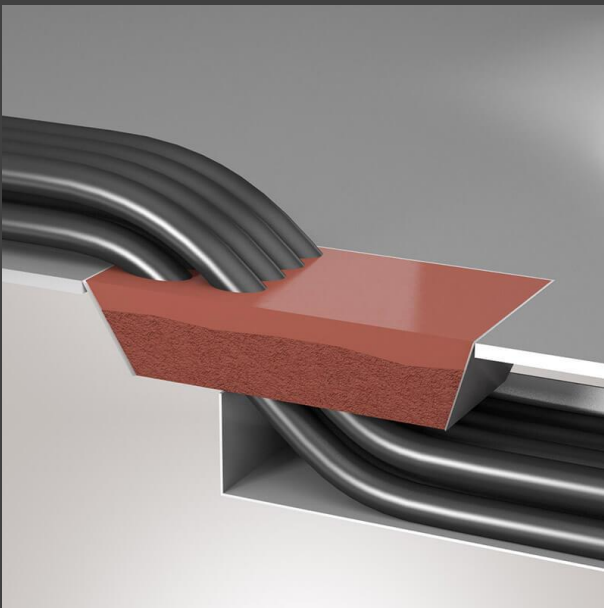


# FIRE PROTECTION CLOSURE FOR PENETRATIONS IN VEHICLES FLOORS USING **ZZ<sup>®</sup> 380-P FIRE PROTECTION CASTING COMPOUND AND ZZ<sup>®</sup> 381-F FIRE PROTECTION CASTING COMPOUND**

## TECHNICAL INFORMATION



# TECHNICAL INFORMATION FOR THE IMPLEMENTATION OF FIRE PROTECTION SEALS IN THE FLOOR OF RAIL VEHICLES

## – USING **ZZ® 380-P FIRE PROTECTION CASTING COMPOUND AND ZZ® 381-F FIRE PROTECTION CASTING COMPOUND**

### 1. CONTENT AND USE

- / This technical information outlines possible solutions for fire protection of services through openings in the floor of rail vehicles using **ZZ® 380-p** and **ZZ® 381-f**.
- / The test results do not replace a usability certificate but can serve as a basis for evaluation or for planning usability tests.
- / Application-specific boundary conditions not addressed in this technical information may impact the functionality of the penetration seal.

### 2. DESCRIPTION OF **ZZ® 380-P FIRE PROTECTION CASTING COMPOUND AND ZZ® 381-F FIRE PROTECTION CASTING COMPOUND**

- / **ZZ® 380-p** and **ZZ® 381-f** are waterproof and quickly curing sealants made of polyurethane foam, designed to precisely seal openings. The fire protection effect is based on halogen-free fire protection additives that expand in the event of a fire, forming an insulating layer. This significantly slows the spread of fire and smoke, enabling the rescue of people and the protection of materials.
- / The penetration seal is suitable for use in rail vehicles and provides fire resistance with compartmentalizing effectiveness for 30 minutes (**E30**) and thermal insulation for up to 30 minutes (**I30**), in accordance with the **EI30** classification. The classification depends on the thickness of the casting compound used.
- / The assembly of the penetration seals with **ZZ® 380-p** and **ZZ® 381-f** is described in detail in the design examples.

### 3. IMPLEMENTATION OF FIRE PROTECTION SEALS OF OPENINGS IN THE VEHICLE FLOOR OF RAIL VEHICLES USING **ZZ® 380-P FIRE PROTECTION CASTING COMPOUND AND ZZ® 381-F FIRE PROTECTION CASTING COMPOUND**

<b>Products</b>	<b>ZZ® 380-p</b> and <b>ZZ® 381-f</b> These products meet the requirements of EN 45545-2 for hazard levels HL1, HL2, and HL3, and satisfy the criteria R22 and R23.
<b>Openings</b>	Suitable for watertight cable penetrations in rail vehicle floors. The components should meet equivalent fire protection requirements.
<b>Assembly</b>	The component penetration must be cleaned before filling with <b>ZZ® 380-p</b> and/or <b>ZZ® 381-f</b> . The opening is filled with <b>ZZ® 380-p</b> compound using a formwork installed underneath. Once fully cured, the formwork can be removed and excess material may be cut off using a knife. To achieve a smooth and visually appealing surface, the opening can first be pre-filled with <b>ZZ® 380-p</b> and then filled with <b>ZZ® 381-f</b> . A ratio of 2:1 <b>ZZ® 380-p</b> to <b>ZZ® 381-f</b> has been found to produce an appealing and appearance.
<b>Services</b>	Electrical cables with $\varnothing \leq 62,5$ mm Cable bundles with $\varnothing \leq 20$ mm (Bundles with individual cable $\varnothing \leq 1,9$ mm)
<b>Special Notes</b>	The implementation of the penetration sealing for cable and pipe penetrations using <b>ZZ® 380-p</b> and <b>ZZ® 381-f</b> was carried out in accordance with the specifications of the current test report (see attachment). The dimensions of the installations used, as well as other details, can also be found in this test report.

