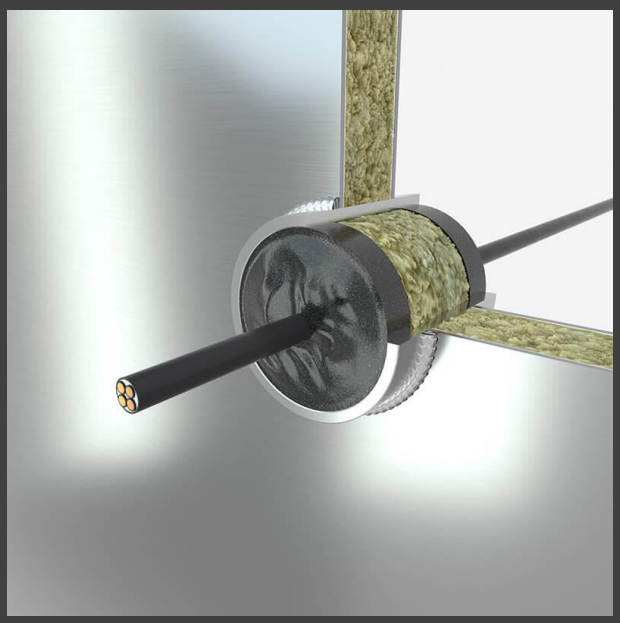
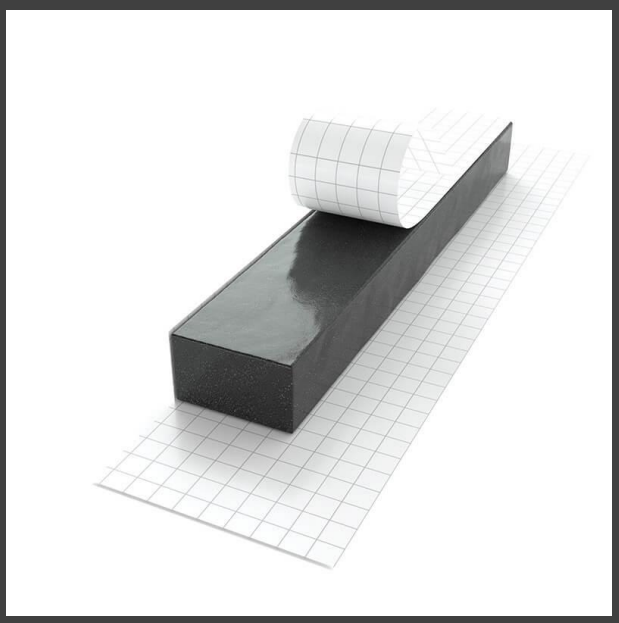
ZZ ZAPP-ZIMMERMANN
INNOVATIVE FIRE-PROTECTION SYSTEMS

FIRE PROTECTION SEALING OF OPENINGS IN RAIL VEHICLES USING **ZZ® 390 FIRE PROTECTION PUTTY**

TECHNICAL INFORMATION





TECHNICAL INFORMATION FOR CREATING FIRE PROTECTION SEALS OF SMALL AND/OR IRREGULAR OPENINGS IN RAIL VEHICLES

– USING **ZZ® 390 FIRE PROTECTION PUTTY**

1. CONTENT AND USE

- This technical information outlines possible solutions for fire protection of small and/or irregular openings in rail vehicles using **ZZ® 390 Fire Protection Putty.**
- 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® 390 FIRE PROTECTION PUTTY**

- **ZZ® 390 Fire Protection Putty** is a permanently deformable, self-adhesive butyl rubber compound with fire protection properties. The fire protection effect is based on halogen-free fire protection additives that expand during 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 installation of **ZZ® 390 Fire Protection Putty** is described in detail in the construction examples.

3. IMPLEMENTATION OF FIRE SEALS FOR SMALL AND/OR IRREGULAR OPENINGS IN RAIL VEHICLES USING **ZZ® 390 FIRE PROTECTION PUTTY**

Products	**ZZ® 390 Fire Protection Putty** This product meets the requirements of EN 45545-2 for hazard levels HL1, HL2, and HL3, and satisfies the criteria R22 and R23.
Suitable Components	Small and/or irregularly shaped openings in rail vehicles. The components should meet equivalent fire protection requirements.
Assembly	The component recess must be cleaned before filling with **ZZ® 390 Fire Protection Putty.** The putty is manually molded and pressed into the opening. The putty is self-adhesive and remains pliable even after prolonged storage, making re-application easier.
Services	Electrical cables with Ø ≤ 21 mm Bundles of cables with Ø ≤ 20 mm (bundles with individual cables Ø ≤ 1,9 mm)
Special Notes	The implementation of the sealing in small and irregular openings with **ZZ® 390 Fire Protection Putty** is carried out in accordance with the specifications of the current test report (see attachment). The dimensions of the used installations, etc., can also be found in this test report.

4. SUMMARY

- Fire protection measures using **ZZ® 390 Fire Protection Putty** can be implemented in rail vehicles after verifying the boundary conditions.
- **ZZ® 390 Fire Protection Putty** achieves fire-resistance with compartmentalization of 30 minutes and up to 30 minutes of thermal insulation, depending on material thickness. These values are in accordance with **EI30** classification.
- The example (see following pages) highlights 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.

