jacket please refer to cable colour chart
								XX			diameter of the cable (1/10 mm)
										–xx	options 1 to 4, see next page
02– 48–	12	G50/ E9/	CW BQ	J SN	(ZNG)	H– V–	M G	27 96	–F		example I example II

HUBER+SUHNER cable code

Rules

- For cables where each 0.6 or 0.9 mm tube is individually strain relieved (code = J) , the termination diameter is specified. For cables where all tubes have a common strain relief (code = ZN or ZNG) the cable diameter is specified. By individual and common strain relief in the same cable, the termination diameter gets specified.
- The fiber colour is only indicated if not standard
- All options follow the basic code :
  basic key – 1st – 2nd – 3rd – 4th option
- The cable code has no spaces
- Items not used are left out

1st option: fiber class or bandwidth length-product MHz × km, 850/1300 nm		
	G50	G62
Standard without indication	OM2	OM1
-D		OM2: 500/500
-E	OM2: 600/1200	
-F	OM3: 1500/500	
-G	OM4: 3500/500	

OM classes please see under section "Fiber types"

2nd option: fiber colour	
-FΔ	fiber colours refer to fiber colour chard (1 – 12)
-FΔG	fiber colours with ring mating (13 – 24)

3rd option: special information	
-UN	UL-listed OFNG: General purpose UL1685
-UR	UL-listed OFNR: Riser cable UL1666
-UP	UL-listed OFNP: Plenum cable UL910

4th option: electrical elements (hybrid cable)			
+XX-			number of conductors respectively units
	C		electrical conductor, copper cords
		XX	conductor cross section (1/10 mm²)
+02-	C	15	example

Fiber and cable colours Δ	
A	red
B	green
C	blue
D	orange
E	yellow
F	white
G	black
H	grey
I	brown
K	violet
L	heather violet
M	turquoise
N	light blue
O	ochre-brown
P	purple
Q	yellow-green
R	olive-green
T	transparent
U	nature (milky or beige)
Z	black with orange stripes

DIN/VDE 0888 cable code

Application	A	outdoor cable
	I	indoor cable
	U	universal cable
	AT	breakout outdoor
	IT	breakout indoor
Tube type	V	tight tube (acc. vde)
	H	loose tube jellyfree and 1 fiber
	W	loose tube with jelly and 1 fiber
	B	loose tube jellyfree
	D	loose tube with jelly
Cable design	Q	dry and longitudinal watertight
	(ZN)	strain-relief non-metallic
	(ZS)	strain-relief with steel
	B	glass roving strain-relief/anti rodent
	I	mica tape/flame barrier
	W	corrugated steel
Jacket material	H	acc. LSFH (FRNC, LSOH etc.)
	2Y	PE, polyethylene
	4Y	PA, polyamide
	11Y	PUR, polyurethane, rubber-like e.g. for drag chain
Quantity of fiber resp. tube	n	amount of fiber
	n × m	amount of loose tube × amount of fiber per tube
Fiber type	E	singlemode fiber (glass/glass)
	G	multimode graded index fiber (glass/glass)
	S	multimode step index fiber (glass/glass)
	K	PCF, multimode step index fiber (glass/plastic)
	GK	PCF, multimode graded index fiber (glass/plastic)
	P	POF, plastic fiber (plastic/plastic)
Core diameter	µm	diameter (e.g. 9, 50, 62.5, 200, ...)
Cladding diameter	µm	diameter (e.g. 125, 230, ...)
Attenuation	dB/km	attenuation at wave length
Wave length	A	650 nm
	B	850 nm
	F	1300 nm
	H	1550 nm
Bandwidth	MHz × km	bandwidth with MM fibers (POF MHz × 100 m)
	ns/km	at SM fibers also ps/nm × km

Conformity and certificate

RoHS conformity

The HUBER+SUHNER companies aim to comply with all relevant legal requirements at all time. This also holds true for the European Union Directive 2011/65/EU restriction of the use of certain hazardous substances in electrical and electronic equipment commonly referred to as the Restriction of Hazardous Substances Directive or RoHS. We are proud to state that we are able to supply components fully compliant with the RoHS directive.

This directive restricts the use of six hazardous materials: Lead (Pb), Mercury (Hg), Cadmium (Cd), hexavalent Chromium (Cr VI), and two types of brominated flame retardants, Polybrominated Biphenyls (PBB) and Polybrominated Diphenyl Ethers (PBDE) in the manufacture of various types of electronic and electrical equipment to reduce generation of toxic waste from discarded electrical and electronic equipment.

RoHS compliant

ISO Certificate

High-quality products and supplier relationships have always been a top priority for HUBER+SUHNER. After having already been confirmed by the Swiss forerunner movement, the HUBER+SUHNER quality system was very soon acknowledged by the international ISO quality certificate. This much sought-after certificate according to ISO 9001, which must be earned over and over again, has been awarded to HUBER+SUHNER without interruption since 1990. The fact that HUBER+SUHNER is also prepared to meet specific customer quality standards exceeding those of ISO 9001 is amply proved by a large number of successfully passed customer audits.


Certificate


IQNet

THE INTERNATIONAL CERTIFICATION NETWORK

CERTIFICATE

HUBER+SUHNER Group

CH-9100 Herisau

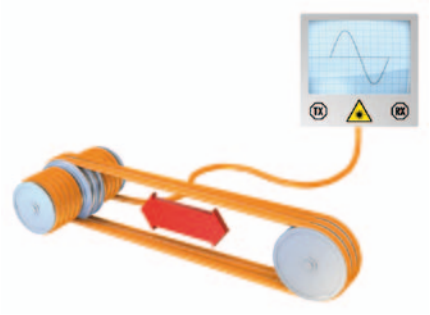
HUBER+SUHNER Companies worldwide according to the appendix

Components and systems for electrical and optical interconnection applications in the fields of Telecommunication, Industry and Transportation

Management System

ISO 9001:2000 / ISO 14001:1996

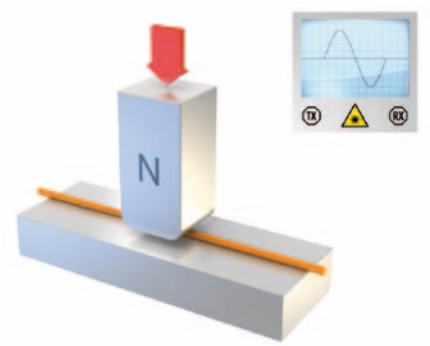
Test procedures



Tensile performance

Examines the behaviour of the attenuation and/or the fiber elongation strain as a function of the load on a cable design which may occur during installation (short term load or maximum specified load for the cable) and operation (long term load). This method is intended to be non-destructive.

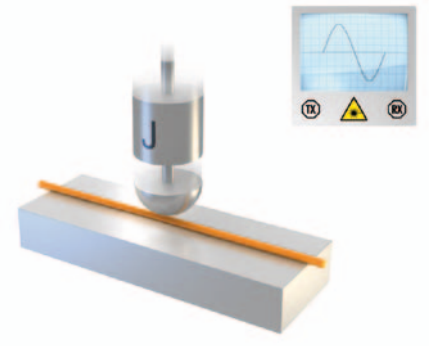
Standards: IEC 60794-1-2 E1 (future IEC 60794-1-21 E1)



Crush resistance

Examines the ability of an optical fiber cable to withstand crushing (transverse compression load) for long term (operation) and for short term (installation) loads. The load is uniformly applied on the cable sample.

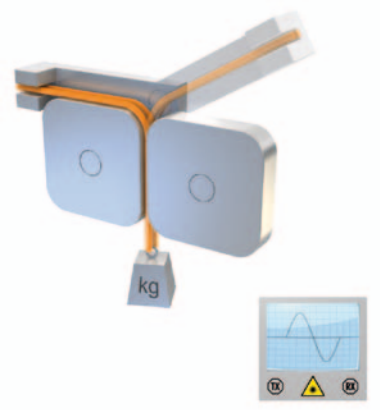
Standards: IEC 60794-1-2 E3 (future IEC 60794-1-21 E3)



Impact

Examines the ability of an optical fiber cable to withstand repeated impacts such as dropping of tools or stones.

Standards: IEC 60794-1-2 E4 (future IEC 60794-1-21 E4)

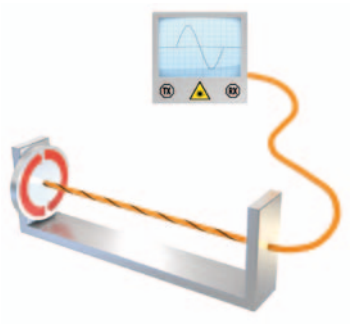


Repeated bending

Examines the ability of an optical fiber cable to withstand repeated bending. The stress occurs by repeated bending the cable back and forth by 90°.

Standards: IEC 60794-1-2 E6 (future IEC 60794-1-21 E6)

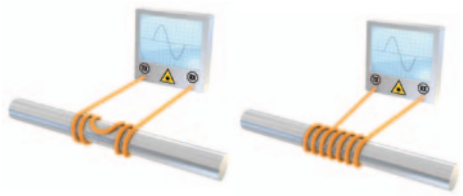
Test procedures



Torsion

Examines the ability of a fibre optic cable to withstand mechanical twisting. The primary purpose of this procedure is to measure any variation in the optical power transmittance of a fiber when the cable is subjected to external torsional forces. A secondary purpose is to evaluate the possibility of physical damage that may occur as a result of such stresses.

Standards: IEC 60794-1-2 E7 (future IEC 60794-1-21 E7)



Cable bend

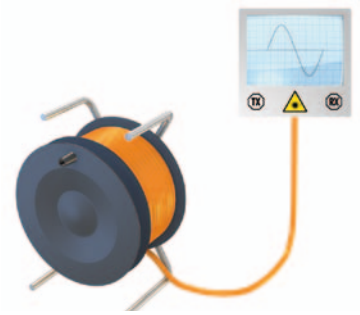
Examines the ability of an optical fiber cable or cable element to withstand bending around a test mandrel.

Standards: IEC 60794-1-2 E11A (future IEC 60794-1-21 E11A)

Kink

Examines the minimum loop diameter at the onset of the kinking of an optical fiber cable.

Standards: IEC 60794-1-2 E10 (future IEC 60794-1-21 E10)

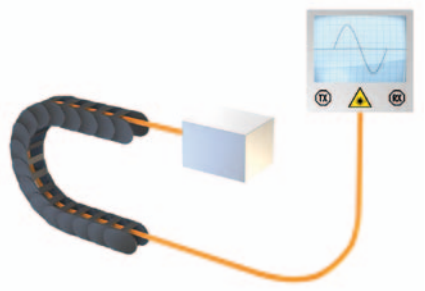


Coiling capability

Shows the ability of a fiber optic cable to withstand winding and unwinding
The purpose is to measure variation of the optical power transmittance of a fiber and to evaluate possible physical damage when the cable is wound and unwound on a reel.

Standards: HUBER+SUHNER (future IEC 60794-1-21 E33)

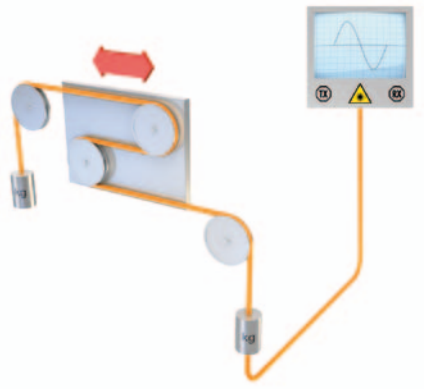
Test procedures



Drag chain capability

Determines the ability of a fiber optic cable to withstand movement in drag chains. The purpose is to measure variation of the optical power transmittance of a fiber and to evaluate possible physical damage when the cable is exposed to external bending and tensile force.

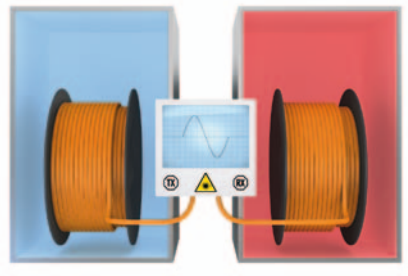
Standards: HUBER+SUHNER



Flexing

Examines the ability of a fiber optic cable to withstand repeated flexing in service. The primary purpose of this procedure is to measure any variation in the optical power transmittance of a fiber when the cable is subjected to external bending and tensional forces. A secondary purpose is to evaluate the possibility of physical damage that may occur as a result of such stresses. This is a specialized test intended for specific types of cable, such as elevator cable or the like.

Standards: IEC 60794-1-2 E8 (future IEC 60794-1-21 E8)



Temperature cycling (change)

Long length cables

Examines the stability behaviour of the attenuation of cables submitted to temperature changes. Test conditions for temperature-dependent measurements simulate the worst conditions.

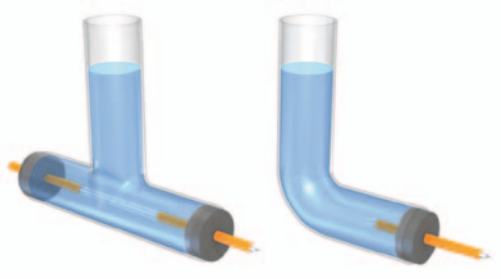
Standards: IEC 60794-1-2 F1 (future IEC 60794-1-22 F1)

Short length cables (i.e. cables for patchcords)

Examines the attenuation behaviour (change in attenuation) when optical fibre cables for use in patch cords are subjected to temperature cycling.

Standard: IEC 60794-2-50 F12 (future IEC 60794-1-22 F12)
(IEC 601300-2-22)

Test procedures



method A method B

Water penetration

Examines the ability of a cable to block water migration along a specified length.

Standards: IEC 60794-1-2 F5A/B (future IEC 60794-1-22 F5A/B/C)

Ageing

Examines the life-time behaviour of the attenuation of cables, or physical attributes specified in the detail specification.

Standards: IEC 60794-1-2 F10 (future IEC 60794-1-22 F10)

Fire propagation on a vertical single cable

Cables for information transmission inside buildings installed on the surface of walls are a potential source for fire propagation.
A 60 cm long cable is mounted vertically. The flame must extinguish itself and the fire damage must not reach the upper end of sample

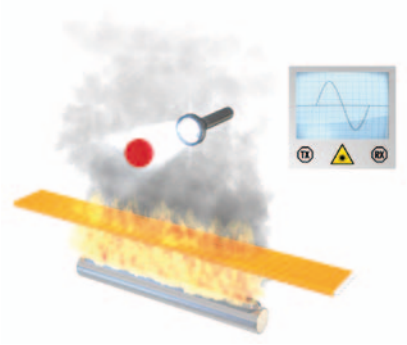
Standards: IEC 60332-1
(DIN VDE 0472-804B)
DIN VDE 0482-265

Fire propagation on a vertical cable bundle

Depending on the volume of flammable material the cable bundles are fixed on a 3.5 m long ladder and a test flame is applied at the base during 20 minutes.
The height of fire damage must not exceed 2.5 m.
This simulates a simplified chimney effect in a cable duct. Cables which pass this test have a improved characteristics regarding fire propagation.

Standards: IEC 60332-3
(DIN VDE 0472-804C)
DIN VDE 0482-260...

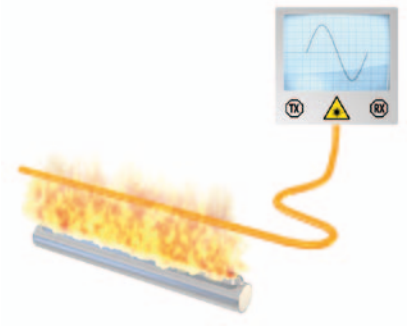
Test procedures



Smoke emission

In a defined test environment the cable is exposed to an open fire of burning alcohol. The smoke density is determined with an optical transmission measurement. This test allows a statement of the expected line-of-sight obstruction in case of fire.

Standards: IEC 61034
(DIN VDE 0472-816)
DIN VDE 0482-268



Fire test with circuit integrity

A test fire is applied horizontally from a distance of 60 cm to a single suspended cable during a specified time. The test is passed when there was continuous circuit integrity and no extremely increased attenuation values during and after the test respectively. For instance FE 90 cables have endured at least 90 minutes, «FE» stands for flame exposure.
This fire test shows the functional integrity duration (minutes) of a mechanically unloaded connection with a flame exposure of minimum 750 °C in a dry environment.

Standards: IEC 60331-25
DIN VDE 0472-814

Fire with shock, circuit integrity

In addition to the fire test with circuit integrity, a test flame is applied to a specified test layout and the cable is exposed to mechanical impacts at regular intervals.
This test simulates how many minutes a cable exposed to fire of at least 750 °C and mechanical impacts keeps minimum insulation efficiency (circuit integrity) in a dry environment.

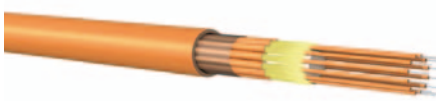
Standards: IEC 60331-31

Corrosive fire gases and free of halogen

Flammable materials are combusted at over 900 °C. Resulting fire gases are washed out in water bottles and the corrosivness of this solution is determined by means of ph-values and electric conductivity.
Halogen free products contain hardly any elements of fluorine, chlorine, bromine or jodine. Materials containing halogen can release a considerable quantity of corrosive gases. These gases can cause consequential damage to the surrounding area as well as respiratory problems.

Standards: IEC 60754-1/60754-2
(DIN VDE 0472-819)
DIN VDE 0482-267

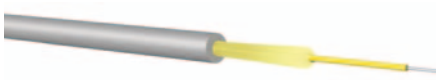
Indoor cables

	Cable type	Page	Ordering key	Weight kg/km	Number of fibers
	Semi-tight tubes 0.9 mm	32	01-.../CH-...9	0.8	1
	Tight tubes 0.9 mm	34	01-.../F-...9	0.8	1
	Tight tubes 0.6 mm	36	01-.../V-T6-...	0.3	1
	Simplex	38	01-.../VJH-...14 01-.../CWJH-...17 01-.../CWJH-...20 01-.../CWJH-...24 01-.../CWJH-...27	2.0 3.0 4.0 5.3 7.0	1 1 1 1 1
	Duplex figure 8 (Zip cord)	40	02-.../VJH-...14 02-.../FJH-...17 02-.../CWJH-...17 02-.../CWJH-...20 02-.../CWJH-...27	4.4 6.5 6.6 9.0 14.3	2 2 2 2 2
	Duplex figure 0	42	02-.../VJH-A...14 02-.../CWJH-A...20 02-.../CWJH-A...27	9.4 19 24	2 2 2
	Duplex round	44	02-.../V(ZN)H-...21	4.3	2
	OptiPack	46	12-.../(ZN)H...30 24-.../(ZN)H...36	8.3 11.0	12 24
	Breakout 1.4 mm	48	12-.../VJSNH-...14 16-.../VJSNH-...14 24-.../VJSNH-...14	83 76 105	12 16 24
	Breakout 2.0 mm	50	04-.../CWJSNH-...20 08-.../CWJSNH-...20 12-.../CWJSNH-...20 16-.../CWJSNH-...20	48 77 146 130	4 8 12 16

p = passed

Tube Ø mm	Ø Single fiber cable mm	Jacket Ø mm	Jacket material	Direct connector assembly	Tensile strength N	Crush resis-tance N/dm	Temperature range in service °C	Fire propagation IEC 60332-1-2	Fire propagation IEC 603332-3
0.9		0.9	LSFH™	•	20	1000	−25 to +75		
0.9		0.9	TPE	•	20	1000	−40 to +80		
0.6		0.6	acrylate	•	20	500	−40 to +85		
0.6 0.9 0.9 0.9 0.9		1.4 1.7 2.0 2.4 2.7	LSFH™ LSFH™ LSFH™ LSFH™ LSFH™	• • • • •	150 150 400 400 400	2000 3000 3000 5000 5000	−25 to +70 −25 to +70 −25 to +70 −25 to +70 −10 to +70	 p p p	 p p p
0.6 0.9 0.9 0.9 0.9	1.4 1.7 1.7 2.0 2.7	1.4 x 3.0 1.7 x 3.5 1.7 x 3.5 2.0 x 4.1 2.7 x 5.5	LSFH™ LSFH™ LSFH™ LSFH™ LSFH™	• • • • •	300 300 300 800 800	7500 10 000 4000 6000 10 000	−25 to +70 −40 to +70 −25 to +70 −25 to +70 −25 to +70	 p p p p	 p p p p
0.6 0.9 0.9	1.4 2.0 2.7	2.3 x 3.7 3.1 × 5.2 3.5 × 6.2	LSFH™ LSFH™ LSFH™	• • •	300 800 800	9000 7000 10 000	−25 to +70 −25 to +70 −25 to +70	 p p	 p p
0.6		2.1	LSFH™	•	200	5000	−25 to +70	p	p
		3.0 3.6	LSFH™ LSFH™	• •	500 500	5000 5000	−20 to +70 −20 to +70	p p	p p
0.6 0.6 0.6	1.4 1.4 1.4	9.0 9.0 10.6	LSFH™ LSFH™ LSFH™	• • •	3000 4000 5000	12 000 12 000 9000	−25 to +70 −25 to +70 −25 to +70	p p p	p p p
0.9 0.9 0.9 0.9	2.0 2.0 2.0 2.0	7 9 12 12	LSFH™ LSFH™ LSFH™ LSFH™	• • • •	1200 2400 4000 4800	7500 7500 7500 4000	−25 to +70 −25 to +70 −25 to +70 −25 to +70	p p p p	p p p p

Indoor cables (continuance)

	Cable type	Page	Ordering key	Weight kg/km	Number of fibers
	Fire resistant breakout 2.0 mm	52	04-.../CWJSNHIH-...20 08-.../CWJSNHIH-...20 12-.../CWJSNHIH-...20	108 147 216	4 8 12
	OptiPack indoor breakout - 12	54	24/48-.../(ZN)SNH-...30 72-.../(ZN)SNH-...30 144-.../(ZN)SNH-...30	58 92 145	24/48 72 144
	OptiPack indoor breakout – 24	56	48/96-.../(ZN)H-...36 144-.../(ZN)H-...36 288-.../(ZN)H-...36	83 137 212	48/96 144 288
	Riser	58	04-.../FSN(ZN)H-...50 12-.../FSN(ZN)H-...70 24-.../FSN(ZN)H-...88	28 52 77	4 12 24
	FTTH simplex	60	01-E9A2/CWJH-...27-FG	7	1
	FTTH Microtube	62	04-E9A2/MH(ZN)H-...H23	4.7	4
	FTTH indoor	64	04-E9A2/V(ZN)H-...28	8	4
	FTTH indoor HOMESTAR	66	01-E9A./F(ZN)H-...48 02-E9A./FSN(ZN)H-...48 04-E9A./FSN(ZN)H-...48	25 25 25	1 2 4

p = passed

Tube Ø mm	Ø Single fiber cable mm	Jacket Ø mm	Jacket material	Direct connector assembly	Tensile strength N	Crush resistance N/dm	Temperature range in service °C	Fire propagation IEC 60332-1	Fire propagation IEC 603332-3
0.9 0.9 0.9	2.0 2.0 2.0	10.0 12.0 15.0	LSFH™ LSFH™ LSFH™	• • •	1200 2400 4000	4000 4000 4000	−25 to +70 −25 to +70 −25 to +70	p p p	p p p
	3.0 3.0 3.0	8.5 10.4 19.5	LSFH™ LSFH™ LSFH™	• • •	800 1000 1200	15 000 15 000 15 000	−10 to +70 −10 to +70 −10 to +70	p p p	p p p
	3.6 3.6 3.6	10.1 12.4 17.0	LSFH™ LSFH™ LSFH™	• • •	1200 1200 1200	15 000 15 000 15 000	−10 to +70 −10 to +70 −10 to +70	p p p	p p p
0.9 0.9 0.9		5.0 7.0 8.8	LSFH™ LSFH™ LSFH™	• • •	1200 3000 4500	18 000 18 000 15 000	−20 to +70 −20 to +70 −20 to +70	p p p	p p p
0.9		2.7	LSFH™	•	400	7000	−25 to +70	p	p
		2.3	LSFH™	•	400	5000	−20 to +70		
0.6		2.8	LSFH™	•	400	2000	−40 to +70	p	
0.9 0.9 0.9		4.8 4.8 4.8	LSFH™ LSFH™ LSFH™	• • •	400 500 500	20 000 15 000 10 000	−25 to +70 −25 to +70 −25 to +70	p p p	

Semi-tight tubes 0.9 mm

Properties

- Metal free indoor cable
- For direct connector assembly
- Tube can be stripped up to 2 m in one piece
- Tight bending radii
- High flexibility
- Halogen free and non-corrosive fire gases
- Jacket material according to UL 94V-0
- Jelly free, dry

Applications

- Pigtail assemblies for fusion or mechanical splicing within distribution frames and termination boxes
- Mini patch cables within protected enclosures
- For termination with passive optical components such as connectors

Design

Tube	coloured fiber in dry tube (jelly free)	
Tube material	halogen free (LSFH)	
Tube colour	E9	yellow
	G50 - OM2	orange
	G50 - OM3	turquoise
	G50 - OM4	heather violet
	G62.5 - OM1	blue
	other colours on request	

According to IEC 60794-1-2

Ordering information

01-.../CH-...9

Please see page 128.

Semi-tight tubes 0.9 mm

Specification			Semi-tight tube dry	
Tube Ø		mm	0.9	
Approx. weight		kg/km	0.8	

Mechanical properties				
Tensile strength	during installation	N	20	IEC 60794-1-2 E1
	in service	N	10	
Min. bend radius [1]	during installation	mm	25	IEC 60794-1-2 E11
	in service	mm	25	
Crush resistance	short-term	N/dm	1000	IEC 60794-1-2 E3
	long-term	N/dm	500	
Impact resistance	Wp = 0.74 J	impacts	3	IEC 60794-1-2 E4
Kink resistance	r = 5 mm		passed	IEC 60794-1-2 E10
Torsion	± 360°, length = 1000 mm, F = 5N	cycles	3	IEC 60794-1-2 E7

Thermal properties				
Temperature range	during installation	°C	−10 to +50	IEC 60794-1-22 F12
	in service	°C	−25 to +75	
	in storage	°C	−40 to +75	

Combustion properties				
Fire load		MJ/m	0.02	
2011/65/EC (RoHS)			compliant	

[1] Smaller bending radius are possible with E9/125 LowBend (ITU G.657) and G50/125-OM3/OM4 BendOptimized.

Tight tubes 0.9 mm

Properties

- Metal free indoor cable
- For direct connector assembly
- Tube can be stripped up to 30 mm in one piece
- Tight bending radii
- For high mechanical and thermal stability
- Halogen free and non-corrosive fire gases
- Improved crush resistance

Applications

- Patch cable within distribution frames and termination boxes
- In thermally and mechanically critical environments
- For mobile or flexible systems

Design

Tube	buffer layer on fiber	
Tube material	halogen free (TPE)	
Tube colour	E9	yellow
	G50 – OM2	orange
	G50 – OM3	turquoise
	G50 – OM4	heather violet
	G62.5 – OM1	blue
	other colours on request	

According to IEC 60794-1-2

Ordering information

01-.../F-...9

Please see page 128.

Tight tubes 0.9 mm

Specification			Tight tube	
Tube Ø		mm	0.9	
Approx. weight		kg/km	0.8	

Mechanical properties				
Tensile strength	during installation (r ≥ 25 mm)	N	20	IEC 60794-1-2 E1
	in service (r ≥ 25 mm)	N	10	
Min. bend radius [1]	during installation	mm	25	IEC 60794-1-2 E11
	in service	mm	25	
Crush resistance	short-term	N/dm	1000	IEC 60794-1-2 E3
	long-term	N/dm	500	
Impact resistance	Wp = 0.74 J, r = 25 mm	impacts	100	IEC 60794-1-2 E4
Torsion	± 7200°, length = 1000 mm, F = 5 N	cycles	3	IEC 60794-1-2 E7

Thermal properties				
Temperature range	during installation	°C	−10 to +60	IEC 60794-1-22 F12
	in service	°C	−40 to +85	
	in storage	°C	−40 to +60	

Combustion properties			
Fire load	MJ/m	0.02	
2011/65/EC (RoHS)		compliant	

[1] Smaller bending radius are possible with E9/125 LowBend (ITU G.657) and G50/125-OM3/OM4 BendOptimized.

Tight tubes 0.6 mm

Properties

- Metal free indoor cable
- For direct connector assembly
- Tube can be stripped up to 30 mm in one piece
- Tight bending radii
- For high thermal stability
- Halogen free and non-corrosive fire gases

Applications

- Data cable in distribution network – FTTH
- Installation in indoor area

Design

Tube	coloured fiber with a transparent buffer layer	
Tube material	acrylat	
Tube colour	E9	yellow
	G50 - OM2	orange
	G50 - OM3	turquoise
	G50 - OM4	heather violet
	G62.5 - OM1	blue
	other colours on request	

According to IEC 60794-1-2

Ordering information

01-.../V-T6-...

Please see page 128.

