

I-B(ZN)BH B2ca cable with **circuit integrity**

CPR classified B2ca cables with circuit integrity ensures **the highest security and fire protection.**

Cables complies with standards:

- STN 92 0205
- ČSN 73 0895
- DIN 4102-12

Cables were tested on supporting constructions from:

- OBO Bettermann
- ARKYS
- Metro double hooks

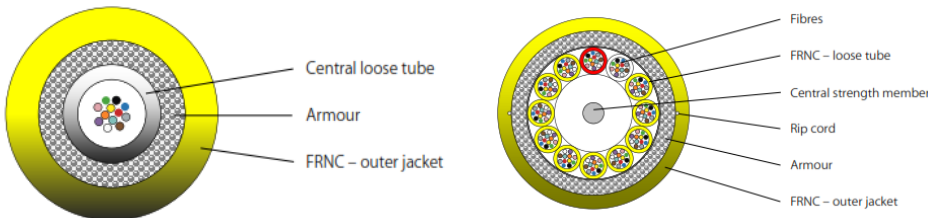
Cables are classified as:

- P₇₅₀90
- PH90-R
- P90-R, E90



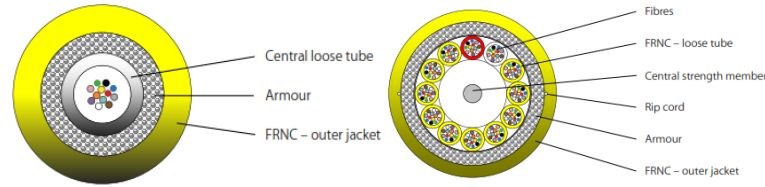
Cable can be produced in two basic designs:

- central loose tube (max. 24 fibers)
- multi loose tube (max. 288 fibers)



- Dry fibre optic cable (no gel inside tubes)
- Water resistant cable
- Multifunctional E-glass yarns as a strain relief elements and non-metallic rodent protection
- For fixed installation indoor, in cable ducts, tubes and also suitable for interconnections
- Cable is NOT UV resistant.
- Suitable for assembly with fiber dividers, multifiber connectors and for splice cassettes
- Not suitable for underground laying (direct buried)
- Mechanical installation by winch is permitted only when using force meters with recording function.
- Halogen-free and flame-retardant material (FRNC)

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Mechanical characteristics:

Min. bending radius fixed (static) acc. IEC 60794-1-2 E11A	15 x OD	10 x OD
Min. bending radius during assembly (dynamic), with additional tensile strain acc. IEC 60794-1-2 E6	20 x OD	15 x OD
Max. tensile force acc. IEC 60794-1-2 E1, short term	1500 N	3000 N
Max. crush resistance acc. IEC 60794-1-2 E3, short term	1500 N/dm	1000 N/dm
Max. crush resistance acc. IEC 60794-1-2 E3, long term	600 N/dm	
Impact resistance acc. IEC 60794-1-2 E4	3 impacts, 2.0 Nm R = 12.5 mm	3 impacts, 1.0 Nm R = 300 mm

Thermal characteristics:

Transport and storage	-25°C to +70°C	
Installation	-5°C to +50°C	
In use acc. IEC 60794-1-2 F1	-25°C to +60°C	-25°C to +70°C

Fire performance:

Flame retardance	acc. to IEC 60332-1-2 and IEC 60332-3-24-C	
Smoke density	acc. to IEC 61034	
Halogen-free	acc. to IEC 60754-1	
Acidity of the combustion gases	acc. to IEC 60754-2	
Fire Class according EN 13501-6	B2ca-s1a, d0, a1	B2ca-s1a, d1, a1

Chemical characteristics:

No resistance to oil, petrol, acid and leach
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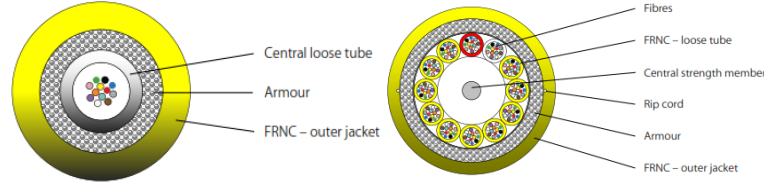
Declaration of CPR performance

CDERF0000038 – V5	CDERF0000067 – V3
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Fiber colours:

1 - 12	red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink
13 - 24	red, green, blue, yellow, white, grey, brown, violet, turquoise, transparent, orange, pink
	always with black ring marking, except transparent

