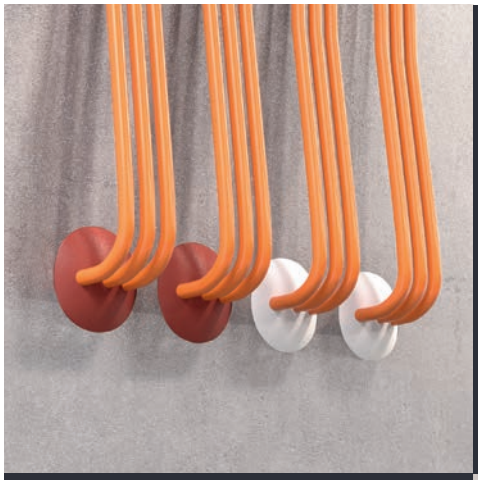
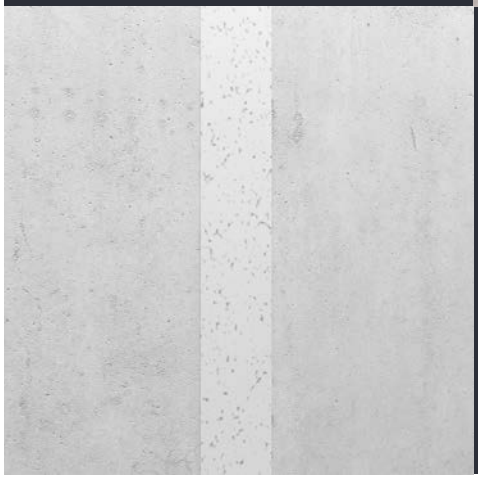
ZAPP-
ZIMMERMANN



OUR TUNNEL PRODUCTS

SPECIAL USE

STANDARD USE



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PRODUCT CATALOG TUNNEL

# Innovative fire protection systems

# CONTENT


# Innovative fire protection systems for tunnel construction

Tunnel construction projects are among the most demanding challenges in constructural fire protection. In an emergency, people must be evacuated quickly and safely, and damage to infrastructure must be minimised. For over 35 years, ZAPP-ZIMMERMANN GmbH has been developing tried-and-tested, innovative fire protection solutions tailored to the special conditions of tunnel construction.

Our company specialises in elastic fire protection joint solutions and high-performance cable, pipe and mixed penetration seals, which have been successfully used in numerous tunnel construction projects, both in transport and utility tunnels. Thanks to high-quality materials and tested systems, our reliable solutions meet the required fire resistance classes in accordance with national and international standards.

The wide range of products offers the right solution for almost any installation situation – easy to install, space-saving and flexible in use. Even complex requirements can be implemented safely and efficiently, enabling quick installation even in hard-to-reach or irregular openings.

As a reliable partner, we accompany you from planning to implementation – with project-specific advice and technical documentation. In this way, we work together to create sustainable safety – exactly where it makes the decisive difference in an emergency.

# Components and building materials

ZAPP-ZIMMERMANN GmbH specialises in the field of intumescent construction materials. The company works in close cooperation with Karl Zimmermann GmbH, which develops, tests and produces intumescent construction materials and products.

The term intumescence means expansion or swelling and is used in the fire protection industry for substances that increase their volume under the effect of heat. If an intumescent building material is charged with heat, a physiochemical reaction starts, which in parallel with decomposition of the construction material and formation of an insulating layer, results in an increase of the volume. For the most part, intumescent construction materials are based on organic substances.