Tight tubes 0.6 mm

Specification			Tight tube	
Tube Ø		mm	0.6	
Approx. weight		kg/km	0.3	
Mechanical properties				
Tensile strength	during installation	N	20	IEC 60794-1-2 E1
	in service	N	10	
Min. bend radius [1]	during installation	mm	25	IEC 60794-1-2 E11
	in service	mm	25	
Crush resistance	short-term	N/dm	500	IEC 60794-1-2 E3
	long-term	N/dm	250	
Thermal properties				
Temperature range	during installation	°C	−10 to +60	IEC 60794-1-22 F12
	in service	°C	−40 to +85	
	in storage	°C	−40 to +60	
Combustion properties				
Fire load		MJ/m	0.007	
2011/65/EC (RoHS)			compliant	

[1] Smaller bending radius are possible with E9/125 LowBend (ITU G.657) and G50/125-OM3/OM4 BendOptimized.

Simplex cables

Properties

- Metal free indoor cable
- Each fiber strain relieved
- For direct connector assembly with strain relief
- Tight bending radii
- High flexibility
- Halogen free and non-corrosive fire gases
- Jacket material according to UL 94V-0
- Low fire load for high safety requirements

Applications

- Patch cables for data centers
- Installation in indoor area
- Measurement cable withstanding mechanical loading
- Data cable in distribution centres
- Strain-relieved pigtail
- Ideal for applications involving safety requirements in case of fire

Design

Tube	tight buffered tube 0.6 mm, stripped up to 30 mm semi-tight tubes 0.9 mm, stripped up to 1 m	
Strain relief	aramide yarn	
Jacket material	LSFH™	
Tube colour	E9	yellow
	G50 - OM2	orange
	G50 - OM3	turquoise
	G50 - OM4	heather violet
	G62.5 - OM1	orange

According to IEC 60794-1-2

Ordering information

01-.../VJH-...14
01-.../CWJH-...17
01-.../CWJH-...20
01-.../CWJH-...24
01-.../CWJH-...27

Please see page 129.

Simplex cables

Specification								
Jacket Ø		mm	1.4	1.7	2.0	2.4	2.7	
Tube Ø		mm	0.6	0.9	0.9	0.9	0.9	
Approx weight		kg/km	2.0	3.0	4.0	5.3	7.0	

Mechanical properties								
Tensile strength	during installation	N	150	150	400	400	400	IEC 60794-1-2 E1
	in service	N	100	100	200	200	200	
Min. bend radius [1]	during installation	mm	25	50	50	50	50	IEC 60794-1-2 E11
	in service	mm	25	25	25	25	25	
Crush resistance	short-term	N/dm	2000	3000	3000	5000	5000	IEC 60794-1-2 E3
	long-term	N/dm	500	1000	1000	1000	1000	
Impact resistance	Wp = 0.74 J Wp = 0.5 J Wp = 1.0 J	impacts	10	 3	 3	10	 20	IEC 60794-1-2 E4
Repeated bending	r = 25 mm	cycles	1000	5000	5000	1000	5000	IEC 60794-1-2 E6

Thermal properties								
Temperature range	during installation	°C	−10 to +50	−10 to +50	−10 to +50	−10 to +50	−10 to +50	IEC 60794-1-22 F12
	in service	°C	−25 to +70	−25 to +70	−25 to +70	−25 to +70	−10 to +70	
	in storage	°C	−40 to +70	−40 to +70	−40 to +70	−40 to +70	−40 to +70	

Combustion properties								
Fire load		MJ/m	0.05	0.08	0.10	0.15	0.17	
Fire propagation	on vertical single cable on vertical cable bundle				p p	p p	p p	IEC 60332-1-2 IEC 60332-3-25
Smoke density			p	p	p	p	p	IEC 61034-2
Halogen acid gas	jacket material		p	p	p	p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	p	p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant					

p = passed

[1] Smaller bending radius are possible with E9/125 LowBend (ITU G.657) and G50/125-OM3/OM4 BendOptimized.

Duplex figure 8 (zip cord)

Properties

- Metal free indoor cable
- Each fiber strain relieved
- For direct connector assembly with strain relief
- Tight bending radii
- For high thermal stability
- Halogen free and non-corrosive fire gases
- Jacket material according to UL 94V-0
- Low fire load for high safety requirements

Applications

- Installation in indoor area
- Patch cable in distribution centres
- Data cable in distribution networks
- Ideal for applications involving safety requirements in case of fire

Design

Tube	2 semi-tight tubes 0.9 mm 2 tight tubes 0.6 mm/0.9 mm	
Strain relief	aramide yarn	
Jacket material	LSFH™	
Tube colour	E9	yellow
	G50 - OM2	orange
	G50 - OM3	turquoise
	G50 - OM4	heather violet
	G62.5 - OM1	orange

According to IEC 60794-1-2

Ordering information

02-.../VJH-...14
02-.../FJH-...17
02.../CWJH-...17
02.../CWJH-...20
02.../CWJH-...27

Please see page 130.

Duplex figure 8 (zip cord)

Specification								
Jacket Ø		mm	1.4 x 3.0	1.7 x 3.5	1.7 x 3.5	2.0 x 4.1	2.7 x 5.5	
Single fiber cable Ø		mm	1.4	1.7	1.7	2.0	2.7	
Tube Ø		mm	0.6 tight	0.9 tight	0.9 semi-tight	0.9 semi-tight	0.9 semi-tight	
Channel marking on single fiber								inscription on one side
Approx weight		kg/km	4.4	6.5	6.6	9.0	14.3	

Mechanical properties								
Tensile strength	during installation	N	300	300	300	800	800	IEC 60794-1-2 E1
	in service	N	2 × 100	2 × 100	2 × 100	2 × 200	2 × 200	
Min. bend radius [1]	during installation	mm	25	50	50	50	50	IEC 60794-1-2 E11
	in service	mm	25	25	25	25	25	
Crush resistance	short-term	N/dm	7500	10 000	10 000	10 000	10 000	IEC 60794-1-2 E3
	long-term	N/dm	2500	4000	4000	5000	5000	
Impact resistance	Wp = 0.74 J Wp = 1.0 J	impacts	10	40	40	 20	 20	IEC 60794-1-2 E4
Repeated bending	r = 25 mm, weight = 0.5 kg	cycles	1000	5000	5000	5000	10 000	IEC 60794-1-2 E6

Thermal properties								
Temperature range	during installation	°C	−10 to +50	−10 to +50	−10 to +50	−10 to +50	−10 to +50	IEC 60794-1-22 F1
	in service	°C	−25 to +70	−40 to +70	−25 to +70	−25 to +70	−10 to +70	
	in storage	°C	−40 to +70	−40 to +70	−40 to +70	−40 to +70	−25 to +70	

Combustion properties								
Fire load		MJ/m	0.10	0.13	0.13	0.22	0.34	
Fire propagation	on a vertical single cable					p	p	IEC 60332-1-2
	on a vertical cable bundle					p	p	IEC 60332-3-25
Halogen acid gas	jacket material		p	p	p	p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	p	p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant					

p = passed

[1] Smaller bending radius are possible with E9/125 LowBend (ITU G.657) and G50/125-OM3/OM4 BendOptimized

Duplex cables figure 0

Properties

- Metal free indoor cable
- Each fiber strain relieved
- For direct connector assembly with strain relief
- Tight bending radii
- Low fire load for high safety requirements
- Jacket material according to UL 94V-0
- Halogen free and non-corrosive fire gases

Applications

- Installation in indoor area
- Patch cable in distribution centres
- Data cable in distribution networks
- Ideal for applications involving safety requirements in case of fire

Design

Tube	2 simplex cables with semi-tight tubes 0.9 mm 2 simplex cables with tight tubes 0.6 mm	
Strain relief	aramide yarn	
Jacket material	LSFH™	
Tube colour	E9	yellow
	G50 - OM2	orange
	G50 - OM3	turquoise
	G50 - OM4	heather violet
	G62.5 - OM1	orange

According to IEC 60794-1-2

Ordering information

02-.../VJH-A...14
02-.../CWJH-A...20
02-.../CWJH-A...27

Please see page 131.

Duplex cables figure 0

Specification						
Jacket Ø		mm	2.3 × 3.7	3.1 × 5.2	3.5 × 6.2	
Single fiber cable Ø		mm	1.4	2.0	2.7	
Tube Ø		mm	0.6 tight	0.9 semi-tight	0.9 semi-tight	
Channel marking on single cable			numbered	numbered	coloured	
Approx. weight		kg/km	9.4	13.7	24	

Mechanical properties						
Tensile strength	during installation	N	300	800	800	IEC 60794-1-2 E1
	in service	N	2 × 100	2 × 200	2 × 200	
Min. bend radius [1]	during installation	mm	25	50	50	IEC 60794-1-2 E11
	in service	mm	25	25	25	
Crush resistance	short-term	N/dm	9000	7000	10 000	IEC 60794-1-2 E3
	long-term	N/dm	4000	5000	5000	
Impact resistance	Wp = 1.0 J	impacts	50	20	20	IEC 60794-1-2 E4
Repeated bending	r = 25 mm, weight = 0.5 kg	cycles	10 000	10 000	10 000	IEC 60794-1-2 E6

Thermal properties						
Temperature range	during installation	°C	−10 to +50	−10 to +50	−10 to +50	IEC 60794-1-22 F12
	in service	°C	−25 to +70	−10 to +70	−10 to +70	
	in storage	°C	−25 to +70	−25 to +70	−25 to +70	

Combustion properties						
Fire load		MJ/m	0.22	0.33	0.45	
Fire propagation	on a vertical single cable		p	p	p	IEC 60332-1-2
	on a vertical cable bundle		p	p	p	IEC 60332-3-25
Halogen acid gas	jacket material		p	p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant			

p = passed

[1] Smaller bending radius are possible with E9/125 LowBend (ITU G.657) and G50/125-OM3/OM4 BendOptimized.

Duplex round cables (LC uniboot compatible)

Properties

- Metal free indoor cable
- Strain relieve with aramide yarn
- For direct connector assembly
- Tight bending radii
- High flexibility
- Low smoke, halogen free and self-extinguishing
- Jacket material according to UL 94V-0
- LC Uniboot compatible

Applications

- Patch cables for data centers
- Duplex cable for LC Uniboot

Design

Tube	2 tight buffered tubes 0.6 mm	
Strain relief	aramide yarn	
Jacket material	LSFH™	
Tube colour	E9 low bend	yellow
	G50 - OM3	turquoise
	G50 - OM4	heather violet

According to IEC 60794-1-2

Ordering information

02-.../V(ZN)H-...21

Please see page 131.

Duplex round cables (LC uniboot compatible)

Specification				
Jacket Ø		mm	2.1	
Tube Ø		mm	0.6 tight	
Approx. weight		kg/km	4.3	

Mechanical properties				
Tensile strength	during installation	N	200	IEC 60794-1-2 E1
	in service	N	100	
Min. bend radius	during installation	mm	10	IEC 60794-1-2 E11
	in service	mm	15	
Crush resistance	short-term	N/dm	5000	IEC 60794-1-2 E3
	long-term	N/dm	900	
Kink resistance	radius 3 mm		p	IEC 60794-1-2 E10

Thermal properties				
Temperature range	during installation	°C	−10 to +50	IEC 60794-1-22-F1
	in service	°C	−25 to +70	
	in storage	°C	−25 to +70	

Combustion properties				
Fire load		MJ/m	0.11	
Fire propagation	on a vertical single cable		p	IEC 60332-1-2
	on a vertical cable bundle		p	IEC 60332-3-25
Halogen acid gas	jacket material		p	IEC 60754-1
Degree of acidity	jacket material		p	IEC 60754-2
2011/65/EC (RoHS)			compliant	

p = passed

OptiPack cable with 12 and 24 fibers

Properties

- Metal free indoor cable
- Strain relieved with aramid yarn
- For direct connector assembly with strain relief
- Tight bending radii
- Low smoke, halogen free and self-extinguishing
- Jacket material according to UL 94V-0
- Optimized outer-diameter construction

Applications

- data center
- Fits multi fiber connectors (as MPO®/MTP)

Design

Strain relief	aramide yarn	
Jacket material	LSFH™	
Tube colour	E9 low bend	yellow
	G50 - OM3	turquoise
	G50 - OM4	heather violet

According to IEC 60794-1-2

Ordering information

12-.../(ZN)H-...30
24-.../(ZN)H-...36

Please see page 132.

OptiPack cable with 12 and 24 fibers

Specification					
Jacket Ø		mm	3.0	3.6	
Number of fiber			12	24	
Approx. weight		kg/km	8.3	11	

Mechanical properties					
Tensile strength	during installation	N	500	500	IEC 60794-1-2 E1
	in service	N	200	200	
Min. bend radius	during installation	mm	20	20	IEC 60794-1-2 E11
	in service	mm	10	10	
Crush resistance	short-term	N/dm	5000	5000	IEC 60794-1-2 E3
	long-term	N/dm	1000	1000	
Impact resistance	Wp = 1.0 J	impacts	50	50	IEC 60794-1-2 E4
Kink resistance	r = 5 mm		p	p	IEC 60794-1-2 E10

Thermal properties					
Temperature range	during installation	°C	−10 to +50	−10 to +50	IEC 60794-1-22 F1
	in service	°C	−20 to +70	−20 to +70	
	in storage	°C	−20 to +70	−20 to +70	

Combustion properties					
Fire load		MJ/m	0.18	0.24	
Fire propagation	on a vertical single cable on a vertical cable bundle		p p	p p	IEC 60332-1-2 IEC 60332-3-25
Smoke density			p	p	IEC 61034-2
Halogen acid gas	jacket material		p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant	compliant	

p = passed

Breakout cables 1.4 mm

Properties

- Metal free indoor cable
- Each fiber strain relieved
- For direct connector assembly with strain relieved
- Ripcord for easy jacket removal
- Low smoke, halogen free and self-extinguishing
- Optimized outer-diameter construction

Applications

- Installation in indoor areas
- Data cable in distribution networks
- For installations in cable ducts
- For horizontal and collapsed backbone cabling
- Terminations possible for SFF connectors only

Design

Cable design	central strength member, non-metallic 12 to 24 single fiber cables with tight buffered tube 0.6 mm strain relief (aramide yarn) separating tape and 1 ripcord	
Channel marketing	single fiber cable numbered	
Jacket material	LSFH™	
Tube/jacket colour	E9	yellow
	G50 - OM3	turquoise
	G50 - OM4	heather violet
	G62.5 - OM1	orange

According to IEC 60794-1-2

Ordering information

12-.../VJSNH-...14
16-.../VJSNH-...14
24-.../VJSNH-...14

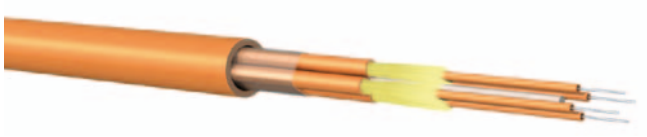
Please see page 132.

Breakout cables 1.4 mm

Specification			12	16	24	
Jacket Ø		mm	9.0	9.0	10.6	
Single fiber cable Ø		mm	1.4	1.4	1.4	numbered
Tube Ø		mm	0.6	0.6	0.6	
Approx. weight		kg/km	83	76	105	
Mechanical properties						
Tensile strength	during installation	N	3000	4000	5000	IEC 60794-1-2 E1
	in service	N	12 × 70	16 × 70	24 × 70	
Min. bend radius	during installation	mm	130	130	160	IEC 60794-1-2 E11
	in service	mm	90	90	100	
Crush resistance	short-term	N/dm	12 000	12 000	9000	IEC 60794-1-2 E3
	long-term	N/dm	3000	3000	3000	
Impact resistance	Wp = 2.21 J	impacts	100	100	100	IEC 60794-1-2 E4
Repeated bending	r = 100 mm r = 200 mm	cycles	2000	2000	 2000	IEC 60794-1-2 E6
Thermal properties						
Temperature range	during installation	°C	−10 to +60			IEC 60794-1-22 F1
	in service	°C	−25 to +70			
	in storage	°C	−25 to +70			
Combustion properties						
Fire load		MJ/m	2.2	2.3	3.1	
Fire propagation	on a vertical single cable		p	p	p	IEC 60332-1-2
	on a vertical cable bundle		p	p	p	IEC 60332-3-25
Smoke density			p	p	p	IEC 61034-2
Halogen acid gas	jacket material		p	p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant	compliant	compliant	

p = passed

Breakout cables 2.0 mm



Properties

- Metal free indoor cable
- Each fiber strain relieved
- For direct connector assembly with strain relief
- Ripcord for easy jacket removal
- Low smoke, halogen free and self-extinguishing
- Cable with improved fire performance

Applications

- Installation in indoor areas
- Data cable in distribution networks
- For installation in cable ducts
- Deal for applications involving high safety requirements in case of fire
- For horizontal and collapsed backbone cabling

Design

Cable design	central strengh member, non-metallic 4 to 16 single fiber cables with semi-tight tubes strain relief (aramide yarn) separating tape and 1 ripcord	
Channel marketing	single fiber cable numbered	
Jacket material	LSFH™	
Tube/jacket colour	E9	yellow
	G50 - OM2	orange
	G50 - OM3	turquoise
	G50 - OM4	heather violet
	G62.5 - OM1	orange

According to IEC 60794-1-2

Ordering information

04-.../CWJSNH-...20
08-.../CWJSNH-...20
12-.../CWJSNH-...20
16-.../CWJSNH-...20

Please see page 133.

Approvals

Germanischer Lloyd,
GL-approval certificate no. 24 367-04 HH
Lloyd's Register
LR-approval certificate no. 05/200 44

Breakout cables 2.0 mm

Specification			4	8	12	16	
Jacket Ø		mm	7.0	9.0	12.0	12.0	
Single fiber cable Ø		mm	2.0	2.0	2.0	2.0	numbered
Tube Ø		mm	0.9	0.9	0.9	0.9	
Approx. weight		kg/km	48	77	146	130	
Mechanical properties							
Tensile strength	during installation	N	1200	2400	4000	4800	IEC 60794-1-2 E1
	in service	N	4 × 100	8 × 100	12 × 100	16 × 100	
Min. bend radius	during installation	mm	100	120	180	180	IEC 60794-1-2 E11
	in service	mm	70	80	120	120	
Crush resistance	short-term	N/dm	7500	7500	7500	4000	IEC 60794-1-2 E3
	long-term	N/dm	2000	2000	2000	2000	
Impact resistance	Wp = 2.21 J, r = 25 mm	impacts	50	50	50	50	IEC 60794-1-2 E4
Repeated bending	r = 100 mm	cycles	1000	1000	1000	1000	IEC 60794-1-2 E6
Flexing		cycles	5000	5000	5000	10 000	IEC 60794-1-2 E8
Torsion	± 360°, l = 1000 mm m = 2 kg	cycles	25 000	25 000	25 000	25 000	IEC 60794-1-2 E7
Thermal properties							
Temperature range	during installation	°C	−10 to +60				IEC 60794-1-22 F12
	in service	°C	−25 to +70				
	in storage	°C	−40 to +70				
Combustion properties							
Fire load		MJ/m	1.09	1.72	3.40	3.00	
Fire propagation	on a vertical single cable		p	p	p	p	IEC 60332-1
	on a vertical cable bundle		p	p	p	p	IEC 60332-3-24
Smoke density			p	p	p	p	IEC 61034-2
Halogen acid gas	jacket material		p	p	p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant				

p = passed

Fire resistant breakout cables 2.0 mm

Properties

- Metal free indoor cable
- Each fiber strain relieved
- For direct connector assembly with strain relief
- Ripcord for easy jacket removal
- Low smoke, halogen free and self-extinguishing
- Cable with improved fire performance

Applications

- Installation in indoor areas
- Data cable in distribution networks
- For installation in cable ducts
- Ideal for applications involving high safety requirements in case of fire
- For horizontal and collapsed backbone cabling

Design

Cable design	central strengh member, non-metallic 4 to 12 single fiber cables with semi-tight tubes strain relief (aramide yarn) separating tape and 1 ripcord	
Channel marketing	single fiber cable numbred	
Jacket material	LSFH™ – double jacket with flame barrier	
Tube/jacket colour	E9	yellow
	G50 – OM2	orange
	G50 – OM3	turquoise
	G50 – OM4	heather violet
	G62.5 – OM1	orange

According to IEC 60794-1-2

Ordering information

04-.../CWJSNHIH-...20
08-.../CWJSNHIH-...20
12-.../CWJSNHIH-...20

Please see page 133.

Approvals

Germanischer Lloyd,
GL-approval certificate no. 26 976-05 HH
Lloyd's Register
LR-approval certificate no. 06/20007

Fire resistant breakout cables 2.0 mm

Specification			4	8	12	
Jacket Ø		mm	10.0	12.0	15.0	
Single fiber cable Ø		mm	2.0	2.0	2.0	numbered
Tube Ø		mm	0.9	0.9	0.9	
Approx. weight		kg/km	108	147	216	
Mechanical properties						
Tensile strength	during installation	N	1200	2400	4000	IEC 60794-1-2 E1
	in service	N	4 × 100	8 × 100	12 × 100	
Min. bend radius	during installation	mm	145	175	220	IEC 60794-1-2 E11
	in service	mm	95	115	145	
Crush resistance	short-term	N/dm	4000	4000	4000	IEC 60794-1-2 E3
	long-term	N/dm	2000	2000	2000	
Impact resistance	Wp = 2.21 J, r = 25 mm	impacts	50	50	50	IEC 60794-1-2 E4
Repeated bending	r = 100 mm	cycles	1000	1000	1000	IEC 60794-1-2 E6
Thermal properties						
Temperature range	during installation	°C	−10 to +60			IEC 60794-1-22 F12
	in service	°C	−25 to +70			
	in storage	°C	−40 to +70			
Combustion properties						
Fire load		MJ/m	2.50	3.35	5.00	
Fire propagation	on a vertical single cable		p	p	p	IEC 60332-1-2
	on a vertical cable bundle		p	p	p	IEC 60332-3-24
Fire test	with circuit integrity (CI)	min.	180	180	180	IEC 60331-25
Fire test	with circuit integrity (CI) with shock	min.	180	180	180	IEC 60331-31
Smoke density			p	p	p	IEC 61034-2
Halogen acid gas	jacket material		p	p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant			

p = passed

OptiPack breakout cables 24 to 144 fibers

Properties

- Single tubes with 12 fibers
- Metal free indoor cable
- Strain relieved with aramide yarn
- Ripcord for easy jacket removal
- Low smoke, halogen free and self-extinguishing
- Cable with improved fire performance

Applications

- Installation in indoor areas
- Data cable in distribution networks
- Ideal for applications involving high safety requirements in case of fire
- For horizontal and collapsed backbone cabling
- Fits multi fiber connectors (MPO®/MTP)

Design

Cable design	central strength member, non-metallic 24 to 144 optical fibers strain relief (aramide yarn) separating tape and 1 ripcord	
Jacket material	LSFH™	
Channel marketing	single fiber cable numbred	
Tube/jacket colour	E9 low bend	yellow
	G50 – OM3	turquoise
	G50 – OM4	heather violet

According to IEC 60794-1-2

Ordering information

24-12.../(ZN)SNH-...30
48-12.../(ZN)SNH-...30
72-12.../(ZN)SNH-...30
144-12.../(ZN)SNH-...30

Please see page 134.

OptiPack breakout cables 24 to 144 fibers

Specification			24/48 fibers	72 fibers	144 fibers	
Jacket Ø		mm	8.5	10.4	13.5	
Single cable Ø		mm	3.0	3.0	3.0	numbered
Approx. weight		kg/km	58	92	145	
Mechanical properties						
Tensile strength	during installation	N	800	1000	1200	IEC 60794-1-2 E1
	in service	N	400	500	600	
Min. bend radius	during installation	mm	90	100	190	IEC 60794-1-2 E11
	in service	mm	130	150	200	
Crush resistance	short-term	N/dm	15 000	15 000	15 000	IEC 60794-1-2 E3
	long-term	N/dm	2000	2000	2000	
Impact resistance	Wp = 2.21 J	impacts	3	3	3	IEC 60794-1-2 E4
Kink resistance	r = 20 mm r = 30 mm		p	p	 p	IEC 60794-1-2 E10
Thermal properties						
Temperature range	during installation	°C	−10 to +50	−10 to +50	−10 to +50	IEC 60794-1-22 F12
	in service	°C	−10 to +70	−10 to +70	−10 to +70	
	in storage	°C	−20 to +70	−20 to +70	−20 to +70	
Combustion properties						
Fire load		MJ/m	1.4	2.2	3.3	
Fire propagation	on a vertical single cable on a vertical cable bundle		p p	p p	p p	IEC 60332-1-2 IEC 60332-3-25
Smoke density			p	p	p	IEC 61034-2
Halogen acid gas	jacket material		p	p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant	compliant	compliant	

p = passed

OptiPack breakout cables 48 to 288 fibers

Properties

- Single tubes with 24 fibers
- Metal free indoor cable
- Strain relieved with aramide yarn
- Ripcord for easy jacket removal
- Low smoke, halogen free and self-extinguishing
- Cable with improved fire performance

Applications

- Installation in indoor areas
- Data cable in distribution networks
- Ideal for applications involving high safety requirements in case of fire
- For horizontal and collapsed backbone cabling
- Fits multi fiber connectors (MPO®/MTP)

Design

Cable design	central strength member, non-metallic 48 to 288 optical fibers strain relief (aramide yarn) separating tape and 1 ripcord	
Jacket material	LSFH™	
Channel marketing	single fiber cable numbred	
Tube/jacket colour	E9 low bend	yellow
	G50 – OM3	turquoise
	G50 – OM4	heather violet

According to IEC 60794-1-2

Ordering information

48-24.../(ZN)SNH-...36
96-24.../(ZN)SNH-...36
144-24.../(ZN)SNH-...36
288-24.../(ZN)SNH-...36

Please see page 134.

OptiPack breakout cables 48 to 288 fibers

Specification			48/96 fibers	144 fibers	288 fibers	
Jacket Ø		mm	10.1	12.4	17.0	
Single cable Ø		mm	3.6	3.6	3.6	numbered
Approx. weight		kg/km	83	137	212	
Mechanical properties						
Tensile strength	during installation	N	1200	1200	1200	IEC 60794-1-2 E1
	in service	N	600	600	600	
Min. bend radius	during installation	mm	150	180	250	IEC 60794-1-2 E11
	in service	mm	100	120	170	
Crush resistance	short-term	N/dm	15 000	15 000	15 000	IEC 60794-1-2 E3
	long-term	N/dm	2000	2000	2000	
Impact resistance	Wp = 2.21 J	impacts	20	20	20	IEC 60794-1-2 E4
Kink resistance	r = 30 mm		p	p	p	IEC 60794-1-2 E10
Thermal properties						
Temperature range	during installation	°C	−10 to +50			IEC 60794-1-22 F1
	in service	°C	−10 to +70			
	in storage	°C	−20 to +70			
Combustion properties						
Fire load		MJ/m	1.93	3.1	4.6	
Fire propagation	on a vertical single cable		p	p	p	IEC 60332-1-2
	on a vertical cable bundle		p	p	p	IEC 60332-3-25
Smoke density			p	p	p	IEC 61034-2
Halogen acid gas	jacket material		p	p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant			

p = passed

Riser cables (distribution cables)

Properties

- Metal free indoor cable
- Strain relief with aramide yarn
- For direct connector assembly
- Ripcord for easy jacket removal
- For high mechanical and thermal stability
- Low smoke, halogen free and self-extinguishing

Applications

- Internal building distribution
- Rising zone/LAN
- Applications with high safety requirements
- For horizontal and collapsed backbone cabling

Design

Cable design	central strengh member, non-metallic 4 to 24 tight tube fibers strain relief (aramide yarn) 1 ripcord
Tube colour	according to colour code
Jacket material	LSFH™
Outer jacket colour	black

According to IEC 60794-1-2

Ordering information

04-.../FSN(ZN)H-...50
12-.../FSN(ZN)H-...70
24-.../FSN(ZN)H-...88

Please see page 135.

Riser cables (distribution cables)

Specification			4	12	24	fiber
Jacket Ø		mm	5.0	7.0	8.8	
Tube Ø		mm	0.9	0.9	0.9	coloured
Approx. weight		kg/km	28	52	77	
Mechanical properties						
Tensile strength	during installation	N	1200	3000	4500	IEC 60794-1-2 E1
	in service	N	400	1000	1500	
Min. bend radius [1]	during installation	mm	100	130	130	IEC 60794-1-2 E11
	in service	mm	50	70	100	
Crush resistance	short-term	N/dm	18 000	18 000	15 000	IEC 60794-1-2 E3
	long-term	N/dm	3000	3000	2000	
Impact resistance	Wp = 2.21 J	impacts	100	100	100	IEC 60794-1-2 E4
Repeated bending	r = 50 mm	cycles	1000	2000	2000	IEC 60794-1-2 E6
Thermal properties						
Temperature range	during installation	°C	−10 to +50			IEC 60794-1-22 F1
	in service	°C	−20 to +70			
	in storage	°C	−25 to +70			
Combustion properties						
Fire load		MJ/m	0.4	1.1	1.9	
Fire propagation	on a vertical single cable		p	p	p	IEC 60332-1-2
	on a vertical cable bundle		p	p	p	IEC 60332-3-24
Smoke density			p	p	p	IEC 61034-2
Halogen acid gas	jacket material		p	p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant			

p = passed

[1] Smaller bending radius are possible with E9/125 LowBend (ITU G.657) and G50/125-OM3/OM4 BendOptimized.