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Tubes:

outer diameter	3,0 mm with 2-12 fibres	1,6 mm with 2-12 fibres
	3,5 mm with 13-24 fibres	3,5 mm with 13-24 fibres
Tube colour	nature	counting tube red, counting direction tube white
Stranding		stranded around a central glass fiber (GFR) strength member

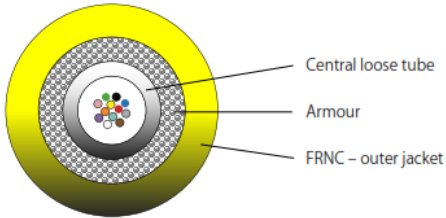
Armour:

Type of armour	Multifunctional E-glass yarns as strain relief elements and non-metallic rodent protection	
		wrapped in two layers (left and right spin)

Outer jacket:

Color	yellow, or according customer requirement	
Outer diameter and wall thickness	see tables below	
Ripcords	none	2 ripcords

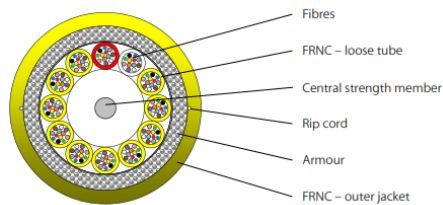
I-B(ZN)BH B2ca cable with **circuit integrity**



Inkjet-marking (black):

WEINERT - FiberConnect® I-B(ZN)BH n fibre type 1500 N JF **FOSS**
DB4678 B2ca s1a d0 a1 DoP:CDERF0000038 (Reel No.), (sequential length in metres)

Fiber max.	Outer diameter (mm)	Weight (kg/km)	Fire load (MJ/m)
12	6.5	46	0.62
24	7.0	51	0.68



Inkjet-marking (black):

WEINERT - FiberConnect® I-B(ZN)BH nx12(24) fibre type JF **FOSS**
DB4678 B2ca s1a d1 a1 DoP:CDERF0000067 (Reel No.), (sequential length in metres)

Construction	Fibres max.	Wall thickness (mm)	Outer diam. (mm)	Weight (kg/km)	Fire load (MH/m)
2x12	24	1.0	8.3	75	0.78
3x12	36	1.0	8.3	75	0.78
4x12	48	1.0	8.3	75	0.78
5x12	60	1.0	8.3	75	0.78
6x12	72	1.0	8.6	80	0.86
8x12	96	1.0	9.9	105	1.09
12x12	144	1.0	11.4	140	1.57

Ordering number creation			
Product	Numbers of fibers	Type of fiber	Ordering P/N
DB4678	12	A1	DB4678012A1
DB4678	24	M3	DB4678024M3
DB4678	144	A1	DB4678144A1

Fiber types:

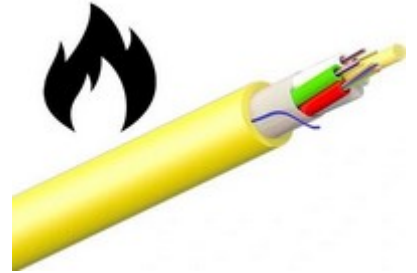
- A1 - Singlemode G.657.A1
- A2 - Singlemode G.657.A2
- M2 - Multimode 50/125 OM2
- M3 - Multimode 50/125 OM3
- M4 - Multimode 50/125 OM4
- M5 - Multimode 50/125 OM5

Other fibers upon request

Construction Products Regulation (CPR)

In connection with the European Parliament and the Council (EU) No. 305/2011, also known as Construction Products Regulation (CPR), STN EN 50575 standard is obligatory in Slovakia from July 1st 2017

This standard defines cables for general use in construction in relation to fire response requirements. It is basically a new cable categorization system. Evaluation of the reaction of cables to fire is actually an assessment of their fire danger in terms of:



- a) heat and smoke generation
- b) flame spread
- c) formation of burning droplets and particles
- d) formation of gases in combustion products containing halogen gases (acidity and conductivity)

Class	Test methods				
	EN ISO 1716	EN 50399	EN 60332-1-2	EN 61034-2	EN 60754-2
Aca	x				
B1ca		x	x	x	x
B2ca		x	x	x	x
Cca		x	x	x	x
Dca		x	x	x	x
Eca		x			
Fca	no performance declared				

Additional classifications:

Smoke (s):

