Fiber Optic Cables

LEONI Fiber Optics – Your specialist for Fiber Optics

THE QUALITY CONNECTION

LEONI

Wire · Cable · Wiring Systems

Contents

Edition: May 2006

The LEONI Q-Line Concept

New, faster network protocols and the further development of active and passive network components to match make constantly rising transmission rates possible. A key element of such nets are the cables used. LEONI Fiber Optics fully concentrates on the cable and regards it as our core competence.

Over the past few years we have managed to constantly increase the quality of our fiber optic cables through improvements and process optimization. We do not only keep pace with constantly changing technical requirements by means of state-of-the-art and most flexible technologies but we have also been leading in the areas of further development and innovations. Fiber optic cables of the LEONI Q-Line series are both technically and economically optimal passive components for company networks as well as for telecommunications.

It is our demand to be better than others. This is one of the reasons why the customer and his individual demands always come first. By being in steady contact with our customer we achieve a plus in product and service quality which is reflected in the LEONI Q-Line series.

LEONI Q-Line – which means:

- **Best quality**
  Continuously developing and improving productivity.
- **Ease of installation**
  Extremely rugged cables which can be installed both time and cost efficiently.
- **Systems independence**
  Individual solutions which fit in any system.
- **Availability**
  Delivery at short notice without delivery charge.
- **Technical support**
  Comprehensive instruction and individual help for all of your questions.

LEONI Quality Management

LEONI Quality Management

A consistently high level of quality is indispensable for our products. This means that the entire process at LEONI – from a product's planning to its completion – is subjected to permanent monitoring. Our quality management system is certified in accordance with DIN/ISO 9001 and QA 9000/VDA 6.1 and is permanently monitored.

Environmentally Friendly and Safe

Halogen-free versions of all the cables in our range are also available, of course. Not only does this reduce the strain on the environment, it also means less smoke and corrosive emissions in the event of a fire – for your safety.

LEONI Environmental Management

For us, business success with ecological responsibility is not a contradiction in terms. As such, environmental protection is an intrinsic element of our corporate activities. Our environmental management system is certified as complying with DIN EN ISO 14001, confirming that our environmental policy is effectively implemented.

Fire protection

All the fiber optic cables for inhouse cabling in this catalogue are made in **FRNC (LSFROH)** versions.

FR	Flame Retardant
NC	Non Corrosive
LS	Low Smoke
0H	Zero Halogen

There is good reason for this – safety for persons, buildings and installations in the case of fire. LEONI Q-Line data cables with a sheath made of halogen-free and flame-retardant material are the better alternative to PVC in this respect, as their mechanical properties are fully guaranteed.

PVC used to be a preferred choice of cable sheath material for cost reasons. Initially PVC displays good flame-inhibiting properties; its exposure to flames is accompanied, however, by severe loss of plasticizer components through vaporization, reducing the flame-retardant effect. Furthermore, the halogens contained in PVC can result in the emission of toxic dioxin, which along with carbon monoxide emissions constitutes a major hazard for people.

In a fire PVC also results in the formation of chloric acid gas, which is highly corrosive and attacks both metal surfaces and reinforced concrete. The damage caused to a building by corrosion is generally greater by a multiple than that caused by the actual fire.

Advantages of FRNC cables compared to PVC cables:
FRNC contains absolutely no halogen and is non-corrosive, for that reason no dioxins and no corrosive gases are emitted. Exposure to flames creates water vapor, which absorbs heat and therefore quenches the burning cable.

All LEONI Q-Line fiber optic indoor and outdoor cables pass the extensive fire behavior tests laid down in IEC 60332-1 (DIN VDE 0472 Part 804 B) and in addition to the stricter bundle fire test according to IEC 60332-3, Category A durchgeführt (DIN VDE 0472 Part 804 C).

Smoke production of FRNC is very small compared to PVC and is measured compliant with IEC 61034-1 and 61034-2. Both tests are necessary for verification of minimum smoke production. Absence of halogen is tested in accordance with IEC 60754-2. The most dangerous component for people in the event of a fire is carbon monoxide. FRNC produces only about 1/5th of the volume of carbon monoxide created by PVC.

The advantages of FRNC cables at a glance:
- no self-propagation of fire along the cable
- relatively low toxicity of gases emitted in a fire
- no production of corrosive gases
- no dioxins in the remains of the fire
- minimum smoke production

Standards

Fiber optic cables from LEONI Fiber Optics fulfil one or several of the following standards:
- DIN VDE 0888
- DIN VDE 0899
- DIN VDE 0472
- DIN VDE 0473
- EN 50 173
- EN 187 000 to 187 105
- EN 188 000
- ITU-T Rec G.651 to G.655
- IEC 60793 and 60794

Order number coding

Cable construction	Number of fibers	Core type	Fiber type
□□□□□	□□	□	□

Cable construction

see product page

Number of fibers

00	= 1 fiber
01	= 2 fibers
02	= 4 fibers
03	= 6 fibers
04	= 8 fibers
xx	= 2 x XX fibers

Core type

0	= tight buffered fiber
1	= semi-tight fiber, gel filled
2	= loose tube with 2 fibers
3	= loose tube with 4 fibers
4	= loose tube with 6 fibers
5	= loose tube with 8 fibers
6	= loose tube with 10 fibers
7	= loose tube with 12 fibers
B	= loose tube with 16 fibers
D	= loose tube with 20 fibers
F	= loose tube with 24 fibers

Fiber type

A	= 0.38F3.5/0.28H18 OS1
B	= 0.36F3.5/0.22H18 OS1
F	= 3.0B350/1.0F600 OM1
G	= 2.7B500/0.8F1000 OM2
H	= 2.7B600/0.7F1200 OM2
I	= 2.5B1500/0.7F500 OM3
K	= 3.2B160/1.0F500
L	= 3.2B250/0.9F600 OM1
M	= 3.0B300/0.8F800 OM1

Ordering examples:

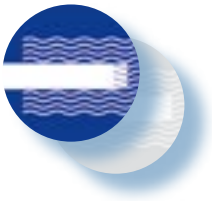
8	4	0	0	5	0	1	1	H	→ I-VH 2x1G50/125 2.7B600/0.7F1200
8	4	0	2	5	0	6	7	L	→ U-DBH 12G62.5/125 3.2B250/0.9F600
8	4	3	1	6	7	2	7	B	→ A-DQ(ZN)B2Y 12x12E9/125 0.36F3.5/0.22H18

Pictograms

Flame-retardant and halogen-free jacket
The outer jacket of the cable is self-extinguishing and not fire conductive. The halogen-free jacket material develops neither toxic nor corrosive combustion gases in the case of a fire.

Rodent proof
The cable core is protected against damage due to rodents.

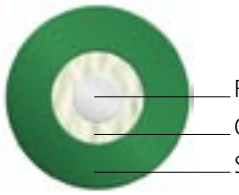
Longitudinally waterproof
Water in the cable core cannot spread in the longitudinal direction.



Transversely water
Diffusion of water in the transverse direction of the cable core is prevented.

Fiber optic cores

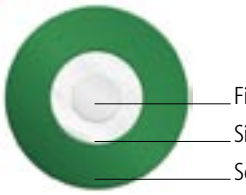
STB – Semi-Tight Buffered fiber



Properties/Applications

- For splicing as pigtail
- As connection cables in equipment and distribution cabinets
- High flexibility
- Very good kink resistance
- Longitudinal waterproof due to gel filling
- Available without gel filling for pigtails
- Ease of installation and assembly (1000 mm and more can be stripped in one piece)

TB – Tight Buffered fiber



Properties/Applications

- In equipment and distributor cabinets as two-sided ready assembled cable
- Resistant against temperature fluctuations
- High resistance to external mechanical loads as bending, transverse pressures,… and environmental influences
- Easy consistent stripping of buffer
- Installation-friendly, because of no gel filling

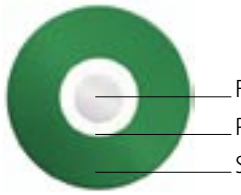
Temperature range

Transport and storage	– 20 °C to + 50 °C
Installation	+5 °C to + 40 °C
Operation	–10 °C to + 60 °C

Mechanical properties

min. bending radius	30 mm
max. pull force long-term	5 N
max. crush resistance long-term	200 N

LB – Superstrip fiber



Properties/Applications

- For splicing as pigtail
- For Indoor cables in equipment and distribution cabinets as well as on cable trays
- High flexibility
- Very good kink resistance
- Installation-friendly, because of no gel
- Ease of installation and assembly (1000 mm and more can be stripped in one piece)

Type	Construction	Diameter (µm)	Weight (kg/km)	Order-No.
TB 900	Tight buffered fiber	900	0.75	84998000 (fiber type)
TB 600	Tight buffered fiber	600	0.50	84950116 (fiber type)
LB 900	Semi-tight fiber, dry core	900	0.75	84998006 (fiber type)
STB 900	Semi-tight fiber, gel filled	900	0.75	84998001 (fiber type)
STB 900 unfilled✖	Semi-tight fiber, dry core	900	0.70	84998009 (fiber type)

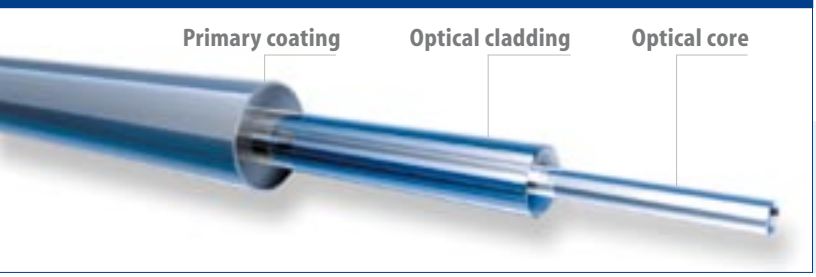
✖ only available as buffered core for pigtail production

Fiber optic color code for multi-fiber loose tubes Standard code of LEONI Fiber Optics GmbH according to IEC 60 304

No. of fiber	
1	red
2	green
3	blue
4	yellow
5	white
6	grey
7	brown
8	violet
9	turquoise
10	black
11	orange
12	pink

No. of fiber	(with ring marking)
13	red
14	green
15	blue
16	yellow
17	white
18	grey
19	brown
20	violet
21	turquoise
22	**transparent** (no ring marking)
23	orange
24	pink