FTTH simplex indoor cables

Properties

- Metal free indoor cable
- Strain relief with aramide yarn
- Tube can be stripped up to 1 m in one piece
- For direct connector assembly
- Tight bending radii
- Low smoke, halogen free and non-corrosive
- Jacket material according to UL94V-0

Applications

- Data cable in distribution network – FTTH
- Installation in indoor areas
- For horizontal and collapsed backbone cabling

Design

Cable design	1 semi-tight tube
Strain relief	aramide yarn
Jacket material	LSFH™
Jacket colour	white/grey

According to IEC 60794-1-2

Ordering information

01-E9A2/CWJH-...27-FG

Please see page 134.

FTTH simplex indoor cables

Specification				
Jacket Ø		mm	2.7	
Tube Ø		mm	0.9	
Approx. weight		kg/km	7.0	

Mechanical properties				
Tensile strength	during installation	N	400	IEC 60794-1-2 E1
	in service	N	200	
Min. bend radius [1]	during installation	mm	50	IEC 60794-1-2 E11
	in service	mm	25	
Crush resistance	short-term	N/dm	7000	IEC 60794-1-2 E3
	long-term	N/dm	5000	
Impact resistance	Wp = 1.0 J	impacts	20	IEC 60794-1-2 E4
Repeated bending	r = 25 mm	cycles	5000	IEC 60794-1-2 E6

Thermal properties				
Temperature range	during installation	°C	−10 to +50	IEC 60794-1-22 F12
	in service	°C	−25 to +70	
	in storage	°C	−25 to +70	

Combustion properties				
Fire load		MJ/m	0.17	
Fire propagation	on a vertical single cable		p	IEC 60332-1
	on a vertical cable bundle		p	IEC 60332-3-25
Halogen acid gas	jacket material		p	IEC 60754-1
Degree of acidity	jacket material		p	IEC 60754-2
2011/65/EC (RoHS)			compliant	

p = passed

[1] Smaller bending radius are possible with E9/125 LowBend (ITU G.657) and G50/125-OM3/OM4 BendOptimized.

FTTH Microtube

Properties

- Metal free indoor cable
- Strain relieved with aramide yarn
- Ripcord for easy jacket removal
- No need for cleaning the fibers (jelly free)
- Tight bending radii
- Halogen free and non-corrosive fire gases
- Jacket material according to UL 94V-0
- Easy stripping

Applications

- Data cable in distribution network – FTTH
- Installation in indoor areas
- For horizontal and collapsed backbone cabling

Design

Cable design	Microtube dry with 4 fibers
Strain relief	aramide yarn
Jacket material	LSFH™
Jacket colour	white/grey

According to IEC 60794-1-2

Ordering information

04-E9A2/MH(ZN)H-...23

Please see page 135.

FTTH Microtube

Specification				
Number of fibers			4	
Jacket Ø		mm	2.3	
Approx. weight		kg/km	4.7	

Mechanical properties				
Tensile strength	during installation	N	400	IEC 60794-1-2 E1
	in service	N	200	
Min. bend radius	during installation	mm	15	IEC 60794-1-2 E11
	in service	mm	25	
Crush resistance	short-term	N/dm	5000	IEC 60794-1-2 E3
	long-term	N/dm	400	
Impact resistance	Wp = 1 J	impacts	3	IEC 60794-1-2 E4
Kink resistance	r = 5 mm		p	IEC 60794-1-2 E10
Coiling capability	length = 100 m/r =45 mm	cycles	3	HUBER+SUHNER

Thermal properties				
Temperature range	during installation	°C	−10 to +60	IEC 60794-1-22 F1
	in service	°C	−20 to +70	
	in storage	°C	−20 to +70	

Combustion properties				
Fire load		MJ/m	0.12	
Smoke density			p	IEC 61034-2
Halogen acid gas	jacket material		p	IEC 60754-1
Degree of acidity	jacket material		p	IEC 60754-2
2011/65/EC (RoHS)			compliant	

p = passed

FTTH indoor cables with tight tubes 0.6 mm

Properties

- Metal free indoor and outdoor cable
- Strain relieved with aramide yarn
- For direct connector assembly
- Tight bending radii
- Halogen free and non-corrosive fire gases
- Optimized outer-diameter construction

Applications

- Data cable in distribution network – FTTH
- Installation in indoor areas
- For horizontal and collapsed backbone cabling

Design

Cable design	4 tight tubes buffered 0.6 mm, easy stripping
Strain relief	aramide yarn
Jacket material	LSFH™
Jacket colour	grey

According to IEC 60794-1-2

Ordering information

04-E9A2/V(ZN)H-...28

Please see page 135.

FTTH indoor cables with tight tubes 0.6 mm

Specification				
Number of fibers		mm	4	
Jacket Ø			2.8	
Tube Ø		mm	0.6	easy stripping/coloured
Approx. weight		kg/km	8	

Mechanical properties				
Tensile strength	during installation	N	400	IEC 60794-1-2 E1
	in service	N	200	
Min. bend radius	during installation	mm	7.5	IEC 60794-1-2 E11
	in service	mm	7.5	
Crush resistance	short-term	N/dm	2000	IEC 60794-1-2 E3
	long-term	N/dm	1000	
Impact resistance	Wp = 1 J	impacts	5	IEC 60794-1-2 E4
Repeated bending	r = 30 mm	cycles	5000	IEC 60794-1-2 E6
Kink resistance	r = 6 mm	cycles	p	IEC 60794-1-2 E10
Coiling capability	length = 100 m/r = 70 mm	cycles	3	HUBER+SUHNER

Thermal properties				
Temperature range	during installation	°C	–20 to +70	IEC 60794-1-22 F1
	in service	°C	–40 to +70	
	in storage	°C	–40 to +70	

Combustion properties				
Fire load		MJ/m	0.19	
Fire propagation	on a vertical single cable		p	IEC 60332-1-2
Smoke density			p	IEC 61034-2
Halogen acid gas	jacket material		p	IEC 60754-1
Degree of acidity	jacket material		p	IEC 60754-2
2011/65/EC (RoHS)			compliant	

p = passed

FTTH indoor cables HOMESTAR

Properties

- Metal free indoor and outdoor cable
- Strain relieved with aramide yarn
- For direct connector assembly
- Tight bending radii
- Low smoke, halogenfree and self-extinguishing

Applications

- Data cable in distribution network – FTTH
- Installation in indoor areas
- For horizontal and collapsed backbone cabling

Design

Cable design	central strength member, non-metallic 1, 2 to 4 tight buffered tubes
Strain relief	aramide yarn
Jacket material	LSFH™
Jacket colour	grey

According to IEC 60794-1-2

Ordering information

01-E9A.../F(ZN)H-...48
02-E9A.../FSN(ZN)H-...48
04-E9A.../FSN(ZN)H-...48

Please see page 135.

FTTH indoor cables HOMESTAR

Specification						
Number of fibers			1	2	4	
Jacket Ø		mm	4.8	4.8	4.8	
Tube Ø		mm	0.9	0.9	0.9	coloured
Approx. weight		kg/km	25	25	25	

Mechanical properties						
Tensile strength	during installation	N	400	500	500	IEC 60794-1-2 E1
	in service	N	200	300	300	
Min. bend radius	during installation	mm	10	10	10	IEC 60794-1-2 E11
	in service	mm	10	10	10	
Crush resistance	short-term	N/dm	20 000	15 000	10 000	IEC 60794-1-2 E3
	long-term	N/dm	1500	1500	1500	
Impact resistance	Wp = 2.21 J	impacts	100	100	100	IEC 60794-1-2 E4
Repeated bending	r = 30 mm	cycles	5000	5000	5000	IEC 60794-1-2 E6
Kink resistance	r = 7.5 mm		p	p	p	IEC 60794-1-2 E10
Torsion	angle = ± 360° / length = 500 mm	cycles	1000	1000	1000	IEC 60794-1-2 E7
H+S Crush resistance	short-term long-term	N/5 mm N/5 mm	400 200	500 300	500 300	HUBER+SUHNER

Thermal properties						
Temperature range	during installation	°C	−10 to +50			IEC 60794-1-22 F1
	in service	°C	−25 to +70			
	in storage	°C	−25 to +70			

Combustion properties						
Fire load		MJ/m	0.6	0.6	0.6	
Fire propagation	on a vertical single cable		p	p	p	IEC 60332-1-2
Smoke density			p	p	p	IEC 61034-2
Halogen acid gas	jacket material		p	p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant			

p = passed

Universal cables

	Cable type	Page	Ordering key	Weight kg/km	Amount of fibers
	Jelly free – dry block multi-fiber loose tube up to 24 fibers	70	12-.../BQ(ZN)H-...35 24-.../Q(ZN)H-...50	11.4 25	2 to 12 2 to 24
	Jelly free – dry blockglass-armoured multi-fiber loose tube up to 24 fibers	72	24-.../Q(ZNG)H-...70	96	2 to 24
	Non-armoured multi-fiber loose tube up to 24 fibers	74	12-.../BW(ZN)H-...35 24-.../W(ZNG)H-...50	10.3 27	2 to 12 2 to 24
	Glass-armoured multi-fiber loose tube up to 24 fibers	76	24-.../W(ZNG)H-...70 24-.../W(ZNG)H-...85 24-.../W(ZNG)H-...120	55 83 178	2 to 24 2 to 24 2 to 24
	Glass-armoured multi-fiber loose tube TWINTUBE up to 24 fibers	78	24-.../W(ZNG)H-...94	101	up to 24
	Glass-armoured multi-fiber loose tube up to 144 fibers	80	24-.../BWSN(ZNG)H-...96 48-.../BWSN(ZNG)H-...96 72-.../BWSN(ZNG)H-...106 96-.../BWSN(ZNG)H-...122 144-.../BWSN(ZNG)H-...145	109 109 119 151 220	up to 24 up to 48 up to 72 up to 96 up to 144
	Steel-armoured multi-fiber loose tube up to 24 fibers	82	24-.../W(ZN)HAH-...80	82	2 to 24
	Steel-armoured multi-fiber loose tube TWINTUBE up to 24 fibers	82	24-.../W(ZNG)HAH-...125	200	up to 24
	Steel-armoured multi-fiber loose tube up to 72 fibers	84	48-.../BWSN(ZNG)HAH-...130 72-.../BWSN(ZNG)HAH-...140	220 246	up to 48 up to 72
	RADOX multi-fiber loose tube up to 24 fibers	86	24-.../W(ZNG)R-...-85	88	2 to 24

p = passed

Multi-fiber loose tube	Jacket Ø mm	Jacket material	Rodent protection	Tensile strength N	Crush resistance N/dm	Temperature range (in service) °C	Fire propagation IEC 60332-1	Fire propagation IEC 60332-3
mini standard	3.5 5.0	LSFH™ LSFH™		900 1000	3000 3000	−25 to +70 −5 to +70	p	
standard	7.0	LSFH™	p	2000	5000	−40 to +70	p	p
mini standard	3.5 5.0	LSFH™ LSFH™		900 1000	3000 3000	−40 to +70 −40 to +70	p	
standard standard standard	7.0 8.5 12.0	LSFH™ LSFH™ LSFH™	p p p	2000 3000 9000	5000 8 000 11 000	−40 to +70 −40 to +70 −40 to +70	p p p	p p p
standard	8.8 × 9.4	LSFH™	p	3000	8000	−20 to +70	p	p
mini mini mini mini mini	9.6 9.6 10.6 12.2 14.5	LSFH™ LSFH™ LSFH™ LSFH™ LSFH™	p p p p p	9000 9000 9000 9000 9000	6000 6000 6000 6000 6000	−40 to +70 −40 to +70 −40 to +70 −40 to +70 −40 to +70	p p p p p	p p p p p
standard	8.0	LSFH™	p	3000	4000	−40 to +70	p	p
standard	12.5	LSFH™	p	3000	8000	−20 to +70	p	p
mini mini	13.0 14.0	LSFH™ LSFH™	p p	9000 9000	8000 8000	−40 to +70 −40 to +70	p p	p p
standard	8.5	RADOX	p	3000	10 000	−60 to +85	p	p

Jellyfree multi-fiber loose tube cables – up to 24 fibers

Properties

- Metal free indoor and outdoor cable
- Jelly free
- Strain relief with aramide yarn
- Ripcord for easy jacket removal
- Low smoke, halogen free and self-extinguishing
- Low fire load for high safety requirements
- No need for cleaning the fibers

Applications

- Data cable in distribution networks
- For vertical applications up to 500 m
- For installation in cable ducts

Design

Cable design	dry multi-fiber loose tube with 2 up to 24 fibers 1 ripcord	
Strain relief	aramide yarn	
Fiber colour	according to colour code	
Jacket material	LSFH™	
Jacket colour	E9	yellow
	G50 - OM2	orange
	G50 - OM3	turquoise
	G 50 - OM4	heather violet
	G62.5 - OM1	orange

According to IEC 60794-1-2

Ordering information

12-.../BQ(ZN)H-...35
24-.../Q(ZN)H-...50

Please see page 136.

Jellyfree multi-fiber loose tube cables – up to 24 fibers

Specification					
Jacket Ø		mm	3.5	5.0	
Number of fibers			2 to 12	2 to 24	
Mulit fiber loose tube		mm	mini	standard	
Approx. weight		kg/km	11.4	25.0	

Mechanical properties					
Tensile strength	during installation	N	900	1000	IEC 60794-1-2 E1
	in service	N	250	400	
Min. bend radius	during installation	mm	50	80	IEC 60794-1-2 E11
	in service	mm	35	50	
Crush resistance	short-term	N/dm	3000	3000	IEC 60794-1-2 E3
	long-term	N/dm	1500	1500	

Thermal properties					
Temperature range	during installation	°C	−10 to +50	−10 to +50	IEC 60794-1-22 F1
	in service	°C	−25 to +70	−5 to +70	
	in storage	°C	−25 to +70	−25 to +70	

Combustion properties					
Fire load		MJ/m	0.24	0.63	
Fire propagation	on a vertical single cable			p	IEC 60332-1
Smoke density				p	IEC 61034-2
Halogen acid gas	jacket material		p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	IEC 60754-2
2002/95/EC (RoHS)			compliant		

p = passed

Jellyfree glass-armoured multi-fiber loose tube cables – up to 24 fibers

Properties

- Metal free indoor and outdoor cable
- Jelly free, no need for cleaning the fibers
- Rodent-protected, glass-armoured
- Low smoke, halogen free and self-extinguishing
- Longitudinal and transversal watertight cable

Applications

- Data cable in distribution networks
- For vertical applications up to 500 m
- For installation in cable ducts
- For high safety requirements in case of fire

Design

Cable design	dry multi-fiber loose tube with up to 24 fibers
Strain relief and rodent protection	glass – roving
Fiber colour	according to colour code
Jacket material	LSFH™
Jacket colour	black or colour coded

According to IEC 60794-1-2

Ordering information

12-.../Q(ZNG)H-...70

Please see page 137.

Jellyfree glass-armoured multi-fiber loose tube cables – up to 24 fibers

Specification				
Jacket Ø		mm	7.0	
Number of fibers			2 to 24	
Approx. weight		kg/km	50	

Mechanical properties				
Tensile strength	during installation	N	2000	IEC 60794-1-2 E1
	in service	N	1200	
Min. bend radius	during installation 6 turns	mm	110	IEC 60794-1-2 E11
	in service 6 turns	mm	70	
Crush resistance	short-term	N/dm	5000	IEC 60794-1-2 E3
	long-term	N/dm	2000	
Impact resistance	Wp = 1 J	impacts	100	IEC 60794-1-2 E4

Thermal properties				
Temperature range	during installation	°C	−10 to +50	IEC 60794-1-22 F1
	in service	°C	−40 to +70	
	in storage	°C	−40 to +70	

Combustion properties				
Fire load		MJ/m	1.0	
Fire propagation	on a vertical single cable		p	IEC 60332-1
Fire propagation	on vertical cable bundle		p	IEC 60332-3-25
Smoke density			p	IEC 61034-2
Water penetration	h = 1 m, 24 h, p < 3 m		p	IEC 60794-1-2 F5B
2011/65/EC (RoHS)			compliant	

p = passed

Non-armoured multi-fiber loose tube cables – up to 24 fibers

Properties

- Metal free indoor and outdoor cable
- Strain relief with aramide yarn
- Ripcord for easy jacket removal
- Low smoke, halogen free and self-extinguishing
- For use in ducts and in unprotected environment

Applications

- Data cable in distribution networks
- Installation in indoor and outdoor areas
- For installation in cable ducts

Design

Cable design	multi-fiber loose tube with 2 up to 24 fibers, jelly-filled 1 ripcord
Strain relief	aramide yarn
Fiber colour	according to colour code
Jacket material	LSFH™
Jacket colour	black

According to IEC 60794-1-2

Ordering information

12-.../BW(ZN)H-...35
24-.../W(ZN)H-...50

Please see page 137, 139.

Non-armoured multi-fiber loose tube cables – up to 24 fibers

Specification					
Jacket Ø		mm	3.5	5.0	
Number of fibers			2 to 12	2 to 24	
Multi fiber loose tube			mini	standard	
Approx. weight		kg/km	10	27	

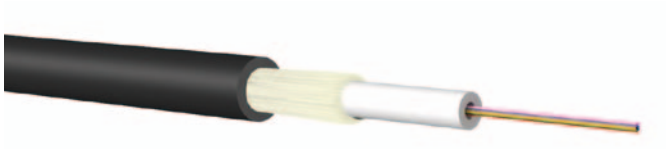
Mechanical properties					
Tensile strength	during installation	N	900	1000	IEC 60794-1-2 E1
	in service	N	250	400	
Min. bend radius	during installation	mm	52.5	80	IEC 60794-1-2 E11
	in service	mm	35	50	
Crush resistance	short-term	N/dm	3000	3000	IEC 60794-1-2 E3
	long-term	N/dm	1000	1500	
Impact resistance	Wp = 1.4 J Wp = 2.21 J	impacts	50	 50	IEC 60794-1-2 E4
Repeated bending	r = 35 mm/1 kg r = 50 mm/1 kg	cycles	5000	 5000	IEC 60794-1-2 E6

Thermal properties					
Temperature range	during installation	°C	−10 to +50	−10 to +50	IEC 60794-1-22 F1
	in service	°C	−40 to +70	−40 to +70	
	in storage	°C	−40 to +70	−40 to +70	

Combustion properties					
Fire load		MJ/m	0.43	0.71	
Fire propagation	on a vertical single cable			p	IEC 60332-1
Smoke density				p	IEC 61034-2
Halogen acid gas	jacket material		p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant		

p = passed

Glass-armoured multi-fiber loose tube cables – up to 24 fibers



Properties

- Metal free indoor and outdoor cable
- Rodent protection, glass-armoured
- For high mechanical requirements
- Low smoke, halogen free and self-extinguishing
- Low fire load for high safety requirments
- Longitudinal and transversal watertight cable

Applications

- For installation directly in the ground and in mechanically unprotected environments
- Data cable in distribution networks
- For installation outdoor, in wet cable ducts and pipes
- Ideal for high safety requirements in case of a fire

Design

Cable design	multi-fiber loose tube up to 24 fibers, jelly-filled
Strain relief and rodent protection	glass-roving
Fiber colour	according to colour code
Jacket material	LSFH™
Jacket colour	black

According to IEC 60794-1-2

Ordering information

24-.../W(ZNG)H-...70
24-.../W(ZNG)H-...85
24-.../W(ZNG)H-...120

Please see page 138, 139.

Approvals

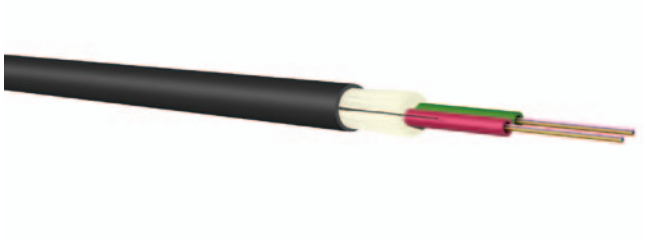
UL listed acc. OFN/OFNG

Glass-armoured multi-fiber loose tube cables – up to 24 fibers

Specification						
Jacket Ø		mm	7.0	8.5	12.0	
Number of fibers			2 to 24	2 to 24	2 to 24	
Multi fiber loose tube			standard	standard	standard	
Approx. weight		kg/km	55	83	178	
Mechanical properties						
Tensile strength	during installation	N	2000	3000	9000	IEC 60794-1-2 E1
	in service	N	1200	1500	4500	
Min. bend radius	during installation	mm	110	130	180	IEC 60794-1-2 E11
	in service	mm	70	80	120	
Crush resistance	short-term	N/dm	5000	8 000	11 000	IEC 60794-1-2 E3
	long-term	N/dm	2000	3000	6000	
Impact resistance	Wp = 1.5 J Wp = 4.41 J Wp = 4.5 J	impacts	100	 30	 500	IEC 60794-1-2 E4
Repeated bending	r = 50 mm/2.5 kg	cycles	2000	5000	5000	IEC 60794-1-2 E6
Torsion	± 1440°, 1 length 1 m	cycles	50	50	5	IEC 60794-1-2 E7
Water penetration	h = 1 m, 48 h, p < 3 m		p	p	p	IEC 60794-1-2 F5B
Thermal properties						
Temperature range	during installation	°C	–10 to +50	–10 to +50	–10 to +50	IEC 60794-1-22 F1
	in service	°C	–40 to +70	–40 to +70	–40 to +70	
	in storage	°C	–40 to +70	–40 to +70	–40 to +70	
Combustion properties						
Fire load		MJ/m	1.2	1.5	3.1	
Fire propagation	on a vertical single cable		p	p	p	IEC 60332-1
Fire propagation	on a vertical cable bundle		p	p	p	IEC 60332-3-24
Fire test	with circuit integrity (CI)	min.		180	180	IEC 60331-25
Smoke density				p	p	IEC 61034-2
Halogen acid gas	jacket material		p	p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant			

p = passed

Glass-armoured multi-fiber loose tube cables TWINTUBE – up to 24 fibers



Properties

- Metal free indoor and outdoor cable
- Rodent-protected, glass-armoured
- Ripcord for easy jacket removal
- Low smoke, halogen free and self-extinguishing
- Longitudinal and transversal watertight cable

Applications

- For installations directly in the ground and in mechanically unprotected environments
- As data cable in distribution networks
- For installation outdoor, in wet cable ducts and pipes
- Ideal for applications involving high safety requirements in case of a fire

Design

Cable design	2 multi-fiber loose tubes, jelly-filled with 2 x 12 fibers 2 ripcords
Strain relief and rodent protection	glass-roving
Jacket material	LSFH™
Jacket colour	black

According to IEC 60794-1-2

Ordering information

24-.../W(ZNG)H-...94

Please see page 140.

Glass-armoured multi-fiber loose tube cables TWINTUBE – up to 24 fibers

Specification				
Jacket Ø		mm	8.8 × 9.4	
Number of fibers			2 × 12	
Approx. weight		kg/km	101	

Mechanical properties				
Tensile strength	during installation	N	3000	IEC 60794-1-2 E1
	in service	N	1500	
Min. bend radius	during installation	mm	150 [1]	IEC 60794-1-2 E11
	in service	mm	100 [1]	
Crush resistance	short-term	N/dm	8000 [1]	IEC 60794-1-2 E3
	long-term	N/dm	4000 [1]	
Water penetration	h = 1 m, 24 h, p < 3 m		p	IEC 60794-1-2 F5B

Thermal properties				
Temperature range	during installation	°C	−10 to +50	IEC 60794-1-22 F1
	in service	°C	−20 to +70	
	in storage	°C	−40 to +70	

Combustion properties				
Fire load		MJ/m	1.85	
Fire propagation	on a vertical single cable		p	IEC 60332-1
Fire test	with circuit integrity (CI)	min.	180	IEC 60331-25
Halogen acid gas	jacket material		p	IEC 60754-1
Degree of acidity	jacket material		p	IEC 60754-2
2011/65/EC (RoHS)			compliant	

p = passed

[1] refers to the flat side of the cable

Glass-armoured multi-fiber loose tube cables – up to 144 fibers

Properties

- Metal free indoor and outdoor cable
- Rodent protection, glass-armoured
- Ripcord for easy jacket removal
- Jacket material according to UL 94V-0
- Low smoke, halogen free and self-extinguishing
- Longitudinal and transversal watertight cable

Applications

- Data cable in distribution networks
- For applications involving high safety requirements in case of fire

Design

Cable design	4 to 12 multi-fiber loose tube, jelly-filled with 2 to 12 fibers strength member 2 ripcords
Strain relief and rodent protection	glass-roving
Jacket material	LSFH™
Jacket colour	black (optional with 2 orange stripes)

According to IEC 60794-1-2

Ordering information

24-.../BWSN(ZNG)H-...96
48-.../BWSN(ZNG)H-...96
72-.../BWSN(ZNG)H-...106
96-.../BWSN(ZNG)H-...122
144-.../BWSN(ZNG)H-...145

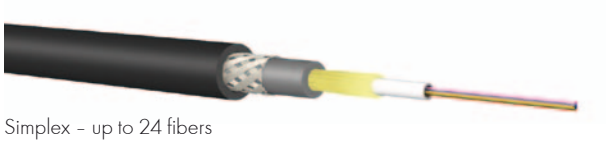
Please see page 140.

Glass-armoured multi-fiber loose tube cables – up to 144 fibers

Specification			4	6	8	12	
Number of fibers			24/48	72	96	144	
Jacket Ø		mm	9.6	10.6	12.2	14.5	
Multi fiber loose tube			mini	mini	mini	mini	
Approx. weight		kg/km	109	119	151	220	
Mechanical properties							
Tensile strength	during installation	N	9000	9000	9000	9000	IEC 60794-1-2 E1
	in service	N	4000	4000	4000	4000	
Min. bend radius	during installation	mm	140	160	180	220	IEC 60794-1-2 E11
	in service	mm	100	110	120	150	
Crush resistance	short-term	N/dm	6000	6000	6000	6000	IEC 60794-1-2 E3
	long-term	N/dm	3000	3000	3000	3000	
Impact resistance	Wp = 2.21 J	impact	50	50	50	50	IEC 60794-1-2 E4
Water penetration	h = 1 m, 24 h, p < 3 m		p	p	p	p	IEC 60794-1-2 F5A
Thermal properties							
Temperature range	during installation	°C	−10 to +50				IEC 60794-1-22 F1
	in service	°C	−40 to +70				
	in storage	°C	−40 to +70				
Combustion properties							
Fire load		MJ/m	1.9	2.3	3.0	4.3	
Fire propagation	on a vertical single cable		p	p	p	p	IEC 60332-1
Fire propagation	on a vertical cable bundle		p	p	p	p	IEC 60332-3-25
Smoke density			p	p	p	p	IEC 61034-2
Halogen acid gas	jacket material		p	p	p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant				

p = passed

Glass-armoured multi-fiber loose tube cables – simplex and TWINTUBE



Simplex – up to 24 fibers

TWINTUBE þ up to 24 fibers

Properties

- Steel-armoured indoor and outdoor cable
- Rodent-protected (steel-armoured)
- For high mechanical and thermal requirements
- Low smoke, halogen free and self-extinguishing
- Low fire load for high safety requirements

Applications

- For outdoor and indoor installations and in mechanically unprotected environments
- Data cable in distribution networks
- For installations directly in the ground

Design

Cable design	1 to 2 multi-fiber loose tubes, jelly-filled with 2 to 24 fibers
Strain relief	aramid yarn/glass-roving
Rodent protection	steel-armoured
Jacket material	LSFH™
Jacket colour	black

According to IEC 60794-1-2

Ordering information

24-.../W(ZN)HAH-...80
24-.../W(ZNG)HAH-...125

Please see page 140, 141.