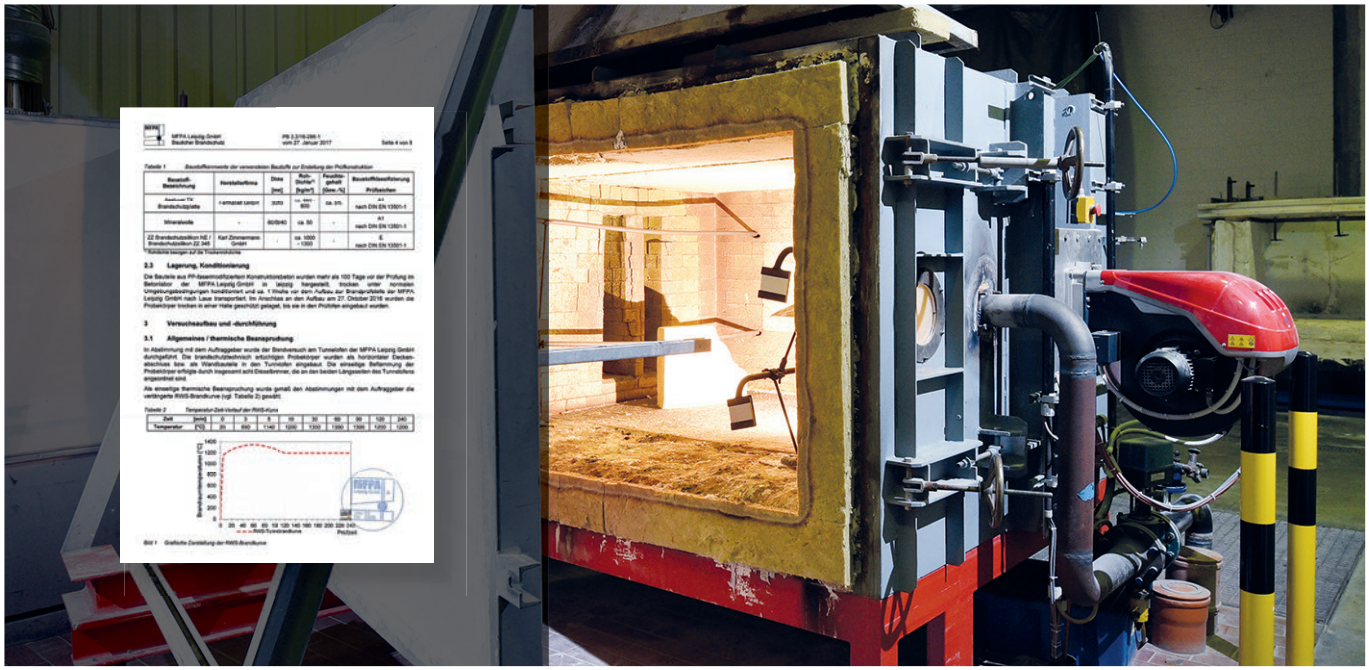
Depending on the application area and required purpose of the construction material or component, it is possible to influence the intumescence with reference to numerous parameters:

/ Level of intumescence
/ Temperature-dependent start of intumescence
/ Direction of intumescence
/ Stability of the insulating layer
/ Expansion pressure (i.e. the force with which the intumescence develops)

This is achieved by adding specific flame-retardants and additives to the construction material.
No flame retardants that contain halogen are used.

## Preliminary tests of fire barriers

The in-house testing installation of Karl Zimmermann GmbH can be used to conduct fire resistance tests for special fire barriers. This allows us to support you throughout the entire development process and to offer you the right product for your tunnel application.



# Certified safety

## Tests according to the RWS fire curve

The RWS fire curve simulates extremely high temperatures of up to 1350 °C over a fire duration of up to 240 minutes. Products such as our **ZZ® 535 Fire Protection Joint Seal** and **ZZ® 345 Fire Protection Silicone** have been successfully tested according to this curve. This makes them ideally suited for safety-critical applications in tunnel construction.

## Tunnel atmosphere and durability (type X)

Tunnels pose special challenges due to high humidity and temperature fluctuations.
Our **ZZ® 535 Fire Protection Joint Seal** and **ZZ® 345 Fire Protection Silicone** have successfully passed tests for durability and weather resistance. With their Type X classification, they are reliably suitable for use in tunnels.

## European Technical Assessments (ETA)

Our European products have been extensively tested – including tests for weather resistance and durability – and have a European Technical Assessment (ETA). This allows them to be used across borders within Europe and ensures maximum comparability and safety thanks to harmonised testing procedures.

## General building approvals (aBG)

All our fire protection systems used in Germany have a general building approval (aBG) from the German Institute for Building Technology (DIBt). This ensures that our solutions are recognised by building authorities and guarantee the highest level of safety.

**Other:** CE marking, quality management (DIN EN ISO 9001) and regular external monitoring (MPA Stuttgart and MPA Braunschweig)


# References

## Ruhrbahn, underground tunnel and platform (Essen)

Product: **ZZ® 220-120 Fire Protection Block**, **ZZ® 330 Fire Protection Foam** und **ZZ® 630 Fire Protection Box**