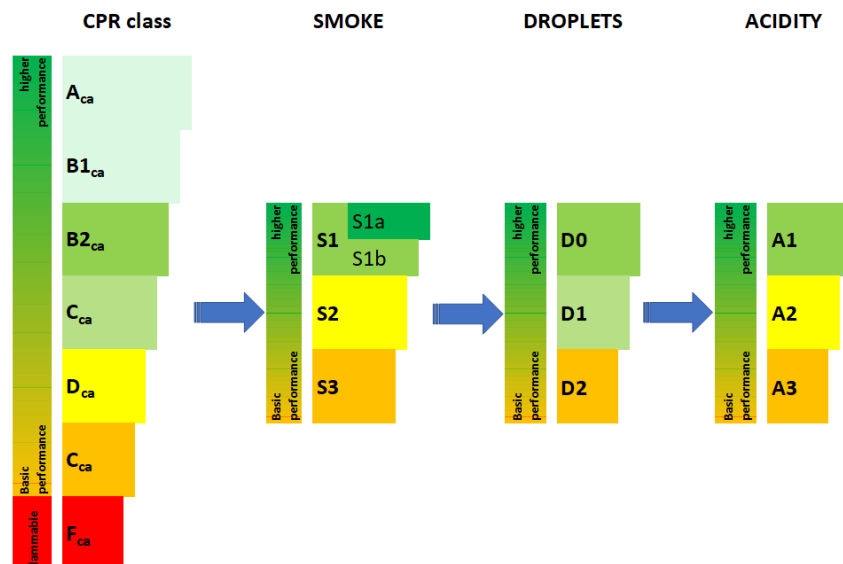
- s1 - low smoke
- s2 - average smoke
- s3 - no parameter guarantee

Drops (d):

- d0 - no burning particles
- d1 - burning particles (within 10s after dripping)
- d2 - without parameter guarantee

Acidity (a):

- a1 - very low
- a2 - low
- a3 - without parameter guarantee



Standard EN 50575 specifies CPR classes. But this standard don't specify in which areas of the building should be used cables complying with exact CPR classes.

This regulation is specified in each country by local standards. For example in Slovakia standard STN 92 0203 specify, that in following areas must be used cables complying CPR classification B2ca s1 d1 a1:

- in the premises of medical facilities
- in social services constructions
- in buildings with internal assembly areas
- in residential buildings (except family houses)
- in buildings to accommodate more than 20 people
- in buildings with a fire height of more than 60 m
- in protected escape routes

Euro Class	Additional classification			Safety requirement in buildings
	Smoke production	Flaming droplets	Acidity	
B2ca	s1a xxxx			Very high
	s1b xxx	d0 xx	a1 xxx	
	s1 xx	d1 x	a2 xx	
	s2 x	d2	a3	
	s3			

The fire reaction classes themselves are specified in more details in the standard STN EN 50575



From the security point of view the structured optical cabling is evaluated only by the so called CPR classification – more details can be found in following article: <https://www.fossfibreoptics.com/sk/sk/news-foss-standard-eu-cpr-cables>

The currently most strict class is B2ca, s1, a0, d1. CPR classification describes the performance of the cables during the fire from the fire propagation point of view, as well as the aggressivity of the generated smoke (smoke acidity) and volume of the falling burning droplets from the cable. More information about the CPR classification can be found on following link: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006D0751&qid=1654675523923&from=EN>

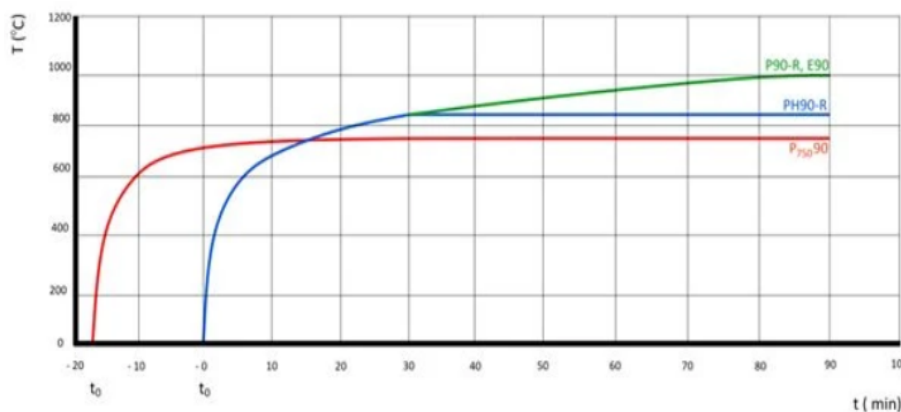
However, the CPR does not specify the **functional resistance of the cable** – so called **circuit integrity (CI)**. Functional resistance is the ability of the cable to transmit the data once burning. This is needed in some specific applications:

- Evacuation systems
- CCTV systems in tunnels
- Supervising and control system in critical infrastructures as Nuclear Power Plants, petrochemical industry or traffic infrastructure

