

TECHNOFLAME FOC-2-SLT-HFFR PH120/E30-E60

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Fire resistant fibre-optic cables in Fire Protection Systems**Technokabel S.A. has been a manufacturer of fire protection cables for over 20 years.**

As the first company in Poland at the beginning of the 21st century, Technokabel introduced its first cables with increased fire resistance to the domestic market. Very quickly it turned out that such cables are essential for the maintenance of increased fire safety in numerous newly constructed buildings and structures intended for the broadly understood public utility. For this reason, over the past 20 years, Technokabel's production portfolio has been significantly expanded to include a whole range of types of cables and wires, which are successfully used in places where the highest fire safety is required.

All cables and wires manufactured by Technokabel S.A. for fire protection systems have appropriate national certificates and certificates of approval issued by CNBOP-PIB. They have been tested in accredited laboratories according to standard DIN 4102-12 and perform their functions in fire conditions. Numerous tests carried out with many cable carrier systems manufactured by renowned global companies such as BAKS, OBO BETTERMANN, PUK, NIEDAX and others allow our customers to realise the safest installations in high-rise buildings, subways or tunnels.

A special group of fire safety products are installation cables, which cooperate with fire alarm systems and have to fulfil the function of alarm signal transmission.

Improving fire protection systems

Fire protection systems are a set of compatible elements (sensors, converters, cameras, controllers...) which, together creating an installation with a specific configuration, are able to detect a fire, initiate an alarm or perform other actions aimed at reducing the effects of fire. The primary task of these systems is to quickly and flawlessly detect an emerging fire before it develops and reaches an unmanageable size. Importantly, the system is also to function as long as possible during the fire until it is degraded, and the alarm signal transmitted should be fully legible and understandable and therefore insensitive to interference.

The fire protection system is one of the basic safety systems in buildings.

The improvement and adaptation of the fire safety system takes place in all areas of fire protection activities. Current challenges, needs and threats to fire safety result in the need to search for and implement new, diverse fire protection solutions. These new solutions are necessary to increase effectiveness and improve fire protection.

Fiber-optic technologies provide new inspiration for designers of fire protection systems. The availability of fibre optic converters makes the demand for fire resistant fiber-optic cables for use in e.g. VAS systems (Voice Alarm Systems).



Pict.1 Example of a fire panel

Why is a fiber-optic cable in fire protection systems

In installations of buildings, apart from traditional cables and wires used for power supply, control and telecommunication cables are used to cooperate with telecommunication devices for data transmission, radio and video frequency signals transmission and signalling and control functions.

All these cables and wires are the subject of technical assumptions, followed by a design that presents specific fire system solutions, including cable and wire routing diagrams, taking into account relevant regulations and standards and architectural features of the facilities.

In particular, there is an electromagnetic compatibility problem. Each electrically conductive cable generates an electromagnetic field in its environment, which is a source of interference for signals carried in adjacent cables and wires. It is important that the transmitted alarm signal is legible and understandable under fire conditions, and therefore not susceptible to interference.

Particularly high levels of interference occur during short circuits in electrical circuits, which happens very often in the circumstances of fire. The spectrum of electromagnetic interference is very wide, from low frequencies to very high (range of MHz 106), which are characteristic for example for video signals.

To prevent interference with the installation cables, shields are used to significantly reduce external interference and also to limit the spreading of own cable interference. However, even the best cable shielding does not provide full protection against interference over the entire wide range of interference frequencies.

This is not the case with fiber-optic cables. The optical signal guided by a fiber-optic cable is completely 100% resistant to any electromagnetic interference. The optical wavelengths of multi-mode optical cables are 1300 nm and 850 nm, which corresponds to frequencies in the extra high range (THz - 10¹² and above). It is an area of infrared - electromagnetic radiation from outside the visible light range.

A fiber-optic cable is essentially dielectric, with no metal elements, so there is no concern that it will induce voltages that cause parasitic currents to flow, which may damage the elements that cover the fibre optics.

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In addition, very low attenuation of signals transmitted via fibre of fibre-optic cable makes the distances between the devices of the system can be large - much larger in comparison with the connections made with copper cables.

New fiber-optic cables manufactured by Technokabel S.A. for fire protection systems

Pict.2 Fiber-optic cable TECHNOFLAME FOC-2-SLT-HFFR PH120/E30-E60

To meet the emerging market demand, Technokabel S.A. was again the first company in Poland to design and, after obtaining the necessary certifications and approvals, implemented into production a new, fire resistant, fully dielectric fibre optic cable dedicated to fire protection installations.

The cable is 100% resistant to interference, and thus suitable for laying in the immediate vicinity of power cables, which allows cable route designers to save space in tunnels. Besides, it has a small diameter and is flexible, which ensures ease of installation and laying.