Fiber specification



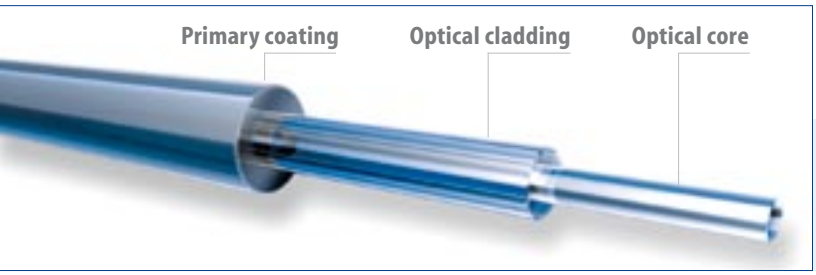
G50/125

Multi-mode fiber G50/125
according to IEC 60 793-2-10

Geometry/mechanical properties

Core diameter (µm)	50 ± 2.5	Cladding non-circularity (%)	< 1
Cladding diameter (µm)	125 ± 2	Core/Clad concentricity error (µm)	< 1.5
Coating diameter (µm)	245 ± 10	Eccentricity of coating (µm)	< 10
Core non-circularity (%)	< 5	Screen-Test	≥ 100 kpsi

Transmission properties	Fiber type F (OM1)		Fiber type G (OM2)		Fiber type H (OM2)		Fiber type I (OM3)	
Wavelength (nm)	850	1300	850	1300	850	1300	850	1300
Attenuation max. (dB/km)	3.0	1.0	2.7	0.8	2.7	0.7	2.5	0.7
Bandwidth min. (MHz · km)	350	600	500	1000	600	1200	1500	500
Effective group of refraction	1.483	1.478	1.483	1.478	1.483	1.478	1.483	1.478
Numerical apperture	0.200 ± 0.020		0.200 ± 0.015		0.200 ± 0.015		0.200 ± 0.015	



G62.5/125

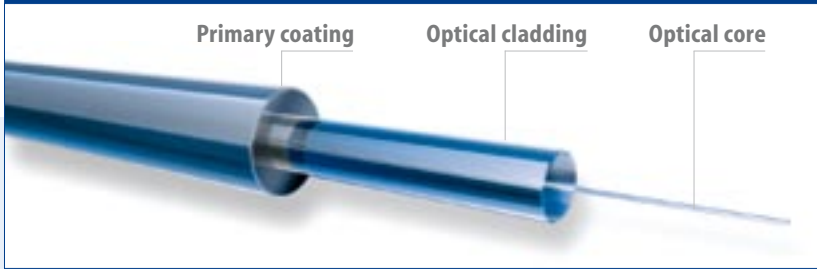
Multi-mode fiber G62.5/125
according to IEC 60 793-2-10

Geometry/mechanical properties

Core diameter (µm)	62.5 ± 3	Cladding non-circularity (%)	< 1
Cladding diameter (µm)	125 ± 2	Core/Clad concentricity error (µm)	< 1.5
Coating diameter (µm)	245 ± 10	Eccentricity of coating (µm)	< 10
Core non-circularity (%)	< 5	Screen-Test	≥ 100 kpsi

Transmission properties	Fiber type K		Fiber type L (OM1)		Fiber type M (OM1)	
Wavelength (nm)	850	1300	850	1300	850	1300
Attenuation max. (dB/km)	3.2	1.0	3.2	0.9	3.0	0.8
Bandwidth min. (MHz · km)	160	500	250	600	300	800
Effective group of refraction	1.497	1.493	1.497	1.493	1.497	1.493
Numerical apperture	0.275 ± 0.020		0.275 ± 0.015		0.275 ± 0.015	

Fiber specification



E9/125

additional fiber types e.g. ITU-T G.652.D or ITU-T G.655 on request

Single-mode fiber E9/125
(matched cladding type)
according to ITU-T Rec. G.652 and IEC 60 793-2-50

Geometry/mechanical properties

Mode field diameter (at 1310 nm) (µm)	9.2 ± 0.4	Core/Clad concentricity error (µm)	< 0.8
Cladding diameter (µm)	125 ± 1	Eccentricity of coating (µm)	< 10
Coating diameter (µm)	245 ± 5	Screen-Test	≥ 100 kpsi
Cladding non-circularity (%)	< 1		

Transmission properties	**Fiber type A** for semi-tight and tight buffered fibers		**Fiber type B** for multi-fiber loose tubes	
Wavelength (nm)	1310	1550	1310	1550
Attenuation max. (dB/km)	0.38	0.28	0.36	0.22
Dispersion coefficient max. (ps/nm · km)	3.5	18	3.5	18
Zero dispersion wavelength (nm)	1300 – 1322		1300 – 1322	
Dispersion slope (ps/nm² · km)	≤ 0.092		≤ 0.092	
Cutoff wavelength (cabled) (nm)	≤ 1250		≤ 1250	
Polarization mode dispersion (ps/$\sqrt{km}$)	≤ 0.1		≤ 0.1	
Effective group of refraction	1.4695	1.4701	1.4695	1.4701

Applications and link lenghts

		G50/125				G62.5/125		
		F	**G**	**H**	**I**	**K**	**L**	**M**
Type according to IS 11801: 09/2002		OM1	OM2	OM2	OM3		OM1	OM1
Gigabit Ethernet	1000BASE-SX (850 nm)	500 m	525 m	750 m	1,000 m	300 m	350 m	400 m
Gigabit Ethernet	1000BASE-LX (1300 nm)	550 m	1000 m	2,000 m	550 m	550 m	550 m	1,000 m
10 Gigabit Ethernet	10GBASE-SX (850 nm)				300 m✖			
10 Gigabit Ethernet	10GBASE-LX4 (1310 nm WDM)				300 m			

✖ 10 Gigabit Ethernet link length according to ISO 11801 2nd edition. We offer OM3 fibers with a maximum 10 Gigabit link length of 600 m upon request.

Packaging

Drums

Fiber optic cables of higher cross-section are usually delivered on wooden drums of the KTG Kabeltrommel GmbH & Co. KG, Köln. They are provided on loan exclusively under the conditions of this company which we will send to you upon request.

Standard wooden reels

Type	Flange-Ø (mm)	Core-Ø (mm)	Width over all (mm)	Winding width (mm)	Reel weight approx. (kg)	Max. load max. (kg)
KT081	800	400	520	400	31	400
KT101	1000	500	710	560	71	900
KT121	1250	630	890	670	144	1700
KT141	1400	710	890	670	175	2000
KT161	1600	800	1100	850	280	3000
KT181	1800	1000	1100	840	380	4000
KT201	2000	1250	1350	1045	550	5000
KT221	2240	1400	1450	1140	710	6000
KT250	2500	1400	1450	1140	875	7500

If requested we can deliver fiber optic cables on the following disposable drums:

Disposable drums (wood)

Type	Flange-Ø (mm)	Core-Ø (mm)	Width over all (mm)	Winding width (mm)	Drilling (mm)	Reel weight approx. (kg)
K3000	300	212	103	90	51	0.7
H5001	500	400	116	100	46	3.5
H5005	500	312	331	315	80	3.7
H6007	600	312	335	315	80	5.0
H6008	600	313	410	390	80	4.6
H7601	760	313	415	390	80	8.5
H7603	760	470	544	520	80	12.0
H1001	1000	500	590	560	80	15.0
G1201	1200	600	790	645	80	74
G1401	1400	800	700	600	82	193
G1601	1600	1000	1100	900	80	240

Indoor cables

LEONI Q-Line fiber optic indoor cables are used in the building backbone and the horizontal cabling of a generic cabling system.
In the rising area for connecting the individual floors of a building, fiber optic indoor cables with multi-mode fibers are used mostly to achieve higher data rates over larger distances. With a view to the rising requirements of users in the future, "fiber to the desk", i.e. fiber optic cabling up to the workplace, is the adequate solution.

To fulfil the strict fire protection requirements in the indoor area, fiber optic indoor cables with halogen-free and flame-retardant jacket are required because they guarantee that fire does not spread through the cables and no corrosive and toxic gases arise.

Flexibility, highly reduced weight, small outside diameter and sturdiness are requirements on fiber optic indoor cables varying according to operating area, which are fulfilled with cables from the LEONI Q-Line series.

The design variety of the LEONI Q-Line fiber optic indoor cables is demonstrated with simplex and dual cables, the mini break-out cable as well as the break-out cables in the flat and round versions.

LEONI Q-Line® I-V(ZN)H 1...

Simplex cable

Application

Because of the small diameter and high flexibility, ideal as patch cable in distribution systems as well as for connecting terminals.

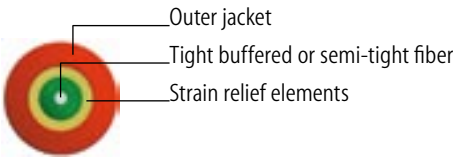
Order-No. 84 003 □□ □ □

Standardization DIN VDE 0888, Part 4 and IEC 60 794-2

Construction

Cable core	Tight buffered fiber (TB) or semi-tight fiber, gel filled (STB)
Strain relief elements	non-metallic (aramid)
Cable jacket	halogen-free and flame-retardant material
Color of jacket	orange for multi-mode, yellow for single-mode ➔ other colors possible

Cross section



Temperature range

Transport and storage	–25 °C to +70 °C
Installation	–5 °C to +50 °C
Operation	–10 °C to +70 °C

Fire performance

Flame retardancy	IEC 60332-1 and IEC 60332-3 Cat. A
Smoke density	IEC 61034
Halogen-free	IEC 60754-2

No toxic and corrosive fumes

Mechanical properties

min. bending radius	static	30 mm
	dynamic	60 mm

Outer-Ø	Type	Weight	max. pull force long-term	max. crush resistance long-term	Fire load
mm		kg/km	N	N/dm	MJ/m
1.6	I-V(ZN)H 1...	2.9	200	100	0.09
1.8	I-V(ZN)H 1...	3.7	200	100	0.10
2.0	I-V(ZN)H 1...	5.0	300	100	0.11
2.1	I-V(ZN)H 1...	5.1	300	100	0.12
2.4	I-V(ZN)H 1...✖	5.7	400	150	0.16
2.8	I-V(ZN)H 1...	7.9	400	150	0.18
2.9	I-V(ZN)H 1...	8.0	400	150	0.20
3.0	I-V(ZN)H 1...	8.1	400	150	0.21
3.4	I-V(ZN)H 1...✖	12.0	400	150	0.32

✖ acc. to TS 0011/96 Deutsche Telekom

All simplex cables are available with TB, STB and LB cores.
Order-No. on request.

