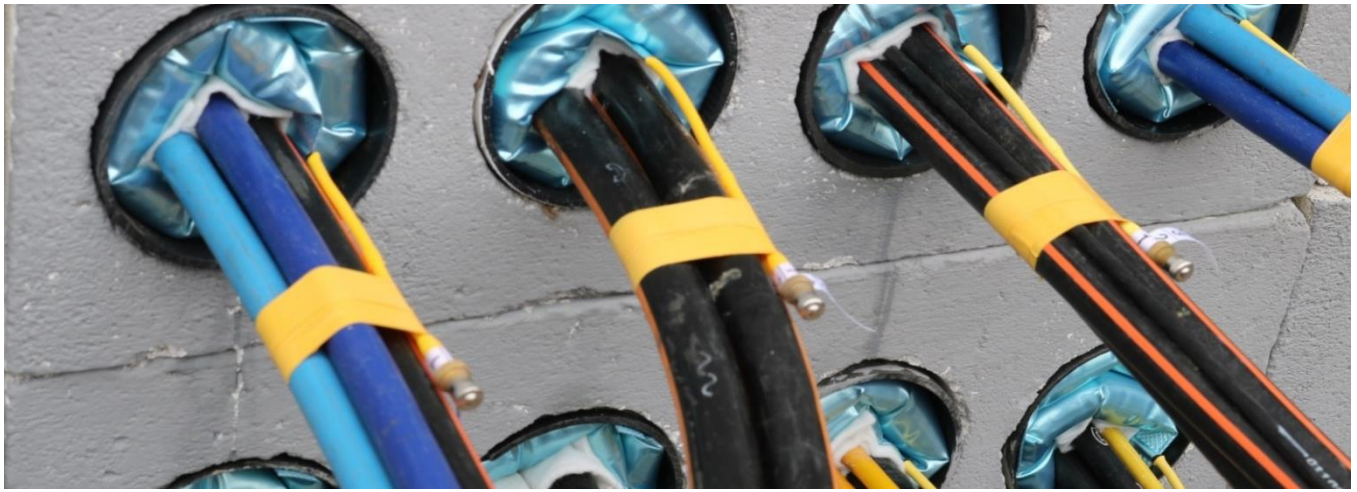
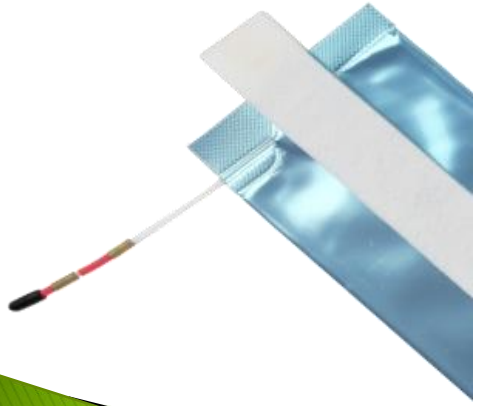
Inflatable sealing technology

Innovative and economical solutions for cable entries





Sealing against periodically accumulating water (3 m water column DIN 18195-x) and gas diffusion

In addition: solutions against propagation of fire and smoke penetration

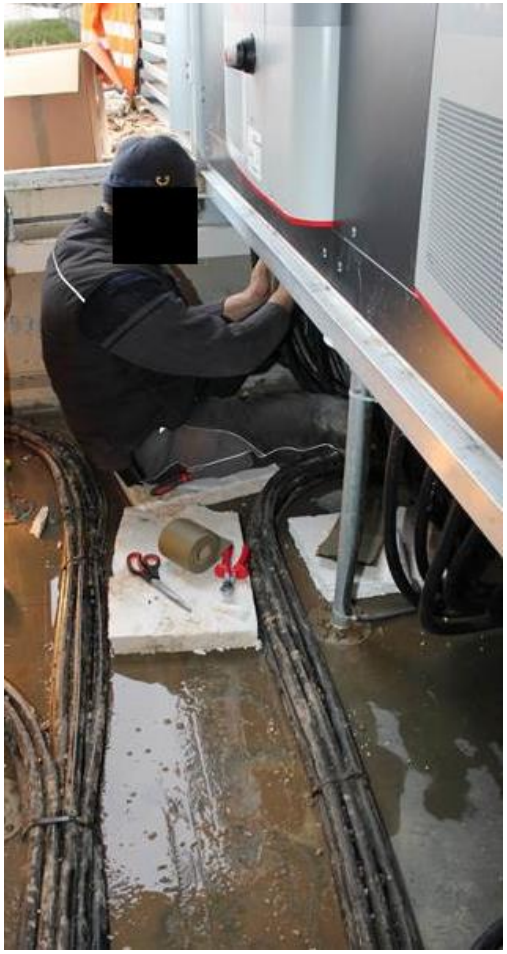
Sealing cushions for ...