#### 4. SUMMARY

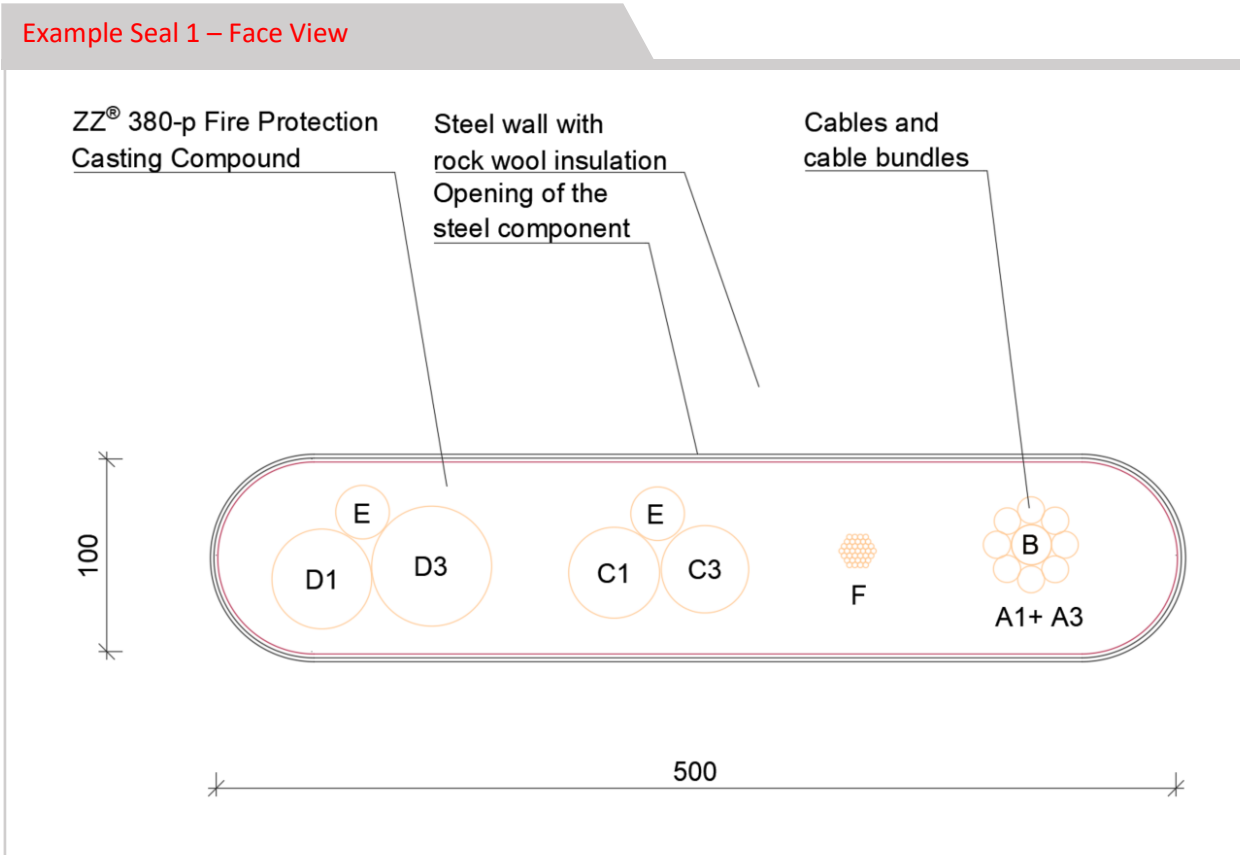
- / Fire protection measures using **ZZ® 380-p** and **ZZ® 381-f** in rail vehicles can be implemented after verifying the boundary conditions.
- / **ZZ® 380-p** and **ZZ® 381-f** achieve a fire resistance of 30 minutes compartmentalization and up to 30 minutes of thermal insulation, depending on material thickness. These values are in accordance with **EI30** classification.
- / Examples 1 and 2 (see following pages) highlight the key construction details that typically need to be considered.
- / Penetration seals can only be installed if the load bearing (load-transferring and stiffening) components have at least the same fire resistance duration as the penetration seals.
- / If constructions are planned that substantially deviate from the examples provided here, ZAPP-ZIMMERMANN is available to assist in the verification process.