Glass-armoured multi-fiber loose tube cables – simplex and TWINTUBE

Specification			Simplex	TWINTUBE	
Jacket Ø		mm	8.0	12.5	
Number of fibers			2 to 24	2 x 12	
Multi-fiber loose tube		mm	standard	standard	
Approx. weight		kg/km	82	200	
Mechanical properties					
Tensile strength	during installation	N	3000	3000	IEC 60794-1-2 E1
	in service	N	1500	1500	
Min. bend radius	during installation	mm	120	190 [1)]	IEC 60794-1-2 E11
	in service	mm	80	125 [1)]	
Crush resistance	short-term	N/dm	4000	8000 [1)]	IEC 60794-1-2 E3
	long-term	N/dm	2000	4000 [1)]	
Thermal properties					
Temperature range	during installation	°C	−10 to +50	−10 to +50	IEC 60794-1-22 F1
	in service	°C	−40 to +70	−20 to +70	
	in storage	°C	−40 to +70	−40 to +70	
Combustion properties					
Fire load		MJ/m	1.32	3.35	
Fire propagation	on a vertical single cable		p	p	IEC 60332-1
Fire propagation	on a vertical cable bundle		p	p	IEC 60332-3-24
Smoke density			p	p	IEC 61034-2
Halogen acid gas	jacket material		p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	IEC 60754-2
Fire test	with circuit integrity (CI)	min.	180	180	IEC 60331-25
2011/65/EC (RoHS)			compliant		

p = passed

[1)] refers to the flat side of the cable

Steel-armoured multi-fiber loose tube cables – up to 72 fibers

Properties

- Steel-armoured indoor and outdoor cable
- Rodent-protected (steel-armoured)
- For use in ducts and unprotected environment
- For high mechanical requirements
- Low smoke, halogen free and self-extinguishing

Applications

- For outdoor and indoor installations and in mechanically unprotected environments
- Data cable in distribution networks
- For installations directly in the ground

Design

Cable design	4 to 6 multi-fiber loose tube, jelly-filled with 2 to 12 fibers strength member 2 ripcords
Strain relief	glass-roving
Rodent protection	steel-armoured
Jacket material	LSFH™
Jacket colour	black

According to IEC 60794-1-2

Ordering information

24-.../BWSN(ZNG)HAH-...130
48-.../BWSN(ZNG)HAH-...130
72-.../BWSW(ZNG)HAH-...140

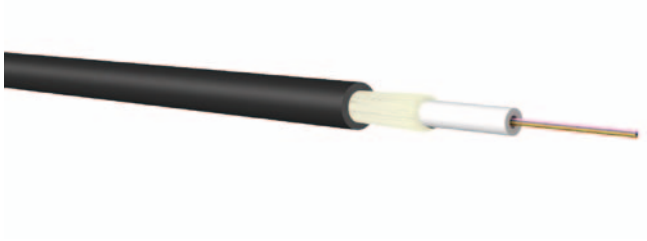
Please see page 141.

Steel-armoured multi-fiber loose tube cables – up to 72 fibers

Specification			4	6	
Jacket Ø		mm	13.0	14.0	
Number of fibers			24/48	72	
Multi-fiber loose tube			mini	mini	
Approx. weight		kg/km	220	246	
Mechanical properties					
Tensile strength	during installation	N	9000	9000	IEC 60794-1-2 E1
	in service	N	4000	4000	
Min. bend radius	during installation	mm	200	210	IEC 60794-1-2 E11
	in service	mm	130	140	
Crush resistance	short-term	N/dm	6000	6000	IEC 60794-1-2 E3
	long-term	N/dm	3000	3000	
Impact resistance	Wp = 2.21 J	impacts	50	50	IEC 60794-1-2 E4
Thermal properties					
Temperature range	during installation	°C	–10 to +50		IEC 60794-1-22 F1
	in service	°C	–40 to +70		
	in storage	°C	–40 to +70		
Combustion properties					
Fire load		MJ/m	3.6	4.1	
Fire propagation	on a vertical single cable		p	p	IEC 60332-1
Fire propagation	on a vertical cable bundle cable		p	p	IEC 60332-3-25
Halogen acid gas	jacket material		p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant		

p = passed

RADOX® metal free multi-fiber loose tube cables



Properties

- Metal free rodent-protected indoor and outdoor cable
- High flexibility and form stability
- UV and ozone resistance
- High abrasion and soldering iron resistance
- Halogen free cable with improved behaviour in case of fire
- Meets requirements for circuit integrity in case of fire
- Best oil and fluid resistance

Applications

- Ideal for applications involving safety requirements in case of fire
- Rolling stock in railway
- Oil and gas platforms
- Ships
- Tunnels
- Underground train stations

Design

Cable design	1 multi-fiber loose tube up to 24 fibers, jelly-filled RADOX cable
Strain relief	glass-roving
Jacket material	RADOX
Jacket colour	black or colour coded

According to IEC 60794-1-2

Ordering information

24-.../W(ZNG)R-...85

Please see page 141.

RADOX® metal free multi-fiber loose tube cables

Specification				
Jacket Ø			8.5	
Number of fibers			2 to 24	
Approx. weight		kg/km	88	

Mechanical properties				
Tensile strength	during installation	N	3000	IEC 60794-1-2 E1
	in service	N	1500	
Min. bend radius	during installation	mm	130	IEC 60794-1-2 E11
	in service	mm	80	
Crush resistance	short-term	N/dm	10 000	IEC 60794-1-2 E3
	long-term	N/dm	2500	
Impact resistance	Wp = 4.41 J	impacts	15	IEC 60794-1-2 E4
Water penetration	h = 1 m, 24 h, p < 3 m		p	IEC 60794-1-2 F5B

Thermal properties				
Temperature range	during installation	°C	−10 to +50	IEC 60794-1-22 F1
	in service	°C	−60 to +85	
	in storage	°C	−60 to +85	

Combustion properties				
Fire load		MJ/m	1	
Fire propagation	on a vertical single cable		p	IEC 60332-1
Fire propagation	on a vertical bundle cable		p	IEC 60332-3-25
Fire test	with circuit integrity (CI)	min.	180	IEC 60331-25
Smoke density			p	IEC 61034-2
Halogen acid gas	jacket material		p	IEC 60754-1
Degree of acidity	jacket material		p	IEC 60754-2
2011/65/EC (RoHS)			compliant	

p = passed

RADOX®

- Meets LSFH properties.
- RADOX® jacket material compliant to EM 104 specification of EN 50264-1 for railway rolling stock application.
- Fully compliant to CEN/TS 45545-2 for fire safety in railway applications.
- Meets the increased requirements of SHF2 (SHF Mud) and fulfills flame, fire, oil and mud resistance acc. NEK 606.
- NEK 606 standard for offshore oil and gas, ship and marine apllications.
- Application acc. NEK 606: outdoor cable for emergency systems – operational during fire.

Outdoor cables

	Cable type	Page	Ordering key	Weight kg/km	Amount of fibers
	Non-armoured multi-fiber loose tube up to 24 fibers	90	12-.../BW(ZN)V-...35 24-.../W(ZN)Y-...50	9.6 20	2 to 12 2 to 24
	ADSS loose tube up to 12 fibers	92	12-.../BW(ZN)V-...G55	23	2 to 12
	Glass-armoured multi-fiber loose tube up to 24 fibers	94	24-.../W(ZNG)Y-...70 24-.../W(ZNG)Y-...85 24-.../W(ZNG)Y-...120	63 63 135	2 to 24 2 to 24 2 to 24
	Glass-armoured multi-fiber loose tube TWINTUBE, up to 24 fibers	96	24-.../W(ZNG)Y-...94	69	up to 24
	Glass-armoured multi-fiber loose tube up to 144 fibers	98	24-.../BWSN(ZNG)V-...96 48-.../BWSN(ZNG)V-...96 72-.../BWSN(ZNG)V-...106 96-.../BWSN(ZNG)V-...121 144-.../BWSN(ZNG)V-...176	84 84 97 130 194	up to 48 up to 48 up to 72 up to 96 up to 144
	Steel-armoured multi-fiber loose tube up to 24 fibers	100	24-.../W(ZN)YAY-...80	70	2 to 24
	Steel-armoured multi-fiber loose tube TWINTUBE up to 24 fibers	100	24-.../W(ZNG)YAY-...125	152	up to 24
	Steel-armoured multi-fiber loose tube up to 72 fibers	102	48-.../BWSN(ZNG)VAV-...130 72-.../BWSN(ZNG)VAV-...140	179 185	up to 48 up to 72

p = passed

Multi-fiber loose tube	Jacket Ø mm	Jacket material	Rodent protection	Tensile strength N	Crush resistance N/dm	Temperature range (in service) °C
mini standard	3.5 5.0	PE PE		900 1000	3000 3000	−40 to +70 −40 to +70
mini	5.5	PE		2800	5000	−40 to +70
standard standard standard	7.0 8.5 12.0	PE PE PE	p p p	2000 3000 9000	5000 10 000 12 000	−40 to +70 −40 to +70 −40 to +70
standard	8.8 × 9.4	PE	p	3000	8000	−20 to +70
mini mini mini mini mini	9.6 9.6 10.6 12.2 14.5	PE PE PE PE PE	p p p p p	9000 9000 9000 9000 9000	8000 8000 8000 8000 8000	−40 to +70 −40 to +70 −40 to +70 −40 to +70 −40 to +70
standard	8.0	PE	p	3000	4000	−40 to +70
standard	12.5	PE	p	3000	8000	−20 to +70
mini mini	13.0 14.0	PE PE	p p	9000 9000	8000 8000	−40 to +70 −40 to +70

Non-armoured multi-fiber loose tube cables – up to 24 fibers

Properties

- Metal free outdoor cable
- Strain relieved with aramide yarn
- For use in ducts and unprotected environment
- High chemical resistance against acids and alkalies
- Halogen free and non-corrosive fire gases

Applications

- Data cable in distribution networks
- For outdoor installations in humid and wet cable ducts

Design

Cable design	multi-fiber loose tube with 2 up to 24 fibers, jelly-filled
Strain relief	aramide yarn
Jacket material	PE
Jacket colour	black or colour coded

According to IEC 60794-1-2

Ordering information

up to 12-.../BW(ZN)V-...35	
up to 24-.../W(ZN)Y-...50	

Please see page 142.

Non-armoured multi-fiber loose tube cables – up to 24 fibers

Specification					
Jacket Ø		mm	3.5	5.0	
Number of fibers			2 to 12	2 to 24	
Multi fiber loose tube			mini	standard	
Approx. weight		kg/km	9.6	20	

Mechanical properties					
Tensile strength	during installation	N	900	1000	IEC 60794-1-2 E1
	in service	N	250	400	
Min. bend radius	during installation	mm	50	80	IEC 60794-1-2 E11
	in service	mm	35	50	
Crush resistance	short-term	N/dm	3000	3000	IEC 60794-1-2 E3
	long-term	N/dm	1000	1500	
Impact resistance	Wp = 1.4 J Wp = 2.21 J	impacts	50	 50	IEC 60794-1-2 E4
Repeated bending	r = 35 mm/1 kg r = 50 mm/1 kg	cycles	5000	 5000	IEC 60794-1-2 E6

Thermal properties					
Temperature range	during installation	°C	–10 to +50	–10 to +50	IEC 60794-1-22 F1
	in service	°C	–40 to +70	–40 to +70	
	in storage	°C	–40 to +70	–40 to +70	

Combustion properties					
Fire load		MJ/m	0.32	0.75	
2011/65/EC (RoHS)			compliant		

p = passed

ADSS[1] – multi-fiber loose tube cables – up to 12 fibers

Properties

- Aerial use, self-supporting
- Extremely light weight cable construction
- Optimized diameter for easy installation
- Metal free outdoor cable
- Strain relieved with aramide yarn
- For high mechanical requirements
- Halogen free and non-corrosive fire gases
- Surface resistance properties

Applications

- Aerial use
- Self-supporting

Design

Cable design	multi-fiber loose tube with 2 up to 12 fibers, jelly-filled
Strain relief	aramide yarn
Jacket material	HDPE
Jacket colour	black

According to IEC 60794-1-2

Ordering information

up to 12-.../BW(ZN)V-...G55	

Please see page 142.

Note: Installation material such as support-anchor and dead-end-anchor's are additionally available.

[1] ADSS = All-Dielectric, Self-Supporting

ADSS – multi-fiber loose tube cables – up to 12 fibers

Specification				
Jacket Ø		mm	5.5	
Number of fibers			2 to 12	
Approx. weight		kg/km	23	

Mechanical properties				
Tensile strength	during installation	N	2800	IEC 60794-1-2 E1
	in service	N	1400	
Min. bend radius	during installation, 6 turns	mm	82.5	IEC 60794-1-2 E11
	in service, 6 turns	mm	55	
Crush resistance	short-term	N/dm	5000	IEC 60794-1-2 E3
	long-term	N/dm	3000	
Surface resistance			> 12 kV	EN 50305 § 6.6

Thermal properties				
Temperature range	during installation	°C	–25 to +60	IEC 60794-1-22 F1
	in service	°C	–40 to +70	
	in storage	°C	–40 to +70	

Combustion properties			
Fire load	MJ/m	0.81	
2002/95/EC (RoHS)		compliant	

Performance under load				
Span length m	sag %	sag m	wind load km/h	tensile load with wind load N
50	1.5	0.75	100	694
100		1.50		1387
150		2.25		2081
200		3.00		2774

Glass-armoured multi-fiber loose tube cables – up to 24 fibers

Properties

- Metal free outdoor cable
- Rodent protection, glass-armoured
- For use in ducts and in unprotected environment
- High chemical resistance against acids and alkalies
- For high mechanical and thermal stability
- Halogen free and non-corrosive fire gases
- Longitudinal and transversal watertight cable

Applications

- For installation directly in the ground and in mechanically unprotected environments
- Data cable in distribution networks
- For installation outdoor, in wet cable ducts and pipes

Design

Cable design	multi-fiber loose tube with 2 up to 24 fibers, jelly-filled
Strain relief and rodent protection	glass-roving
Jacket material	PE
Jacket colour	black

According to IEC 60794-1-2

Ordering information

up to 24-.../W(ZNG)Y-...70	
up to 24-.../W(ZNG)Y-...85	
up to 24-.../W(ZNG)Y-...120	

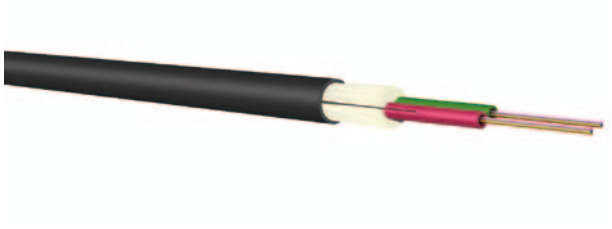
Please see page 142, 143.

Glass-armoured multi-fiber loose tube cables – up to 24 fibers

Specification						
Jacket Ø		mm	7.0	8.5	12.0	
Number of fibers each bundle			2 to 24	2 to 24	2 to 24	
Multi fiber loose tube			standard	standard	standard	
Approx. weight		kg/km	42	62	135	
Mechanical properties						
Tensile strength	during installation	N	2000	3000	12 000	IEC 60794-1-2 E1
	in service	N	1200	1500	6000	
Min. bend radius	during installation	mm	110	130	180	IEC 60794-1-2 E11
	in service	mm	70	80	120	
Crush resistance	short-term	N/dm	5000	10 000	12 000	IEC 60794-1-2 E3
	long-term	N/dm	2000	3000	6000	
Impact resistance	Wp = 4.41 J Wp = 4.5 J	impacts	10	30	 100	IEC 60794-1-2 E4
Repeated bending	r = 80 mm r = 120 mm	cycles	3000	5000	 5000	IEC 60794-1-2 E6
Torsion	± 1440° ± 360°	cycles	3	3	 3	IEC 60794-1-2 E7
Water penetration	h = 1 m, 24 h, p < 3 m		p	p	p	IEC 60794-1-2 F5B
Thermal properties						
Temperature range	during installation	°C	–10 to +50	–10 to +50	–10 to +50	IEC 60794-1-22 F1
	in service	°C	–40 to +70	–40 to +70	–40 to +70	
	in storage	°C	–40 to +70	–40 to +70	–25 to +70	
Combustion properties						
Fire load		MJ/m	1.3	1.6	3.4	
2011/65/EC (RoHS)			compliant			

p = passed

Glass-armoured multi-fiber loose tube cables TWINTUBE – up to 24 fibers



Properties

- Metal free outdoor cable
- Rodent-protected, glass-armoured
- For use in ducts and unprotected environment
- Ripcord for easy jacket removal
- High chemical resistance against acids and alkalies
- Halogen free and non-corrosive fire gases
- Longitudinal and transversal watertight cable

Applications

- For installations directly in the ground and in mechanically unprotected environments
- Data cable in distribution networks
- For installation outdoor, in wet cable ducts and pipes

Design

Cable design	2 multi-fiber loose tubes, jelly-filled with up to 2 × 12 fibers 2 ripcords
Strain relief and rodent protection	glass-roving
Jacket material	PE
Jacket colour	black

According to IEC 60794-1-2

Ordering information

up to 24-.../W(ZNG)Y-...94	

Please see page 144.

Glass-armoured multi-fiber loose tube cables TWINTUBE – up to 24 fibers

Specification				
Jacket Ø		mm	8.8 × 9.4	
Number of fibers			2 x 12	2 up to 12 fibers
Approx. weight		kg/km	69	

Mechanical properties				
Tensile strength	during installation	N	3000	IEC 60794-1-2 E1
	in service	N	1500	
Min. bend radius	during installation	mm	150 [1)]	IEC 60794-1-2 E11
	in service	mm	100 [1)]	
Crush resistance	short-term	N/dm	8000 [1)]	IEC 60794-1-2 E3
	long-term	N/dm	4000 [1)]	
Repeated bending	r = 150 mm, weight = 5 kg	cycles	5000 [1)]	IEC 60794-1-2 E6
Water penetration	h = 1 m, 24 h, p < 3 m		p	IEC 60794-1-2 F5B

Thermal properties				
Temperature range	during installation	°C	−10 to +50	IEC 60794-1-22 F1
	in service	°C	−20 to +70	
	in storage	°C	−40 to +70	

Combustion properties				
Fire load		MJ/m	1.8	
2011/65/EC (RoHS)			compliant	

p = passed

[1)] refers to the flat side of the cable

Glass-armoured multi-fiber loose tube cables – up to 144 fibers

Properties

- Metal free outdoor cable
- Rodent protection, glass-armoured
- For use in ducts and unprotected environment
- Ripcord for easy jacket removal
- High chemical resistance against acids and alkalies
- Halogen free and non-corrosive fire gases
- Longitudinal and transversal watertight cable

Applications

- For installation directly in the ground and in mechanically unprotected environments
- Data cable in distribution networks
- For installation outdoor, in wet cable ducts and pipes

Design

Cable design	4 to 12 multi-fiber loose tube, jelly-filled with 2 to 12 fibers strength member 2 ripcords
Strain relief and rodent protection	glass-roving
Jacket material	PE
Jacket colour	black with 2 orange stripes

According to IEC 60794-1-2

Ordering information

24-.../BWSN(ZNG)V-...96	
48-.../BWSN(ZNG)V-...96	
72-.../BWSN(ZNG)V-...106	
96-.../BWSN(ZNG)V-...122	
144-.../BWSN(ZNG)V-...145	

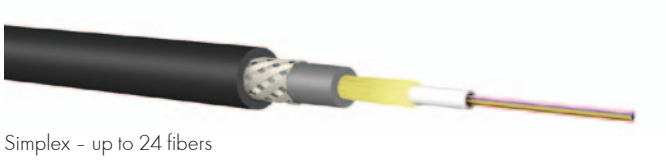
Please see page 144.

Glass-armoured multi-fiber loose tube cables – up to 144 fibers

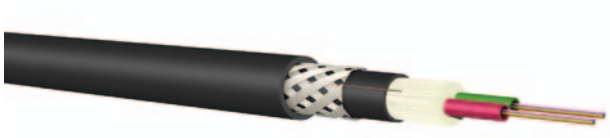
Specification			4	6	8	12	
Fiber up to			24/48	72	96	144	
Jacket Ø		mm	9.6	10.6	12.2	14.5	
Multi fiber loose tube			mini	mini	mini	mini	
Approx. weight		kg/km	84	97	121	176	
Mechanical properties							
Tensile strength	during installation	N	9000	9000	9000	9000	IEC 60794-1-2 E1
	in service	N	4000	4000	4000	4000	
Min. bend radius	during installation	mm	140	160	180	220	IEC 60794-1-2 E11
	in service	mm	100	110	120	150	
Crush resistance	short-term	N/dm	6000	6000	6000	6000	IEC 60794-1-2 E3
	long-term	N/dm	3000	3000	3000	3000	
Impact resistance	Wp = 2.21 J	impacts	50	50	50	50	IEC 60794-1-2 E4
Water penetration	h = 1 m, 24 h, p < 3 m		p	p	p	p	IEC 60794-1-2 F5B
Thermal properties							
Temperature range	during installation	°C	−10 to +50				IEC 60794-1-22 F1
	in service	°C	−40 to +70				
	in storage	°C	−40 to +70				
Combustion properties							
Fire load		MJ/m	2.1	2.5	3.3	4.7	
2011/65/EC (RoHS)			compliant				

p = passed

Steel-armoured multi-fiber loose tube cables – simplex and TWINTUBE



Simplex – up to 24 fibers



TWINTUBE – up to 24 fibers

Properties

- Steel-armoured outdoor cable
- Rodent-protected (steel-armoured)
- High chemical resistance against acids and alkalies
- Halogen free and non-corrosive fire gases

Applications

- For outdoor installations and in mechanically unprotected environments
- Data cable in distribution networks
- For installations directly in the ground

Design

Cable design	1 to 2 multi-fiber loose tubes, jelly-filled with 2 to 24 fibers
Strain relief	aramid yarn/glass-roving
Rodent protection	steel-armoured
Jacket material	PE
Jacket colour	black

According to IEC 60794-1-2

Ordering information

up to 24-.../W(ZN)YAY-...80	
up to 24-.../W(ZNG)YAY-...125	

Please see page 145.

Steel-armoured multi-fiber loose tube cables – simplex and TWINTUBE

Specification			Simplex	TWINTUBE	
Jacket Ø		mm	8.0	12.5	
Numbers of fibers			24	2 × 12	
Multi-fiber loose tube			standard	standard	
Approx. weight		kg/km	70	152	
Mechanical properties					
Tensile strength	during installation	N	3000	3000	IEC 60794-1-2 E1
	in service	N	1500	1500	
Min. bend radius	during installation	mm	120	190*	IEC 60794-1-2 E11
	in service	mm	80	125*	
Crush resistance	short-term	N/cm	4000	8000*	IEC 60794-1-2 E3
	long-term	N/cm	2000	4000*	
Impact resistance	Wp = 4.41 J	impacts	50		IEC 60794-1-2 E4
	Wp = 15 J	impacts		3	
Thermal properties					
Temperature range	during installation	°C	−10 to +50	−10 to +50	IEC 60794-1-22 F1
	in service	°C	−40 to +70	−20 to +70	
	in storage	°C	−40 to +70	−40 to +70	
Combustion properties					
Fire load		MJ/m	1.78	3.51	
2011/65/EC (RoHS)			compliant		

p = passed

* refers to the flat side of the cable

Steel-armoured multi-fiber loose tube cables – up to 72 fibers

Properties

- Steel-armoured outdoor cable
- Rodent-protected (steel-armoured)
- For use in ducts and unprotected environment
- Halogen free and non-corrosive fire gases

Applications

- For outdoor installations and in mechanically unprotected environments
- Data cable in distribution networks
- For installation directly in the ground

Design

Cable design	4 to 6 multi-fiber loose tubes, jelly-filled with 2 to 12 fibers strength member 2 ripcords
Strain relief	glass-roving
Rodent protection	steel-armoured
Jacket material	PE
Jacket colour	black

According to IEC 60794-1-2

Ordering information

24-.../BWSN(ZNG)VAV-...130	
48-.../BWSN(ZNG)VAV-...130	
72-.../BWSW(ZNG)VAV-...140	

Please see page 145

Steel-armoured multi-fiber loose tube cables – up to 72 fibers

Specification			4	6	
Jacket Ø		mm	13.0	14.0	
Fiber quantity up to			24/48	72	
Multi-fiber loose tube			mini	mini	
Approx. weight		kg/km	173	185	
Mechanical properties					
Tensile strength	during installation	N	9000	9000	IEC 60794-1-2 E1
	in service	N	4000	4000	
Min. bend radius	during installation	mm	200	210	IEC 60794-1-2 E11
	in service	mm	130	140	
Crush resistance	short-term	N/dm	6000	6000	IEC 60794-1-2 E3
	long-term	N/dm	3000	3000	
Impact resistance	Wp = 2.21 J	impacts	50	50	IEC 60794-1-2 E4
Thermal properties					
Temperature range	during installation	°C	–10 to +50		IEC 60794-1-22 F1
	in service	°C	–40 to +70		
	in storage	°C	–40 to +70		
Combustion properties					
Fire load		MJ/m	4.0	4.4	
2011/65/EC (RoHS)			compliant		

p = passed

Special cables

	Cable type	Page	Ordering key	Weight kg/km	Amount of fibers
	Simplex cables with tight tube	106	01-.../FJZ-...19	3	1
	Rugged simplex cables	108	01-.../FJH(ZN)Z-...27	40	1
	Industry Link TWINFLEX and rugged minicord breakout cables	110	02-.../FJ(ZN)Z-...17 02-.../...(ZN)Z-...22	28 46	2 2
	Industry Link TWINFIX	112	02-.../...(ZNG)H-...22	61	2
	Industry link QUADFIX	114	04-.../FJSN(ZNG)H-...22 04-H200/VJSN(ZNG)H-...22	91	4
	Mobile field cables	116	02-.../FSN(ZN)Z-...56 04-.../FSN(ZN)Z-...56 08-.../FSN(ZN)Z-...68 12-.../FSN(ZN)Z-...80	24 26 40 53	2 4 8 12
	Glass-armoured riser cables 2 tubes	118	02-.../F(ZNG)H-...48 02-.../F(ZNG)H-...55 02-.../F(ZNG)H-...70	26 35 55	2 2 2
	Glass-armoured riser cables 4 tubes	120	04-.../FSN(ZNG)H-...55	33	4
	Rugged multi-fiber loose tube up to 24 fibers (dry)	122	24-.../Q(ZNG)Z-...70	44	2 to 24
	Drag chain cables	124	12-.../FSN(ZN)YZ-...130	128	up to 12
	Hybrid cables	126	04-.../CWJSNH-...27+...-C15 08-.../CWJSNH-...27+...-C15 60-.../WSN(ZNG)Y-...150+...-C... 96-.../WSN(ZNG)Y-...180+...-C...		up to 4 up to 8 up to 60 up to 96

p = passed

Amount of conductors	Tube Ø mm	Simplex cable Ø mm	Jacket Ø mm	Jacket material	Direct connector termination	Tensile strength N	Crush resistance N/dm	Temperature range in service °C	Fire propagation IEC 60332-1-2	Fire propagation IEC 60332-3-24
	0.9		1.9	TPU	•	180	10 000	−40 to +85		
	0.9	2.7	6.0	TPU	•	4000	20 000	−25 to +70		
	0.9 0.9	1.7 2.2	6.0 7.5 × 8	TPU TPU	• •	2000 2000	6000 6000	−40 to +70 −40 to +70		p p
	0.9	2.2	7.5x7.2	LSFH™	•	2000	6000	−40 to +70		p
	0.9	2.2	9.0	LSFH™	•	2000	15 000	−40 to +70		p
	0.9 0.9 0.9 0.9		5.6 5.6 6.8 8.0	TPU TPU TPU TPU	• • • •	4000 4000 4000 4000	21 000 21 000 21 000 10 000	−60 to +85 −60 to +85 −60 to +85 −60 to +85		
	0.9 0.9 0.9		4.8 5.5 7.0	LSFH™ LSFH™ LSFH™	• • •	1000 1000 1000	20 000 20 000 20 000	−40 to +75 −40 to +75 −40 to +75	p p p	p p p
	0.9		5.5	LSFH™	•	1000	20 000	−40 to +75	p	p
			7.0	TPU		2500	9000	−45 to +85		
	0.9		13.0	TPU	•	4000	4000	−30 to +85		
up to 3 up to 4 up to 4 up to 4	0.9 0.9 3.0 3.0	2.7 2.7 2.5 2.5	10.0 13.0 15.0 8.0	LSFH™ LSFH™ PE PE	• •	2000 4000 9000 13 000	10 000 10 000 8000 8000	−20 to +70 −20 to +70 −40 to +70 −40 to +70	p p	p

Simplex cables with tight tube

Properties

- Metal free indoor and outdoor cable
- Strain relieved with aramide yarn
- For direct connector assembly with strain relief
- Tight bend radii
- For high mechanical and thermal stability
- Halogen free and non-corrosive fire gases

Applications

- For outdoor and indoor installations
- Patch cable in distribution centres

Design

Tube	tight tube 0.9 mm	
Strain relief	aramide yarn	
Jacket material	TPU	
Jacket colour	E9	yellow
	G50 – OM2	orange
	G50 – OM3	turquoise
	G50 – OM4	heather violet
	G62.5 – OM1	orange

According to IEC 60794-1-2

Ordering information

01-.../FJZ-...19

Please see page 146.

Simplex cables with tight tube

Specification				
Jacket Ø		mm	1.9	
Tube Ø		mm	0.9	
Approx. weight		kg/km	3	

Mechanical properties				
Tensile strength	during installation	N	180	IEC 60794-1-2 E1
	in service	N	90	
Min. bend radius [1]	during installation	mm	50	IEC 60794-1-2 E11
	in service	mm	25	
Crush resistance	short-term	N/dm	10 000	IEC 60794-1-2 E3
	long-term	N/dm	2000	
Impact resistance	Wp = 0.74 J	impacts	30	IEC 60794-1-2 E4
Repeated bending	r = 30 mm, weight = 1 kg	cycles	2500	IEC 60794-1-2 E6

Thermal properties				
Temperature range	during installation	°C	−10 to +50	IEC 60794-1-22 F12
	in service	°C	−40 to +85	
	in storage	°C	−40 to +85	

Combustion properties			
Fire load	MJ/m	0.11	
2011/65/EC (RoHS)		compliant	

[1] Smaller bending radius are possible with E9/125 LowBend (ITU G.657) and G50/125-OM3/OM4 BendOptimized.