The functionality of the fiber-optic cable and the application

TECHNOFLAME FOC-2-SLT-HFFR PH120/E30-E60 is a fire resistant and waterproof fiber-optic cable with one central loose tube (up to 6 fibers per tube), designed for use as part of the following installations:

- a) fire alarm systems,
- b) smoke and fire control systems,
- c) fixed fire-fighting equipment,
- d) audible warning systems,
- e) monitoring, cooperation and integration of fire protection systems.

The cable can be used in rooms protected by fixed water extinguishing devices (sprinklers).

The cable can be laid with low-current and telecommunication cables.

The cable is made of completely halogen-free materials, which means that it is suitable for use where high fire safety is required.

The cable is flame retardant, its smoke emission in fire is low and the gases released are not toxic and do not cause corrosion.

The waterproof fibreglass reinforcement used in the cable provides the necessary strength during installation, protection against mechanical damage and rodent attacks during operation.

A loose tube filled with thixotropic gel prevents water from entering the fiber-optic fibres and moisture penetration along the cable.

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The cable is versatile and can be used in indoor and outdoor installations and tunnels.

Construction of fire-resistant fiber optic cable

- 4 coloured multi-mode optical fibres
MM 50/125 OM2 placed in a loose tube,
- a loose tube of 2.5 ± 0.5 mm diameter (filled with gel
thixotropic, the colours of the fibres in the tube: red, green,
(blue, yellow)
- double fire barrier,
- glass fibre reinforcement swelling under the influence of water ,
- cable outer sheath made of red UV-stabilized halogen-free plastic
(HFFR).

Performance characteristics and parameters

Number of fibres	Tube diameter [mm]	Cable outer diameter [mm]	Cable weight [kg/km]
do 6	$2,5 \pm 0,5$	$7,8 \pm 0,5$	80
Unit attenuation, max. for 850 nm for 1300 nm	$\leq 2,3$ dB/km ≤ 0.5 dB/km	Corrosivity of gas separation pH, about conductivity, approximately	PN-EN 60754-1/-2 IEC 60754-1/-2 6.8 0.4 μ S/mm
Core diameter	50 μ m	Smoke density	PN-EN 61034-2 IEC 61034-2
Jacket diameter	125 μ m	light transmittance, min.	80%
Primary coverage diameter	250 μ m	The flammability of the cable	does not spread the flame, flame retarded
Operating temperature range: during operation when installing	from - 30 to + 70°C from - 5 to + 50°C	Flammability tests	PN-EN 60332-1-2 IEC 60332-1-2
Minimum bending radius: static dynamic	10 x cable diameter 15 x cable diameter	Function support according to EN 50582 *): up to 60 min (E30-E60) P60-R PS 60 PH120	DIN 4102-12 CSN 73 0895 STN 92 0205 PN-EN 50200 + Annex E
Maximum tensile strength: during operation when installing	1500 N 2000 N	Execution according to	CNBOP-PIB-KOT- 2020/0196-3701 edition 1, WT-TK- 51
Crushing resistance: Long-term short term	2000 N 5000 N	Reaction to fire	Cca-s1a,d0,a1 (PN-EN 13501-6)

*) The maximum change in fibre optic attenuation according to EN 50582 is 2 dB/m and depends on the cable installation method.

Tests of fire resistance of TECHNOFLAME FOC-2-SLT-HFFR PH120/E30-E60 cable and CNBOP-PIB certificate confirming its performance properties

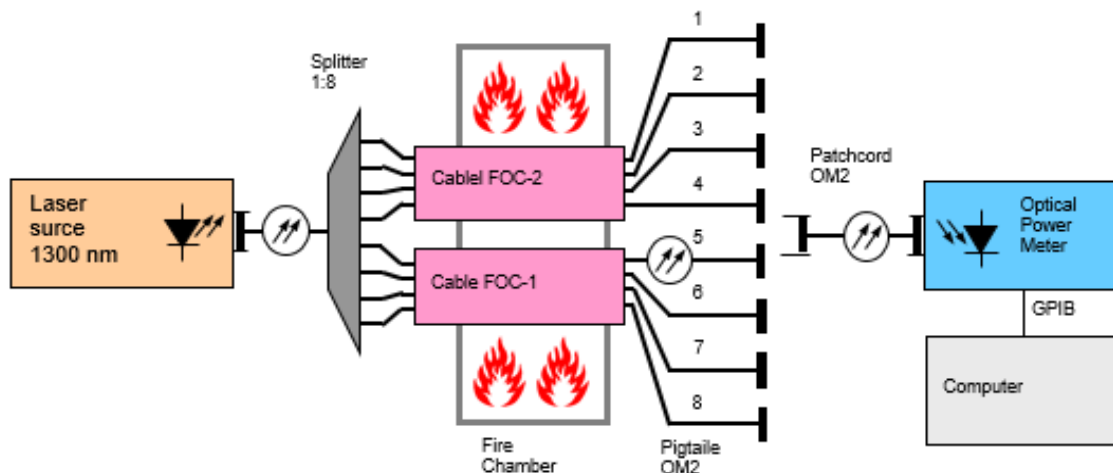
The cable was subjected to necessary examinations on the behaviour of the function during burning and reaction to fire to determine its characteristics and the qualification of its performance.