# EXAMPLE 1

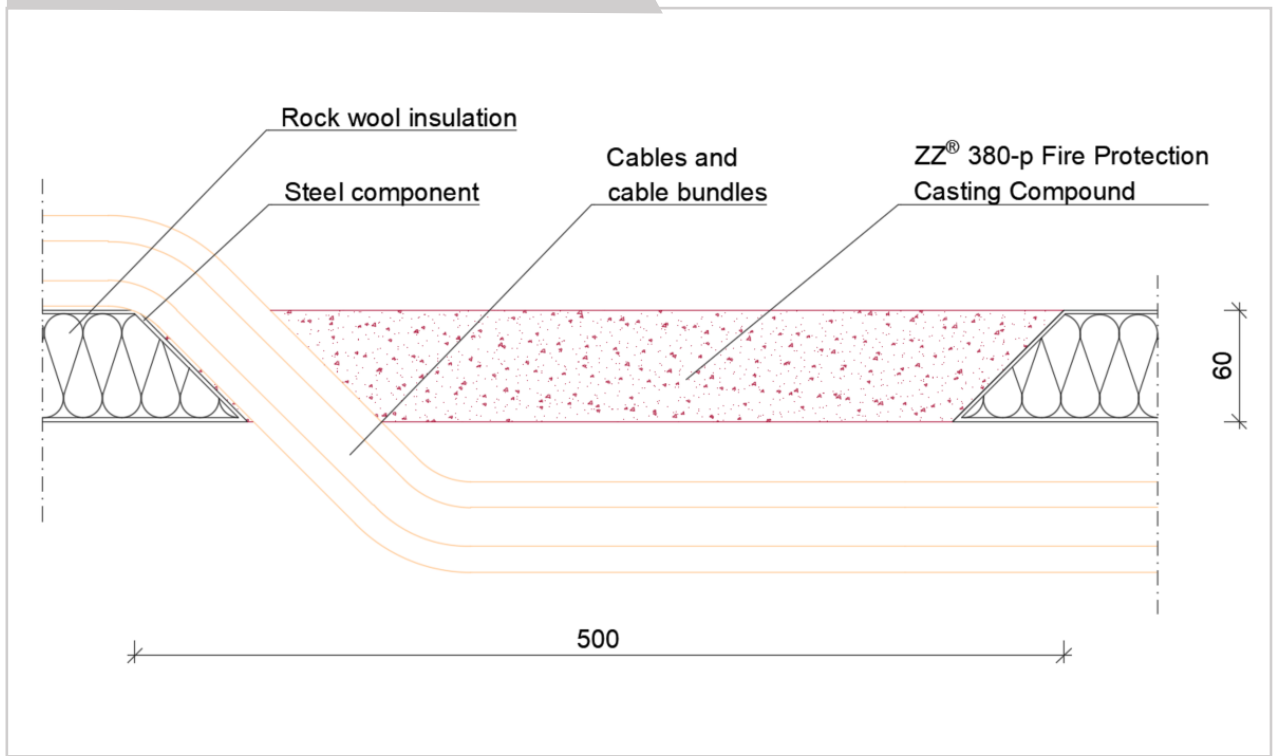
## FOR CABLE PENETRATIONS THROUGH FLOOR OPENINGS IN RAIL VEHICLES USING **ZZ® 380-P FIRE PROTECTION CASTING COMPOUND**

The illustrations depict the fundamental principle of penetration sealing and the installation of **ZZ® 380-p**. It is important to note that a minimum thickness of insulating material must be used to achieve the fire resistance class of the surrounding component.