Rugged simplex cables

Properties

- Metal free indoor and outdoor cable
- Strain relieved with aramide yarn
- For direct connector assembly with strain relief
- High chemical resistance against acids and alkalies
- For high mechanical and thermal stability
- Halogen free and non-corrosive fire gases
- Improved crash resistance

Applications

- Industry LAN
- Mobile data cablings in harsh environment
- Machinery cablings, drag chains

Design

Cable design	1 single fiber cable with tight tubes	
Strain relief	aramide yarn	
Jacket material	TPU/black	
Jacket colour	E9	yellow
	G50 - OM2	orange
	G62.5 - OM1	orange

According to IEC 60794-1-2

Ordering information

01-.../FJH(ZN)Z-...27

Please see page 146.

Rugged simplex cables

Specification				
Jacket Ø		mm	6.0	
Single fiber cable Ø		mm	2.7	
Tube Ø		mm	0.9	
Approx. weight		kg/km	40	

Mechanical properties				
Tensile strength	during installation	N	4000	IEC 60794-1-2 E1
	in service	N	1500	
Min. bend radius	during installation	mm	90	IEC 60794-1-2 E11
	in service	mm	60	
Crush resistance	short-term	N/dm	20 000	IEC 60794-1-2 E3
	long-term	N/dm	10 000	
Impact resistance	Wp = 2.25J	impacts	150	IEC 60794-1-2 E4
Repeated bending	r = 30 mm, weight = 2.5 kg	cycles	10 000	IEC 60794-1-2 E6
Flexing	r = 77 mm velocity = 2.2 m/s L = 2 m	cycles	100 000	HUBER+SUHNER drag chain test

Thermal properties				
Temperature range	during installation	°C	−10 to +60	IEC 60794-1-22 F1
	in service	°C	−25 to +70	
	in storage	°C	−40 to +70	

Combustion properties				
Fire load		MJ/m	0.57	
Halogen acid gas	jacket material		p	IEC 60754-1
Degree of acidity	jacket material		p	IEC 60754-2
2011/65/EC (RoHS)			compliant	

p = passed

Industry Link TWINFLEX and rugged minicord breakout cables

Rugged minicord breakout

Industry Link TWINFLEX

Properties

- Metal free indoor and outdoor cable
- For direct connector assembly with strain relief
- Strain relieved with aramide yarn
- Ripcord for easy jacket removal
- Halogen free and non-corrosive fire gases
- Improved crush resistance
- For high thermal and mechanical stability
- High chemical resistance against acids and alkalies
- High abrasive resistance

Applications

- For flexible, moved and fixed use
- Industrial Ethernet and LAN
- Machine cabling, drag chains
- As control or data cable in factory automation
- Mobile data cabling for harsh environment
- Connection to outdoor devices

Design

Cable design	2 single fiber cables with tight tubes 1 ripcord
Strain relief	aramide yarn
Jacket material	TPU
Jacket colour	black

According to IEC 60794-1-2

Ordering information

Rugged minicord breakout	02-.../FJ(ZN)Z-...17
TWINFLEX	02-.../...(ZN)Z-...22

Please see page 146.

Conformance

TWINFLEX cables with H200 and POF meet PROFINET specification.

Industry Link TWINFLEX and rugged minicord breakout cables

Specification								
Cable type			rugged minicord breakout		Industry Link TWINFLEX			
Fiber types			E9, G50, G62	H200	G50, G62	H200	POF980	
Jacket Ø		mm	6.0		7.5 × 8.0			
Single fiber cable Ø		mm	1.7		2.2			
Tube Ø		mm	0.9	0.9	0.9	0.5	2.2	
Channel marking on single fiber			numbered		black and orange with arrows			
Approx. weight		kg/km	28		46			

Mechanical properties								
Tensile strength	during installation	N	2000	2000	2000	2000	2000	IEC 60794-1-2 E1
	in service	N	1000	500	1000	1000	1000	
Min. bend radius	during installation	mm	25	25	40	60	25	IEC 60794-1-2 E11
	in service	mm	25	25	25	50	25	
Crush resistance	short-term	N/dm	6000	2000	6000	6000	6000	IEC 60794-1-2 E3
	long-term	N/dm	2000	1000	2000	2000	4000	
Impact resistance	Wp = 1.5 J Wp = 2.2 J	impacts	200	200	200	200	200	IEC 60794-1-2 E4
Repeated bending	r = 30 mm/10 kg r = 60 mm/1 kg	cycles	20 000		10 000	10 000	10 000	IEC 60794-1-2 E6
Flexing	r = 77 mm	cycles	100 000					HUBER+SUHNER [1]
Flexing	r = 70 mm r = 80 mm				100 000	100 000	100 000	IEC 60794-1-2 E8 IEC 60794-1-2 E8
Torsion	± 360° ± 1440°	cycles	3		100	10	10	IEC 60794-1-2 E7

Thermal properties						
Temperature range	during installation	°C	−20 to +60		−10 to +60	−30 to +70	IEC 60794-1-22 F1
	in service	°C	−40 to +70		−20 to +70	−30 to +70	
	in storage	°C	−40 to +70		−25 to +70	−30 to +70	

Combustion properties								
Fire load		MJ/m	0.6	0.6	0.75	0.75	0.93	
2011/65/EC (RoHS)			compliant					

Conformance								
PROFINET	Specification [2]					yes	yes	

[1] Drag chain test
[2] Standard with H+S marking. According to PROFINET specification with PROFINET marking (PROFINET Type C 2K200/230 or PROFINET Type C 2P980/1000)

Industry Link TWINFIX – glass-armoured breakout cables

Properties
- Metal free indoor and outdoor cable
- For direct connector assembly with strain relief
- Rodent-protected, glass-armoured
- Easy stripping
- Low smoke, halogen free and self-extinguishing
- Improved crush resistance
- For high thermal and mechanical stability
- UV protected, suitable for outdoor use
- Longitudinal and transversal watertight cable

Applications
- For fixed installation
- Industrial Ethernet and LAN
- Machine cabling
- As control or data cable in factory automation
- Data cabling for harsh environment
- Connection to outdoor devices
- LSFH™ – for applications involving high safety requirements in case of fire

Design

Cable design	2 single fiber cables with tight tubes
Strain relief	glass-armoured
Jacket material	LSFH™
Jacket colour	black

According to IEC 60794-1-2

Ordering information

02-.../...(ZNG)H-...22
02-.../...(ZNG)H-...22_UN (optional)

Please see page 147.

Approvals
UL listed acc. OFN/OFNG

Industry Link TWINFIX – glass-armoured breakout cables

Specification						
Cable type			Industry Link TWINFIX			
Fiber types			E9. G50, G62	H200	POF980	
Jacket Ø		mm	7.5 x 7.2	7.5 x 7.2	7.5 x 7.2	
Single fiber cable Ø		mm	2.2	2.2		
Tube Ø		mm	0.9	0.9	2.2	
Channel marking on single fiber			black and orange with arrows			
Approx. weight		kg/km	61	67	67	

Mechanical properties						
Tensile strength	during installation	N	2000	2000	2000	IEC 60794-1-2 E1
	in service	N	1000	1000	1000	
Min. bend radius	during installation	mm	40	105	25	IEC 60794-1-2 E11
	in service	mm	25	70	25	
Crush resistance	short-term	N/dm	6000	6000	5000	IEC 60794-1-2 E3
	long-term	N/dm	2000	2000	2000	
Impact resistance	Wp = 2.2 J	impacts	200	200	200	IEC 60794-1-2 E4
Repeated bending	r = 60 mm/1 kg	cycles	10 000	10 000	10 000	IEC 60794-1-2 E6
Torsion	± 360°	cycles	10	10	10	IEC 60794-1-2 E7
Water penetration	h = 1 m, 24 d, p < 3 m		p	p	p	IEC 60794-1-2 F5A

Thermal properties						
Temperature range	during installation	°C	−10 to +60	−10 to +60	−10 to +60	IEC 60794-1-22 F1
	in service	°C	−40 to +70	−20 to +70	−30 to +70	
	in storage	°C	−45 to +70	−25 to +70	−30 to +70	

Combustion properties						
Fire load		MJ/m	1.15	1.1	1.25	
Fire propagation	on a vertical cable bundle		p	p		IEC 60332-3-24
Fire test	with circuit integrity (CI)	min	90	90		IEC 60331-25
Halogen acid gas	jacket material		p	p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant			

Conformance						
PROFINET	specification [1]			yes	yes	

p = passed

[1] Standard black jacket and with H+S marking. According to PROFINET specification with green jacket and PROFINET marking (PROFINET Type B 2K200/230 or PROFINET Type B 2P980/1000)

Industry Link QUADFIX – glass-armoured breakout cables

Properties
- Metal free indoor and outdoor cable
- Rodent-protected, glass-armoured
- For direct connector assembly with strain relief
- Easy stripping
- UV-protected, suitable for outdoor use
- For high thermal and mechanical stability
- Low smoke, halogen free and self-extinguishing
- Improved crush resistance
- Longitudinal and transversal watertight cable

Applications
- For fixed installation
- Industrial Ethernet and LAN
- As control or data cable in industrial plants
- Cabling in harsh environment conditions
- LSFH™ – for applications involving high safety requirements in case of fire

Design

Cable design	4 single fiber cables with tight tubes
Strain relief	glass-armoured
Jacket material	LSFH™
Jacket colour	black

According to IEC 60794-1-2

Ordering information

04-.../FJSN(ZNG)H-...22
04-H200/VJSN(ZNG)H-...22

Please see page 147.

Approvals
UL listed acc. OFN/OFNG

Industry Link QUADFIX – glass-armoured breakout cables

Specification					
Cable type			Industry Link QUADFIX		
Fiber types			E9. G50, G62	H200	
Jacket Ø		mm	9	9	
Single fiber cable Ø		mm	2.2	2.2	
Tube Ø		mm	0.9	0.5	
Approx. weight		kg/km	91	87	

Mechanical properties					
Tensile strength	during installation	N	2000	2000	IEC 60794-1-2 E1
	in service	N	1000	1000	
Min. bend radius	during installation	mm	135	135	IEC 60794-1-2 E11
	in service	mm	90	90	
Crush resistance	short-term	N/dm	15 000	6000	IEC 60794-1-2 E3
	long-term	N/dm	4000	2000	
Impact resistance	Wp = 2.2 J	impact	200	200	IEC 60794-1-2 E4
Water penetration	h = 1 m, 24 h, p < 3 m		p	p	IEC 60794-1-2 F5A

Thermal properties					
Temperature range	during installation	°C	−10 to +60	−10 to +60	IEC 60794-1-22 F1
	in service	°C	−40 to +70	−20 to +70	
	in storage	°C	−40 to +70	−25 to +70	

Combustion properties					
Fire load		MJ/m	1.63	1.62	
Fire propagation	on a vertical cable bundle		p	p	IEC 60332-3-24
Fire test	with circuit integrity (CI)	min	180	180	IEC 60331-25
Halogen acid gas	jacket material		p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant	compliant	

p = passed

Mobile field cables

Properties

- High tensile strength
- For direct connector assembly
- Excellent coiling capability
- High chemical resistance against acids and alkalies
- For high mechanical and thermal stability
- Halogen free and non-corrosive fire gases
- Improved crush resistance
- UV-protected, suitable for outdoor use
- Metal free
- Easy stripping
- High tensile strength, high abrasion and cut resistance

Applications

- Fixed or mobile data cabling (MASTERLINE mobile)
- Data cabling for harsh environment
- Military tactical field use
- Field video broadcast
- Machine cabling, drag chains

Design

Cable design	2, 4, 8 and 12 tight tubes
Strain relief	aramide yarn
Jacket material	TPU
Jacket colour	black

According to IEC 60794-1-2

Ordering information

02-.../FSN(ZN)Z-...56
04-.../FSN(ZN)Z-...56
08-.../FSN(ZN)Z-...68
12-.../FSN(ZN)Z-...80

Please see page 147.

Mobile field cables

Specification								
Number of Fiber				2	4	8	12	
Jacket Ø			mm	5.6	5.6	6.8	8.0	
Tube Ø			mm	0.9	0.9	0.9	0.9	coloured
Approx. weight			kg/km	24	26	40	53	

Mechanical properties								
Tensile strength	during installation		N	4000	4000	4000	4000	IEC 60794-1-2 E1
	in service		N	2000	2000	2000	2000	
Min. bend radius	during installation		mm	90	90	90	120	IEC 60794-1-2 E11
	in service		mm	45	45	45	80	
Crush resistance	short-term	E9 G50	N/dm	21 000 19 000	21 000 19 000	21 000 19 000	10 000 10 000	IEC 60794-1-2 E3
	long-term	E9 G50	N/dm	6000 8000	6000 8000	6000 2000	2000 2000	
Repeated bending	r=50 mm, weight = 2 kg r=80 mm, weight = 5 kg		cycles	20 000	20 000	20 000	20 000	IEC 60794-1-2 E6
Flexing	r=100 mm, weight = 1 kg r=120 mm, weight = 2 kg r=80 mm, weight = 1.5 kg		cycles	100 000	100 000	100 000	100 000	IEC 60794-1-2 E8
Impact resistance	Wp = 2.21 J		impacts	300	300	300	300	IEC 60794-1-2 E4
Coiling capability	length= 500 m/r=45 mm length= 500 m/r=80 mm length= 100 m/r=80 mm		cycles	5	5	5	5	HUBER+SUHNER
Torsion	± 1440°, l = 1000 mm ± 360°, l = 1000 mm		cycles	1000	1000	1000	1000	IEC 60794-1-2 F5B IEC 60794-1-2 E7

Thermal properties					
Temperature range	during installation	°C	−45 to +85		IEC 60794-1-22 F1
	in service	°C	−60 to +85		
	in storage	°C	−60 to +85		

Combustion properties							
Fire load		MJ/m	0.5	0.5	0.75	0.7	
2011/65/EC (RoHS)			compliant				

p = passed

Glass-armoured riser cables – 2 fibers

Properties
- Metal free indoor and outdoor cable
- Rodent-protected, glass-armoured
- For vertical appcications
- For direct connector assembly
- Halogen free and self-extinguishing
- Low fire load for high safety requirements
- Longitudinal and transversal watertight cable

Applications
- For FTTA installation
- Data cable in distribution networks

Design

Cable design	2 tight tubes
Strain relief and rodent protection	glass-armoured
Jacket material	LSFH™
Jacket colour	black

According to IEC 60794-1-2

Ordering information

02-.../F(ZNG)H-...48
02-.../F(ZNG)H-...55
02-.../F(ZNG)H-...70

Please see page 148.

Approvals
UL listed acc. OFNR

Glass-armoured riser cables – 2 fibers

Specification						
Number of fibers			2	2	2	
Jacket Ø		mm	4.8	5.5	7.0	
Tube Ø		mm	0.9	0.9	0.9	coloured
Approx. weight		kg/km	26	35	55	

Mechanical properties						
Tensile strength	during installation	N	1000	1000	1000	IEC 60794-1-2 E1
	in service	N	500	500	500	
Min. bend radius [1]	during installation	mm	72	83	105	IEC 60794-1-2 E11
	in service	mm	48	60	70	
Crush resistance SM	short-term	N/dm	20 000	20 000	20 000	IEC 60794-1-2 E3
	long-term	N/dm	6000	6000	6000	
Crush resistance MM	short-term	N/dm	20 000	20 000	20 000	IEC 60794-1-2 E3
	long-term	N/dm	7500	6000	6000	
Water penetration	h = 1 m, 24 h, p < 3 m		p	p	p	IEC 60794-1-2 F5B

Thermal properties						
Temperature range	during installation	°C	–40 to +70	–25 to +75	–25 to +75	IEC 60794-1-22 F1
	in service	°C	–40 to +75	–40 to +75	–40 to +75	
	in storage	°C	–40 to +75	–40 to +75	–40 to +75	

Combustion properties						
Fire load		MJ/m	0.46	0.67	1.2	
Fire propagation	on a vertical single cable		p	p	p	IEC 60332-1-2
	on a vertical cable bundle		p	p	p	IEC 60332-3-25
	on a vertical cable bundle		p	p	p	UL 1666
Halogen acid gas			p	p	p	IEC 60754-1
Degree of acidity			p	p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant			

[1] Smaller bending radius are possible with E9/125 LowBend (ITU G.657) and G50/125-OM3/OM4 BendOptimized.

Glass-armoured riser cables – 4 fibers

Properties

- Metal free indoor and outdoor cable
- Rodent-protected, glass-armoured
- Ripcord for easy jacked removal
- For direct connector assembly
- Low smoke, halogen free and self-extinguishing
- Low fire load for high safety requirements
- Longitudinal and transversal watertight cable

Applications

- For FTTA installation
- Data cable in distribution networks

Design

Cable design	central strength member (non metallic) 4 tight tubes 1 ripcord
Strain relief and rodent protection	glass-armoured
Jacket material	LSFH™
Jacket colour	black

According to IEC 60794-1-2

Ordering information

04-.../FSN(ZNG)H-...55

Please see page 148.

Glass-armoured riser cables – 4 fibers

Specification					
Fiber types			E9	G50, G62	
Number of fiber			4	4	
Jacket Ø		mm	5.5	5.5	
Tube Ø		mm	0.9	0.9	coloured
Approx. weight		kg/km	33	33	

Mechanical properties					
Tensile strength	during installation	N	1000	1000	IEC 60794-1-2 E1
	in service	N	500	500	
Min. bend radius [1]	during installation	mm	83	83	IEC 60794-1-2 E11
	in service	mm	60	60	
Crush resistance	short-term	N/dm	20 000	6000	IEC 60794-1-2 E3
	long-term	N/dm	3000	2000	
Impact resistance	Wp = 1.53 J	impacts	100	200	IEC 60794-1-2 E4
Repeated bending	r = 40 mm, weight = 1 kg	cycles	10 000	10 000	IEC 60794-1-2 E6
Flexing	r = 100 mm, weight = 1.5 kg	cycles	20 000	20 000	IEC 60794-1-2 E8
Torsion	± 360°, l = 1000 mm	cycles	1000	1000	IEC 60794-1-2 E7
Water penetration	h = 1 m, 24 h, p < 3 m		p	p	IEC 60794-1-2 F5B

Thermal properties					
Temperature range	during installation	°C	–25 to +75	–25 to +75	IEC 60794-1-22 F1
	in service	°C	–40 to +75	–40 to +75	
	in storage	°C	–40 to +75	–40 to +75	

Combustion properties					
Fire load		MJ/m	0.7	0.7	
Fire propagation	on a vertical single cable		p	p	IEC 60332-1-2
	on a vertical cable bundle		p	p	IEC 60332-3-24
	on a vertical cable bundle		p	p	UL 1666
Halogen acid gas	jacket material		p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant		

p = passed

[1] Smaller bending radius are possible with E9/125 LowBend (ITU G.657) and G50/125-OM3/OM4 BendOptimized.

Rugged multi-fiber loose tube up to 24 fibers (jelly-free)

Properties

- Metal and jelly free cable
- Rodent-protected, glass-armoured
- For mobile applications
- No need for cleaning the fibers
- Longitudinal and transversal watertight cable

Applications

- Fixed or mobile data cabling
- Data cabling for harsh environment
- Machine cabling, drag chains

Design

Cable design	dry multi-fiber loose tube with 2 up to 24 fibers
Strain relief and rodent protection	glass-roving
Jacket material	TPU
Jacket colour	black

According to IEC 60794-1-2

Ordering information

24-.../Q(ZNG)Z-...70

Please see page 149.

Rugged multi-fiber loose tube up to 24 fibers (jelly-free)

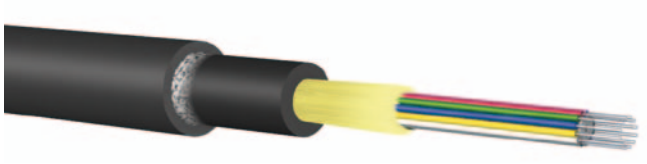
Specification				
Number of fiber		mm	2 to 24	
Jacket Ø		mm	7.0	
Tube Ø		mm	2.8	coloured
Approx. weight		kg/km	44	

Mechanical properties				
Tensile strength	during installation	N	2500	IEC 60794-1-2 E1
	in service	N	1500	
Min. bend radius	during installation	mm	50	IEC 60794-1-2 E11
	in service	mm	70	
Crush resistance	short-term	N/dm	9000	IEC 60794-1-2 E3
	long-term	N/dm	2000	
Impact resistance	Wp = 1.5 J	impacts	100	IEC 60794-1-2 E4
Repeated bending	r = 50 mm, weight = 2 kg	cycles	10 000	IEC 60794-1-2 E6
Flexing	r = 120 mm velocity = 1.4 m/s	cycles	100 000	IEC 60794-1-2 E8
Water penetration	h = 1 m, 24 h, p < 3 m		p	IEC 60794-1-2 F5B

Thermal properties				
Temperature range	during installation	°C	−25 to +70	IEC 60794-1-22 F1
	in service	°C	−45 to +85	
	in storage	°C	−45 to +85	

Combustion properties			
Fire load	MJ/m	0.58	
2011/65/EC (RoHS)		compliant	

Drag chain cables



Properties

- Strain relieved with aramide yarn
- For direct connector assembly
- High chemical resistance against acids and alkalies
- For high mechanical and thermal stability
- Halogen free and non-corrosive fire gases
- Improved crush resistance
- Metal free

Applications

- Medium to large drag chains
- Cabling in industrial applications
- As control or data cable in industry robots, cranes, production lines and automation systems
- Cable design allows for a permanent load with more than one million drag chain cycles

Design

Cable design	up to 12 tight tubes strength member
Strain relief and rodent protection	aramide yarn
Jacket material	TPU
Jacket colour	black

According to IEC 60794-1-2

Ordering information

12-.../FSN(ZN)YZ-...130

Please see page 149.

Drag chain cables

Specification					
Fiber types		mm	E9	G50, G62.5	
Jacket Ø		mm	13	13	
Tube Ø		mm	0.9	0.9	coloured
Approx. weight		kg/km	128	128	

Mechanical properties					
Tensile strength	during installation	N	4000	4000	IEC 60794-1-2 E1
	in service	N	2000	2000	
Min. bend radius	during installation	mm	200	200	IEC 60794-1-2 E11
	in service	mm	100	100	
Crush resistance	short-term	N/dm	4000	4000	IEC 60794-1-2 E3
	long-term	N/dm	2000	2000	
Repeated bending	r = 100 mm, weight = 5 kg	cycles	5000	5000	IEC 60794-1-2 E6
Flexing	r = 120 mm velocity = 0.5 m/s, L = 2.0 m	cycles	100 000	100 000	IEC 60794-1-2 E8
Flexing	r = 100 mm velocity = 2 m/s, L = 2.0 m	cycles	1 000 000	1 000 000	HUBER+SUHNER drag chain test

Thermal properties					
Temperature range	during installation	°C	−10 to +50	−10 to +50	IEC 60794-1-22 F1
	in service	°C	−40 to +85	−30 to +85	
	in storage	°C	−40 to +85	−40 to +85	

Combustion properties				
Fire load		MJ/m	3.49	
2011/65/EC (RoHS)			compliant	

p = passed

Hybrid cables

Hybrid breakout cable

Hybrid multi-fiber loose tube cable

Properties

- Custom designed cable configuration
- Each fiber strain relieved
- High chemical resistance against acids and alkalies
- Tube can be stripped up to 2 m in one piece
- For high mechanical requirements
- Low smoke, halogen free and self extinguishing
- Hybrid multi-fiber loose tube cables are rodent protected (glass armoured)

Applications

- As data and power cable for industry, LAN, video, tele-phone or customer-specific applications
- Installation outdoors, in moist, wet cable ducts
- With LSFH™ jacket ideal for applications involving high safety requirements in case of a fire (installation indoors)

Design of hybrid breakout cables

Cable design	single fiber semi-tight tubes, orange, numbered
Conductor	1.5 mm^2 up to 4 conductors
Strain relief	aramide yarn
Jacket material	LSFH™
Jacket colour	black

Design of hybrid multi-fiber loose tube cables

Cable design	multi-fiber loose tubes
Conductor	1.5 mm^2 up to 4 conductors 2.5 mm^2 up to 4 conductors
Strain relief	glass-armouring
Jacket material	PE (optional LSFH™)
Jacket colour	black

According to IEC 60794-1-2

Ordering information

- Hybrid breakout cables
  04-.../CWJSN(ZN)H-...27+...-C15
  08-.../CWJSN(ZN)H-...27+...-C15
- Hybrid multi-fiber loose tube cables, PE jacket/LSFH™
  bis 60-.../WSN(ZNG).-...150+...-C...
  bis 96-.../WSN(ZNG).-...180+...-C.

Hybrid cable order on request.

Hybrid cables

Specification fiber optic components			 4-way Breakout	 8-way Breakout	 5-way Multi-fiber loose tube	 8-way Multi-fiber loose tube	
Jacket Ø		mm	10.0	13.0	15.0	18.0	
Single fiber cable Ø/multi-fiber loose tube Ø		mm	2.7	2.7	2.8	2.8	
Channel marking on single fiber			numbered		coloured		
Specification conductor							
Outer Ø conductor [1]	1.5 mm² 2.5 mm²	mm mm	2.7	2.7	2.7 3.5	2.7 3.5	
Rated voltage U_0/U	1.5 mm² 2.5 mm²	V V	600/1000 600/1000				
Electrical resistance	1.5 mm² 2.5 mm²	Ω/km	13.7	13.7	13.7 8.2	13.7 8.2	
Jacket material			RADOX 125, halogen free				
Mechanical properties							
Tensile strength	during installation	N	2000	4000	9000	13000	IEC 60794-1-2 E1
	in service	N	1000	2000	4500	6500	
Min. bend radius	during installation	mm	150	200	225	270	IEC 60794-1-2 E11
	in service	mm	100	130	150	180	
Crush resistance	short-term	N/dm	10 000	10 000	8000	8000	IEC 60794-1-2 E3
	long-term	N/dm	2000	2000	3000	3000	
Impact resistance	r = 25 mm Wp = 2.21 J Up = 4.41 J	impacts	50	50	100 100	100 100	IEC 60794-1-2 E4
Thermal properties							
Temperature range	during installation	°C	−10 to +50		−10 to +50		IEC 60794-1-22 F1
	in service	°C	−20 to +70		−40 to +70		
	in storage	°C	−25 to +70		−40 to +70		
Combustion properties							
Fire propagation			p	p	p [2]	p [2]	IEC 60332-1
2011/65/EC (RoHS)			compliant				

p = passed

Other hybrid cable types available upon request.

[1] Customer-specific order of colours for conductors. Available colours are black, red, white, blue, yellow/green
[2] Only applies to LSFH™, PE jacket material 'not passed'

Order information for indoor cables

Semi-tight tubes 0.9 mm
available as standard only: 2000 m

Item no.	Cable type	Description
22521983	01-E9/CH-E9-FE	1-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 0.9 mm, tube and fiber color: yellow
84065234	01-E9A2/CH-E9-FG	1-fiber, 9/125 µm acc.G.657-A2, Ø 0.9 mm, tube color yellow and fiber color black
22520626	01-G50/CH-D9-FD	1-fiber, 50/125 µm OM2, Ø 0.9 mm, tube and fiber color: orange
84005132	01-G50/CH-M9-F-FM OM3	1-fiber, 50/125 µm OM3 BendOptimized, Ø 0.9 mm, tube and fiber color: turquoise
84121373	01-G50/CH-L9-G-FL OM4	1-fiber, 50/125 µm OM4 BendOptimized, Ø 0.9 mm, tube and fiber color: heather violet
22520967	01-G62/CH-C9-FC	1-fiber, 62.5/125 µm OM1, Ø 0.9 mm, tube and fiber color: blue

On request: up to12 different colors for all different fiber types available; up to 24 different colors with ring marking for all different fiber types available.