During combustion of the fiber-optic cable in the test chamber, changes in attenuation in individual fibers as a function of time and temperature were tested. For this purpose, special measuring stands were developed by the Telecommunications Equipment Testing

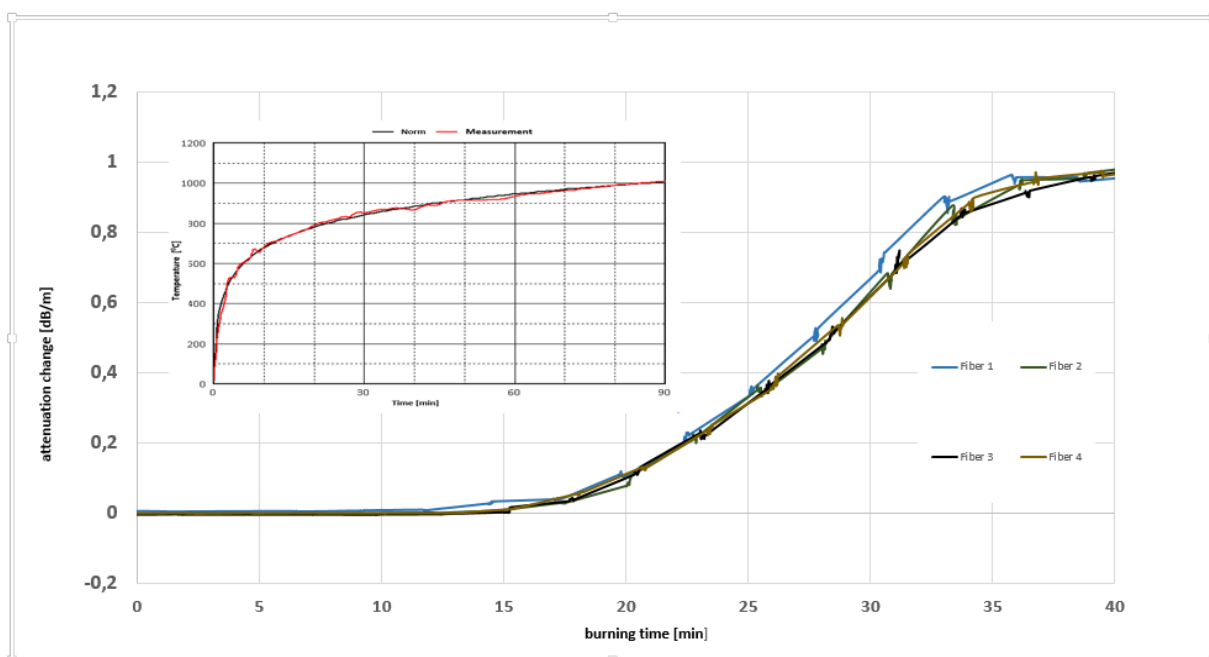
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Laboratory of the Institute of Communications, which were used for testing according to DIN 4102-12 and PN EN 50582 and PN-EN 50200 and PN-EN 50582 standards.



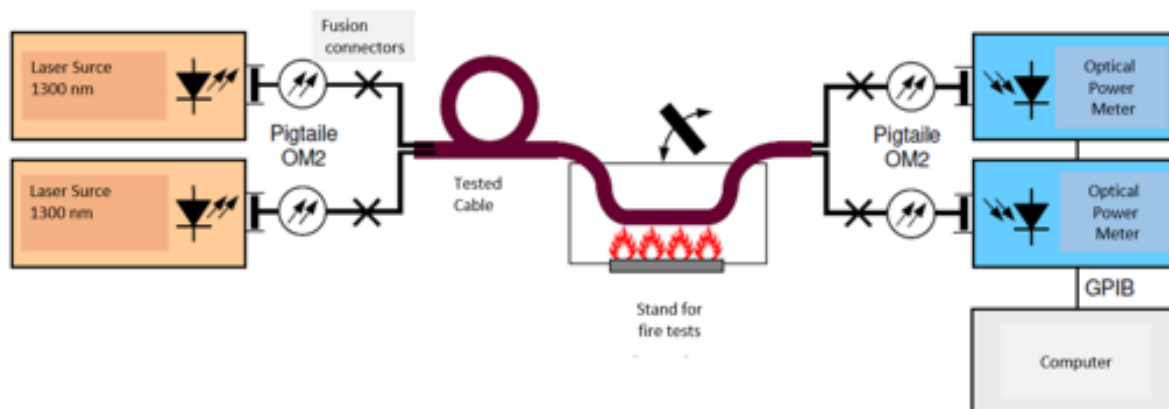
Pict. 3 Ideal scheme for measuring fiber-optic attenuation in the TECHNOFLAME FOC-2-SLT-HFFR PH120/E30-E60 cable during a fire test according to DIN 4102-12.