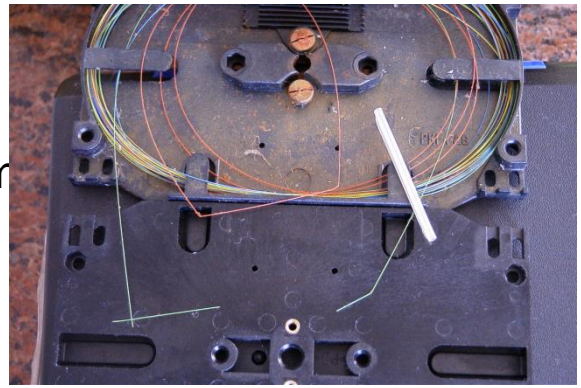
... cable and duct entries, distribution cabinets, cable conduits, core boreholes, wall feed-throughs, service entries in buildings, annular spaces and more.
For inner diameters up to 500 mm.

Reasons for using sealing technology for cable feedthroughs to protect against water entry or gas diffusion e.g. carbon monoxide

- Prevention of personal injury caused by gas diffusion
- Prevention of damage to property in buildings and technical rooms
- Prevention of short-circuits caused by water entry
- Prevention of network failure caused by optical fibre breakage (optical fibres are particularly sensitive to water entry or immersion in water)
- Cable manhole facilities do not have to be pumped out
- Prevention of costly repair and renovation measures

Consequences of non-existent or inadequate sealing, e.g. in cable feedthroughs





Penetration of water and mud in cable manholes, substations, technical room etc.

Damage and breakage of technical components, fibre breakage in joint boxes

Damage due to unsealed or inadequately sealed conduits etc.

- Soil particles and water may be washed into the conduit and swept along it . High costs may be incurred for removing the contamination and cleaning up. See §4 BBodSchV (German Federal Soil Protection Act and Ordinance).
- Conduits blocked by contaminants can cause damage to cables during installation. Damage may also be caused by solutions with pH2-pH12 entering conduits.

The requirements of international telecommunication network providers

Regulations governing the closure of cabled ducts against the entry and further passage of water, and the requirements for the sealing elements used for this purpose, are to be found in the following:

Deutsche Telekom TS 0307/96
British Telecom pls LN584
France Telecom (RAD) ST/FTR/7644
Bell Canada 2017-05-23 (Rev.)
DOI Japan
Fibre Optics CT GmbH –Test Principles PG-DMPK-1 and 2

Requirements of international telecommunication network providers for sealing elements

(also to be found in Fibre Optics CT GmbH – Test principles PG-DMPK-1 and 2)

Examples of requirements are:

- Tightness against 3 m water column and gas diffusion
  (* after removal and re-installation without damage to conduit or cables)
- Service life (defined by the total leak rate)
- Tightness after temperature cycling from -15°C to +30°C (ageing)
- Tightness despite vibration
- Resistance to chemicals, petrol, diesel or kerosene mixtures, paraffin oil, cable lubrication agents

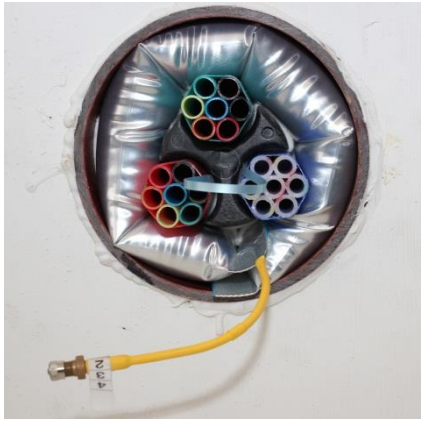
* A more stringent demand from France Telecom, Fibre Optics CT