PENETRATION SEAL EXAMPLE

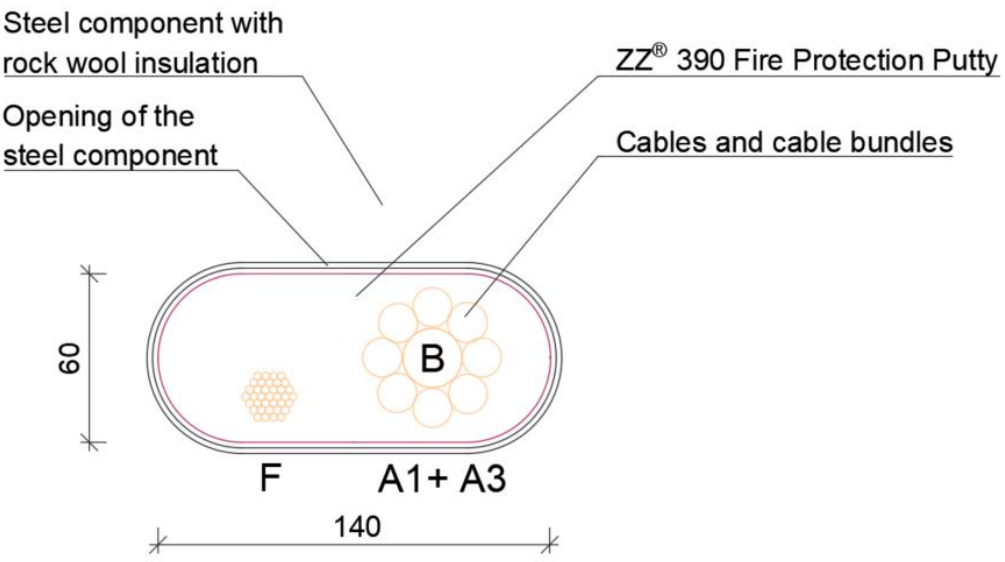
FOR SMALL AND/OR IRREGULAR OPENINGS IN RAIL VEHICLES USING

ZZ® 390 FIRE PROTECTION PUTTY

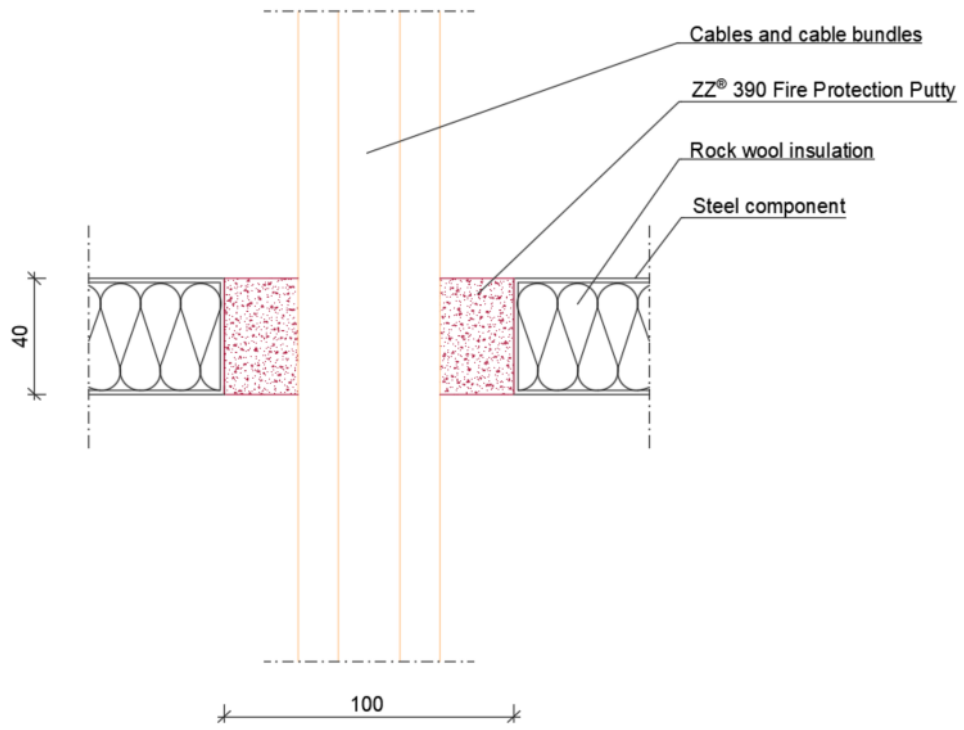
The illustrations depict the fundamental principle of penetration sealing and the installation of **ZZ® 390 Fire Protection Putty.** It is important to note that a minimum thickness of insulating material must be used to achieve the fire resistance class of the surrounding component.

A 40 mm thick seal made of **ZZ® 390 Fire Protection Putty** achieves a compartmentalization and thermal insulation of 30 minutes, giving a rating of **EI30**.

Example Seal – Face View



Example Seal – Section View



FOUNDATIONS OF THIS TECHNICAL INFORMATION

This technical information on **ZZ® 390 Fire Protection Putty** in rail vehicles is based on the following documents:

- Test Report Nr. R23-0372, Currenta, issued 27.09.2023
- R22, R23 according to EN 45545-2
  - Classification Report Nr. 19/1737, Currenta
  - Test Report Nr. 19/1710 ISO 4589-2
  - Test Report Nr. 19/1312 ISO 5659-2
  - Test Report Nr. 19/1736 NF X 70-100-1/-2
- DIN EN 45545-3: 2013
- DIN EN 1364-1: 2015
- EN 1366-3: 2021
- Construction diagrams according to example

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