LEONI Q-Line® I-V(ZN)H 2x1...

Duplex cable

Application

Because of the small diameter and high flexibility, ideal as patch cable in distribution systems as well as for connecting terminals.

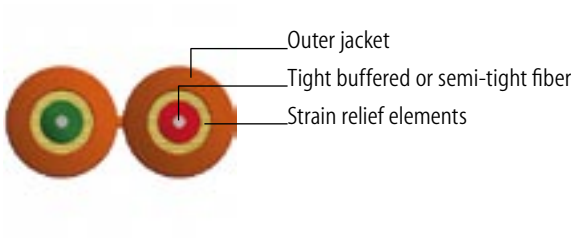
Order-No. **84 005** □□ □ □

Standardization DIN VDE 0888, Part 6 and IEC 60 794-2

Construction

Cable core	Tight buffered fiber (TB) or semi-tight fiber, gel filled (STB)
Strain relief elements	non-metallic (aramid)
Cable jacket	halogen-free and flame-retardant material
Color of jacket	orange for multi-mode, yellow for single-mode ➔ other colors possible

Cross section



Temperature range

Transport and storage	–25 °C to +70 °C
Installation	–5 °C to +50 °C
Operation	–10 °C to +70 °C

Fire performance

Flame retardancy	IEC 60332-1 and IEC 60332-3 Cat. A
Smoke density	IEC 61034
Halogen-free	IEC 60754-2

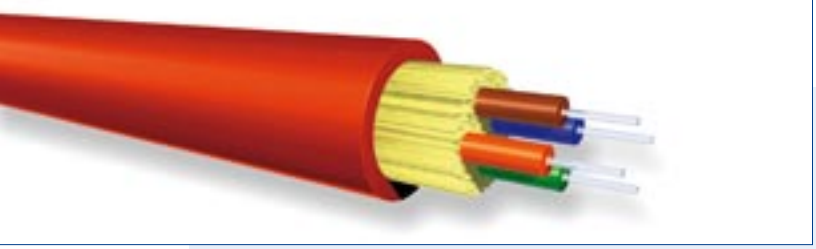
No toxic and corrosive fumes

Mechanical properties

min. bending radius	static	30 mm
(over flat side)	dynamic	60 mm

Outer dimension	Type	Weight	max. pull force long-term	max. crush resistance long-term	Fire load
mm		kg/km	N	N/dm	MJ/m
1.6 x 3.3	I-V(ZN)H 2x1...	5.8	400	200	0.18
1.8 x 3.7	I-V(ZN)H 2x1...	7.4	400	200	0.20
2.0 x 4.1	I-V(ZN)H 2x1...	9.5	400	200	0.22
2.1 x 4.3	I-V(ZN)H 2x1...	10.2	400	400	0.24
2.4 x 4.9	I-V(ZN)H 2x1...	12.6	400	400	0.31
2.8 x 5.7	I-V(ZN)H 2x1...	15.8	600	600	0.36
3.0 x 6.1	I-V(ZN)H 2x1...	17.5	600	600	0.38

All duplex cables are available with TB, STB and LB cores.
Order-No. on request.



LEONI Q-Line® I-V(ZN)H n...

Mini-breakout-cable

Application

Because of its high flexibility and small dimensions ideal for fiber to the desk (FTTD).

Non-metallic indoor cable for direct plug assembly.

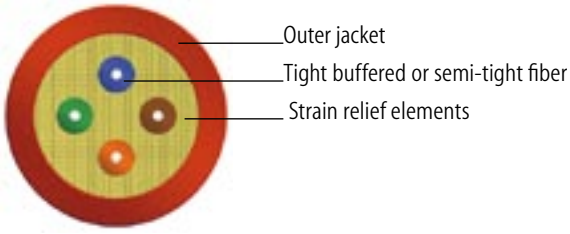
Order-No. **84 026** □□ □ □

Standardization DIN VDE 0888, Part 6 and IEC 60 794-2

Construction

Cable core	Tight buffered fiber (TB) or semi-tight fiber, gel filled (STB)
Strain relief elements	non-metallic (aramid)
Cable jacket	halogen-free and flame-retardant material
Color of jacket	orange for multi-mode, yellow for single-mode

Cross section



Temperature range

Transport and storage	–25 °C to +70 °C
Installation	–5 °C to +50 °C
Operation	–10 °C to +70 °C

Fire performance

Flame retardancy	IEC 60332-1 and IEC 60332-3 Cat. A
Smoke density	IEC 61034
Halogen-free	IEC 60754-2

No toxic and corrosive fumes

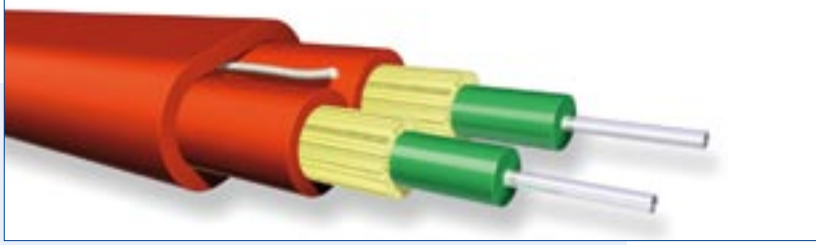
Mechanical properties

max. pull force	long-term	800 N
max. crush resistance	long-term	300 N/dm

Number of fibers n	2	4	6	8	12	16	24
Outer-Ø (mm)	4.2	5.6	5.9	6.1	7.0	8.4	9.4
Weight (kg/km)	14	21	25	30	38	59	72
min. bending radius static (mm)	40	55	60	60	70	85	95
min. bending radius dynamic (mm)	65	85	90	90	95	120	135
Fire load (MJ/m)	0.45	0.47	0.50	0.52	0.55	0.74	0.92

All mini-breakout cables flat are available with TB, STB and LB cores.
Order-No. on request.

LEONI Q-Line® I-V(ZN)HH 2x1...



Breakout-cable, flat

Application

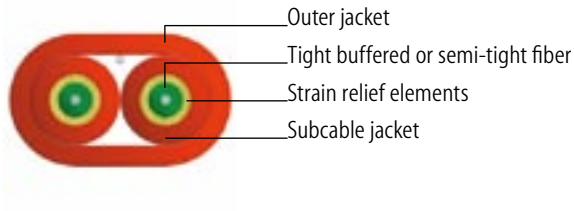
Light, thin and robust indoor cable for use as patch cable in distribution systems, as connection cable for terminals as well as for fiber to the desk.
For direct connector assembly.

Order-No. **84 011** □□ □ □
Standardization DIN VDE 0888, Part 6 and IEC 60 794-2

Construction

Cable core	Two single fiber cables (tight buffered or semi-tight fibers) lying parallel to one another with strain relief elements (aramid) and halogen-free, flame-retardant jacket (Ø see table)
Cable jacket	halogen-free and flame-retardant material
Color of jacket	orange for multi-mode, yellow for single-mode

Cross section



Temperature range

Transport and storage	–25 °C to +70 °C
Installation	–5 °C to +50 °C
Operation	–10 °C to +70 °C

Fire performance

Flame retardancy	IEC 60332-1 and IEC 60332-3 Cat. A
Smoke density	IEC 61034
Halogen-free	IEC 60754-2

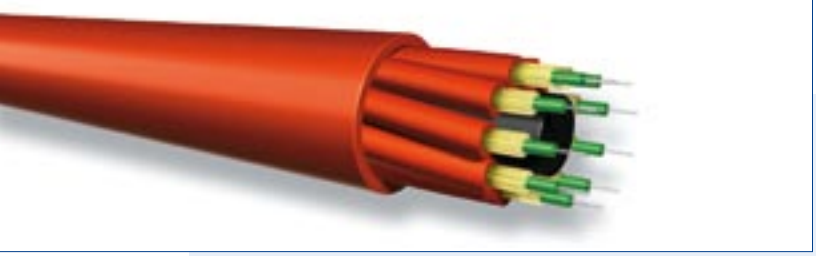
no toxic and corrosive fumes

Mechanical properties

min. bending radius	static	35 mm
(over flat side)	dynamic	65 mm

Subcable	Outer dimension	Type	Weight	max. pull force long-term	max. crush resistance long-term	Fire load
mm	mm			kg/kmN	N/dm	MJ/m
1.7	**2.8 x 4.5**	I-V(ZN)HH 2x1...	16.5	400	400	0.58
1.8	**2.9 x 4.7**	I-V(ZN)HH 2x1...	17.5	400	400	0.60
2.0	**3.1 x 5.2**	I-V(ZN)HH 2x1...	19.0	600	400	0.63
2.1	**3.1 x 5.2**	I-V(ZN)HH 2x1...	19.0	600	400	0.63
2.5	**3.7 x 6.2**	I-V(ZN)HH 2x1...	26.0	600	600	0.65
2.8	**4.0 x 6.8**	I-V(ZN)HH 2x1...	32.0	600	600	0.83

All breakout cables flat are available with TB, STB and LB cores.
Order-No. on request.



LEONI Q-Line® I-V(ZN)HH n...

Breakout-cable

Application

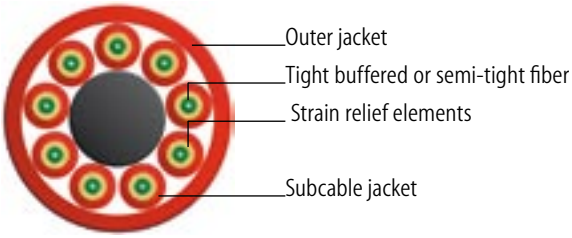
Non-metallic, robust cable for installation in the rising and horizontal area.
For direct connector assembly.