Wolf GmbH: Inflatable sealing cushions –APPLICATIONS

For telecommunication cables

For power cables

Protected microtubes



Ducts within ducts
(Ø up to 500 mm)

Additional protection against the propagation of fire and smoke penetration

Wolf GmbH: Inflatable sealing cushions –ADVANTAGES

- Reliable sealing against water entry and gas diffusion for round or oval boreholes, or concrete, plastic, cast iron or stoneware cable conduits
- Universal application, independent of cable and duct diameters or cable configuration, i.e. the diameter and number of cables in a duct)
- Reusable sealing cushions
- Additional sealing solutions are available against smoke penetration or fire propagation
- Installation, removal and retrofitting are quick and easy
- CO2-free inflation with compressed air

Inflatable sealing cushions from Wolf GmbH ….

fulfil and even exceed international requirements

These include:

T-Com TS 0307/96, France **Telecom** RSD CSE C75-11H,

British Telecom LN584, Testing for power cables VDE 0278-629-1/A1 and

DIN EN 61442, as well as the DVGW* provisions in VP601 for service entries for gas and water in houses, etc.

*standardization body for the gas and water industry

- Sealing effectiveness against pressing water up to 5 m water column
- Tightness against gas diffusion ≤ 0.1 bar, in acc. with DVGW-VP601
- Fulfilment of the demands of temperature cycling tests
- Resistance to various chemicals with pH2 to pH12, petrol, diesel, kerosene…
- Reusability, with a removal time of < 1.5 min, in acc. with FO PB 179/2011

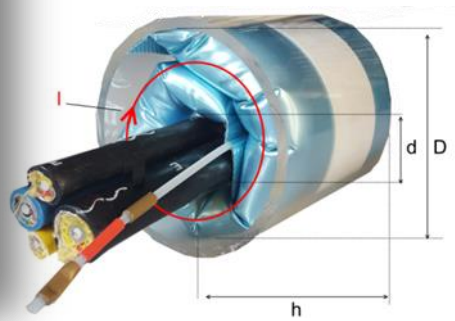
Advantage: A comparison of service lifetimes

We measured and compared the total leak rates of inflatable sealing elements in an independent laboratory.

The result: Wolf sealing elements outperformed those of competitor products and exceeded the Deutsche Telekom requirement, i.e. they have a **longer service life**

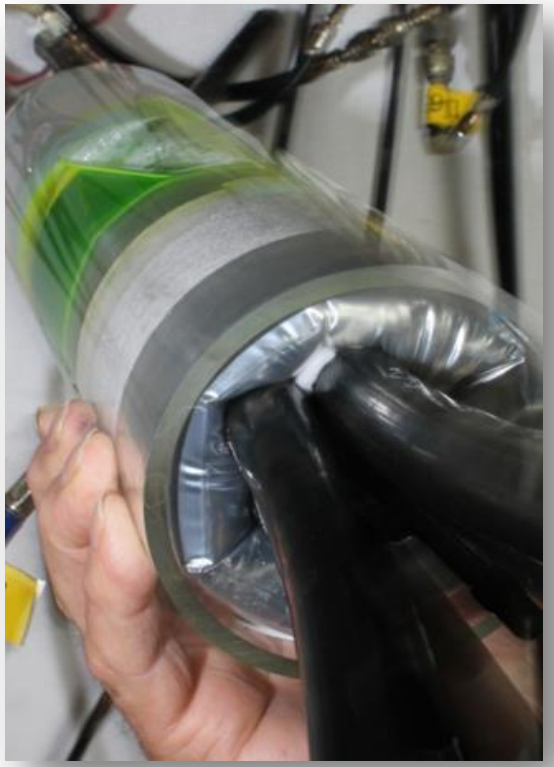
[Unit]	**Wolf GmbH** SSB2	**Wolf GmbH** QADK/V (valve) with valve cap	T-Com requirement (current technology)	Competitor product CO2
mbarl/sec	* <2.3 x 10^{-8}	* <2.3 x 10^{-8}	≤4.4 x 10^{-6}	≤6.5 x 10^{-6}
mbarl/year	0.73	0.73	138.8	205.0