Application: Mixed Penetration Seals

## Midfield Airside Road tunnel (Abu Dhabi, UAE)

Product: **ZZ® 230 Fire Protection Block**, **ZZ® 330 Fire Protection Foam**

Application: Mixed Penetration Seals

## KVB tunnel (Cologne)

Product: **ZZ® 220-120 Fire Protection Block**

Application: Partitions in cable trays

## VDE 8 (Nuremberg/Bamberg, Erfurt/Leipzig-Halle)

Product: **ZZ® 100 Fire Protection Plug**

Application: Closure of cable pull conduits

# SPECIAL USE

Products with special requirements in tunnel construction

1

**ZZ® 535**
**Fire Protection Joint Seal**

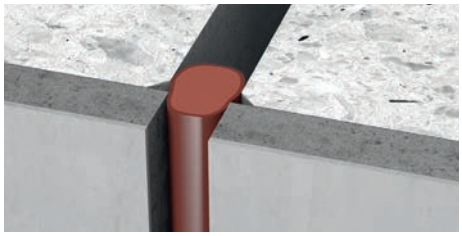
⇨ 10

2


**ZZ® 345**
**Fire Protection Silicone**

⇨ 11

# ZZ® 535 Fire Protection Joint Seal



## Description

The fire protection joint seal consists of elastic polyurethane foam with special fire protection additives and is covered with a flexible silicone outer skin. This makes it particularly suitable for use in component joints that are exposed to higher levels of moisture or climatic stress. With a fire resistance classification of up to EI240, it reliably contributes to maintaining fire resistance in moving joints.

Processing is straightforward and efficient: the joint seal is simply inserted into the joint with the specified excess and adapts easily thanks to its elastic structure. It can compensate for movements of up to 25% and can be cut to size individually. The ends are sealed with silicone. This makes it a true “one-product solution” that requires no additional materials or work steps and enables economical, time-saving installation.

## Particularly suitable for

- use in harsh weather conditions (frost, UV, splash water and salt spray)
- Tested in durability assessment for type X applications (with additional loads)
- Tunnel atmosphere with weathering
- Joint widths Ø 20 - 80 mm

## Advantages

- Intumescent foam with silicone cover protects internal joint seals from fire and tunnel atmosphere
- Resistant to moisture, exhaust gases, UV radiation, high temperature fluctuations and mechanical loads
- Quick installation without adhesives or fasteners

**Fire protection in tunnels – tested according to RijksWaterStaat curve (RWS)**

Up to EI120 between concrete test specimens with 30 mm fibre cement boards

Up to EI240 in combination with fibre cement boards

For further information and system components, see **www.z-z.eu**

# ZZ® 345 Fire Protection Silicone


## Description

The fire protection silicone is suitable for reliably sealing expansion and movement joints in walls and ceilings with a joint width of up to 40 mm. It has been tested for outdoor applications in accordance with DIN EN ISO 11600, Class F 20 LM, and thus meets high requirements for flexibility and durability. In addition, it has successfully passed a tunnel test (type X) for PP and plastic fibre concrete. Even under extreme conditions, the system guarantees a permanent seal – even at temperatures as low as -20 °C and mechanical expansions of up to 20%.

### Can also be used in the following systems

ETA: **ZZ® C31** in accordance with ETA 13/0123, **ZZ® G30** in accordance with ETA 12/0118

aBG: **ZZ® C31-DE** in accordance with Z-19.53-2481

## Particularly suitable for

- Joint constructions in concrete and fire protection panels
- Outdoor use with high UV, ozone and weather resistance
- Use with or without mineral wool backfill

## Advantages

- Up to EI120 without, EI180 and EI240 with mineral wool backfill (RWS curve tested)
- High adhesion without primer, smoke, gas and water resistant
- Alternative to **ZZ® 535 Fire Protection Joint Seal**
- Halogen- and solvent-free, good workability and stability