Order-No. **see table**
Standardization DIN VDE 0888, Part 6 and IEC 60 794-2

Construction

Cable core	Stranded single elements designed as tight buffered (TB) or semi-tight fibers (STB), gel filled with strain relief elements (aramid) and halogen-free, flame-retardant jacket (diameter see table)
Cable jacket	halogen-free and flame-retardant material
Color of jacket	orange for multi-mode, yellow for single-mode

Cross section



Temperature range

Transport and storage	–25 °C to +70 °C
Installation	–5 °C to +50 °C
Operation	–10 °C to +70 °C

Fire performance

Flame retardancy	IEC 60332-1 and IEC 60332-3 Cat. A
Smoke density	IEC 61034
Halogen-free	IEC 60754-2

No toxic and corrosive fumes

Remarks

Available with a non-metallic rodent protection (B)

Subcable 1.8 mm

Core: TB 600

Tight buffered fiber with Ø 600 µm

Order-No. **84 015** □□ **0** □ (Tight buffered fiber)

or **84 015** □□ **1** □ (Semi-tight fiber)

or **84 015** □□ **6** □ (Superstrip fiber)

Number of fibers n	2	4	6	8	10	12	16	18
Outer-Ø (mm)	5.7	5.7	7.0	8.3	9.6	11.0	10.7	11.3
Weight (kg/km)	38	38	60	72	84	96	105	120
min. bending radius static (mm)	60	60	70	85	95	110	110	115
min. bending radius dynamic (mm)	85	85	105	125	145	165	160	170
max. pull force long-term (N)	600	600	800	800	800	800	1000	1000
max. crush resistance (N/dm)	800	800	800	800	800	800	800	800
Fire load (MJ/m)	0.96	0.96	1.09	1.15	1.24	1.32	1.48	1.65

Subcable 2.1 mm

Core: TB 900 or STB 900

Tight buffered fiber (TB) or semi-tight fiber with Ø 900 µm

Order-No. **84 013** □□ **0** □ (Tight buffered fiber)

or **84 013** □□ **1** □ (Semi-tight fiber)

or **84 013** □□ **6** □ (Superstrip fiber)

Number of fibers n	2	4	6	8	10	12	16	18	20	24	26
Outer-Ø (mm)	7.0	7.0	8.2	9.6	11.0	12.5	12.0	13.0	14.5	15.0	15.5
Weight (kg/km)	40	45	65	95	135	155	140	160	205	210	225
min. bending radius static (mm)	70	70	80	95	110	125	120	130	145	150	155
min. bending radius dynamic (mm)	95	95	120	145	165	190	180	195	220	225	235
max. pull force long-term (N)	800	800	1000	1000	1000	1000	1000	1000	1000	1000	1000
max. crush resistance (N/dm)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Fire load (MJ/m)	1.10	1.10	1.18	1.31	1.42	1.57	1.62	2.00	2.10	2.35	2.45

Subcable 2.5 mm

Core: TB 900 or STB 900

Tight buffered fiber or semi-tight fiber with Ø 900 µm

Order-No. **84 010** □□ **0** □ (Tight buffered fiber)

or **84 010** □□ **1** □ (Semi-tight fiber)

or **84 010** □□ **6** □ (Superstrip fiber)

Number of fibers n	2	4	6	8	10	12	16	18	20	24	26
Outer-Ø (mm)	7.5	7.5	9.0	11.0	13.0	14.5	14.0	14.5	16.0	17.5	18.0
Weight (kg/km)	45	50	75	110	160	182	160	175	225	245	260
min. bending radius static (mm)	75	75	90	110	130	145	140	145	160	175	180
min. bending radius dynamic (mm)	115	115	135	165	195	215	210	215	240	260	270
max. pull force long-term (N)	800	800	1200	1200	1200	1200	1200	1200	1200	1200	1200
max. crush resistance (N/dm)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Fire load (MJ/m)	1.20	1.20	1.36	1.52	1.68	1.80	1.84	1.92	2.16	2.48	2.50

Universal cables

Universal cables which can be used both in the indoor and in the outdoor area of local area networks (LAN) are recommended for campus and building backbone. Interfaces between campus area and the buildings are not required when using universal cables, and thus the time-consuming splicing is not necessary, which in turn has positive effects on installation times and costs of LAN cabling.

Integration of a metallic humidity barrier can also make a further contribution to reducing costs. Universal cables with aluminium tape or steel armour are suitable for running directly in the ground, so that it is not necessary to use a HDPE protective conduit.

The halogen-free and flame-retardant cable jacket of the LEONI Q-Line universal cables guarantees compliance with the strict fire protection requirements on cables in the inhouse area.

A smaller outer diameter, a lower weight and smaller bending radius are advantages of universal cables in comparison to outdoor cables. Thus it is possible to install clearly larger lengths in one piece, e.g. in conduits, ducts or on cable trays. Non-metallic reinforcements with glass yarns or metallic armourings with corrugated steel tape offer protection against rodents and humidity.

LEONI *Fire Secure* U-D(ZN)BH n...2500

Rodent protected universal cable with central tube (2500 N)

Application

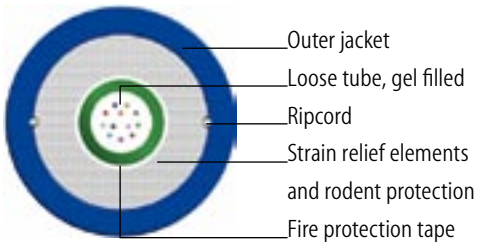
Non-metallic flexible and light cable for enhanced tensile load, that can be used both inside and outside buildings.
Installation in cable ducts, on cable trays or in cable conduits.
To be used in areas with circuit integrity requirements.

Order-No. **84 040** □□ □ □
Standardization DIN VDE 0888, Part 6

Construction

Cable core	Loose tube, gel filled
Armouring	multi-functional, strengthened E-glass yarn, water-absorbent as non-metallic strain relief elements and as rodent protection
Cable jacket	halogen-free and flame-retardant material
Color of jacket	blue

Cross section



Temperature range

Transport and storage	–25 °C to +70 °C
Installation	–5 °C to +50 °C
Operation	–20 °C to +60 °C

Fire performance

Flame retardancy	IEC 60332-1 and IEC 60332-3 Cat. A
Smoke density	IEC 61034-1 / -2
Halogen-free	IEC 60754-2

no toxic and corrosive fumes

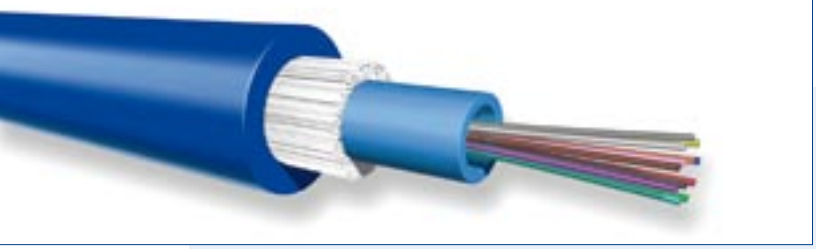
Mechanical properties

min. bending radius	static	15 x outside diameter
	dynamic	20 x outside diameter
max. pull force	long-term	2500 N
max. crush resistance	long-term	3000 N/dm

Circuit integrity

EN 50200/DIN VDE 0482 Part 1
max. change of attenuation 2.0 dB

No. of fibers max.	Outer-Ø (mm)	Weight (kg(km)	Fire Load (MJ/m)
12	9.2	105	0.92
24	9.7	115	1.15



LEONI Q-Line® U-DQ(ZN)BH n... 1750

Rodent protected universal cable with central tube (1750 N)

Application

Non-metallic, light and flexible cable that can be used both inside and outside buildings.

Installation in cable ducts, on cable trays or in cable conduits.

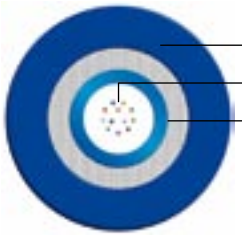
Order-No. **84 025** □□ □ □

Standardization DIN VDE 0888, Part 6

Construction

Cable core	Loose tube, gel filled
Armouring	multi-functional E-glass yarn, water-absorbent as non-metallic strain relief elements and as rodent protection
Cable jacket	halogen-free and flame-retardant material
Color of jacket	blue

Cross section



Temperature range

Transport and storage	–25 °C to +70 °C
Installation	–5 °C to +50 °C
Operation	–20 °C to +60 °C

Fire performance

Flame retardancy	IEC 60332-1
Smoke density	IEC 61034
Halogen-free	IEC 60754-2

no toxic and corrosive fumes

Mechanical properties

min. bending radius	static	15 x outside diameter
	dynamic	20 x outside diameter
max. pull force	long-term	1750 N
max. crush resistance	long-term	1500 N/dm

No. of fibers max.	Outer-Ø (mm)	Weight (kg/km)	Fire Load (MJ/m)
12	7.0	48	0.70
24	7.5	55	0.72

LEONI Q-Line® U-DQ(ZN)BH n...2500

Rodent protected universal cable with central tube (2500N)

Application

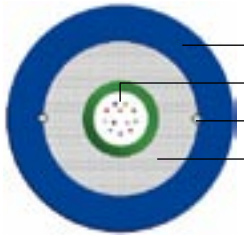
Non-metallic, flexible and light cable for enhanced tensile load, that can be used both inside and outside buildings.
Installation in cable ducts, on cable trays or in cable conduits.

Order-No. **84 032** □□ □ □
Standardization DIN VDE 0888, Part 6

Construction

Cable core	Loose tube, gel filled
Armouring	multi-functional, strengthened E-glass yarn, water-absorbent as non-metallic strain relief elements and as rodent protection
Cable jacket	halogen-free and flame-retardant material
Color of jacket	blue

Cross section



Temperature range

Transport and storage	–25 °C to +70 °C
Installation	–5 °C to +50 °C
Operation	–20 °C to +60 °C

Fire performance

Flame retardancy	IEC 60332-1 and IEC 60332-3 Cat. A
Smoke density	IEC 61034
Halogen-free	IEC 60754-2

no toxic and corrosive fumes

Mechanical properties

min. bending radius	static	15 x outside diameter
	dynamic	20 x outside diameter
max.pull force	long-term	2500 N
max. crush resistance	long-term	3000 N/dm

No. of fibers max.	Outer-Ø (mm)	Weight (kg(km)	Fire Load (MJ/m)
12	9.2	105	0.92
24	9.7	115	1.15

LEONI Q-Line® U-DH nxm...