Tight tubes 0.9 mm
available as standard only: 2000 m

Item no.	Cable type	Description
22521478	01-E9/F-E9	1-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 0.9 mm, tube color: yellow
23012983	01-E9/F-F9	1-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 0.9 mm, tube color white
84145050	01-E9A2/F-E9-FG	1-fiber, 9/125 µm G.657-A2, Ø 0.9 mm, tube color: yellow
85001241	01-E9A2/F-F9	1-fiber, 9/125 µm G.657-A2, Ø 0.9 mm, tube color: white
22521479	01-G50/F-D9	1-fiber, 50/125 µm OM2, Ø 0.9 mm, tube color: orange
22523050	01-G62/F-C9	1-fiber, 62.5/125 µm OM1, Ø 0.9 mm, tube color: blue

Tight tubes 0.6 mm
available as standard only: 2000 m

Item no.	Cable type	Description
84077172	01-E9A2/V-T6-FA	1-fiber, 9/125 µm acc.G.657-A2, Ø 0.6 mm, tube color: red
84077173	01-E9A2/V-T6-FB	1-fiber, 9/125 µm acc.G.657-A2, Ø 0.6 mm, tube color: green
84077174	01-E9A2/V-T6-FE	1-fiber, 9/125 µm acc.G.657-A2, Ø 0.6 mm, tube color: yellow
84077175	01-E9A2/V-T6-FC	1-fiber, 9/125 µm acc.G.657-A2, Ø 0.6 mm, tube color: blue

Order information for indoor cables

Simplex cables 1.4 mm
LSFH™ jacket with tight tube 0.6 mm

Item no.	Cable type	Description
84099204	01-E9LB/VJH-E14	1-fiber, 9/125 µm acc.G.657-A2, Ø 1.4 mm, jacket LSFH yellow
84093690	01-G50/VJH-M14-F OM3	1-fiber, 50/125 µm OM3 BendOptimized, Ø 1.4 mm, jacket LSFH turquoise
tbd	01-G50/VJH-L14-G OM4	1-fiber, 50/125 µm OM4 BendOptimized, Ø 1.4 mm, jacket LSFH heather violet

Simplex cables 1.7 mm
LSFH™ jacket with semi-tight tube 0.9 mm

Item no.	Cable type	Description
85020782	01-E9/CWJH-E17	1-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 1.7 mm, jacket LSFH yellow
84078975	01-E9A2/CWJH-E17-FG	1-fiber, 9/125 µm acc.G.657-A2, Ø 1.7 mm, jacket LSFH yellow

Simplex cables 2.0 mm
LSFH™ jacket with semi-tight tube 0.9 mm

Item no.	Cable type	Description
84012397	01-E9/CWJH-E20	1-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 2.0 mm, jacket LSFH yellow
84044941	01-E9/CWJH-C20	1-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 2.0 mm, jacket LSFH blue
84065255	01-E9A2/CWJH-E20-FG	1-fiber, 9/125 µm acc.ITU-G.657-A2, Ø 2.0 mm, jacket LSFH yellow
84000564	01-G50/CWJH-D20	1-fiber, 50/125 µm OM2, Ø 2.0 mm, jacket LSFH orange
84033249	01-G50/CWJH-M20-F OM3	1-fiber, 50/125 µm OM3 BendOptimized, Ø 2.0 mm, jacket LSFH turquoise
84121677	01-G50/CWJH-L20-G OM4	1-fiber, 50/125 µm OM4 BendOptimized, Ø 2.0 mm, jacket LSFH heather violet
84000565	01-G62/CWJH-D20	1-fiber, 62.5/125 µm OM1, Ø 2.0 mm, jacket LSFH orange

Simplex cables 2.4 mm
LSFH™ jacket with semi-tight tube 0.9 mm

Item no.	Cable type	Description
85020593	01-E9/CWJH-E24	1-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 2.4 mm, jacket LSFH yellow

Simplex cables 2.7 mm
LSFH™ jacket with semi-tight tube 0.9 mm

Item no.	Cable type	Description
22523125	01-E9/CWJH-E27	1-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 2.4 mm, jacket LSFH yellow
84086802	01-E9A2/CWJH-E27-FG	1-fiber, 9/125 µm acc.ITU-G.657-A2, Ø 2.7 mm, jacket LSFH yellow
22523126	01-G50/CWJH-D27	1-fiber, 50/125 µm OM2, Ø 2.7 mm, jacket LSFH orange
22523127	01-G62/CWJH-D27	1-fiber, 62.5/125 µm OM1, Ø 2.7 mm, jacket LSFH orange

Order information for indoor cables

Duplex cables figure 8 – 1.4 mm
LSFH™ jacket with tight tube 0.6 mm

Item no.	Cable type	Description
84065738	02-E9/VJH-E14	2-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 1.4 × 3.0 mm, jacket LSFH yellow
84126462	02-E9A2/VJH-E14-FG	2-fiber, 9/125 µm acc.G.657-A2, Ø 1.4 × 3.0 mm, jacket LSFH yellow
84145087	02-G50/VJH-M14-F OM3	2-fiber, 50/125 µm OM3 BendOptimized, Ø 1.4 × 3.0 mm, jacket LSFH turquoise
84146528	02-G50/VJH-L14-G OM4	2-fiber, 50/125 µm OM4 BendOptimized, Ø 1.4 × 3.0 mm, jacket LSFH heather violet

Duplex cables figure 8 – 1.7 mm
LSFH™ jacket with tight tube 0.9 mm

Item no.	Cable type	Description
23040758	02-E9/FJH-E17	2-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 1.7 × 3.4 mm, jacket LSFH yellow
84127588	02-E9A2/FJH-E17-FG	2-fiber, 9/125 µm acc.ITU-G.657-A2, Ø 1.7 × 3.4 mm, jacket LSFH yellow
23040759	02-G50/FJH-D17	2-fiber, 50/125 µm OM2, Ø 1.7 × 3.4 mm, jacket LSFH orange
84005418	02-G50/FJH-M17-F OM3	2-fiber, 50/125 µm OM3 BendOptimized, Ø 1.7 × 3.4 mm, jacket LSFH turquoise
84121679	02-G50/FJH-L17-G OM4	2-fiber, 50/125 µm OM4 BendOptimized, Ø 1.7 × 3.4 mm, jacket LSFH heather violet
23040760	02-G62/FJH-D17	2-fiber, 62.5/125 µm OM1, Ø 1.7 × 3.4 mm, jacket LSFH orange

Duplex cables figure 8 – 1.7 mm
LSFH™ jacket with semi-tight tubes 0.9 mm

Item no.	Cable type	Description
85024637	02-E9/CWJH-E17	2-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 1.7 × 3.4 mm, jacket LSFH yellow
85029964	02-E9A2/CWJH-E17-FG	2-fiber, 9/125 µm acc.G.657-A2, Ø 1.7 × 3.4 mm, jacket LSFH yellow
85030614	02-G50/CWJH-M17-F	2-fiber, 50/125 µm OM3 BendOptimized, Ø 1.7 × 3.4 mm, jacket LSFH turquoise

Duplex cables figure 8 – 2.0 mm
LSFH™ jacket with semi-tight tube 0.9 mm

Item no.	Cable type	Description
84008151	02-E9/CWJH-E20	2-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 2.0 × 4.1 mm, jacket LSFH yellow
84065256	02-E9A2/CWJH-E20-FG	2-fiber, 9/125 µm acc.ITU-G.657-A2, Ø 2.0 × 4.1 mm, jacket LSFH yellow
84008152	02-G50/CWJH-D20	2-fiber, 50/125 µm OM2, Ø 2.0 × 4.1 mm, jacket LSFH orange
84008169	02-G50/CWJH-M20-F OM3	2-fiber, 50/125 µm OM3 BendOptimized, Ø 2.0 × 4.1 mm, jacket LSFH turquoise
84121856	02-G50/CWJH-L20-G OM4	2-fiber, 50/125 µm OM4 BendOptimized, Ø 2.0 × 4.1 mm, jacket LSFH heather violet
84008153	02-G62/CWJH-D20	2-fiber, 62.5/125 µm OM1, Ø 2.0 × 4.1 mm, jacket LSFH orange

Order information for indoor cables

Duplex cables figure 8 – 2.7 mm
LSFH™ jacket with semi-tight tube 0.9 mm

Item no.	Cable type	Description
22523202	02-E9/CWJH-E27	2-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 2.7 × 5.4 mm, jacket LSFH yellow
22523203	02-G50/CWJH-D27	2-fiber, 50/125 µm OM2, Ø 2.7 × 5.4 mm, jacket LSFH orange
84005133	02-G50/CWJH-M27-F OM3	2-fiber, 50/125 µm OM3 BendOptimized, Ø 2.7 × 5.4 mm, jacket LSFH turquoise
22523204	02-G62/CWJH-D27	2-fiber, 62.5/125 µm OM1, Ø 2.7 × 5.4 mm, jacket LSFH orange

Duplex cable figure 0 – 1.4 mm
LSFH™ jacket with tight tube 0.6 mm

Item no.	Cable type	Description
84149009	02-E9/VJH-AE14	2-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 2.3 × 3.7 mm, jacket LSFH yellow
84148983	02-E9A2/VJH-AE14-FG	2-fiber, 9/125 µm acc.G.657-A2, Ø 2.3 × 3.7 mm, jacket LSFH yellow
84153026	02-G50/VJH-AM14-F OM3	2-fiber, 50/125 µm OM3 BendOptimized, Ø 2.3 × 3.7 mm, jacket LSFH turquoise
84153207	02-G50/VJH-AL14-G OM4	2-fiber, 50/125 µm OM4 BendOptimized, Ø 2.3 × 3.7 mm, jacket LSFH heather violet

Duplex cables figure 0 – 2.0 mm
LSFH™ jacket with semi-tight tube 0.9 mm

Item no.	Cable type	Description
23039888	02-E9/CWJH-AE20	2-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 3.1 × 5.2 mm, jacket LSFH yellow
84073839	02-E9A2/CWJH-AE20-FG	2-fiber, 9/125 µm acc.ITU-G.657-A2, Ø 3.1 × 5.2 mm, jacket LSFH yellow
23039889	02-G50/CWJH-AD20	2-fiber, 50/125 µm OM2, Ø 3.1 × 5.2 mm, jacket LSFH orange
84005553	02-G50/CWJH-AM20-F OM3	2-fiber, 50/125 µm OM3 BendOptimized, Ø 3.1 × 5.2 mm, jacket LSFH turquoise
84121859	02-G50/CWJH-AL20-G OM4	2-fiber, 50/125 µm OM4 BendOptimized, Ø 3.1 × 5.2 mm, jacket LSFH heather violet
23039891	02-G62/CWJH-AD20	2-fiber, 62.5/125 µm OM1, Ø 3.1 × 5.2 mm, jacket LSFH orange

Duplex cables figure 0 – 2.7 mm
LSFH™ jacket with semi-tight tube 0.9 mm

Item no.	Cable type	Description
22523252	02-E9/CWJH-AE27	2-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 3.5 × 6.2 mm, jacket LSFH yellow
22523253	02-G50/CWJH-AD27	2-fiber, 50/125 µm OM2, Ø 3.5 × 6.2 mm, jacket LSFH orange
84005135	02-G50/CWJH-AM27-F	2-fiber, 50/125 µm OM3 BandOptimized, Ø 3.5 × 6.2 mm, jacket LSFH turquoise
22523254	02-G62/CWJH-AD27	2-fiber, 62.5/125 µm OM1, Ø 3.5 × 6.2 mm, jacket LSFH orange

Duplex cables round 2.1 mm
LSFH™ jacket with tight tube 0.6 mm for LC Uniboot

Item no.	Cable type	Description
84107633	02-E9A2/V(ZN)H-E21	2-fiber, 9/125 µm acc.ITU-G.657-A2, Ø 2.1 mm, jacket LSFH yellow
84107634	02-G50/V(ZN)H-M21-F OM3	2-fiber, 50/125 µm OM3 BandOptimized, Ø 2.1 mm, jacket LSFH turquoise
84124505	02-G50/V(ZN)H-L21-G OM4	2-fiber, 50/125 µm OM4 BandOptimized, Ø 2.1 mm, jacket LSFH heather violet

Order information for indoor cables

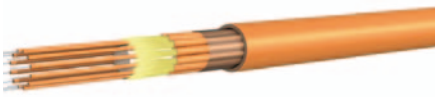
OptiPack 12 – 3.0 mm
Multi-fiber patch cable
LSFH™ jacket with 12 fibers for MTP® / MPO

Item no.	Cable type	Description
84138650	12-E9A2/(ZN)H-E30	12-fiber, 9/125 µm acc.G.657-A2, Ø 3.0 mm, jacket LSFH yellow
84150817	12-G50/(ZN)H-M30-F OM3	12-fiber, 50/125 µm OM3 BendOptimized, Ø 3.0 mm, jacket LSFH turquoise
84144927	12-G50/(ZN)H-L30-G OM4	12-fiber, 50/125 µm OM4 BendOptimized, Ø 3.0 mm, jacket LSFH heather violet

OptiPack 24 – 3.6 mm
Multi-fiber patch cable
LSFH™ jacket with 24 fibers for MTP® / MPO

Item no.	Cable type	Description
85001254	24-E9A2/(ZN)H-E36	24-fiber, 9/125 µm acc.G.657-A2, Ø 3.6 mm, jacket LSFH yellow
85001255	24-G50/(ZN)H-M36-F OM3	24-fiber, 50/125 µm OM3 BendOptimized, Ø 3.6 mm, jacket LSFH turquoise
85001256	24-G50/(ZN)H-L36-G OM4	24-fiber, 50/125 µm OM4 BendOptimized, Ø 3.6 mm, jacket LSFH heather violet

Breakout cable – 1.4 mm
LSFH™ jacket with tight tube 0.6 mm



Item no.	Cable type	Description
84127584	12-E9/VJSNH-E14	12-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 9 mm, jacket LSFH yellow
84150017	12-G50/VJSNH-M14-F OM3	12-fiber, 50/125 µm OM3 BendOptimized, Ø 9 mm, jacket LSFH turquoise
84150018	12-G50/VJSNH-L14-G OM4	12-fiber, 50/125 µm OM4 BendOptimized, Ø 9 mm, jacket LSFH heather violet
84127585	16-E9/VJSNH-E14	16-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 9 mm, jacket LSFH yellow
84137530	18-E9/VJSNH-E14	18-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 9.5 mm, jacket LSFH yellow
84127586	24-E9/VJSNH-E14	24-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 10.6 mm, jacket LSFH yellow
84144533	24-E9A2/VJSNH-E14	24-fiber, 9/125 µm acc.ITU-G.657-A2, Ø 10.6 mm, jacket LSFH yellow
84138289	24-G50/VJSNH-M14-F OM3	24-fiber, 50/125 µm OM3 BendOptimized, Ø 10.6 mm, jacket LSFH turquoise
84135616	24-G50/VJSNH-L14-G OM4	24-fiber, 50/125 µm OM4 BendOptimized, Ø 10.6 mm, jacket LSFH heather violet

Order information for indoor cables

Breakout cables – 2.0 mm
LSFH™ jacket with semi-tight tube 0.9 mm

Item no.	Cable type	Description
84008843	04-E9/CWJSNH-E20	4-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 7 mm, jacket LSFH yellow
84008846	04-G50/CWJSNH-D20	4-fiber, 50/125 µm OM2, Ø 7 mm, jacket LSFH orange
84033250	04-G50/CWJSNH-M20-F OM3	4-fiber, 50/125 µm OM3 BendOptimized, Ø 7 mm, jacket LSFH turquoise
84121850	04-G50/CWJSNH-L20-G OM4	4-fiber, 50/125 µm OM4 BendOptimized, Ø 7 mm, jacket LSFH heather violet
84008847	04-G62/CWJSNH-D20	4-fiber, 62/125 µm OM1, Ø 7 mm, jacket LSFH orange
84009199	08-E9/CWJSNH-E20	8-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 7 mm, jacket LSFH yellow
84009200	08-G50/CWJSNH-D20	8-fiber, 50/125 µm OM2, Ø 9 mm, jacket LSFH orange
84033251	08-G50/CWJSNH-M20-F OM3	8-fiber, 50/125 µm OM3 BendOptimized, Ø 9 mm, jacket LSFH turquoise
84121854	08-G50/CWJSNH-L20-G OM4	8-fiber, 50/125 µm OM4 BendOptimized, Ø 9 mm, jacket LSFH heather violet
84009201	08-G62/CWJSNH-D20	8-fiber, 62/125 µm OM1, Ø 9 mm, jacket LSFH orange
84009443	12-E9/CWJSNH-E20	12-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 12 mm, jacket LSFH yellow
84073652	12-E9A2/CWJSNH-E20-FG	12-fiber, 9/125 µm acc.G.657-A2, Ø 12 mm, jacket LSFH yellow
84009444	12-G50/CWJSNH-D20	12-fiber, 50/125 µm OM2, Ø 12 mm, jacket LSFH orange
84033252	12-G50/CWJSNH-M20-F OM3	12-fiber, 50/125 µm OM3 BendOptimized, Ø 12 mm, jacket LSFH turquoise
84121855	12-G50/CWJSNH-L20-G OM4	12-fiber, 50/125 µm OM4 BendOptimized, Ø 12 mm, jacket LSFH heather violet
84009445	12-G62/CWJSNH-D20	12-fiber, 62/125 µm OM1, Ø 12 mm, jacket LSFH orange
84015387	16-E9/CWJSNH-E20	16-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 12 mm, jacket LSFH yellow

Breakout cables – fire resistance – 2.0 mm
LSFH™ jacket with semi-tight tube 0.9 mm

Item no.	Cable type	Description
84018102	04-E9/CWJSNHIH-E20	4-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 10 mm, jacket LSFH yellow
84018103	04-G50/CWJSNHIH-D20	4-fiber, 50/125 µm OM2, Ø 10 mm, jacket LSFH orange
84150417	04-G50/CWJSNHIH-L20-G OM4	4-fiber, 50/125 µm OM4 BendOptimized, Ø 10 mm, jacket LSFH heather violet
84018104	04-G62/CWJSNHIH-D20	4-fiber, 62/125 µm OM1, Ø 10 mm, jacket LSFH orange
84018106	08-E9/CWJSNHIH-E20	8-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 12 mm, jacket LSFH yellow
84018107	08-G50/CWJSNHIH-D20	8-fiber, 50/125 µm OM2, Ø 12 mm, jacket LSFH orange
85001062	08-G50/CWJSNHIH-L20-G OM4	8-fiber, 50/125 µm OM4 BendOptimized, Ø 12 mm, jacket LSFH heather violet
84018108	08-G62/CWJSNHIH-D20	8-fiber, 62/125 µm OM1, Ø 12 mm, jacket LSFH orange
84018109	12-E9/CWJSNHIH-E20	12-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 15 mm, jacket LSFH yellowt
84018110	12-G50/CWJSNHIH-D20	12-fiber, 50/125 µm OM2, Ø 15 mm, jacket LSFH orange
84150427	12-G50/CWJSNHIH-L20-G OM4	12-fiber, 50/125 µm OM4 BendOptimized, Ø 15 mm, jacket LSFH heather violet
84018111	12-G62/CWJSNHIH-D20	12-fiber, 62/125 µm OM1, Ø 15 mm, jacket LSFH orange

Order information for indoor cables

OptiPack 12 – breakout – 3.0 mm up to 144

Multi-fiber breakout cable
LSFH™ jacket with 12 fibers for MTP® / MPO

Item no.	Cable type	Description
85013548	24-12E9A2/(ZN)SNH-E30	24-fiber, 9/125 µm acc.G.657-A2, Ø 8.5 mm, jacket LSFH yellow
85013564	24-12G50/(ZN)SNH-M30-F OM3	24-fiber, 50/125 µm OM3 BendOptimized, Ø 8.5 mm, jacket LSFH turquoise
85013547	24-12G50/(ZN)SNH-L30-G OM4	24-fiber, 50/125 µm OM4 BendOptimized, Ø 8.5 mm, jacket LSFH heather violet
85010852	48-12E9A2/(ZN)SNH-E30	48-fiber, 9/125 µm acc.G.657-A2, Ø 8.5 mm, jacket LSFH yellow
85013565	48-12G50/(ZN)SNH-M30-F OM3	48-fiber, 50/125 µm OM3 BendOptimized, Ø 8.5 mm, jacket LSFH turquoise
85013549	48-12G50/(ZN)SNH-L30-G OM4	48-fiber, 50/125 µm OM4 BendOptimized, Ø 8.5 mm, jacket LSFH heather violet
85010878	72-12E9A2/(ZN)SNH-E30	72-fiber, 9/125 µm acc.G.657-A2, Ø 10.4 mm, jacket LSFH yellow
tbd	72-12G50/(ZN)SNH-M30-F OM3	72-fiber, 50/125 µm OM3 BendOptimized, Ø 10.4 mm, jacket LSFH turquoise
85015798	72-12G50/(ZN)SNH-L30-G OM4	72-fiber, 50/125 µm OM4 BendOptimized, Ø 10.4 mm, jacket LSFH heather violet
85010879	144-12E9A2/(ZN)H-E30	144-fiber, 9/125 µm G.657-A2, Ø 13.5 mm, jacket LSFH yellow
tbd	144-12G50/(ZN)H-M30-F OM3	144-fiber, 50/125 µm OM3 BendOptimized, Ø 13.5 mm, jacket LSFH turquoise
85013550	144-12G50/(ZN)H-L30-G OM4	144-fiber, 50/125 µm OM4 BendOptimized, Ø 13.5 mm, jacket LSFH heather violet

OptiPack 24 – breakout – 3.6 mm up to 288

Multi-fiber breakout cable
LSFH™ jacket with 24 fibers for MTP® / MPO

Item no.	Cable type	Description
85017415	48-24E9A2/(ZN)SNH-E36	48-fiber, 9/125 µm acc. G.657-A2, Ø 10.1 mm, jacket LSFH yellow
tbd	48-24G50/(ZN)SNH-M36-F OM3	48-fiber, 50/125 µm OM3 BendOptimized, Ø 10.1 mm, jacket LSFH turquoise
tbd	48-24G50/(ZN)SNH-L36-G OM4	48-fiber, 50/125 µm OM4 BendOptimized, Ø 10.1 mm, jacket LSFH heather violet
85017416	96-24E9A2/(ZN)SNH-E36	96-fiber, 9/125 µm acc. G.657-A2, Ø 10.1 mm, jacket LSFH yellow
tbd	96-24G50/(ZN)SNH-M36-F OM3	96-fiber, 50/125 µm OM3 BendOptimized, Ø 10.1 mm, jacket LSFH turquoise
tbd	96-24G50/(ZN)SNH-L36-G OM4	96-fiber, 50/125 µm OM4 BendOptimized, Ø 10.1 mm, jacket LSFH heather violet
85017417	144-24E9A2/(ZN)SNH-E36	144-fiber, 9/125 µm acc. G.657-A2, Ø 12.4 mm, jacket LSFH yellow
tbd	144-24G50/(ZN)SNH-M36-F OM3	144-fiber, 50/125 µm OM3 BendOptimized, Ø 12.4 mm, jacket LSFH turquoise
tbd	144-24G50/(ZN)SNH-L36-G OM4	144-fiber, 50/125 µm OM4 BendOptimized, Ø 12.4 mm, jacket LSFH heather violet
85019048	288-24E9A2/(ZN)H-E36	288-fiber, 9/125 µm G.657-A2, Ø 17.0 mm, jacket LSFH yellow
tbd	288-24G50/(ZN)H-M36-F OM3	288-fiber, 50/125 µm OM3 BendOptimized, Ø 17.0 mm, jacket LSFH turquoise
tbd	288-24G50/(ZN)H-L36-G OM4	288-fiber, 50/125 µm OM4 BendOptimized, Ø 17.0 mm, jacket LSFH heather violet

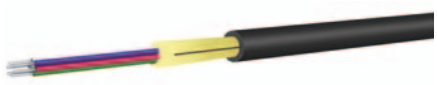
FTTH Simplex cables 2.7 mm

LSFH™ jacket with semi-tight tube 0.9 mm

Item no.	Cable type	Description
84075437	01-E9A2/CWJH-H27-FG	1-fiber, 9/125 µm acc.ITU-G.657-A2, Ø 2.7 mm, jacket LSFH light grey
85021554	01-E9A3/CWJH-F27-FG_blank	1-fiber, 9/125 µm acc.ITU-G.657-A2/B3, Ø 2.7 mm, jacket LSFH white, no labelling

Order information for indoor cables

Riser cables (mini breakout)
LSFH™ jacket with tight tube 0.9 mm



Item no.	Cable type	Description
22523404	04-E9/FSN(ZN)H-G50	4-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 5 mm, jacket LSFH black
22521830	04-G50/FSN(ZN)H-G50	4-fiber, 50/125 µm OM2, Ø 5 mm, jacket LSFH black
84101315	04-G50/FSN(ZN)H-G50-F OM3	4-fiber, 50/125 µm OM3 BendOptimized, Ø 5 mm, jacket LSFH black
84098281	04-G50/FSN(ZN)H-G50-G OM4	4-fiber, 50/125 µm OM4 BendOptimized, Ø 5 mm, jacket LSFH black
22521829	04-G62/FSN(ZN)H-G50	4-fiber, 62.5/125 µm OM1, Ø 5 mm, jacket LSFH black
22523407	12-E9/FSN(ZN)H-G70	12-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 7 mm, jacket LSFH black
84047888	12-E9/FSN(ZN)H-E70	12-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 7 mm, jacket LSFH yellow
22521838	12-G50/FSN(ZN)H-G70	12-fiber, 50/125 µm OM2, Ø 7 mm, jacket LSFH black
84067095	12-G50/FSN(ZN)H-M70-F OM3	12-fiber, 50/125 µm OM3 BendOptimized, Ø 7 mm, jacket LSFH turquoise
84136187	12-G50/FSN(ZN)H-L70-G OM4	12-fiber, 50/125 µm OM4 BendOptimized, Ø 7 mm, jacket LSFH heather violet
22521839	12-G62/FSN(ZN)H-G70	12-fiber, 62.5/125 µm OM1, Ø 7 mm, jacket LSFH black
84066463	24-E9/FSN(ZN)H-G88	24-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 8.8 mm, jacket LSFH black
84148070	24-E9/FSN(ZN)H-E88	24-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 8.8 mm, jacket LSFH yellow
84066644	24-G50/FSN(ZN)H-G88	24-fiber, 50/125 µm OM2, Ø 8.8 mm, jacket LSFH black
84144587	24-G50/FSN(ZN)H-G88-F OM3	24-fiber, 50/125 µm OM3 BendOptimized, Ø 8.8 mm, jacket LSFH black
84110821	24-G50/FSN(ZN)H-G88-G OM4	24-fiber, 50/125 µm OM4 BendOptimized, Ø 8.8 mm, jacket LSFH black
84148078	24-G50/FSN(ZN)H-L88-G OM4	24-fiber, 50/125 µm OM4 BendOptimized, Ø 8.8 mm, jacket LSFH heather violet
84068521	24-G62/FSN(ZN)H-G88	24-fiber, 62.5/125 µm OM1, Ø 8.8 mm, jacket LSFH black

FTTH Microtube cables 2.3 mm
LSFH™ jacket up to 4 fibers

Item no.	Cable type	Description
85024198	04-4E9A2/MH(ZN)H-H23	4-fiber, 9/125 µm acc.G.657-A2, Ø 2.3 mm, jacket LSFH light grey
85018124	04-E9A2/MH(ZN)H-E23	4-fiber, 9/125 µm acc.G.657-A2, Ø 2.3 mm, jacket LSFH yellow

FTTH Indoor cables 2.8 mm
LSFH™ jacket with tight tube 0.6 mm

Item no.	Cable type	Description
84067597	04-E9A2/V(ZN)H-H28	4-fiber, 9/125 µm acc.G.657-A2, Ø 2.8 mm, jacket LSFH light grey
84089089	04-E9A2/V(ZN)H-E28	4-fiber, 9/125 µm acc.G.657-A2, Ø 2.8 mm, jacket LSFH yellow

FTTH Indoor HOMESTAR cables 4.8 mm
LSFH™ jacket with tight tube 0.9 mm

Item no.	Cable type	Description
84067283	01-E9/F(ZN)H-H48	1-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 4.8 mm, jacket LSFH light grey
84060987	02-E9/FSN(ZN)H-H48	2-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 4.8 mm, jacket LSFH light grey
84063363	04-E9/FSN(ZN)H-H48	4-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 4.8 mm, jacket LSFH light grey

Order information for universal cables

Jellyfree – dry block non-armoured multi-fiber loose tube cables – up to 12 fibers with LSFH™ jacket 3.5 mm

Item no.	Cable type	Description
84097664	12-12E9/BQ(ZN)H-E35	12-fiber, 9/125 µm acc.G.652.D, Ø 3.5 mm, jacket LSFH yellow
84078243	12-12E9/BQ(ZN)H-G35	12-fiber, 9/125 µm acc.G.652.D, Ø 3.5 mm, jacket LSFH black
84100920	12-12G50/BQ(ZN)H-D35	12-fiber, 50/125 µm OM2, Ø 3.5 mm, jacket LSFH orange
84078253	12-12G50/BQ(ZN)H-G35	12-fiber, 50/125 µm OM2, Ø 3.5 mm, jacket LSFH black
84097603	12-12G50/BQ(ZN)H-M35-F OM3	12-fiber, 50/125 µm OM3 BendOptimized, Ø 3.5 mm, jacket LSFH turquoise
84121860	12-12G50/BQ(ZN)H-L35-G OM4	12-fiber, 50/125 µm OM4 BendOptimized, Ø 3.5 mm, jacket LSFH heather violet
84101922	12-12G62/BQ(ZN)H-D35	12-fiber, 62.5/125 µm OM1, Ø 3.5 mm, jacket LSFH orange

Jellyfree – dry block non-armoured multi-fiber loose tube cables – up to 24 fibers with LSFH™ jacket 5.0 mm