A 60 mm thick seal made of **ZZ® 380-p** achieves a compartmentalization and thermal insulation of 30 minutes giving a rating of **EI30**. A 40 mm thick seal still achieves **E30** and **I20**, an overall rating of **EI20**.



Example Seal 1 – Section View

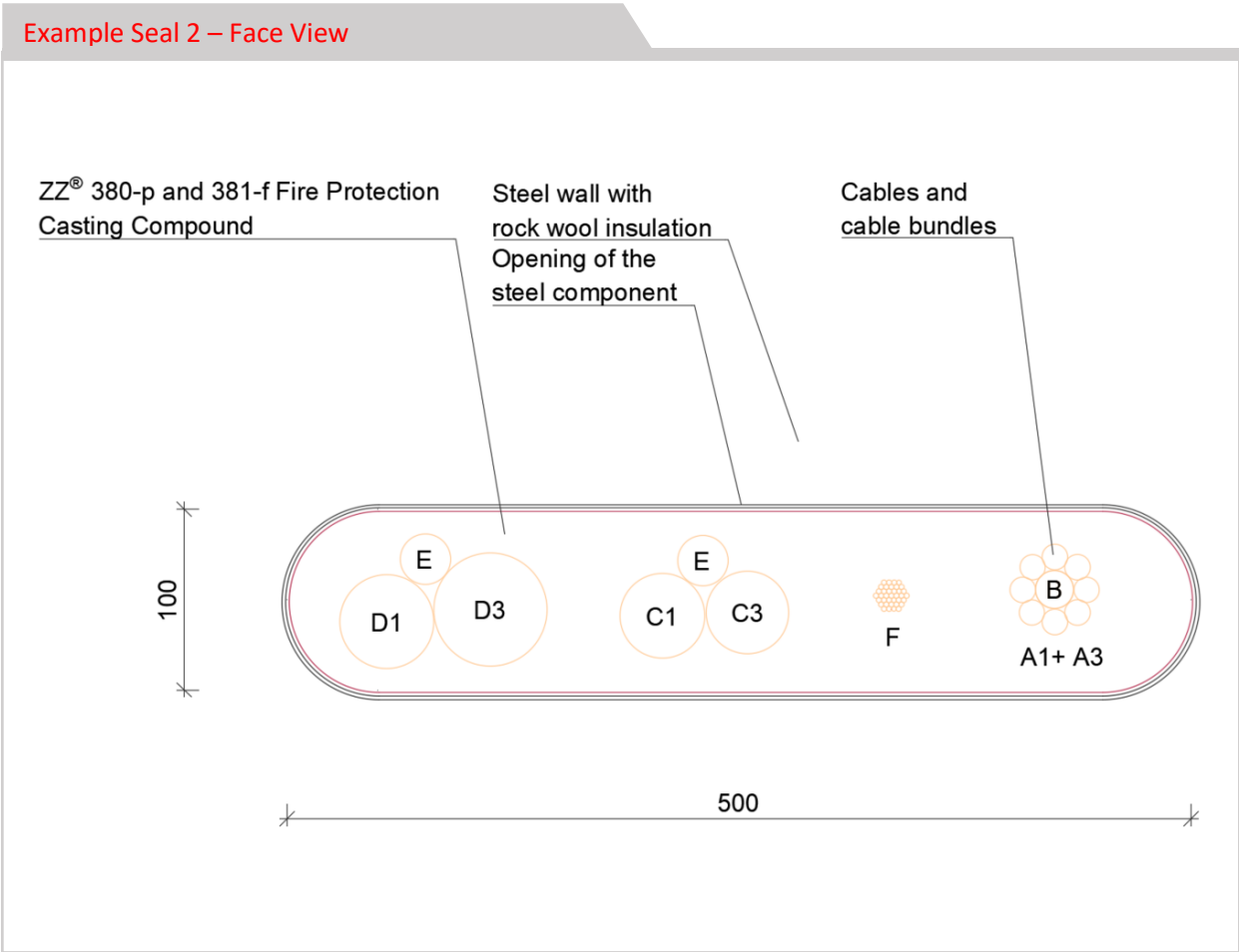


# EXAMPLE 2

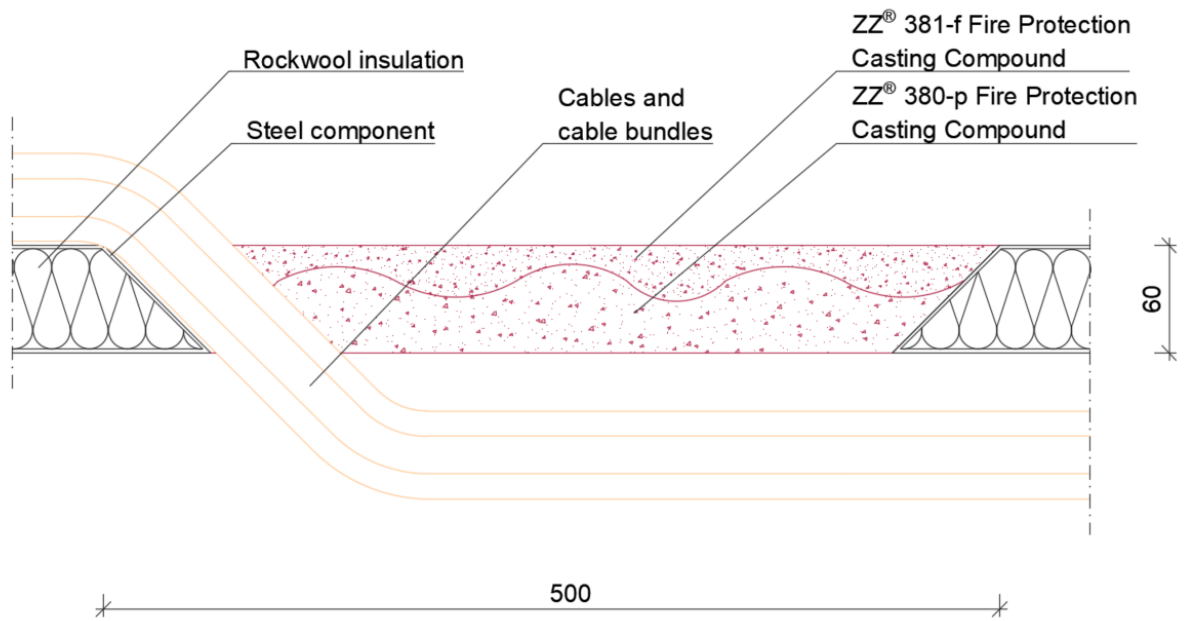
## FOR CABLE PENETRATIONS THROUGH FLOOR OPENINGS IN RAIL VEHICLES USING **ZZ® 380-P FIRE PROTECTION CASTING COMPOUND AND** **ZZ® 381-F FIRE PROTECTION CASTING COMPOUND**

The illustrations depict the fundamental principle of penetration sealing and the installation of **ZZ® 380-p** and **ZZ® 381-f**. It is important to note that a minimum thickness of insulating material must be used to achieve the fire resistance class of the surrounding component.

A 60 mm thick seal made of approximately two thirds **ZZ® 380-p** and one third **ZZ® 380-p** achieves a compartmentalization and thermal insulation of 30 minutes giving a rating of **EI30**. A similar 40 mm thick seal still achieves **E30** and **I20**, an overall rating of **EI20**.



Example Seal 2 – Section View



## FOUNDATIONS OF THIS TECHNICAL INFORMATION

This technical information on **ZZ® 380-p Fire Protection Casting Compound** and **ZZ® 381-f Fire Protection Casting Compound** in rail vehicles is based on the following documents:

- / Test Report Nr. R23-0372, Currenta, issued on 27.09.2023
- / R22, R23 according to EN 45545-2
  - o Classification Report Nr. 17/0423, Currenta
  - o Test Report Nr. 17/0345 ISO 4589-2, Currenta
  - o Test Report Nr. 17/0245 ISO 5659-2, Currenta
  - o Test Report Nr. 17/0422 NF X 70-100-1/-2, Currenta
  - o Classification Report Nr. 17/0356, Currenta
  - o Test Report Nr. 17/0351 ISO 4589-2, Currenta
  - o Test Report Nr. 17/0246 ISO 5659-2, Currenta
  - o Test Report Nr. 17/0354 NF X 70-100-1/-2, Currenta
- / DIN EN 45545-3: 2013
- / DIN EN 1364-1: 2015
- / EN 1366-3: 2021
- / Construction diagrams according to examples

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### Illustrations

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