Universal cable with stranded loose tubes

Application

Non-metallic cable that can be used both inside and outside buildings. Installation in cable ducts, on cable trays or in cable conduits.

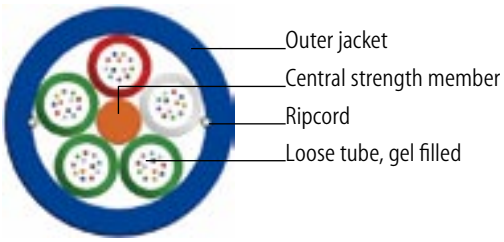
Order-No. 84 029 □□ □ □

Standardization DIN VDE 0888, Part 6

Construction

Cable core	Central strength member (FRP) with stranding elements, designed as gel filled loose tubes and if necessary fillers
Cable jacket	halogen-free and flame-retardant material
Color of jacket	blue

Cross section



Temperature range

Transport and storage	–25 °C to +70 °C
Installation	–5 °C to +55 °C
Operation	–25 °C to +60 °C

Fire performance

Flame retardancy	IEC 60332-1
Smoke density	IEC 61034 and IEC 61034-2
Halogen-free	IEC 60754-2

no toxic and corrosive fumes

Mechanical properties

min. bending radius	static	15 x outside diameter
	dynamic	20 x outside diameter
max. pull force	long-term	1500 N
max. crush resistance	long-term	2000 N/dm

No. of tubes n	1 x m	2 x m	3 x m	4 x m	5 x m	6 x m	7 x m	8 x m
No. of fibers max.	12	24	36	48	60	72	84	96
Outer-Ø (mm)	10.5	10.5	10.5	10.5	10.5	11.0	11.7	12.4
Weight (kg/km)	105	105	105	105	105	125	130	145
Fire Load (MJ/m)	2.2	2.2	2.2	2.2	2.2	2.6	2.9	3.0

LEONI Q-Line® U-DQ(ZN)BH nxm…

Rodent protected universal cable with stranded loose tubes

Application

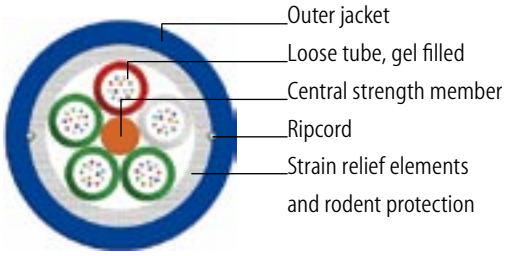
Cable that can be used both inside and outside buildings.
Installation in cable ducts, on cable trays or in cable conduits.

Order-No. **84 033** □□ □ □
Standardization DIN VDE 0888, Part 6

Construction

Cable core	Central strength member with stranding elements, designed as gel filled loose tubes and if necessary fillers
Armouring	multi-functional, strengthened E-glass yarn, water-absorbent as non-metallic strain relief elements and as rodent protection
Cable jacket	halogen-free and flame-retardant material
Color of jacket	blue

Cross section



Temperature range

Transport and storage	–25 °C to +70 °C
Installation	–5 °C to +55 °C
Operation	–25 °C to +60 °C

Fire performance

Flame retardancy	IEC 60332-1 and IEC 60332-3 Cat. A
Smoke density	IEC 61034
Halogen-free	IEC 60754-2

No toxic and corrosive fumes

Mechanical properties

min. bending radius	static	15 x outside diameter
	dynamic	20 x outside diameter
max. pull force	long-term	6000 N
max. crush resistance	long-term	3000 N/dm

No. of tubes	1 x m	2 x m	3 x m	4 x m	5 x m	6 x m	8 x m	10 x m	12 x m	...
No. of fibers max.	12	24	36	48	60	72	96	120	144	
Outer-Ø (mm)	12.5	12.5	12.5	12.5	12.5	13.4	14.4	15.9	17.7	
Weight (kg/km)	185	185	185	185	185	200	225	250	305	
Fire load (MJ/m)	3.1	3.1	3.1	3.1	3.1	3.3	3.3	3.7	4.5	

LEONI Q-Line® U-DQ(ZN)(L)H n...

Order-No. 84 034 □□ □ □

Transversal water protected universal cable with central tube

Application

Cable that can be used both inside and outside buildings. Installation in cable ducts, on cable trays, in conduits or directly in the ground.

Construction

Cable core	Loose tube, gel filled
E-glass yarn	water-absorbent, as non-metallic strain relief elements
Aluminium tape	for transversal water resistance
Cable jacket	halogen-free and flame-retardant material
Color of jacket	blue

Mechanical properties

Outside diameter	up to 12 fibers	10.5 mm
	up to 24 fibers	11.0 mm
Weight	up to 12 fibers	150 kg/km
	up to 24 fibers	155 kg/km
min. bending radius	static	15 x outside diameter
	dynamic	20 x outside diameter
max. pull force	long-term	2500 N
max. crush resistance	long-term	1000 N/dm

LEONI Q-Line® U-DQ(ZN)HWH n...

Order-No. 84 030 □□ □ □

Rodent secure and transveral water protected universal cable with central tube

Application

Cable that can be used both inside and outside buildings. Installation in cable ducts, on cable trays, in conduits or directly in the ground.

Construction

Cable core	Loose tube, gel filled
Strain relief elements	non-metallic (E-glass yarn), water-absorbent
Inner jacket	halogen-free and flame-retardant material
Corrugated steel tape	as rodent protection
Outer jacket	halogen-free and flame-retardant material
Color of jacket	blue

Mechanical properties

Outside diameter	up to 24 fibers	12.5 mm
Weight	up to 24 fibers	210 kg/km
min. bending radius	static	15 x outside diameter
	dynamic	20 x outside diameter
max. pull force	long-term	1750 N
max. crush resistance	long-term	2500 N/dm

LEONI Q-Line® U-DQ(ZN)(L)H nxm...

Transversal water protected universal cable with stranded loose tubes

Application

Cable that can be used both inside and outside buildings.
Installation in cable ducts, on cable trays, in conduits or directly in the ground.

Order-No. 84 035 □□ □ □

Construction

Cable core	Central strength member with stranding elements, designed as gel filled loose tubes and if necessary fillers
E-glass yarn	water-absorbent as non-metallic strain relief elements and as rodent protection
Aluminium tape	for transversal water resistance
Cable jacket (blue)	halogen-free and flame-retardant material

Mechanical properties

min. bending radius	static	15 x outside diameter
	dynamic	20 x outside diameter
max. pull force	long-term	3000 N
max. crush resistance	long-term	1500 N/dm

No. of tubes n	1 x m	2 x m	3 x m	4 x m	5 x m	6 x m	8 x m	10 x m	12 x m	...
Outer-Ø (mm)	12.1	12.1	12.1	12.1	12.1	13.0	14.4	15.9	17.7	
Weight (kg/km)	200	200	200	200	200	215	245	270	325	

LEONI Q-Line® U-DQ(ZN)WH nxm...

Rodent secure and transversal water protected universal cable with stranded loose tubes

Application

Cable that can be used both inside and outside buildings.
Installation in cable ducts, on cable trays, in conduits or directly in the ground.

Order-No. 84 037 □□ □ □

Construction

Cable core	Central strength member with stranding elements, designed as gel filled loose tubes and if necessary fillers
E-glass yarn	water-absorbent as non-metallic strain relief elements and as rodent protection
Corrugated steel tape	as rodent protection
Cable jacket (blue)	halogen-free and flame-retardant material

Mechanical properties

min. bending radius	static	15 x outside diameter
	dynamic	20 x outside diameter
max. pull force	long-term	3000 N
max. crush resistance	long-term	2000 N/dm

No. of tubes n	1 x m	2 x m	3 x m	4 x m	5 x m	6 x m	8 x m	10 x m
Outer-Ø (mm)	12.7	12.7	12.7	12.7	12.7	16.5	16.5	16.5
Weight (kg/km)	220	220	220	220	220	305	305	305

Outdoor cables

LEONI fiber optic outdoor cables are used in the campus area of local networks (LAN) as well as for bridging over the long distances in the MAN (Metropolitan Area Network) and WAN (Wide Area Network).

Especially high mechanical demands with regard to sturdiness and resistance are placed on outdoor cables to guarantee stability towards environmental influences such as frost and humidity. LEONI Fiber Optics offers the suitable cable for different ambient conditions.

Non-metallic or metallic reinforcement protects the fibers against destruction by rodents and serves as a humidity barrier. The outer cladding, used as standard and made of black PE (polyethylene), is halogen-free and UV resistant. LEONI outdoor cables are certified according to the symbol test in accordance with DIN VDE 0888, Part 3.

LEONI A-DQ(ZN)B2Y n... 1750

Rodent protected outdoor cable with central tube (1750 N)

Application

Light, flexible and non-metallic outdoor cable for the backbone. For pulling into conduits, installation on cable trays or directly in the ground.

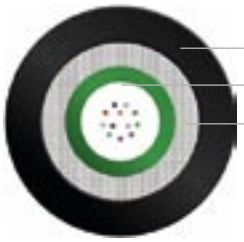
Order-No. **84 305** □□ □ □

Standardization IEC 60 794-3

Construction

Cable core	Loose tube, gel filled
Armouring	multi-functional E-glass yarn, water-absorbent as strain relief elements and as rodent protection
Cable jacket	PE-jacket with imprint
Color of jacket	black

Cross section



Temperature range

Transport and storage	–25 °C to +70 °C
Installation	–5 °C to +50 °C
Operation	–20 °C to +60 °C

Fire performance

Jacket is halogen-free

No toxic and corrosive fumes

Mechanical properties

min. bending radius	static	15 x outside diameter
	dynamic	20 x outside diameter
max. pull force	long-term	1750 N
max. crush resistance	long-term	1500 N/dm

Remarks

The jacket material PE offers good protection against transverse water ingress.

No. of fibers max.	Outer-Ø (mm)	Weight (kg/km)	Fire load (MJ/m)
12	7.0	38	1.50
24	7.5	43	1.70

LEONI A-DQ(ZN)B2Y n… 2500

Rodent protected outdoor cable with central tube (2500 N)

Application

Non-metallic construction for pulling into conduits, installation on cable trays or directly in the ground.