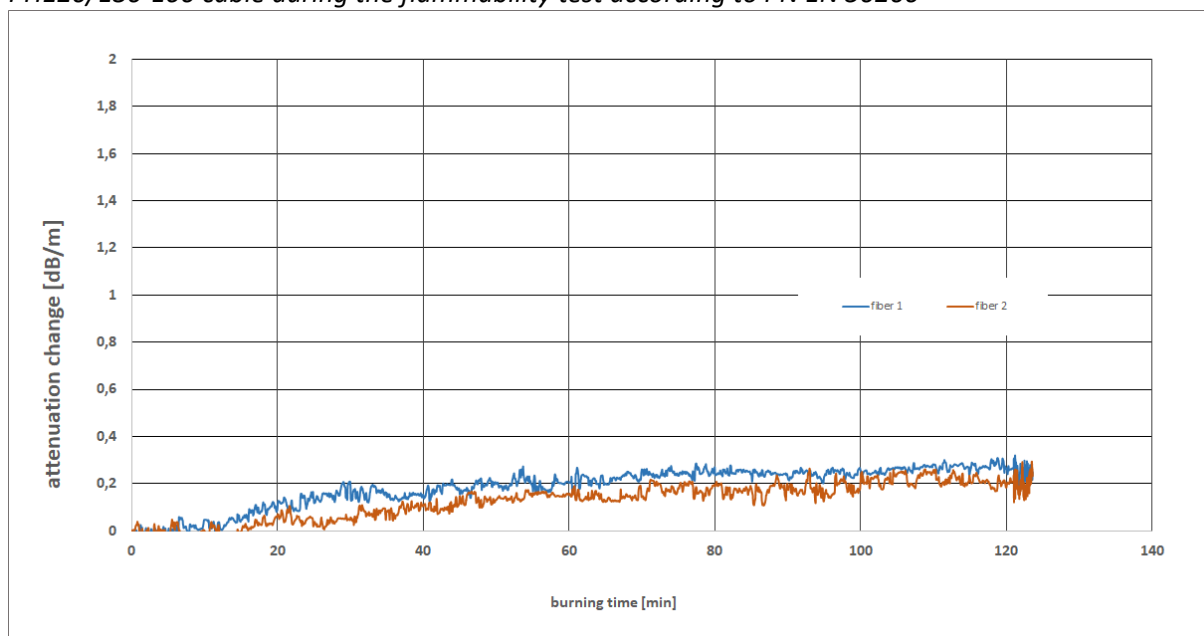
Pict. 4 Changes in fiber-optic attenuation in TECHNOFLAME FOC-2-SLT-HFFR PH120/E30-E60 cable during the fire test according to DIN 4102-12.

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Pict. 5 Ideal scheme for measuring fiber-optic attenuation in TECHNOFLAME FOC-2-SLT-HFFR PH120/E30-E60 cable during the flammability test according to PN EN 50200



Pict. 6 Changes in fiber-optic attenuation in TECHNOFLAME FOC-2-SLT-HFFR PH120/E30-E60 cable during the fire test according to PN EN 50200

The performance characteristics of the cable have been confirmed by a positive assessment by the SCIENCE & RESEARCH CENTRE OF FIRE PROTECTION - STATE RESEARCH INSTITUTE and the issuance of the National Certificate of Constancy of Performance 063-UWB-0253 and the Certificate of Admittance No. 3990/2020 for use in construction, available on our website www.technokabel.com.pl.

Completion / Conclusions

Fire resistant fiber-optic cables used in fire protection systems bring a new quality to the national cable market and contribute to improving fire safety of people and objects.

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The team of designers and advisors from TECHNOKABEL S.A. invites to cooperation Designers and Installers of fire protection systems and encourages to use their products in innovative solutions of fire protection systems.

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