Item no.	Cable type	Description
22523600	12-12E9/Q(ZN)H-E50	12-fiber, 9/125 µm acc.G.652.D, Ø 5.0 mm, jacket LSFH yellow
22521597	12-12G50/Q(ZN)H-D50	12-fiber, 50/125 µm OM2, Ø 5.0 mm, jacket LSFH orange
84075870	12-12G50/Q(ZN)H-M50-F OM3	12-fiber, 50/125 µm OM3 BendOptimized, Ø 5.0 mm, jacket LSFH turquoise
85017189	12-12G50/Q(ZN)H-L50-G OM4	12-fiber, 50/125 µm OM4 BendOptimized, Ø 5.0 mm, jacket LSFH heather violet
22521598	12-12G62/Q(ZN)H-D50	12-fiber, 62.5/125 µm OM1, Ø 5.0 mm, jacket LSFH orange
85030580	24-24E9/Q(ZN)H-E50	24-fiber, 9/125 µm acc.G.652.D, Ø 5.0 mm, jacket LSFH yellow
85030581	24-24G50/Q(ZN)H-D50	24-fiber, 50/125 µm OM2, Ø 5.0 mm, jacket LSFH orange
85030582	24-24G50/Q(ZN)H-M50-F OM3	24-fiber, 50/125 µm OM3 BendOptimized, Ø 5.0 mm, jacket LSFH turquoise
85030583	24-24G50/Q(ZN)H-L50-G OM4	24-fiber, 50/125 µm OM4 BendOptimized, Ø 5.0 mm, jacket LSFH heather violet
85030585	24-24G62/Q(ZN)H-D50	24-fiber, 62.5/125 µm OM1, Ø 5.0 mm, jacket LSFH orange

Order information for universal cables

Jellyfree – dry block glass-armoured multi-fiber loose tube cables – up to 24 fibers with LSFH™ jacket 7.0 mm

Item no.	Cable type	Description
85020587	12-12E9/Q(ZNG)H-G70	12-fiber, 9/125 µm acc.G.652.D, Ø 7.0 mm, jacket LSFH black
85008099	12-12E9A2/Q(ZNG)H-G70	12-fiber, 9/125 µm acc.G.657-A2, Ø 7.0 mm, jacket LSFH black
85026736	12-12E9A2/Q(ZNG)H-G70-UR	12-fiber, 9/125 µm acc.G.657-A2, Ø 7.0 mm, jacket LSFH black UL rating acc.OFN/OFNG
85023867	12-12G50/Q(ZNG)H-G70	12-fiber, 50/125 µm OM2, Ø 7.0 mm, jacket LSFH black
85026737	12-12G50/Q(ZNG)H-G70-UR	12-fiber, 50/125 µm OM2, Ø 7.0 mm, jacket LSFH black UL rating acc.OFN/OFNG
85026277	12-12G50/Q(ZNG)H-G70-F OM3	12-fiber, 50/125 µm OM3 BendOptimized, Ø 7.0 mm, jacket LSFH black
85026738	12-12G50/Q(ZNG)H-G70-F-UR OM3	12-fiber, 50/125 µm OM3 BendOptimized, Ø 7.0 mm, jacket LSFH black UL rating acc.OFN/OFNG
85026278	12-12G50/Q(ZNG)H-G70-G OM4	12-fiber, 50/125 µm OM4 BendOptimized, Ø 7.0 mm, jacket LSFH black
85026739	12-12G50/Q(ZNG)H-G70-G-UR OM4	12-fiber, 50/125 µm OM4 BendOptimized, Ø 7.0 mm, jacket LSFH black UL rating acc.OFN/OFNG
85024090	12-12G62/Q(ZNG)H-G70	12-fiber, 62.5/125 µm OM1, Ø 7.0 mm, jacket LSFH black
85026740	12-12G62/Q(ZNG)H-G70-UR	12-fiber, 62.5/125 µm OM1, Ø 7.0 mm, jacket LSFH black UL rating acc.OFN/OFNG
85030630	24-24E9/Q(ZNG)H-G70	24-fiber, 9/125 µm acc. G.652.D, Ø 7.0 mm, jacket LSFH black
85029988	24-24E9A2/Q(ZNG)H-G70	24-fiber, 9/125 µm acc.G.657-A2, Ø 7.0 mm, jacket LSFH black
85030631	24-24G50/Q(ZNG)H-G70	24-fiber, 50/125 µm OM2, Ø 7.0 mm, jacket LSFH black
85024091	24-24G62/Q(ZNG)H-G70	24-fiber, 62.5/125 µm OM1, Ø 7.0 mm, jacket LSFH black

Non-armoured multi-fiber loose tube cables – up to 12 fibers with LSFH™ jacket 3.5 mm

Item no.	Cable type	Description
84047624	04-4E9/BW(ZN)H-G35	4-fiber, 9/125 µm acc.G.652.D, Ø 3.5 mm, jacket LSFH black
84047675	04-4G50/BW(ZN)H-G35	4-fiber, 50/125 µm OM2, Ø 3.5 mm, jacket LSFH black
84047679	04-4G50/BW(ZN)H-G35-F OM3	4-fiber, 50/125 µm OM3 BendOptimized, Ø 3.5 mm, jacket LSFH black
84047685	04-4G62/BW(ZN)H-G35	4-fiber, 62.5/125 µm OM1, Ø 3.5 mm, jacket LSFH black
84041870	12-12E9/BW(ZN)H-G35	12-fiber, 9/125 µm acc.G.652.D, Ø 3.5 mm, jacket LSFH black
84041871	12-12G50/BW(ZN)H-G35	12-fiber, 50/125 µm OM2, Ø 3.5 mm, jacket LSFH black
84047681	12-12G50/BW(ZN)H-G35-F OM3	12-fiber, 50/125 µm OM3 BendOptimized, Ø 3.5 mm, jacket LSFH black
84148346	12-12G50/BW(ZN)H-G35-G OM4	12-fiber, 50/125 µm OM4 BendOptimized, Ø 3.5 mm, jacket LSFH black
84047687	12-12G62/BW(ZN)H-G35	12-fiber, 62.5/125 µm OM1, Ø 3.5 mm, jacket LSFH black

Order information for universal cables

Non-armoured multi-fiber loose tube cables – up to 24 fibers with LSFH™ jacket 5.0 mm

Item no.	Cable type	Description
84108343	02-2G62/W(ZN)H-G50	2-fiber, 62.5/125 µm OM1, Ø 5.0 mm, jacket LSFH black
84108894	02-2H200/W(ZN)H-G50	2-fiber, HCS 200/230/500 µm, Ø 5.0 mm, jacket LSFH black
84108346	04-4E9/W(ZN)H-G50	4-fiber, 9/125 µm acc.G.652.D, Ø 5.0 mm, jacket LSFH black
84069256	04-4G50/W(ZN)H-G50	4-fiber, 50/125 µm OM2, Ø 5.0 mm, jacket LSFH black
84108341	04-4G62/W(ZN)H-G50	4-fiber, 62.5/125 µm OM1, Ø 5.0 mm, jacket LSFH black
84108344	08-8G50/W(ZN)H-G50	8-fiber, 50/125 µm OM2, Ø 5.0 mm, jacket LSFH black
84132158	12-12E9/W(ZN)H-G50	12-fiber, 9/125 µm acc.G.652.D, Ø 5.0 mm, jacket LSFH black
85021644	12-12G50/W(ZN)H-G50-F OM3	12-fiber, 50/125 µm OM3 BendOptimized, Ø 5.0 mm, jacket LSFH black
85001237	24-24E9/W(ZN)H-G50	24-fiber, 9/125 µm acc.G.652.D, Ø 5.0 mm, jacket LSFH black
85021642	24-24G50/W(ZN)H-G50-F	24-fiber, 50/125 µm OM3 BendOptimized, Ø 5.0 mm, jacket LSFH black

Glass-armoured multi-fiber loose tube cables – up to 24 fibers with LSFH™ jacket 7.0 mm

Item no.	Cable type	Description
85002413	12-12E9/W(ZNG)H-G70	12-fiber, 9/125 µm acc.G.652.D, Ø 7.0 mm, jacket LSFH black
85008736	12-12E9/W(ZNG)H-G70-UR	12-fiber, 9/125 µm acc.G.652.D, Ø 7.0 mm, jacket LSFH black UL rating acc.OFN/OFNG
85003105	12-12G50/W(ZNG)H-G70	12-fiber, 50/125 µm OM2, Ø 7.0 mm, jacket LSFH black
85019849	12-12G50/W(ZNG)H-G70-F OM3	12-fiber, 50/125 µm OM3 BendOptimized, Ø 7.0 mm, jacket LSFH black
85024024	12-12G62/W(ZNG)H-G70	12-fiber, 62.5/125 µm OM1, Ø 7.0 mm, jacket LSFH black
85003102	24-24E9/W(ZNG)H-G70	24-fiber, 9/125 µm acc.G.652.D, Ø 7.0 mm, jacket LSFH black
85008320	24-24E9/W(ZNG)H-G70-UR	24-fiber, 9/125 µm acc.G.652.D, Ø 7.0 mm, jacket LSFH black UL rating acc.OFN/OFNG
85014307	24-24G50/W(ZNG)H-G70	24-fiber, 50/125 µm OM2, Ø 7.0 mm, jacket LSFH black
85019851	24-24G50/W(ZNG)H-G70-F OM3	24-fiber, 50/125 µm OM3 BendOptimized, Ø 7.0 mm, jacket LSFH black
85024025	24-24G62/W(ZNG)H-G70	24-fiber, 62.5/125 µm OM1, Ø 7.0 mm, jacket LSFH black

Order information for universal cables

Glass-armoured multi-fiber loose tube cables – up to 24 fibers
with LSFH™ jacket 8.5 mm

Item no.	Cable type	Description
85016377	02-2H200/W(ZNG)H-G85	2-fiber, HCS 200/230/500 µm, Ø 8.5 mm, jacket LSFH black
84126548	04-4E9/W(ZNG)H-G85	4-fiber, 9/125 µm acc. G.652.D, Ø 8.5 mm, jacket LSFH black
22523601	04-4G50/W(ZNG)H-G85	4-fiber, 50/125 µm OM2, Ø 8.5 mm, jacket LSFH black
84033253	04-4G50/W(ZNG)H-M85-F OM3	4-fiber, 50/125 µm OM3 BendOptimized, Ø 8.5 mm, jacket LSFH turquoise
84122492	04-4G50/W(ZNG)H-L85-G OM4	4-fiber, 50/125 µm OM4 BendOptimized, Ø 8.5 mm, jacket LSFH heather violet
22523603	04-4G62/W(ZNG)H-G85	4-fiber, 62.5/125 µm OM1, Ø 8.5 mm, jacket LSFH black
84090674	06-6G50/W(ZNG)H-G85	6-fiber, 50/125 µm OM2, Ø 8.5 mm, jacket LSFH black
84134847	06-6G50/W(ZNG)H-G85-UR	6-fiber, 50/125 µm OM2, Ø 8.5 mm, jacket LSFH black UL rating acc. OFN / OFNG
84099044	06-6G50/W(ZNG)H-M85-F OM3	6-fiber, 50/125 µm OM3 BendOptimized, Ø 8.5 mm, jacket LSFH black
85001045	06-6G50/W(ZNG)H-L85-G OM4	6-fiber, 50/125 µm OM4 BendOptimized, Ø 8.5 mm, jacket LSFH heather violet
84145412	06-6G62/W(ZNG)H-G85	6-fiber, 62.5/125 µm OM1, Ø 8.5 mm, jacket LSFH black
84080161	08-8E9/W(ZNG)H-G85	8-fiber, 9/125 µm acc. G.652.D, Ø 8.5 mm, jacket LSFH black
22523602	08-8G50/W(ZNG)H-G85	8-fiber, 50/125 µm OM2, Ø 8.5 mm, jacket LSFH black
22523604	08-8G62/W(ZNG)H-G85	8-fiber, 62.5/125 µm OM1, Ø 8.5 mm, jacket LSFH black
22523654	12-12E9/W(ZNG)H-G85	12-fiber, 9/125 µm acc. G.652.D, Ø 8.5 mm, jacket LSFH black
22521943	12-12G50/W(ZNG)H-G85	12-fiber, 50/125 µm OM2, Ø 8.5 mm, jacket LSFH black
84003589	12-12G50/W(ZNG)H-G85-F OM3	12-fiber, 50/125 µm OM3 BendOptimized, Ø 8.5 mm, jacket LSFH black
84005134	12-12G50/W(ZNG)H-M85-F OM3	12-fiber, 50/125 µm OM3 BendOptimized, Ø 8.5 mm, jacket LSFH turquoise
84098491	12-12G50/W(ZNG)H-G85-G OM4	12-fiber, 50/125 µm OM4 BendOptimized, Ø 8.5 mm, jacket LSFH black
84121676	12-12G50/W(ZNG)H-L85-G OM4	12-fiber, 50/125 µm OM4 BendOptimized, Ø 8.5 mm, jacket LSFH heather violet
22521884	12-12G62/W(ZNG)H-G85	12-fiber, 62.5/125 µm OM1, Ø 8.5 mm, jacket LSFH black
84127251	24-24E9/W(ZNG)H-G85	24-fiber, 9/125 µm acc. G.652.D, Ø 8.5 mm, jacket LSFH black
84134851	24-24E9/W(ZNG)H-G85-UR	24-fiber, 9/125 µm acc. G.652.D, Ø 8.5 mm, jacket LSFH black UL rating acc.OFN/OFNG
84127282	24-24G50/W(ZNG)H-G85	24-fiber, 50/125 µm OM2, Ø 8.5 mm, jacket LSFH black
84134852	24-24G50/W(ZNG)H-G85-UR	24-fiber, 50/125 µm OM2, Ø 8.5 mm, jacket LSFH black UL rating acc.OFN/OFNG
84137563	24-24G50/W(ZNG)H-G85-F OM3	24-fiber, 50/125 µm OM3 BendOptimized, Ø 8.5 mm, jacket LSFH black
85013188	24-24G50/W(ZNG)H-G85-G OM4	24-fiber, 50/125 µm OM4 BendOptimized, Ø 8.5 mm, jacket LSFH black
85008171	24-24G62/W(ZNG)H-G85	24-fiber, 62.5/125 µm OM1, Ø 8.5 mm, jacket LSFH black

Glass-armoured multi-fiber loose tube cables– up to 24 fibers
with LSFH™ jacket 12 mm

Item no.	Cable type	Description
84021028	12-12E9/W(ZNG)H-Z120	12-fiber, 9/125 µm acc.G.652.D, Ø 12.0 mm, jacket LSFH black with 2 orange stripes
84021029	12-12G50/W(ZNG)H-Z120-F OM3	12-fiber, 50/125 µm OM3 BendOptimized, Ø 12.0 mm, jacket LSFH black with 2 orange stripes

Order information for universal cables

TWINTUBE glass-armoured multi-fiber loose tube cables – up to 24 fibers
with LSFH™ jacket

Item no.	Cable type	Description
23041032	24-12E9/W(ZNG)H-G94	24-fiber, 9/125 µm acc.G.652.D, Ø 9.4 mm, jacket LSFH black
23038139	24-12G50/W(ZNG)H-G94	24-fiber, 50/125 µm OM2, Ø 9.4 mm, jacket LSFH black
84003522	24-12G50/W(ZNG)H-M94-F OM3	24-fiber, 50/125 µm OM3 BendOptimized, Ø 9.4 mm, jacket LSFH turquoise
84066472	24-12G50/W(ZNG)H-G94-F OM3	24-fiber, 50/125 µm OM3 BendOptimized, Ø 9.4 mm, jacket LSFH black
84121635	24-12G50/W(ZNG)H-L94-G OM4	24-fiber, 50/125 µm OM4 BendOptimized, Ø 9.4 mm, jacket LSFH heather violet
23041033	24-12G62/W(ZNG)H-G94	24-fiber, 62.5/125 µm OM1, Ø 9.4 mm, jacket LSFH black

Glass-armoured mini multi-fiber loose tube cables – up to 144 fibers
with LSFH™ jacket

Item no.	Cable type	Description
85030051	24-12E9/BWSN(ZNG)H-G96	24-fiber, 9/125 µm acc.G.652.D, Ø 9.6 mm, jacket LSFH black
tbd	24-12G50/BWSN(ZNG)H-G96	24-fiber, 50/125 µm OM2, Ø 9.6 mm, jacket LSFH black
85032261	24-12G50/BWSN(ZNG)H-G96-F OM3	24-fiber, 50/125 µm OM3 BendOptimized, Ø 9.6 mm, jacket LSFH black
tbd	24-12G50/BWSN(ZNG)H-G96-G OM4	24-fiber, 50/125 µm OM4 BendOptimized, Ø 9.6 mm, jacket LSFH black
85020262	48-12E9/BWSN(ZNG)H-G96	48-fiber, 9/125 µm acc. G.652.D, Ø 9.6 mm, jacket LSFH black
tbd	48-12G50/BWSN(ZNG)H-G96	48-fiber, 50/125 µm OM2, Ø 9.6 mm, jacket LSFH black
85063647	48-12G50/BWSN(ZNG)H-G96-F OM3	48-fiber, 50/125 µm OM3 BendOptimized, Ø 9.6 mm, jacket LSFH black
85032252	48-12G50/BWSN(ZNG)H-G96-G OM4	48-fiber, 50/125 µm OM4 BendOptimized, Ø 9.6 mm, jacket LSFH black
85029362	72-12E9/BWSN(ZNG)H-G106	72-fiber, 9/125 µm acc.G.652.D, Ø 10.6 mm, jacket LSFH black
tbd	72-12G50/BWSN(ZNG)H-G106-F OM3	72-fiber, 50/125 µm OM3 BendOptimized, Ø 10.6 mm, jacket LSFH black
tbd	72-12G50/BWSN(ZNG)H-G106-G OM4	72-fiber, 50/125 µm OM4 BendOptimized, Ø 10.6 mm, jacket LSFH black
85029364	96-12E9/BWSN(ZNG)H-G122	96-fiber, 9/125 µm acc. G.652.D, Ø 12.2 mm, jacket LSFH black
85029363	120-12E9/BWSN(ZNG)H-G136	120-fiber, 9/125 µm acc.G.652.D, Ø 13.6 mm, jacket LSFH black
85023058	144-12E9/BWSN(ZNG)H-G145	144-fiber, 9/125 µm acc.G.652.D, Ø 145 mm, jacket LSFH black
tbd	144-12G50/BWSN(ZNG)H-G145-F OM3	144-fiber, 50/125 µm OM3 BendOptimized, Ø 14.5 mm, jacket LSFH black
tbd	144-12G50/BWSN(ZNG)H-G145-G OM4	144-fiber, 50/125 µm OM4 BendOptimized, Ø 14.5 mm, jacket LSFH black

TWINTUBE steel-armoured multi-fiber loose tube cables – up to 24 fibers
with LSFH™ jacket 12.5 mm

Item no.	Cable type	Description
84075229	24-12E9/W(ZNG)HAH-G125	24-fiber, 9/125 µm acc.G.652.D, Ø 12.5 mm, jacket LSFH black
84141130	24-12G62/W(ZNG)HAH-G125	24-fiber, 62.5/125 µm OM1, Ø 12.5 mm, jacket LSFH black

Order information for universal cables

Steel-armoured multi-fiber loose tube cables – up to 24 fibers
with LSFH™ jacket 8 mm

Item no.	Cable type	Description
85002232	04-4E9/W(ZN)HAH-G80	4-fiber, 9/125 µm acc.G.652.D, Ø 8.0 mm, jacket LSFH black
85008296	04-4G50/W(ZN)HAH-G80	4-fiber, 50/125 µm OM2, Ø 8.0 mm, jacket LSFH black
84100820	04-4G62/W(ZN)HAH-G80	4-fiber, 62.5/125 µm OM1, Ø 8.0 mm, jacket LSFH black
84139047	06-6E9/W(ZN)HAH-G80	6-fiber, 9/125 µm acc.G.652.D, Ø 8.0 mm, jacket LSFH black
85001987	06-6G62/W(ZN)HAH-G80	6-fiber, 62.5/125 µm OM1, Ø 8.0 mm, jacket LSFH black
84126592	12-12E9/W(ZN)HAH-G80	12-fiber, 9/125 µm acc.G.652.D, Ø 8.0 mm, jacket LSFH black
84136457	12-12G50/W(ZN)HAH-G80	12-fiber, 50/125 µm OM2, Ø 8.0 mm, jacket LSFH black
84122522	12-12G62/W(ZN)HAH-G80	12-fiber, 62.5/125 µm OM1, Ø 8.0 mm, jacket LSFH black

Steel-armoured multi-fiber loose tube cables – up to 72 fibers
with LSFH™ jacket

Item no.	Cable type	Description
85030099	48-12E9/BWSN(ZNG)HAH-G130	48-fiber, 9/125 µm acc.G.652.D, Ø 13.0 mm, jacket LSFH black
85030100	72-12E9/BWSN(ZNG)HAH-G140	72-fiber, 9/125 µm acc.G.652.D, Ø 14.0 mm, jacket LSFH black

RADOX glass-armoured multi-fiber loose tube cables – up to 24 fibers
with LSFH™ jacket 8.5 mm

Item no.	Cable type	Description
85029474	04-4E9A2/W(ZNG)R-G85	4-fiber, 9/125 µm acc.G.657-A2, Ø 8.5 mm, jacket RADOX black
85001138	12-12E9A2/W(ZNG)R-G85	12-fiber, 9/125 µm acc.G.657-A2, Ø 8.5 mm, jacket RADOX black
tbd	12-12G50/W(ZNG)R-G85	12-fiber, 50/125 µm OM2, Ø 8.5 mm, jacket RADOX black
85001358	12-12G50/W(ZNG)R-C85-F OM3	12-fiber, 50/125 µm OM3 BendOptimized, Ø 8.5 mm, jacket RADOX blue
tbd	12-12G50/W(ZNG)R-G85-G OM4	12-fiber, 50/125 µm OM4 BendOptimized, Ø 8.5 mm, jacket RADOX black
85007541	24-24E9A2/W(ZNG)R-G85	24-fiber, 9/125 µm acc.G.657-A2, Ø 8.5 mm, jacket RADOX black

Order information for outdoor cables

Non-armoured multi-fiber loose tube cable – up to 12 fibers
with PE jacket 3.5 mm

Item no.	Cable type	Description
tbd	04-4E9/BW(ZN)V-G35	4-fiber, 9/125 µm acc.G.652.D, Ø 3.5 mm, jacket HDPE black
84098852	12-12E9/BW(ZN)V-G35	12-fiber, 9/125 µm acc.G.652.D, Ø 3.5 mm, jacket HDPE black

Non-armoured multi-fiber loose tube cables – up to 24 fibers
with PE jacket 5.0 mm

Item no.	Cable type	Description
84150182	04-4E9/W(ZN)Y-G50	4-fiber, 9/125 µm acc.G.652.D, Ø 5.0 mm, jacket LDPE black
22520723	04-4G50/W(ZN)Y-G50	4-fiber, 50/125 µm OM2, Ø 5.0 mm, jacket LDPE black
22520687	04-4G62/W(ZN)Y-G50	4-fiber, 62.5/125 µm OM1, Ø 5.0 mm, jacket LDPE black
84150184	08-8E9/W(ZN)Y-G50	8-fiber, 9/125 µm acc.G.652.D, Ø 5.0 mm, jacket LDPE black
22520688	08-8G50/W(ZN)Y-G50	8-fiber, 50/125 µm OM2, Ø 5.0 mm, jacket LDPE black
22520740	08-8G62/W(ZN)Y-G50	8-fiber, 62.5/125 µm OM1, Ø 5.0 mm, jacket LDPE black
84150192	12-12E9/W(ZN)Y-G50	12-fiber, 9/125 µm acc.G.652.D, Ø 5.0 mm, jacket LDPE black
22521250	12-12G50/W(ZN)Y-G50	12-fiber, 50/125 µm OM2, Ø 5.0 mm, jacket LDPE black
22521251	12-12G62/W(ZN)Y-G50	12-fiber, 62.5/125 µm OM1, Ø 5.0 mm, jacket LDPE black
85001052	24-24E9/W(ZN)Y-G50	24-fiber, 9/125 µm acc.G.652.D, Ø 5.0 mm, jacket LDPE black

ADSS multi-fiber loose tube cables – up to 12 fibers
with PE jacket 5.5 mm

Item no.	Cable type	Description
84098041	12-12E9/BW(ZN)V-G55	12-fiber, 9/125 µm acc.G.652.D, Ø 5.5 mm, jacket HDPE black
84146319	12-12G50/BW(ZN)V-G55	12-fiber, 50/125 µm OM2, Ø 5.5 mm, jacket HDPE black

Glass-armoured multi-fiber loose tube cables – up to 24 fibers
with PE jacket 7.0 mm

Item no.	Cable type	Description
tbd	12-12E9/W(ZNG)Y-G70	12-fiber, 9/125 µm acc.G.652.D, Ø 7.0 mm, jacket LDPE black
tbd	24-24E9/W(ZNG)Y-G70	24-fiber, 9/125 µm acc.G.652.D, Ø 7.0 mm, jacket LDPE black

Order information for outdoor cables

Glass-armoured multi-fiber loose tube cables – up to 24 fibers
with PE jacket 8.5 mm

Item no.	Cable type	Description
22521811	02-2G50/W(ZNG)Y-G85	2-fiber, 50/125 µm OM2, Ø 8.5 mm, jacket LDPE black
22521749	02-2G62/W(ZNG)Y-G85	2-fiber, 62.5/125 µm OM1, Ø 8.5 mm, jacket LDPE black
22523652	02-2H200/W(ZNG)Y-G85	2-fiber, HCS 200/230/500 µm, Ø 8.5 mm, jacket LDPE black
22523661	04-4E9/W(ZNG)Y-G85	4-fiber, 9/125 µm acc.G.652.D, Ø 8.5 mm, jacket LDPE black
22521750	04-4G50/W(ZNG)Y-G85	4-fiber, 50/125 µm OM2, Ø 8.5 mm, jacket LDPE black
22521751	04-4G62/W(ZNG)Y-G85	4-fiber, 62.5/125 µm OM1, Ø 8.5 mm, jacket LDPE black
22523653	04-4H200/W(ZNG)Y-G85	4-fiber, HCS 200/230/500 µm, Ø 8.5 mm, jacket LDPE black
22521752	06-6G50/W(ZNG)Y-G85	6-fiber, 50/125 µm OM2, Ø 8.5 mm, jacket LDPE black
22521753	06-6G62/W(ZNG)Y-G85	6-fiber, 62.5/125 µm OM1, Ø 8.5 mm, jacket LDPE black
23017688	08-8E9/W(ZNG)Y-G85	8-fiber, 9/125 µm acc.G.652.D, Ø 8.5 mm, jacket LDPE black
22521754	08-8G50/W(ZNG)Y-G85	8-fiber, 50/125 µm OM2, Ø 8.5 mm, jacket LDPE black
22521755	08-8G62/W(ZNG)Y-G85	8-fiber, 62.5/125 µm OM1, Ø 8.5 mm, jacket LDPE black
22521756	12-12E9/W(ZNG)Y-G85	12-fiber, 9/125 µm acc.G.652.D, Ø 8.5 mm, jacket LDPE black
22521757	12-12G50/W(ZNG)Y-G85	12-fiber, 50/125 µm OM2, Ø 8.5 mm, jacket LDPE black
23027099	12-12G50/W(ZNG)Y-G85-F OM3	12-fiber, 50/125 µm OM3 BendOptimized, Ø 8.5 mm, jacket LDPE black
22521758	12-12G62/W(ZNG)Y-G85	12-fiber, 62.5/125 µm OM1, Ø 8.5 mm, jacket LDPE black
84024359	24-24E9/W(ZNG)Y-G85	24-fiber, 9/125 µm acc.G.652.D, Ø 8.5 mm, jacket LDPE black
84024360	24-24G50/W(ZNG)Y-G85	24-fiber, 50/125 µm OM2, Ø 8.5 mm, jacket LDPE black
85010701	24-24G50/W(ZNG)Y-G85-F OM3	24-fiber, 50/125 µm OM3 BendOptimized, Ø 8.5 mm, jacket LDPE black

Glass-armoured multi-fiber loose tube cables – up to 24 fibers
with PE jacket 12 mm

Item no.	Cable type	Description
22523657	12-12E9/W(ZNG)Y-Z120	12-fiber, 9/125 µm acc.G.652.D, Ø 12.0 mm, jacket LDPE black with 2 orange stripes
22523655	12-12G50/W(ZNG)Y-Z120	12-fiber, 50/125 µm OM2, Ø 12.0 mm, jacket LDPE black with 2 orange stripes
22523656	12-12G62/W(ZNG)Y-Z120	12-fiber, 62.5/125 µm OM1, Ø 12.0 mm, jacket LDPE black with 2 orange stripes
84072782	24-24E9/W(ZNG)Y-Z120	24-fiber, 9/125 µm acc.G.652.D, Ø 12.0 mm, jacket LDPE black with 2 orange stripes

Order information for outdoor cables

TWINTUBE glass-armoured multi-fiber loose tube cables – up to 24 fibers
with PE jacket 9.4 mm