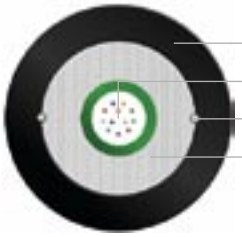
Order-No. **84 321** □□ □ □

Standardization IEC 60 794-3

Construction

Cable core	Loose tube, gel filled
Armouring	multi-functional, strengthened E-glass yarn water-absorbent as non-metallic strain relief element and as rodent protection
Cable jacket	PE-jacket with imprint
Color of jacket	black

Cross section



Temperature range

Transport and storage	–25 °C to +70 °C
Installation	–5 °C to +50 °C
Operation	–20 °C to +60 °C

Fire performance

Jacket is halogen-free

No toxic and corrosive fumes

Mechanical properties

min. bending radius	static	15 x outside diameter
	dynamic	20 x outside diameter
max. pull force	long-term	2500 N
max. crush resistance	long-term	3000 N/dm

Remarks

The jacket material PE offers good protection against transerve water ingress.

Higher pull forces on request.

No. of fibers max.	Outer-Ø (mm)	Weight (kg/km)	Fire load (MJ/m)
12	9.2	85	1.50
24	9.7	95	1.60

LEONI A-DQ(ZN)B2Y nxm…

Rodent protected outdoor cable with stranded loose tubes (dry interstices)

Application

Non-metallic, robust outdoor cable. Installation-friendly because of the cable core kept free of grease. For pulling into conduits, installation on cable trays or directly in the ground.

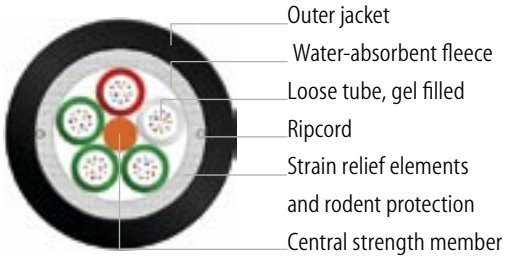
Order-No. **84 316** □□ □ □

Standardization DIN VDE 0888, Teil 3 and IEC 60 794-3

Construction

Cable core	Central strength member with stranding elements, designed as gel filled loose tubes and if necessary fillers
Water-absorbent fleece	
Armouring	multi-functional, strengthened E-glass yarn water-absorbent as non-metallic strain relief element and as rodent protection
Cable jacket	PE-jacket with sinter marking
Color of jacket	black

Cross section



Temperature range

Transport and storage	–40 °C to +70 °C
Installation	–5 °C to +50 °C
Operation	–40 °C to +60 °C

Fire performance

Jacket is halogen-free

No toxic and corrosive fumes

Mechanical properties

min. bending radius	static	15 x outside diameter
	dynamic	20 x outside diameter
max. pull force	long-term	4000 N
max. crush resistance	long-term	3000 N/dm

Remarks

The jacket material PE offers good protection against transverse water ingress.

Higher pull forces on request.

Also available with aluminium- or corrugated steel tape.

No. of tubes n	1 x m	2 x m	3 x m	4 x m	5 x m	6 x m	8 x m	10 x m	12 x m	…
No. of fibers max.	12	24	36	48	60	72	96	120	144	
Outer-Ø (mm)	11.4	11.4	11.4	11.4	11.4	12.3	13.7	15.2	17.0	
Weight (kg/km)	115	115	115	115	115	135	165	205	255	
Fire load (MJ/m)	4.1	4.1	4.1	4.1	4.1	4.5	5.0	5.5	6.2	

LEONI A-DF(ZN)2Y nxm...

Core-filled outdoor cable with stranded loose tubes

Application

Non-metallic, robust outdoor cable for primary cabling and the backbone area. For pulling into conduits, installation on cable trays or directly in the ground.

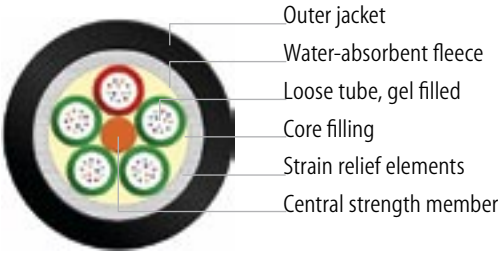
Order-No. **84 300** □□ □ □

Standardization DIN VDE 0888, Part 3 and IEC 60 794-3

Construction

Cable core	Central strength member with stranding elements, designed as gel filled loose tubes and if necessary fillers; cable core filled with water-blocking gel
Water-absorbent fleece	
Strain relief elements	E-glass yarn
Cable jacket	PE-jacket with sinter marking
Color of jacket	black

Cross section



Temperature range

Transport and storage	–40 °C to +70 °C
Installation	–5 °C to +50 °C
Operation	–40 °C to +60 °C

Fire performance

Jacket is halogen-free

No toxic and corrosive fumes

Mechanical properties

min. bending radius	static	15 x outside diameter
	dynamic	20 x outside diameter
max. pull force long-term	≤ 7 stranding elements	3000 N
	> 7 stranding elements	4000 N
max. crush resistance	long-term	3000 N/dm

Remarks

The jacket material PE offers good protection against transverse water ingress.

Also available with aluminium- or corrugated steel tape and copper elements.

No. of tubes n	1 x m	2 x m	3 x m	4 x m	5 x m	6 x m	8 x m	10 x m	12 x m	16 x m	...
No. of fibers max.	12	24	36	48	60	72	96	120	144	192	
Outer-Ø (mm)	11.4	11.4	11.4	11.4	11.4	12.3	13.7	15.2	17.0	16.8	
Weight (kg/km)	120	120	120	120	120	145	175	220	270	275	
Fire load (MJ/m)	4.3	4.3	4.3	4.3	4.3	4.6	5.1	5.7	6.5	7.4	

LEONI A-DF(ZN)2YW2Y nxm…

Rodent secure core-filled outdoor cable with stranded loose tubes

Application

Robust outdoor cable for primary cabling and the backbone area. For pulling into conduits, installation on cable trays or directly in the ground.

Order-No. **84 310** □□ □ □

Standardization DIN VDE 0888, Part 3 and IEC 60 794-3

Construction

Cable core	Central strength member with stranding elements, designed as gel filled loose tubes and if necessary fillers; cable core filled with water-blocking gel
Water-absorbent fleece	
Strain relief elements	E-glass yarn
Inner jacket (black)	PE-jacket
Corrugated steel tape	as rodent protection
Cable jacket	PE-jacket with sinter marking
Color of jacket	black

Cross section

Fire performance

Jacket is halogen-free

No toxic and corrosive fumes

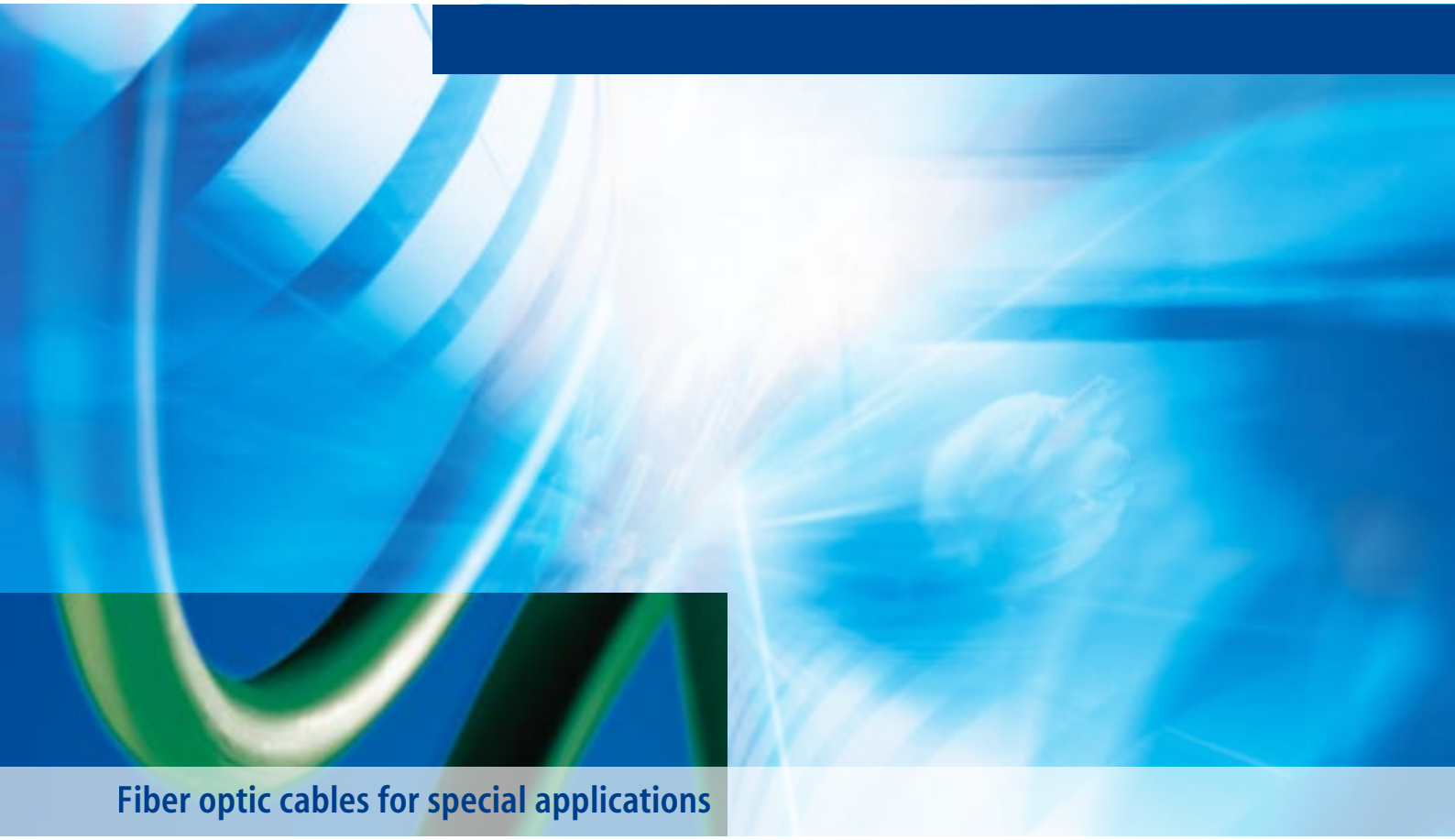
Temperature range

Transport and storage	–40 °C to +70 °C
Installation	–5 °C to +50 °C
Operation	–40 °C to +60 °C

Mechanical properties

min. bending radius	static	15 x outside diameter
	dynamic	20 x outside diameter
max. pull force long-term	≤ 7 stranding elements	3000 N
	> 7 stranding elements	4000 N
max. crush resistance	long-term	3000 N/dm

No. of tubes n	1 x m	2 x m	3 x m	4 x m	5 x m	6 x m	8 x m	10 x m	12 x m	16 x m	...
No. of fibers max.	12	24	36	48	60	72	96	120	144	192	
Outer-Ø (mm)	16.7	16.7	16.7	16.7	16.7	18.8	18.8	21.8	21.8	21.8	
Weight (kg/km)	275	275	275	275	275	335	335	355	370	380	
Fire load (MJ/m)	10.4	10.4	10.4	10.4	10.4	12.0	12.0	12.5	13.1	13.8	



Fiber optic cables for special applications

LEONI customers shall expect the high quality they are used to even in case of special requirements and use.