Duct Ø [D] [cm]	Config. Ø [d] [cm]	Infla-table length l [cm]	Result-ing height h [cm]	Result-ing width w [cm]	Filling volume V [cm]	Cushion fill pressure p: At instal lation [bar]	Min requ [bar]	Permis sible loss	Calculated service life T: Wolf Kabeltechnik SSB2-100	Wolf Kabeltechnik QADE/V L100	T-Com requ. ADE 100
				w=[D-d)/2 [cm]	V=l*h*w [cm]	p1 2.8	p2 1.0	Δp=(p1-p2) mbarl	Leak rate L (mbarl/year) T=Δp/L 0.73	66.23	138.76
10.5	0	33	5.1	5.25	884	2474	884	1590		24	11
10.5	2.9	33	7.8	3.8	978	2739	978	1761		27	13
10.5	6.5	33	10.5	2	693	1940	693	1247	>20 yr	19	9



Tightness 3 m water column and gas diffusion 0.1 bar

Extract from Test Report FO 127/2013



Practice-oriented test setup

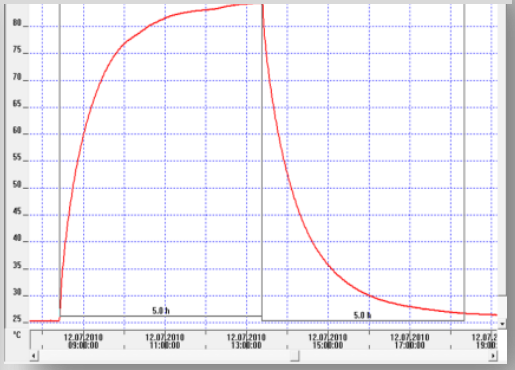
Requirements fulfilled!

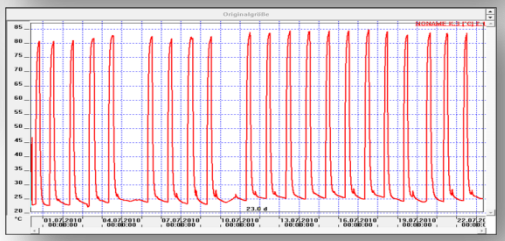
Temperature cycling test (ageing)

Extract from Test Report FO 076/2010 und FO 176/2011

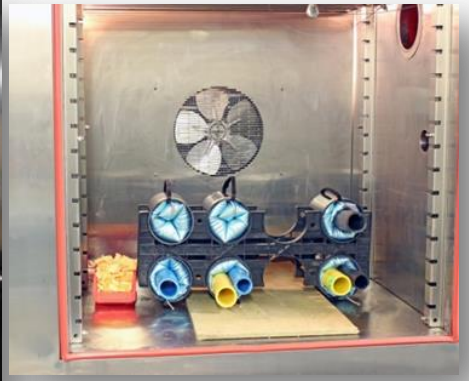
Short-circuit requirement and tightness tests after ageing (temperature cycling)

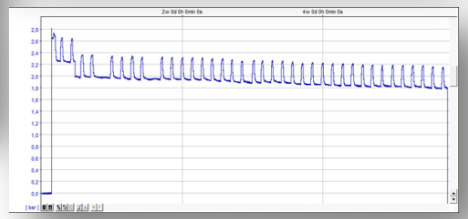
Simulation of cable sheath temperature 70°C (in alternating cycles)