Item no.	Cable type	Description
23038137	24-12E9/W(ZNG)Y-G94	24-fiber, 9/125 µm acc.G.652.D, Ø 9.4 mm, jacket LDPE black
23038138	24-12G50/W(ZNG)Y-G94	24-fiber, 50/125 µm OM2, Ø 9.4 mm, jacket LDPE black
23041030	24-12G50/W(ZNG)Y-G94-F OM3	24-fiber, 50/125 µm OM3 BendOptimized, Ø 9.4 mm, jacket LDPE turquoise
84118482	24-12G50/W(ZNG)Y-G94-G OM4	24-fiber, 50/125 µm OM4 BendOptimized, Ø 9.4 mm, jacket LDPE black
23041031	24-12G62/W(ZNG)Y-G94	24-fiber, 62.5/125 µm OM1, Ø 9.4 mm, jacket LDPE black

Glass-armoured multi-fiber loose tube cables – up to 144 fibers
with PE jacket

Item no.	Cable type	Description
85030052	24-12E9/BWSN(ZNG)V-G96	24-fiber, 9/125 µm acc.G.652.D, Ø 9.6 mm, jacket HDPE black
85022307	48-12E9/BWSN(ZNG)V-G96	48-fiber, 9/125 µm acc.G.652.D, Ø 9.6 mm, jacket HDPE black
85025379	72-12E9/BWSN(ZNG)V-G106	72-fiber, 9/125 µm acc.G.652.D, Ø 10.6 mm, jacket HDPE black
85025378	96-12E9/BWSN(ZNG)V-G122	96-fiber, 9/125 µm acc.G.652.D, Ø 12.2 mm, jacket HDPE black
85025390	120-12E9/BWSN(ZNG)V-G136	120-fiber, 9/125 µm acc.G.652.D, Ø 13.6 mm, jacket HDPE black
85025391	144-12E9/BWSN(ZNG)V-G145	144-fiber, 9/125 µm acc.G.652.D, Ø 14.5 mm, jacket HDPE black

Order information for outdoor cables

Steel-armoured multi-fiber loose tube cables– up to 24 fibers
with PE jacket 8.0 mm

Item no.	Cable type	Description
84144111	04-4G50/W(ZN)YAY-G80	4-fiber, 50/125 µm OM2, Ø 8.0 mm, jacket LDPE black
85023197	04-4G62/W(ZN)YAY-G80	4-fiber, 62.5/125 µm OM1, Ø 8.0 mm, jacket LDPE black
84092334	06-6G50/W(ZN)YAY-G80	6-fiber, 50/125 µm OM2, Ø 8.0 mm, jacket LDPE black
84145972	08-8G62/W(ZN)YAY-G80	8-fiber, 62.5/125 µm OM1, Ø 8.0 mm, jacket LDPE black
22523660	12-12E9/W(ZN)YAY-G80	12-fiber, 9/125 µm acc.G.652.D, Ø 8.0 mm, jacket LDPE black
22523658	12-12G50/W(ZN)YAY-G80	12-fiber, 50/125 µm OM2, Ø 8.0 mm, jacket LDPE black
22523659	12-12G62/W(ZN)YAY-G80	12-fiber, 62.5/125 µm OM1, Ø 8.0 mm, jacket LDPE black
tbd	24-24E9/W(ZN)YAY-G80	24-fiber, 9/125 µm acc.G.652.D, Ø 8.0 mm, jacket LDPE black

TWINTUBE steel-armoured multi-fiber loose tube cables – up to 24 fibers
with PE jacket 12.5 mm

Item no.	Cable type	Description
tbd	24-12E9/W(ZNG)YAY-G125	24-fiber, 9/125 µm acc.G.652.D, Ø 12.5 mm, jacket LDPE black
85030532	24-12G50/W(ZNG)YAY-G125	24-fiber, 50/125 µm OM2, Ø 12.5 mm, jacket LDPE black
85032029	24-12G62/W(ZNG)YAY-G125	24-fiber, 62.5/125 µm OM1, Ø 12.5 mm, jacket LDPE black

Steel-armoured multi-fiber loose tube cables – up to 72 fibers
with PE jacket

Item no.	Cable type	Description
85030101	48-12E9/BWSN(ZNG)VAV-G130	48-fiber, 9/125 µm acc.G.652.D, Ø 13.0 mm, jacket HDPE black
85030102	72-12E9/BWSN(ZNG)VAV-G140	72-fiber, 9/125 µm acc.G.652.D, Ø 14.0 mm, jacket HDPE black

Order information for special cables

Simplex cables 1.9 mm

PUR jacket with tight tube 0.9 mm

Item no.	Cable type	Description
84032682	01-E9/FJU-E19	1-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 1.9 mm, jacket PUR yellow
84063323	01-E9A2/FJU-E19-FG	1-fiber, 9/125 µm acc.ITU-G.657-A2, Ø 1.9 mm, jacket PUR yellow
84032683	01-G50/FJU-D19	1-fiber, 50/125 µm OM2, Ø 1.9 mm, jacket PUR orange
84068995	01-G50/FJU-D19-F OM3	1-fiber, 50/125 µm OM3 BendOptimized, Ø 1.9 mm, jacket PUR orange
84037265	01-G62/FJU-D19	1-fiber, 62.5/125 µm OM1, Ø 1.9 mm, jacket PUR orange

Rugged simplex cables 6.0 mm

PUR jacket with 2.7 mm / tight tube 0.9 mm

Item no.	Cable type	Description
22523102	01-G50/FJH(ZN)Z-D27	1-fiber, 50/125 µm OM2, Ø 6.0 mm, jacket PUR orange
22523103	01-G62/FJH(ZN)Z-B27	1-fiber, 62.5/125 µm OM2, Ø 6.0 mm, jacket PUR green
84020985	01-H200/FJH(ZN)Z-D27	1-fiber, HCS 200/230/500 µm, Ø 6.0 mm, jacket PUR orange

Rugged minicord breakout cables

PUR jacket with simplex 1.7 mm / tight tube 0.9 mm

Item no.	Cable type	Description
84010318	02-E9/FJ(ZN)Z-G17	2-fiber, 9/125 µm acc.G.652.D/G.657.A1, Ø 6.0 mm, jacket PUR black
84080260	02-E9A2/FJ(ZN)Z-G17-FG	2-fiber, 9/125 µm acc.ITU-G.657-A2, Ø 6.0 mm, jacket PUR black
23037747	02-G50/FJ(ZN)Z-G17	2-fiber, 50/125 µm OM2, Ø 6.0 mm, jacket PUR black
23037748	02-G62/FJ(ZN)Z-G17	2-fiber, 62.5/125 µm OM1, Ø 6.0 mm, jacket PUR black
23037749	02-H200/FJ(ZN)Z-G17	2-fiber, HCS 200/230/500 µm, Ø 6.0 mm, jacket PUR black

TWINFLEX Industrial Link

PUR jacket with simplex 2.2 mm / tight tube 0.9 mm

Item no.	Cable type	Description
84045039	02-G50/FJ(ZN)Z-G22	2-fiber, 50/125 µm OM2, Ø 7.5 × 8.0 mm, jacket PUR black
84045188	02-G62/FJ(ZN)Z-G22	2-fiber, 62.5/125 µm OM1, Ø 7.5 × 8.0 mm, jacket PUR black
84045184	02-H200/VJ(ZN)Z-G22	2-fiber, HCS 200/230/500 µm, Ø 7.5 × 8.0 mm, jacket PUR black
84057089	02-POF980/M(ZN)Z-G22	2-fiber, POF 980/1000 µm, Ø 7.5 × 8.0 mm, jacket PUR black

Order information for special cables

TWINFIX Industrial Link

LSFH™ jacket with simplex 2.2 mm / tight tube 0.9 mm

Item no.	Cable type	Description
84118658	02-E9/FJ(ZNG)H-G22	2-fiber, 9/125 µm acc.G.652.D/G.657.A1, Ø 7.5 × 7.2 mm, jacket LSFH black
84045041	02-G50/FJ(ZNG)H-G22	2-fiber, 50/125 µm OM2, Ø 7.5 × 7.2 mm, jacket LSFH black
84125961	02-G50/FJ(ZNG)H-G22-UN	2-fiber, 50/125 µm OM2, Ø 7.5 × 7.2 mm, jacket LSFH black UL rating acc.OFN/OFNG
84045187	02-G62/FJ(ZNG)H-G22	2-fiber, 62.5/125 µm OM1, Ø 7.5 × 7.2 mm, jacket LSFH black
84125963	02-G62/FJ(ZNG)H-G22-UN	2-fiber, 62.5/125 µm OM1, Ø 7.5 × 7.2 mm, jacket LSFH black UL rating acc.OFN/OFNG
84043741	02-H200/VJ(ZNG)H-G22	2-fiber, HCS 200/230/500, Ø 7.5 × 7.2 mm, jacket LSFH black
84057090	02-POF980/M(ZNG)H-G22	2-fiber, POF 980/1000, Ø 7.5 × 7.2 mm, jacket LSFH black

QUADFIX Industrial Link

LSFH™ jacket with simplex 2.2 mm / tight tube 0.9 mm

Item no.	Cable type	Description
84102119	04-E9/FJ(ZNG)H-G22	4-fiber, 9/125 µm acc.G.652.D/G.657.A1, Ø 9.0 mm, jacket LSFH black
84092090	04-G50/FJ(ZNG)H-G22	4-fiber, 50/125 µm OM2, Ø 9.0 mm, jacket LSFH black
84092091	04-G62/FJ(ZNG)H-G22	4-fiber, 62.5/125 µm OM1, Ø 9.0 mm, jacket LSFH black
tbd	04-H200/VJ(ZNG)H-G22	4-fiber, HCS 200/230/500 µm, Ø 9.0 mm, jacket LSFH black

Mobile field cables

PUR jacket with tight tube 0.9 mm

Item no.	Cable type	Description
84096489	02-E9/FSN(ZN)Z-G56	2-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 5.6 mm, jacket PUR black
84096494	02-G50/FSN(ZN)Z-G56	2-fiber, 50/125 µm OM2, Ø 5.6 mm, jacket PUR black
tbd	02-G62/FSN(ZN)Z-G56	2-fiber, 62.5/125 µm OM1, Ø 5.6 mm, jacket PUR black
84035585	04-E9/FSN(ZN)Z-G56	4-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 5.6 mm, jacket PUR black
84035586	04-G50/FSN(ZN)Z-G56	4-fiber, 50/125 µm OM2, Ø 5.6 mm, jacket PUR black
84035587	04-G62/FSN(ZN)Z-G56	4-fiber, 62.5/125 µm OM1, Ø 5.6 mm, jacket PUR black
84016109	08-E9/FSN(ZN)Z-G68	8-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 6.8 mm, jacket PUR black
84016115	08-G50/FSN(ZN)Z-G68	8-fiber, 50/125 µm OM2, Ø 6.8 mm, jacket PUR black
84013027	08-G62/FSN(ZN)Z-G68	8-fiber, 62.5/125 µm OM1, Ø 6.8 mm, jacket PUR black
84016119	12-E9/FSN(ZN)Z-G80	12-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 8 mm, jacket PUR black
84016120	12-G50/FSN(ZN)Z-G80	12-fiber, 50/125 µm OM2, Ø 8 mm, jacket PUR black
84038810	12-G62/FSN(ZN)Z-G80	12-fiber, 62.5/125 µm OM1, Ø 8 mm, jacket PUR black

Order information for special cables

Glass-armoured riser cables – 2 fibers
LSFH™ jacket with tight tube 0.9 mm

Item no.	Cable type	Description
84118844	02-E9A2/F(ZNG)H-G48	2-fiber, 9/125 µm Low Bend acc.ITU-G.657-A2, Ø 4.8 mm, jacket LSFH black
84142653	02-E9A2/F(ZNG)H-G48-UR	2-fiber, 9/125 µm Low Bend acc.ITU-G.657-A2, Ø 4.8 mm, jacket LSFH black UL rating acc.OFN/OFNG
84130268	02-G50/F(ZNG)H-G48-F OM3	2-fiber, 50/125 µm OM3, Ø 4.8 mm, jacket LSFH black
84080315	02-E9A1/F(ZNG)H-G55	2-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 5.5 mm, jacket LSFH black
84128336	02-E9A1/F(ZNG)H-G55-UR	2-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 5.5 mm, jacket LSFH black UL rating acc.OFN/OFNG
84066685	02-G50/F(ZNG)H-G55	2-fiber, 50/125 µm OM2, Ø 5.5 mm, jacket LSFH black
84128340	02-G50/F(ZNG)H-G55-UR	2-fiber, 50/125 µm OM2, Ø 5.5 mm, jacket LSFH black UL rating acc.OFN/OFNG
84129729	02-G62/F(ZNG)H-G55	2-fiber, 62.5/125 µm OM1, Ø 5.5 mm, jacket LSFH black
84080314	02-E9A1/F(ZNG)H-G70	2-fiber, 9/125 µm acc. G.652.D / G.657-A1, Ø 7 mm, jacket LSFH black
84128357	02-E9A1/F(ZNG)H-G70-UR	2-fiber, 9/125 µm acc. G.652.D / G.657-A1, Ø 7 mm, jacket LSFH black UL rating acc.OFN/OFNG
84125119	02-G50/F(ZNG)H-G70	2-fiber, 50/125 µm OM2, Ø 7 mm, jacket LSFH black
84066684	02-G50/F(ZNG)H-G70-UR	2-fiber, 50/125 µm OM2, Ø 7 mm, jacket LSFH black UL rating acc.OFN/OFNG

Glass-armoured riser cables – 4 fibers
LSFH™ jacket with tight tube 0.9 mm

Item no.	Cable type	Description
84104260	04-E9A1/FSN(ZNG)H-G55	4-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 5.5 mm, jacket LSFH black
84075876	04-G50/FSN(ZNG)H-G55	4-fiber, 50/125 µm OM2, Ø 5.5 mm, jacket LSFH black
84129724	04-G62/FSN(ZNG)H-G55	4-fiber, 62.5/125 µm OM1, Ø 5.5 mm, jacket LSFH black

Order information for special cables

Rugged multi-fiber loose tube cables – up to 24 fibers (dry block)
with 7.0 mm PUR jacket

Item no.	Cable type	Description
85027090	12-12E9/Q(ZNG)Z-G70	12-fiber, 9/125 µm acc. G.652.D, Ø 7.0 mm, jacket PUR black
tbd	12-12G50/Q(ZNG)Z-G70	12-fiber, 50/125 µm OM2, Ø 7.0 mm, jacket PUR black
tbd	12-12G62/Q(ZNG)Z-G70	12-fiber, 62.5/125 µm OM1, Ø 7.0 mm, jacket PUR black

Drag chain cables – up to 12 fibers
PUR jacket with tight tube 0.9 mm

Item no.	Cable type	Description
84104254	04-G50/FSN(ZN)YZ-G130	4-fiber, 50/125 µm OM2, Ø 13 mm, jacket PUR black
84074001	04-G50/FSN(ZN)YZ-G130-F OM3	4-fiber, 50/125 µm OM3 BendOptimized, Ø 13 mm, jacket PUR black
84006996	06-G50/FSN(ZN)YZ-G130	6-fiber, 50/125 µm OM2, Ø 13 mm, jacket PUR black
84006999	06-G62/FSN(ZN)YZ-G130	6-fiber, 62.5/125 µm, Ø 13 mm, jacket PUR black
84006997	08-G50/FSN(ZN)YZ-G130	8-fiber, 50/125 µm OM2, Ø 13 mm, jacket PUR black
84034417	12-E9/FSN(ZN)YZ-G130	12-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 13 mm, jacket PUR black
84006998	12-G50/FSN(ZN)YZ-G130	12-fiber, 50/125 µm OM2, Ø 13 mm, jacket PUR black
84007000	12-G62/FSN(ZN)YZ-G130	12-fiber, 62.5/125 µm, Ø 13 mm, jacket PUR black

Technical terms english – german

Tubes	Adern
Tight tube	Vollader
Semi-tight tube	Kompaktader
Suitable for direct connector assembly	Für direkte Steckermontage geeignet
High kink resistance	Hohe Knickfestigkeit
Tight bending radii	Enge Biegeradien
Up to ... m can be stripped in one piece	Abisolierbarkeit der Ader ... m
Optimal for pigtail assemblies for splicing purpose	Optimal für einseitig konfektionierte Leitungen zu Spleisszwecken
High flexibility	Hohe Flexibilität
Suited for high termical requirements	Breiter Einsatztemperaturbereich

Indoor cables	Innenkabel
Single fiber cable	Simplexkabel (Einzelfaserkabel)
Duplex	Duplexkabel (2-fasrig)
Breakout	Breakout
Riser	Riser
Tactical field cable	Taktisches Feldkabel
Metal free indoor cable	Metallfreies Innenkabel
Each fiber is strain-relieved	Jeder LWL zugentlastet
Single fiber cable easy to separate	Einfach zu trennender Mantelsteg
Easy jacket strippability	Mantel gut absetzbar
Suitable for direct connector assembly	Für direkte Steckermontage geeignet
Self-extinguishing, low smoke and halogen free jacket material	Selbstverlöschendes, halgogenfreies und raucharmes Mantelmaterial
Self-extinguishing, low smoke and halogen free	Selbstverlöschend, halogenfrei und raucharm
Up to ... m can be stripped in one piece	Abisolierbarkeit der Ader in ... m an einem Stück
Crush resistant	Trittfest
For high mechanical and thermic requirements	Für hohe mechanische und thermische Ansprüche
Tight tube cable design	Volladeraufbau
Suitable for repeated cable winding	Geeignet für wiederholtes Auf- und Abwickeln
Suited for highest mechanical and thermical requirements	Für höchste mechanische und thermische Ansprüche
Jacket material complies UL94V-0	Mantelmaterial UL94V-0
Tight bending radii	Enge Biegeradien
Compact design saves conduit space	Kompaktes Design, platzsparend
Specification for singlemode at ...nm, for multimode at ... nm	Spezifikationswerte für Singlemode bei ... nm, für Multimode bei ... nm

Technical terms english – german

Multi-fiber loose tube	Bündeladerkabel
Loose tube cable	Hohladerkabel
Multi-fiber loose tube cable	Bündeladerkabel
Jellyfree	Gelfrei (trocken)
Metal free outdoor cable	Metallfreies Aussenkabel
Metal free indoor cable	Metallfreies Innenkabel
Longitudinal and transversal watertight cable design	Längs- und querwasserdichter Kabelaufbau
Good mechanical resistance	Gute mechanische Festigkeit
High chemical resistance against acids and alkaline solutions	Hohe chemische Beständigkeit gegen Säuren und Laugen
Jellyfree multi-fiber loose tube design	Trockener Bündeladeraufbau
Good stripping characteristics/properties	Gute Abisolierbarkeit
Installation directly in the ground and in mechanically unprotected environment	Für Verlegung direkt ins Erdreich und in mechanisch ungeschützter Umgebung
Rodant-protected	Nagetiergeschützt
Increased compressive strength	Erhöhte Querdruckfestigkeit
Self-extinguishing, low smoke and halogen free	Selbstverlöschend, raucharm und halogenfrei
Roving armouring	Glasroving-Armierung
Steel armouring	Strahldraht-Armierung
Non-metallic armouring	Nichtmetallische Armierung
Plastic armouring (rodent protection)	Kunststoff-Armierung (Nagetierschutz)
No need for cleaning the fibers	Keine Reinigung der Fasern erforderlich
For vertical applications	Für vertikale Applikationen
Easy stripping and installation	Einfache Abisolierbarkeit und Installation
Low fire load for high safety requirements	Geringe Brandlast für hohe Sicherheitsanforderungen

Technical terms english – german

Special terms	Spezielle Begriffe
Standard cable	Standardkabel
PE-tube	PE-Röhrchen
Metal free single fiber cable	Metallfreies Einzelfaserkabel
Metal free loose tube cable	Metallfreies, leeres Hohladerkabel
Metal free multi-fiber loose tube cable	Metallfreies Bündeladerkabel
Not stranded multi-fiber loose tube cable	Unverseiltes Bündeladerkabel
Small fire load	Geringe Brandlast
Resistance against rodent attacks	Nagetiersicher
No contamination of installation material because of jelly	Keine Verschmutzung von Installationsmaterial durch Jelly
Cleaning of the fiber not necessary (time saving)	Reinigung der Faser nicht notwendig (Zeitersparnis)
Mechanically resistant	Mechanisch widerstandsfähig
Tear off thread	Aufreissfaden

For technical data	Für Technische Daten
Tensile strength	Zugbeanspruchung
Minimum bending radius	Min. Biegeradius
Compressive strength	Querdruckfestigkeit
Short-term	Kurzzeitig
Long-term	Langzeitig
Impact strength	Schlagfestigkeit
Repeated bending strength	Wechselbiegefestigkeit
Torsion strength	Torsionsfestigkeit
Coiling capability	Auf-/Abwickelfestigkeit
Drag chain capability	Schleppkettenfestigkeit
Water tightness	Längswasserdichtheit
Temperature range	Temperaturbereich
Fire propagation	Brandfortleitung
Fire test with circuit integrity (CI)	Brandfortleitung mit Funktionserhalt (FE)
Fire load	Brandlast
In service	In Betrieb
During installation	Bei Verlegung
On storage	Am Lager
Cycles	Zyklen
Specifications for singlemode at ... nm, for multimode at ... nm	Spezifikationswerte für Singlemode bei ... nm, für Multimode bei ... nm

Glossary

ADSL	Asymmetric Digital Subscriber Line – at the moment the most commonly used communication technique for digital broadband transmission of Internet contents for end-users
Access Network	Sub network for customer access to a carrier network, up to 20 km (12 miles)
Access Node	Network point for the access transfer – usually built as central office including ODR's
APC	Angled Physical Contact is a angled polished endface (usually 8°), so that the reflected light is not travelling back in the fiber, but can escape sidways. Thereby an even lower back reflexion can be achieved as with UPC.
CCTV	Closed Circuit Television – describes a video surveillance system in industrial applications
CTB	Cable Termination Box
CWDM	Coarse Wavelength Division Multiplexing – Various wavelengths are sent through the fiber at the same time. CWDM does not require the same network complexity as DWDM. CWDM is a cost-effective solution for metropolitan area and access networks. According to ITU proposal up to 18 channels can be used in the wavelength range from 1270 to 1610 nm.
DIN	German Institute of Standardization
DMD	Differential Mode Delay
DSL, DSLx	Digtital Subcriber Line – describes different techniques for transmitting data over two or four copper wires of the phone line, so called network termination, with high speed.
DSLAM	Digtital Subcriber Line Access Multiplexer – part of required infrastructure for operation of DSL. DSLAM's are located at a place where all the lines of network terminations are connected
DWDM	Dense Wavelength Division Multiplexing – WDM using a lot of different wavelength in a wavelength range with a small channel spacing. Commercial DWDM systems put 32 wavelength through one fiber, which corresponds, at a rate of 10 Giagabits/s per signal to a total rate of 320 Gigabits/s.
EFM	Ethernet in the First Mile – using the Ethernet protocol in the access network. The working group for EFM (standard IEEE 802.3ah) wants to replace ATM from the access network.
EN	European Standard
Ethernet	Ethernet for data transmission of 10Mb/s. It is the most widely-used data protocol for premises networks.
FT	Fiber Tray – a splice or distribution cassette with telescopic and hinged functionality holding fibers, splice connections and/or adapters. The FT has lateral fiber access to adapters called Side Access.
FTTB	Fiber-To-The-Building – network access with optical fibers to the building
FTTC	Fiber-To-The-Curb – network access with optical fibers to the curb
FTTD	Fiber-To-The-Desk – structured building cabling system (LAN) using optical fibers up to the workplace
FTTH	Fiber-To-The-Home – network access with optical fibers to the home
FTTO	Fiber-To-The-Office – structured building cabling system (LAN) using optical fibers up to the office
FTTP	Fiber-To-The-Premises – network access with optical fibers to the premises
Fiber	Optical fibers are dielectric waveguides which light is transmitted through the core. The cladding has a lower refractive index than the core. Thus the light is refracted at the boundary layer and is guided through the core. The fibers are made of silica (silica glass – pure silicon dioxide) or plastic (e.g. PMMA). The fiber is protected against mechanical damage and humidity with a special plastic coating. Today optical fibers are used to transmit data, to transmit power in the material processing, for illumination and reproduction purposes and in the measurement technique.
FrontAccess	Access to fibers and adapters from the front of the rack, where usually a door is located
GPON	Gigabit-Capable Passive Optical Network
HCS	Hard Clad Silica are optical fibers with a step index profile and with a core made of common mineral glass and the cladding of a special plastic. A known fiber type has a core diameter of 200 µm and a cladding diameter of 230 µm. The fibers are used for short distances and in particular for industrial cabling.
HDTV	High Definition TeleVision – television with high resolution (16:9), 1920 × 1080 pixels
IEC	International Electrotechnical Commission

Glossary

IEEE	Institute of Electrical and Electronics Engineers, Inc. www.ieee.org
IP	Internet Protocol
IPxx	Describes the degree of protection by housings according IEC 60529 (DIN 40050). As protection the immersion of water and particles is specified and digits are assigned to it. The first digit describes the protection of particles with 0 to 6 and the second digit the protection against water with 0 to 8. For example IP67 describes the protection against particles with approx. 50 µm and against water maximal 1m below the surface for 30 minutes.
ITU	International Telecommunication Union
LAN	Local Area Network – for the transmission of information between independent terminal units
LSFH™	Low smoke and free of halogen are characteristics of material behaviour. LSFH™® is a Trademark of HUBER+SUHNER AG. Usually these materials are flame retardant and self-extinguishing, they are made of polyethylene and metalhydroxide additives. Similar abbreviations are LSOH and LSZH.
LWL	Optical wave guides, also called optical fibres, are dielectric wave guides which transmit light through their cores. The cladding surrounding the core has a lower index of refraction (density) than the core. This causes the light at the interface to be totally reflected and to be carried through the core of the optical wave guide. Optical wave guides are made of mineral glass (quartz glass – pure silicon dioxide) or plastic (especially PMMA), depending on the specific application. The cladding is surrounded by a protective layer to prevent mechanical damage. It is made of special plastic, which also protects the fibre against moisture. Today, optical wave guides are especially applied as a medium for transmitting data through optical fibres, for transmitting power in the field of material processing and in medicine, for lighting and imaging purposes and in metrology.
MAN	Metropolitan Area Network – Inter-regional network for the transmission of information
MPO®	Multifiber push-on - an optical connector, standardised under IEC 61754-7:2008 (multimode only) which provides an interface for up to 72 fibers in a single unit, utilising individual rows of 12 fibers in a polymeric ferrule.
MTP	Mechanical transfer push-pull – an enchanced version of the MPO connector offering higher optical performance, repeatability and reliability
Multimode	That is a fiber whose core diameter compared to the wavelength of the light is big. Typical core diameters are 50 µm (EU standard) and 62.5 µm (US standard). In the core a big number of waves can propagate. As a result of many paths signal interference occurs based on running time differences. Multimode fibers are suitable for data transmission over shorter distances.
NT	Network Termination – network termination with fiber or copper technique
NZDSF	Non-Zero Dispersion – Shifted Fiber
OAN	Optical Access Network – access network using optical fibers
PE	Polyethylene is made of ethene by polymerisation and a thermoplastic. Polyethylene is used for cable jackets, that have a high protection against environmental influences. The material is halogen free and can be recycled without concern.
PCF	Polymer Cladded Fiber
PON	Passive Optical Network – an all optical network architecture without electrical/optical conversion and vice versa
PMD	Polarization Mode Dispersion
POF	Plastic Optical Fiber/Polymer Optical Fiber
Primary coating	First buffer around the fiber protecting the fiber against humidity and mechanical stress; typically 250 µm
PUR	Polyurethanes are thermoplastics that are produced from a dialcohol and a polyisocyanate by polyaddition. Because of the excellent mechanical characteristics some polyurethane are suitable for application, where a high abrasive resistance, a high mechanical flexibility and a good fluid resistance are required.
Secondary coating	Second buffer around the fiber; typically 900 µm

Glossary

Singlemode	The light travels through the fiber only in one wave, because the core diameter is small compared to the wavelength of the light (approx. 9 µm). Thus long distances and high data volume are possible with the fiber.
Splice	Permanent joint between 2 optical fibers ruptured in a plane, created by fusion, clamping or gluing
UL94	is defined as a material test from Underwriters Laboratories Inc, (www.ul.com) testing inflammable material in regards to the fiber behaviour. Therefore after exposing a test rot to fire for 60 seconds the self-extinguishing behaviour is analyzed. V describes the test with a vertical test rod, whereas H is with a horizontally fixed rod. The behaviour of the vertical test is classified into 0, 1 or 2 with 0 showing the best self-extinguishing behaviour.
VDSL	Very High Speed Digital Subscriber Line – VSDL is the fastest of all DSL technologies. It allows a data transmission up to 52 Mbit/s over a phone line, though the usable transmission bandwidth declines with the length of the line. For the maximal speed the length may not exceed 300 m; with 900 m it reduces to half and with 1.4 km to a fourth. The speed of the data transmission enables to offer Triple Play via VDSL including television channels, internet and voice traffic. Planned application of VDSL is the transmission of HDTV, whereas also several channels can be transmitted simultaneously.
VoIP	Voice over IP – uses the internet to transport the voice
WAN	Wide Area Network – World-spanning network for the transmission of information (long-haul)
WDM	Wavelength Division Multiplexing – WDM using a lot of different wavelength in a wavelength range with a small channel spacing and transmitted through the same fiber simultaneously

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