We offer customized “tailor-made” solutions in addition to fiber optic cables for local networks and the telecommunications sector. Comprehensive know how, years of experience and highly flexible production processes make it possible for us to manufacture the right cable for even the most demanding application.

No matter whether you require the cable for mobile use in the field or the factory building – we have the solution.

Balancing application and fire protection criteria

The sheath material is designed to protect the fiber optic cables from mechanical, thermal or chemical effects and prevent the penetration of moisture. On the other hand, in case of fire the materials should not spread the fire, and there should be no build up of toxic and corrosive fumes. Halogen-free and flame-retardant materials should be used to protect equipment, buildings and above all people. PUR and PVC are the solution of choice for use in hard industrial environments because of their high resistance to oil and their abrasion resistance. PE is commonly used as a sheath material in outdoor applications.

It is often difficult to fulfill all the requirements with one single sheath material. To find the best solution given the conditions on site, LEONI Fiber Optics offers a choice of four standard materials.

If your application criteria cannot be met with the cable designs and materials that appear in this catalogue, please contact us. It is often possible to meet additional requirements by making specific changes to the sheath design (for example, aluminum tape or special material mixtures).

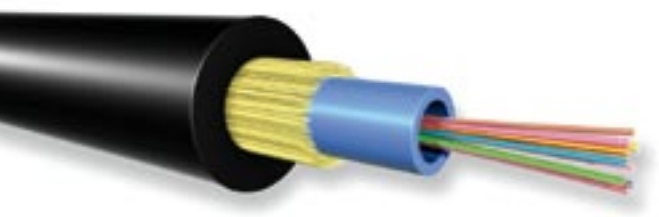
Jacketing material

Jacket material	**TPE-O** (FRNC)	**TPE-U** (PUR)	**PVC**	**PE**
Material properties				
Non-aging	+	+	+	+
Halogen-free	+	+	– –	+
Non-flammability	+	+	+	– –/●
Elasticity	–	+	●	–
Abrasion resistance	–	++	+	+/–
Low fume generation	++	●	–	– –/●
Low emission of corrosive gases	++	●	– –	+/●
Low fume toxicity	++	●	– –	+/●
No toxicological risk	++	●	–	+/●
General resistance to				
UV light	**1)**	**1)**	**1)**	**1)**
Water absorption	–	–	+	+
Gas diffusion	–	**2)**		●
Fuels	–	+	+/–	+
Petroleum/lubricants	–	++	●	+
Organic solvents	–	**+ 3)**	–	**+ 4)**
Alcohol	–	–	+	+
Oxidants	–	–	+	–
Acids	+	– –	+	++
Alkaline solutions	+	– –	+	+
Saline solutions		–	+	+

Note: Instead of FRNC (flame retardant non corrosive) the expression LSOH or LSZH (low smoke zero halogene) is often used.

++ excellent
\+ good
● depends on recipe
– weak
– – inadequate

1) increase in UV resistance by addition of black color pigments or UV stabilizers
2) permeation depends on type of gas, e.g. Ar, CH_4, N_2, O_2 low gas permeation, CO_2, H_2, He higher gas permeation
3) low swelling in saturated hydrocarbons, significant swelling in aromatic hydrocarbons and aliphatic esters cause swelling, highly polar organic solvents dissolve causing extreme swelling
4) swelling in aliphatic and aromatic hydrocarbons and in chlorinated hydrocarbons
5) non resistant to chlorinated hydrocarbons, resistant to hydrocarbons and aliphatic and aromatic solvents



LEONI U-DQ(ZN)11Y n...

Mobile universal cable with central tube

Application

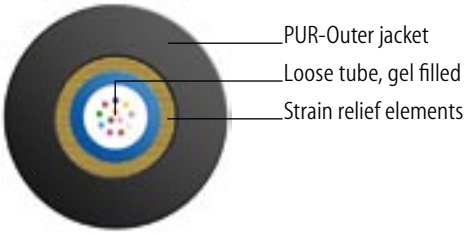
Light, flexible and non-metallic cable that can be used both inside and outside buildings. Installation in cable ducts, on cable trays or in cable conduits. Suitable for a flexible use in hard industrial environments.

Order-No.	**84 023** □□ □ □
Standardization	DIN VDE 0888, Part 6 and IEC 60 794-2

Construction

Cable core	Loose tube, gel filled
Strain relief	Aramid yarns
Cable jacket	Polyurethane (PUR)
Color of jacket	black

Cross section



Temperature range

Transport and storage	–25 °C to +70 °C
Installation	–25 °C to +50 °C
Operation	–25 °C to +70 °C

Fire performance

Cable is self-extinguishing
Halogen-free IEC 60754-2
No toxic and corrosive fumes

Mechanical properties

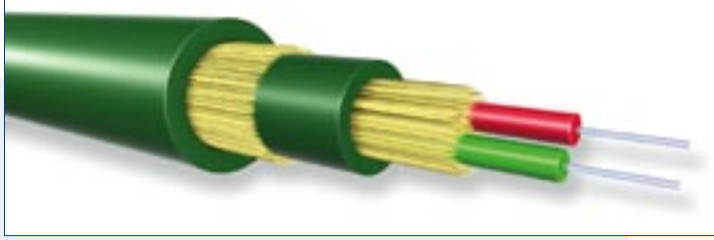
min. bending radius	static	15 x outside diameter
	dynamic	20 x outside diameter
max. pull force	long-term	2500 N
max. crush resistance	long-term	3000 N/dm
Resistance to impact		5 impacts/3 Nm

Chemical properties

Very good resistance to oil, fuel, acid and base

No. of fibers max.	Outer-Ø (mm)	Weight (kg/km)	Fire load (MJ/m)
12	6.5	36	0.55
24	7.7	50	0.76

LEONI A-V(ZN)11Y(ZN)11Y 2...



Mobile field cable (Tactical cable)

Application

Suitable for military tactical field use and commercial applications (i. e. television broadcast or mining)

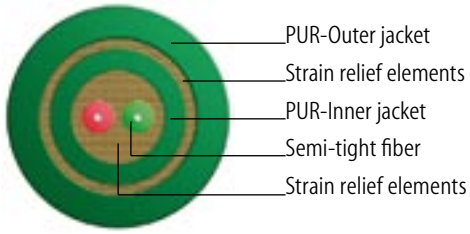
Order-No. **84 950 003** ☐

Standardization BWB TL 6020-0001 (certified) and prEN 177000

Construction

Cable core	Semi-tight fiber, gel filled (STB)
Strain relief elements	non-metallic (aramid)
Inner and outer jacket	Polyurethane (PUR)
Color of jacket	green or customer-specific

Cross section



Temperature range

Transport and storage	–55 °C to +80 °C
Installation	–5 °C to +50 °C
Operation	–40 °C to +70 °C

Mechanical properties

Outside diameter		6.0 mm
Weight		30 kg/km
min. bending radius	static & dynamic	25 mm
max.pull force	long-term	2000 N
max. crush resistance	long-term	1000 N/dm
Resistance to impact		30 impacts/2 Nm

Fire performance

Flame retardancy	IEC 60332-1

Chemical porperties

Very good resistance to oil, fuel, acid and base

LEONI A-V(ZN)11Y n...

Mobile outdoor cable

Application

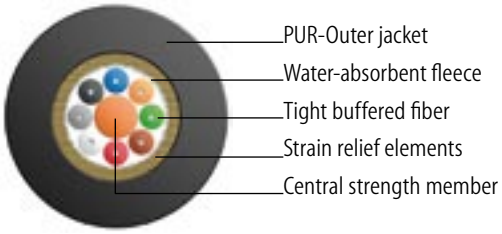
For mobile and flexible use indoor and outdoor. Suitable within drag chains in hard industrial environments. For direct connector assembly.

Order-No.	**84 950 232** ☐
Standardization	DIN VDE 0888, Part 6 and IEC 60 794-2

Construction

Cable core	Central strength member (FRP) with stranding elements, designed as tight buffered fiber (TB) and if necessary fillers
Strain relief	Aramid yarns
Cable jacket	Polyurethane (PUR)
Color of jacket	black

Cross section



Temperature range

Transport and storage	–55 °C to +80 °C
Installation	–5 °C to +55 °C
Operation	–40 °C to +70 °C

Fire performance

Flame retardancy	IEC 60332-1

Mechanical properties

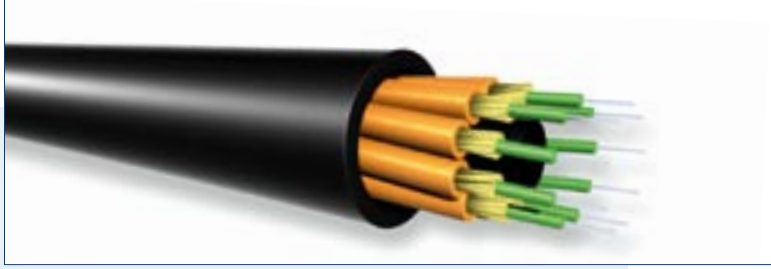
min. bending radius	static & dynamic	25 mm
max. pull force	long-term	2000 N
max. crush resistance	long-term	1000 N/dm
Resistance to impact		50 impacts/2 Nm
Drag chain test		1 000 000 cycles

Chemical properties

Very good resistance to oil, fuel, acid and base

No. of fibers n	4	6	8	10	12
Outer-Ø (mm)	6.0	6.0	7.5	8.8	8.8
Weight(kg/km)	32	32	52	67	67
Fire load (MJ/m)	0.50	0.50	0.75	0.95	0.95

LEONI Q-Line® AT-V(ZN)YY...