Ambient temperature cycling with tightness check





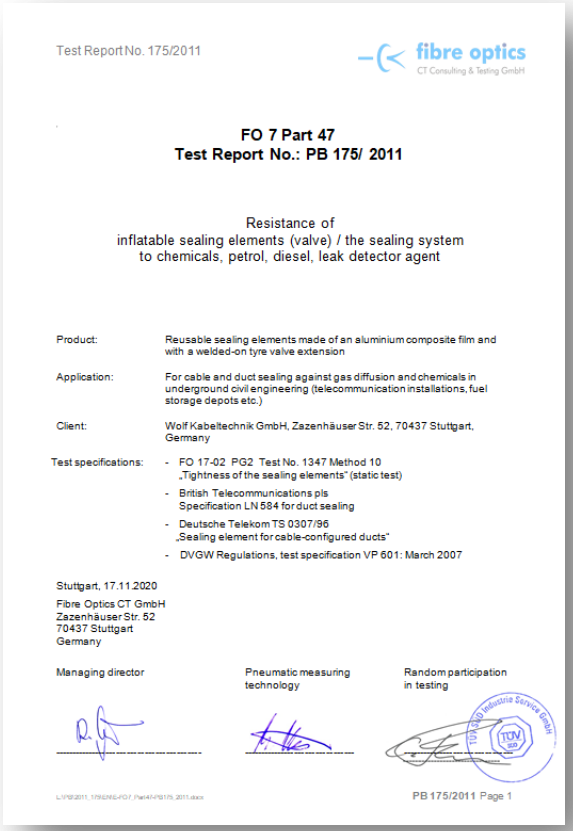
Requirements fulfilled!

Chemical resistance

In order to verify chemical resistance pH2 to pH12, various substances were tested in the presence of TÜV-Süd* (Test protocol FO 175/2011)

* Technical Supervisory Association)

Requirements fulfilled!



Test Report No. 175/2011

fibre optics
CT Consulting & Testing GmbH

FO 7 Part 47
Test Report No.: PB 175/ 2011

Resistance of
inflatable sealing elements (valve) / the sealing system
to chemicals, petrol, diesel, leak detector agent

Product:	Reusable sealing elements made of an aluminium composite film and with a welded-on tyre valve extension
Application:	For cable and duct sealing against gas diffusion and chemicals in underground civil engineering (telecommunication installations, fuel storage depots etc.)
Client:	Wolf Kabeltechnik GmbH, Zazenhäuser Str. 52, 70437 Stuttgart, Germany
Test specifications:	- FO 17-02 PG2 Test No. 1347 Method 10 „Tightness of the sealing elements" (static test) - British Telecommunications plc Specification LN 584 for duct sealing - Deutsche Telekom TS 0307/96 „Sealing element for cable-configured ducts" - DVGW Regulations, test specification VP 601: March 2007

Stuttgart, 17.11.2020

Fibre Optics CT GmbH
Zazenhäuser Str. 52
70437 Stuttgart
Germany

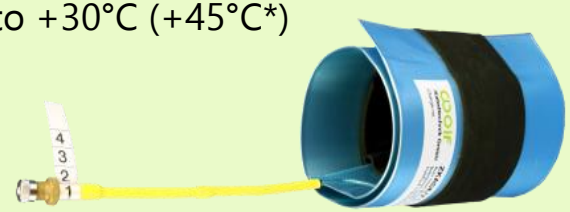
Managing director | Pneumatic measuring technology | Random participation in testing

PB 175/2011 Page 1

Wolf GmbH inflatable sealing cushions – PRODUCTS

Two basic types

- **Sealing elements / V (valve)**
- Temperature range
  -15°C to +30°C (+45°C*)



- Temperature range
  -30°C to +45°C (+70°C*)

Inflatable 4 times, with air

- **Sealing Bag**
  (Crimping technology)
- Temperature range
  -15°C to +30°C (+45°C*)

Inflatable twice, with air

*kurzzeitig 4h

Wolf GmbH inflatable sealing cushions

Coating material

Sealing element coating	Cellular rubber (cushion type **ZKAK/V**) Prod.-No. 16.3 & 16.4
Sealing tape material	Self-sealing cellular rubber sealing strip [Prod.-No. 24] based on ethylene-propylene-diene rubber. Closed-cell, soft-flexible cellular rubber, cell size approx. 0.1 – 0.5 mm
Advantage	**Installation in stagnant or running water possible**
Tightness	ensures tightness up to 0.5 bar/ 5 m water column immediately on contact with water
	Tightness against creeping gases (volatile halogenated hydrocarbons in the soil air ≤ 100 mbar)
Installation	In the case of multi-configurations: We recommend a lubricant or a mixture of dish washing soap - water to reduce the frictional resistance
Removal	Simple & non-destructive. No adhesion to cables or duct
Tightness after water contact	immediately on contact with water
Reuseability	Reusable (re-installation) after recovery of the deformed cellular rubber