**Fire protection in tunnels – tested according to RijksWaterStaat curve (RWS)**

Up to EI240 with mineral wool

Tested according to EN 1366 and DIN 4102

For further information and system components, see **www.z-z.eu**

# STANDARD USE

Our standard products for tunnel construction

1

**ZZ® 212 / ZZ® 217 / ZZ® 220 / ZZ® 230**
**Fire Protection Block**

⇨ 14

2

**ZZ® 530**
**Fire Protection Joint Seal**

⇨ 15


3


**ZZ® 330**
**Fire Protection Foam**

⇨ 16

4


**ZZ® 333**
**Fire Protection Mastic**

⇨ 17

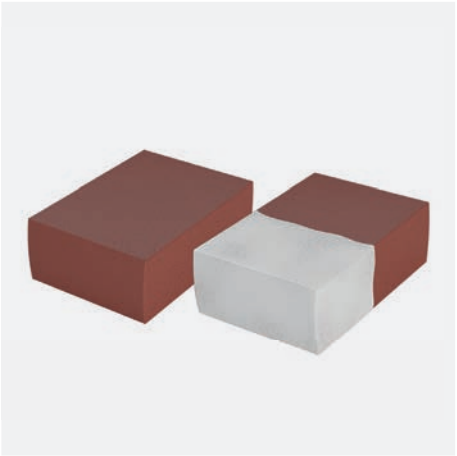
5

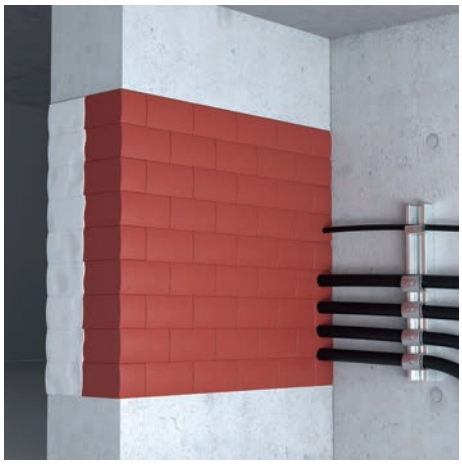
**ZZ® 100 / 130**
**Fire Protection Plug**

⇨ 18

# ZZ® 212 / 217 / 220 / 230 Fire Protection Block







## Description

The soft, flexible moulded foam part is made of polyurethane, which is treated with halogen-free fire protection additives and intumesces in the event of a fire. The fire protection blocks are available in various sizes and are suitable for use in mixed penetration seals up to fire resistance class S90 or EI120. They enable both temporary and permanent fire barriers for electrical cables and lines of all types and diameters, as well as combustible and non-combustible pipes.

**Can be used in the following systems**

ETA: **ZZ® M20** in accordance with ETA-10/0431

aBG: **ZZ® M20-S90** in accordance with Z-19.53-2529, **ZZ® M21-S90** in accordance with Z-19.53-2440, **ZZ® M22-S90** in accordance with Z-19.53-2516

## Particularly suitable for

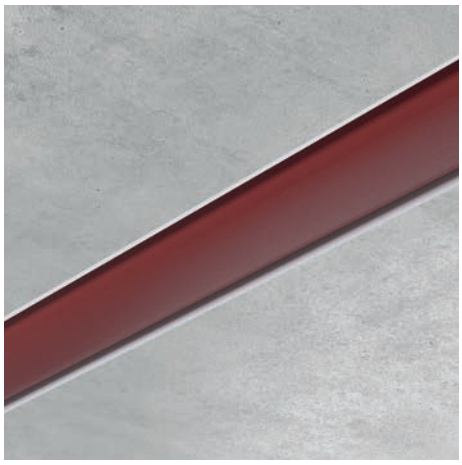
- Medium and large penetration seals with medium to high occupancy
- Mixed occupancy with cables, combustible and non-combustible pipes
- Pipes with various types of insulation
- Hydraulic lines and multi-layer composite pipes
- Partitions with frequently changing occupancy

## Advantages

- Very easy maintenance and replacement of cables
- Cost-effective installation thanks to prefabricated fire protection blocks that can be installed quickly
- Can be combined with **ZZ® 330 Fire Protection Foam**
- High cost-effectiveness thanks to prefabricated elements
- Fibre-free, halogen-free and solvent-free

For further information and system components, see **www.z-z.eu**

# ZZ® 530 Fire Protection Joint Seal



## Description

The fire protection joint seal consists of soft polyurethane foam with integrated fire protection additives and is suitable for moving joints in solid walls and solid ceilings. It is simply inserted into the joint with the specified excess length, without the need for bonding to the component. Thanks to its elastic structure, the joint seal can compensate for expansion movements of up to 25%, maintaining both temporary and permanent fire resistance up to class EI120. Optionally, a sealant can be applied for additional sealing.

**Can be used in the following systems**

ETA: **ZZ® G50** in accordance with ETA-12-0119

## Particularly suitable for

- Separation and expansion joints in large-area solid components
- Joint widths up to 75 mm
- One-sided installation possible

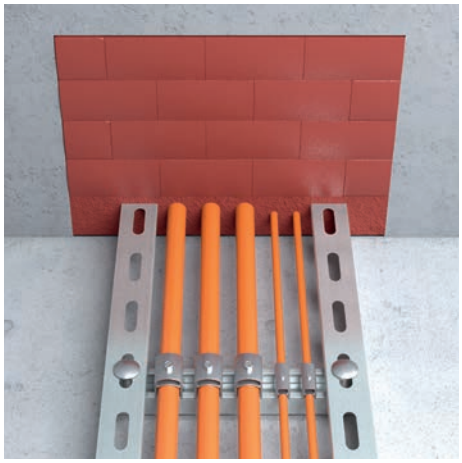
## Advantages

- Dust- and fibre-free processing
- Can be cut to any length and easily pressed into the component joint (compressible)
- Can be inserted into the joint without additional adhesives or fasteners
- Weather resistance possible with the use of standard silicone