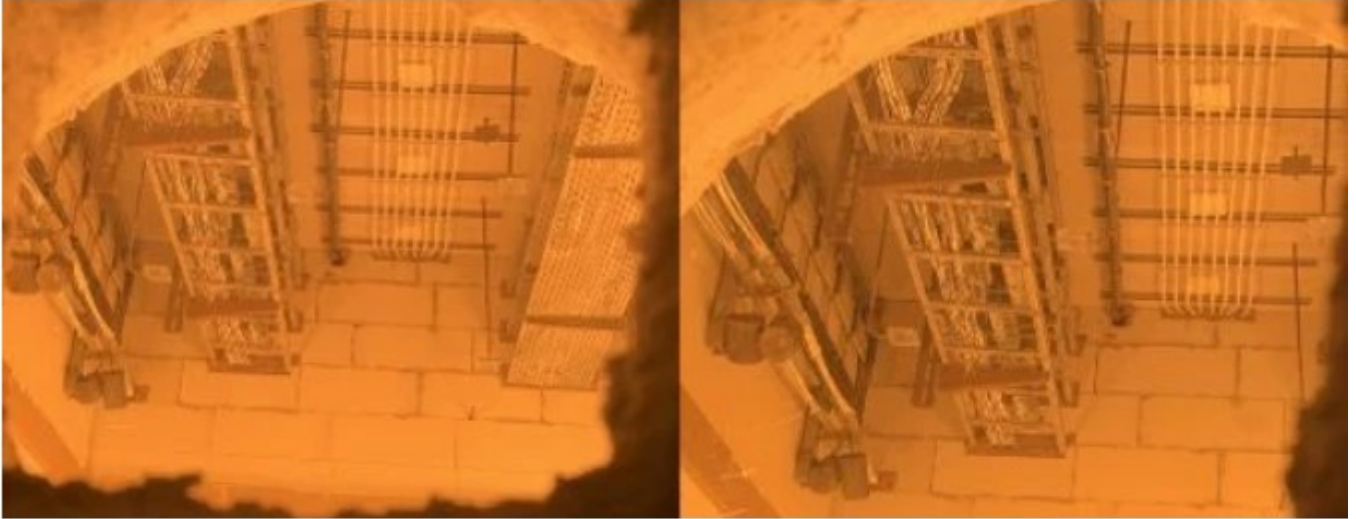
Cables with circuit integrity is necessary to use in certain critical control systems or in the system which strictly require proper communication during fire to avoid further damage on the infrastructure as well as to save human lives.

In the past, the circuit integrity was evaluated based on the ISO/IEC 60331 standard. This standard is not complex to cover the latest requirement from the industry, therefore new requirements were introduced in standards DIN 4102-12, STN 920205 or ČSN 73 0895.

Our company successfully tested and certified our fibre optic cables with CPR classification B2ca, s1, a0, d1 according to STN 92 0205, ČSN 73 0895 and DIN 4102-12. Cables were tested on several different support constructions from company OBO Bettermann and ARKYS. Official tests were done in certified testing laboratories PAVUS (www.pavus.cz) and Fires (www.fires.sk). Cables were successfully tested according to all temperature curves described by above mentioned standards:



- 750 °C (in Czech Republic also known as “Metro curve”)
- 842 °C
- 1000 °C (so-called “standard curve”)



Test at constant temperature of 750°C (90 minutes) - resp. 1000°C (15 minutes)

Vendor	Description of runway	Cable
OBO BETTERMANN	Cable tray LG 640 VS on AS 55/41 FT bracket, on IS 8K/80 ceiling hanger. Span of supports 1200 mm. Load 40kg/m	FOSS DB4678
OBO BETTERMANN	Cable ladder LG 660 VS fixed horizontally to the wall with WB 30/75 angle. Span of support 1200mm. Load 20kg/m	FOSS DB4678
OBO BETTERMANN	Cable ladder SLM 50 C40/600 fixed horizontally to the wall. Span of supports 1500mm. Load 20kg/m	FOSS DB4678
OBO BETTERMANN	Cable clamps 732 on CM 3015P profile on ceiling. Span of the fixing 300mm	FOSS DB4678
	Vertical profile U50 - double cable hooks 40x5 mm with bottom support reinforcement 12x12 mm inserted into transverse cut-outs in the U profile. These are standard elements used in Prague metro tunnels. For fixing the cables on the double hooks, 400 mm socket inserts were used.	FOSS DB4678

Test at constant temperature of 842°C (90 minutes) - resp. 750°C (90 minutes) and 1000°C (30 minutes)

Vendor	Description of runway	Cable
OBO BETTERMANN	Cable tray RKSM 630 FS on AW 55/31 FT bracket, on US 5 K/80 FT ceiling hanger. Span of support 1500mm. Load 20kg/m	FOSS DB4678
OBO BETTERMANN	Cable clamps ASG 732 on CLM 3518P profile on the ceiling. Span of fixing 300mm	FOSS DB4678

Test at standard temperature curve of 1000°C (90 min.) - resp. 842°C (90 min.) and 750°C (60 min.)