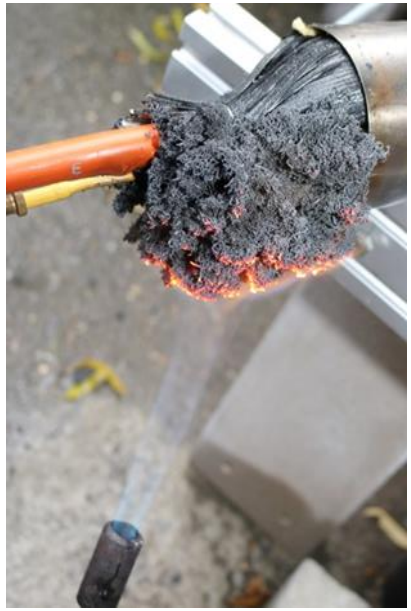
Wolf GmbH inflatable sealing cushions – PRODUCTS

Now including: Heat protection F60 or F90

Fire-resistant sealing elements (Product Group 17), supplied ready-equipped with fire-resistant tapes (in brush form), available in two categories, F60 and F90.

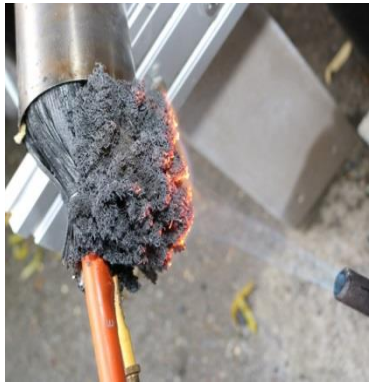
Although the sealing element itself will lose tightness in the event of fire, the foaming exfoliated graphite forms a stable, flameproof mass at a temperature of 145 °C, reliably shutting off the cable duct from **heat, smoke penetration and fire propagation.**

The cable duct remains uncontaminated!



Wolf GmbH: Fire-resistant sealing cushions

- Include all the familiar benefits of the sealing cushion (valve), for example: no penetration by water or gas
- Make the process of retro-fitting of cables or ducts quick and easy (reusability)
- Help to prevent mice and rats from entering
- Heat protection F60 and F90 are resistant to ageing, water, thawing and UV
- Start to react at a temperature of approx. +145°C