Breakout-cable for drag chains

Application

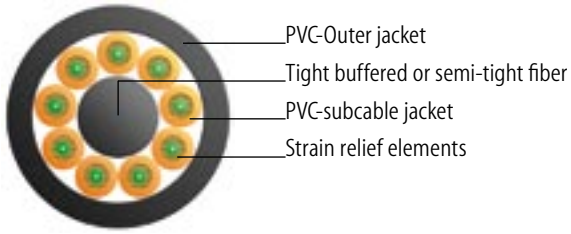
Robust FO drag chain cable that can be used both inside and outside buildings and in hard industrial environments.
For direct connector assembly.

Order-No. **84 206 □□ □ □**
Standardization DIN VDE 0888, Part 6 and IEC 60 794-2

Construction

Cable core	Stranded single elements designed as tight buffered (TB) or semi-tight fibers (STB), gel filled with strain relief elements (aramid) and halogen-free, flame-retardant jacket (2.5 mm diameter)
Color	orange for multi-mode, yellow for single-mode
Cable jacket	Polyvinylchlorid (PVC)
Color of jacket	black

Cross section



Temperature range

Transport and storage	–25 °C to +80 °C
Installation	–5 °C to +50 °C
Operation	–20 °C to +80 °C

Fire performance

Flame retardancy IEC 60332-1

Chemical properties

Good resistance to oil, fuel, acid and base

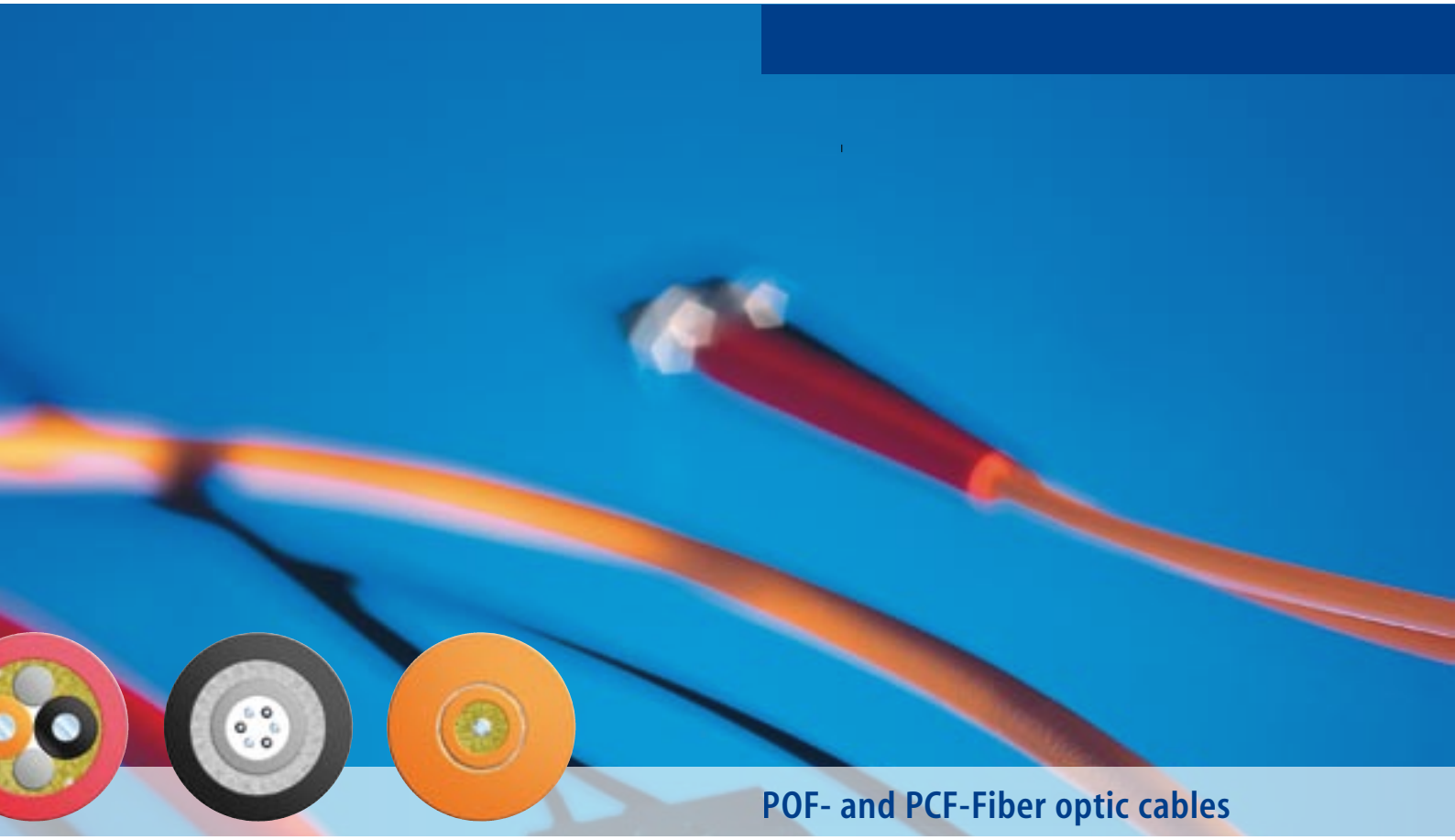
Mechanical properties

Max. crush resistance	long-term	800 N/dm
Resistance to impact		10 impacts/2 Nm
Drag chain test		5 000 000 cycles

Remarks

The cable is also available with a Polyurethane jacket (PUR)

No. of fibers n	2	4	6	8	10	12
Outer-Ø (mm)	8.9	8.9	9.0	11.0	13.0	14.5
Weight (kg/km)	45	50	75	110	160	180
min. bending radius static (mm)	95	95	95	115	135	150
min. bending radius dynamic (mm)	140	140	140	175	205	225
max. pull force (N)	800	800	1200	1200	1200	1200
Fire load (MJ/m)	1.20	1.20	1.36	1.52	1.68	1.84



POF- and PCF-Fiber optic cables

LEONI Fiber Optics has been involved in the development and production of plastic fiber optic cables for quite some time. The LEONI iQ-Line product line was introduced primarily to provide an optimal solution for the industrial applications market.

In addition to our line of standard products, which continue to deliver dependable performance in the field, we can also offer you tailored cable solutions to meet your exact requirements.

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E-mail fiber-optics@leoni.com

POF & PCF

Transmission media with a future

Plastics are attracting increasing attention as a means to transmit information. Pure fiber optics (POF – Polymer Optical Fiber) and plastic-coated glass fiber optics with step index profile have been on the market for years.

They have been used primarily in high-range digital audio systems, the automotive industry, some segments of lighting technology, medical technology, and on bus systems in industrial applications. Bus system applications are found primarily where there are significant EMC issues and the transmission path is relatively short.

Compared to conventional glass fiber optics, plastic fiber optics have the advantage of greater flexibility (high alternate bending stress with small bend radii), and they are also a low-cost connection and transmission solution. These factors are particularly important in mechanical engineering and automation applications. Plastic fiber optics also have all the essential properties – including low EMC susceptibility, perfect galvanic isolation, low susceptibility to electronic surveillance, no cross talk, low weight, etc. – that are generally associated with fiber optics.

Compared to common single-mode and multi-mode fiber optics, plastic fiber optics have higher attenuation, which reduces their range, and they have smaller bandwidth. The latest developments (e.g. gradient index POF), which are currently in the market introduction phase, show that there is still significant potential for improved performance. With the introduction of Ethernet technology and LAN networking in industrial applications, designers and planners have been taking a closer look at POF and PCF.

The distances that can now be bridged are 70m for POF fibers and 500 m for PCF fibers, and this is regarded as sufficient for industrial applications. If you consider that the average length from the floor distribution board to a workstation in a local network is 45m, then it would appear that using POF/PCF is not so unrealistic. Solutions are already available for small office and home networks.

Once the necessary hardware is available in sufficient quantities and at an affordable price, POF/PCF will certainly become an attractive option in many office networks. Despite the drive towards higher and higher bandwidths, 100 Mbit/sec Ethernet connections will be adequate for most applications in the near future, especially if the user focuses on the cost-benefit aspect.

The "LEONI iQ-Line" offers you various cable designs using plastic or PCF fiber optics to enhance our existing broad range of fiber optic cables and to allow you to select the best transmission medium for your application.

LEONI *iQ-Line*® **Intelligence for Industries**

The LEONI product range

Cable

- Automotive wires
- UL and CSA approved cables
- Insulated power cables
- Earthing ropes
- Control cables, shielded and unshielded
- Insulated Hook-up wires according to DIN, VDE
- Fiber optic cables with glass and plastic optical fibers
- Copper data cables
- Coaxial cables
- Customised special cables for robotics, seismology, medicine, sensor systems, audio/video, environmental engineering ...
- Cord sets
- Spiral cables
- Cable assemblies
- Special cables assembled to customer specification
- Connection cables and car kits for mobile phones
- Automotive cables for electronic drive controls, engine management, mobile communication
- Extruded flat cables
- Battery, starter and generator cables with copper and aluminium conductors

Wiring Systems

- Wiring systems for
  - automobiles, trucks and buses
  - tractors and forklifts
- Conventional and preformed cable harnesses
- Plastic mouldings, also in foamed version
- Electronic solutions for automobile construction (part and full multiplex)
- Cable assemblies for ABS systems and sensors

Wire

- Single wires, tin, silver, gold and nickel plated made of copper and copper based alloys
- Bunched and stranded conductors for the cable industry
- Highly flexible copper strands, ropes and braids
- Tinsel conductors and braided tubes
- Copper alloy wires (resistance wires)
- Metallic gold and silver threads; bouillon

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