For further information and system components, see **www.z-z.eu**

# ZZ® 330 Fire Protection Foam

STANDARD USE

## Description

The fire protection foam is characterised by excellent fire protection properties and particularly easy processing.
The coordination of the start of the reaction and curing allows for sufficiently long work interruptions and, at the same time, rapid work progress. Thanks to the high viscosity of the material, the foam does not run out of the penetration seal, and after curing, the structure remains permanently elastic, so that subsequent covering is also possible without any problems.
It is suitable as a system component for mixed penetration seals and cable penetration seals up to fire resistance class S90 or EI120 and can be used to seal off electrical cables and combustible and non-combustible pipes.

**Can be used in the following systems**

ETA: **ZZ® M30** in accordance with ETA-11-0206
aBG: **ZZ® M30-S90** in accordance with Z-19.53-2322

## Particularly suitable for

- Highly occupied partitions
- Hard-to-reach or irregular openings
- Sealing off cables, cable bundles, electrical installation pipes and plastic pipes up to 80 mm
- Insulated metal pipes up to 168,3 mm

## Advantages

- Easy filling of even complex penetrations
- Zero gaps and low wall thicknesses possible
- No additional products required
- Can be used in combination with **ZZ® Fire Protection Block**

For further information and system components, see **www.z-z.eu**

# ZZ® 333 Fire Protection Mastic


## Description

This water-based polyacrylate intumescent mastic is an easy-to-use, single-component, SVHC-free fire protection solution. It is ideal for temporary or permanent sealing of cables and pipes, ensuring fire resistance classes up to S120 or EI120.

**Can be used in the following systems**

ETA: **ZZ® C30** in accordance with ETA-13/0093
aBG: **ZZ® C30-DE** in accordance with Z-19.53-2480

## Particularly suitable for

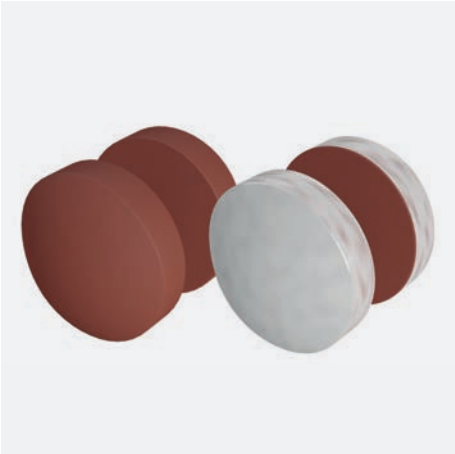
- Small fire protection seals with cables up to 21 mm in diameter
- Sealing the annular gap of individual cables and pipes

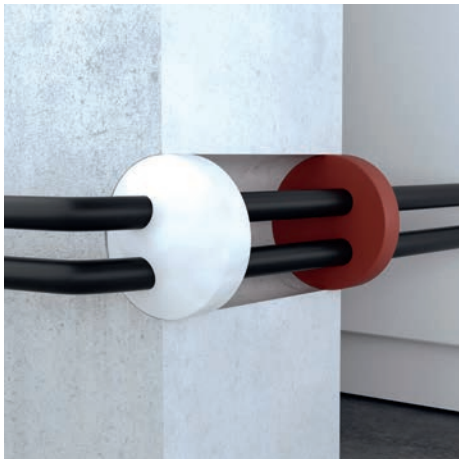
## Advantages

- Cartridge processing with standard equipment
- Good stability, easy to use

For further information and system components, see **www.z-z.eu**

# ZZ® 100 / 130 Fire Protection Plug





## Description

Intumescent polyurethane fire protection plug for use as temporary or permanent mixed penetration seal with fire resistance classes up to S90 or EI120. Can be inserted into a core hole without the use of tools and enables the sealing of standard electrical installations and various non-combustible pipes.

**Can be used in the following systems**

ETA: **ZZ® C10** in accordance with ETA-12/0088

aBG: **ZZ® M10-DE** in accordance with Z-19.53-2470

## Particularly suitable for

- Core drill holes up to Ø 250 mm
- Mixed installations with cables and pipes
- Rooms with frequently changing electrical installations

## Advantages

- Easy installation without power tools
- Easy re-assignment
- Cost-effective solution, also ideal for temporary closures
- Successful suction and pressure testing

For further information and system components, see **www.z-z.eu**

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