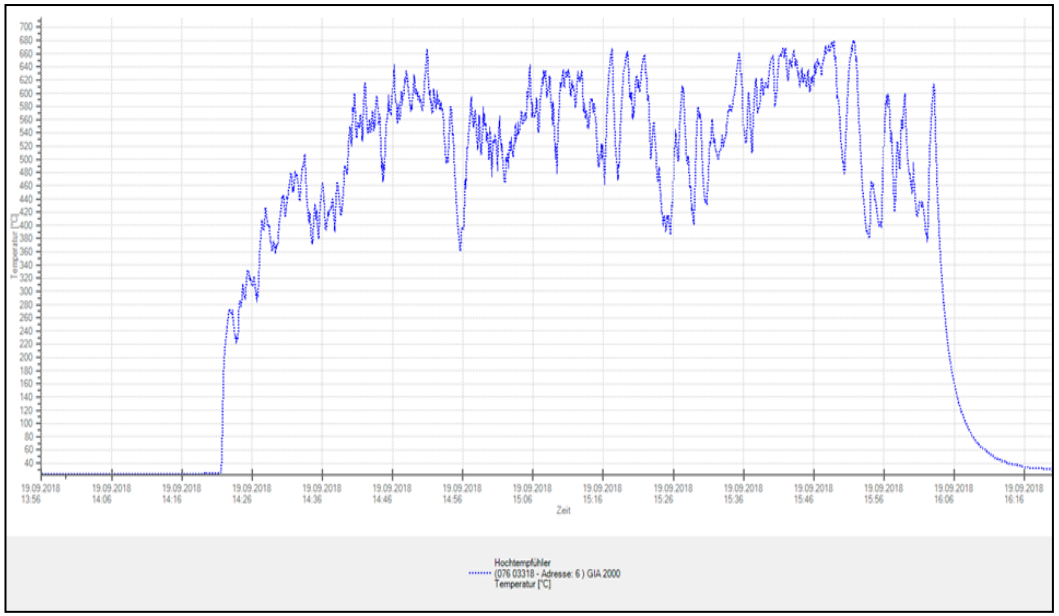
Direkt flame treatment

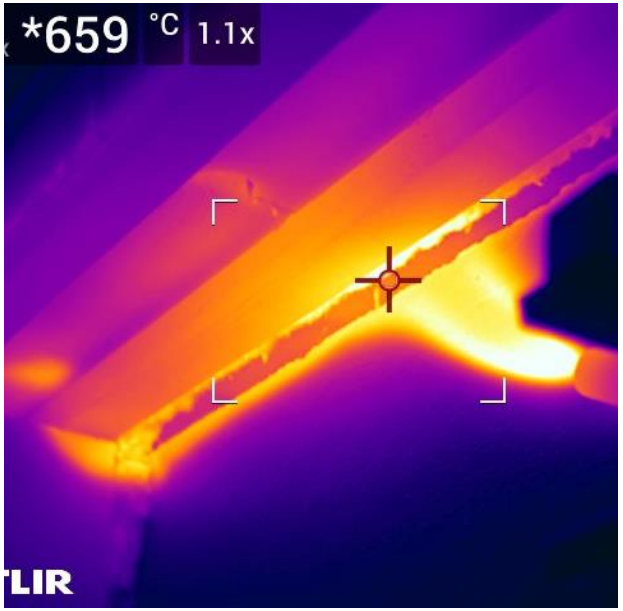
15 minutes … 16 min. …. 17 min. …. 60 min.

Wolf GmbH: Fire-resistant sealing cushions

- Funktion test with flame exposure lasting 110 minutes at temperatures up to +680°C

- The fire-resistance tape fulfils the conditions for approval, DIBt* No. Z 19.11-1713
  * German building supervisory authority





Wolf GmbH Sealing technology

Easy assembly – few accessories –simple

Gap-sealing
for multi-configured cable ducts or cable feedthroughs

Swelling sealing tape or cable separator

Standard compressor with
pressure gauge (display max. 4 bar)
Filling capacity max. 20 l/min

Wolf GmbH Sealing technology

Easy removal!

No adhesion to surrounding structures
Non-destructive removal
Reusable

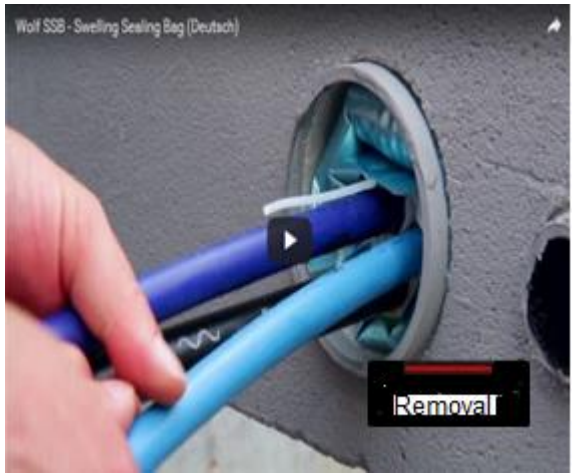
Competitor product:
Difficult removal
Disposable product

Wolf GmbH Sealing technology

Videos of installation and removal on YouTube

Sealing element (valve)

Sealing Bag



Wolf GmbH sealing technology

Innovative and reliable!

- It is important to protect cable ducts and infrastructure systems if follow-on costs and breakdowns are to be avoided and problems such as water entry, gas diffusion or fire are to be effectively prevented
- As a rule, renovation and repair are more expensive than precautionary protective measures
- Wolf GmbH has products for fibre-optic security technology, such as water detectors, unauthorised access and hazard alarms (EMA and GMA), which complete the full product range and serve the purpose of timely danger detection.
- All products are the result of expertise gained in long years of practical experience and can be tailored to the needs of your particular application.

We will be pleased to advise you!

wolf® GmbH

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