Vendor	Description of runway	Cable
OBO BETTERMANN	Cable tray GRM 55/200 on AW 30/21 FT bracket, US 5 K/60 FT ceiling hanger. Span of supports 1200mm. Load 7,5kg/m	FOSS DB4678
OBO BETTERMANN	Cable clamps ASG 732 on CML 3518P profile on the ceiling. Span of fixing 300mm	FOSS DB4678
OBO BETTERMANN	Wired cable tray GRM 55/100 installed on a threaded rods. Cables were fixed in wired cable tray by cable clamps 2056UM. Load 5 kg/m	FOSS DB4678
OBO BETTERMANN	Cable tray SKSU 630 FT installed on the boom MWA 12/31 fixed on hinges US 5 K/80 FT. Cables were fixed by cable clamps OBO 1015 and 822. Load 10 kg/m	FOSS DB4678
ARKYS	Metal cable trays L1 300/60 fixed on STNM 360 supports. Cables are fixed by clamps SONAP 12-N typ B. Load 10 kg/m	FOSS DB4678
ARKYS	Metal cable trays L3 500/50 fixed on NZMU 500 beams. Cables are fixed by clamps SONAP 12-N typ B. Load 15 kg/m	FOSS DB4678
ARKYS	Metal cable trays L3 500/100 fixed on NZMU 500 beams. Cables are fixed by clamps SONAP 12-N typ B. Load 15 kg/m	FOSS DB4678
ARKYS	Wired cable trays M2 500/50 fixed on PZMP 500 supports. Cables are fixed by clamps SONAP 12-N typ B. Load 13 kg/m	FOSS DB4678
ARKYS	Wired cable trays M2 500/50 fixed on PZMP 500 supports. Cables are fixed by clamps SONAP 12-N typ B. Load 10 kg/m	FOSS DB4678
ARKYS	Wired cable trays M2 500/50 fixed on NZM 500 supports. Cables are fixed by clamps SONAP 12-N typ B. Load 15 kg/m	FOSS DB4678
ARKYS	Wired cable trays M2 500/100 fixed on NZM 500 supports. Cables are fixed by clamps SONAP 12-N typ B. Load 15 kg/m	FOSS DB4678
ARKYS	Wired cable trays M2 500/100 fixed on STNM 560 supports. Cables are fixed by clamps SONAP 12-N typ B. Load 13 kg/m	FOSS DB4678

Protocols from tests

Laboratory	System	Testing protocol	Issued on	Test method	Overview
FIRES, s.r.o.	OBO BETTERMANN	FIRES-FR-152-20-AUNS	16.09.2020	ČSN 73 0895 STN 92 0205 DIN 4102-12	Constant temperature of 750 °C
FIRES, s.r.o.	OBO BETTERMANN	FIRES-FR-220-21-AUNS	19.10.2021	ČSN 73 0895 STN 92 0205 DIN 4102-12	Constant temperature of 842 °C
FIRES, s.r.o.	OBO BETTERMANN	FIRES.-FR-279-21-AUNS	24.01.2022	ČSN 73 0895 STN 92 0205 DIN 4102-12	Standard temperature curve 1000 °C
FIRES, s.r.o.	OBO BETTERMANN	FIRES-FR-290-22-AUNS2	24.01.2023	ČSN 73 0895 STN 92 0205 DIN 4102-12	Standard temperature curve 1000 °C
PAVUS, a.s.	Metro dvojháčky (doublehooks)	PAVUS PR-22-2.195	27.01.2023	ČSN 73 0895 STN 92 0205 DIN 4102-12	Constant temperature of 750 °C
FIRES, s.r.o.	ARKYS	FIRES-FR-261-22-AUNS2	25.10.2022	ČSN 73 0895 STN 92 0205 DIN 4102-12	Standard temperature curve 1000 °C
FIRES, s.r.o.	ARKYS	FIRES-FR-317-22-AUNS3	12.12.2022	ČSN 73 0895 STN 92 0205 DIN 4102-12	Standard temperature curve 1000 °C