ZAPP-ZIMMERMANN
INNOVATIVE FIRE-PROTECTION SYSTEMS

FIRE PROTECTION SEALING OF CABLE OPENINGS AND SOCKETS IN RAIL VEHICLES WITH

ZZ® 391 FIRE PROTECTION PUTTY PAD

TECHNICAL INFORMATION

TECHNICAL INFORMATION FOR CREATING FIRE PROTECTION SEALS OF CABLE OPENINGS AND ELECTRICAL SOCKETS IN RAIL VEHICLES

– USING **ZZ® 391 FIRE PROTECTION PUTTY PAD**

1. CONTENT AND USE

- This technical information describes possible solutions for the fire protection sealing of cable openings and electrical sockets in railway vehicles with **ZZ® 391 Fire Protection Putty Pad.**
- 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® 391 FIRE PROTECTION PUTTY PAD**

- **ZZ® 391 Fire Protection Putty Pad** is a permanently deformable, self-adhesive butyl rubber mat 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 20 minutes (**I20**), in accordance with the **EI20** classification.
- The installation of **ZZ® 391 Fire Protection Putty Pad** is described in detail in the construction examples.

3. IMPLEMENTATION OF FIRE SEALS OF CABLE OPENINGS AND ELECTRICAL SOCKETS WITH **ZZ® 391 FIRE PROTECTION PUTTY PAD**

Products	**ZZ® 391 Fire Protection Putty Pad** Diese Produkte erfüllen gemäß EN 45545-2 die Anforderungssätze R22, R23 und sind für Gefährdungsstufen HL1, HL2 und HL3 zugelassen.
Suitable Components	Suitable for cable openings and sockets in railway vehicles. The mat can also be wrapped around cables to act as a fire protection bandage. The components should fulfil equivalent fire protection requirements.
Assembly	The component surface must be cleaned before lining the component with **ZZ® 391 Fire Protection Putty Pad**. The pad is pressed onto the surface and adheres to the component by itself. The mat is suitable for both the inside of openings and the outside of housings and can be wrapped around cable bundles. The mat remains easily deformable even after a long service life, making it easy to add further services to the opening.
Special Notes	The implementation of the sealing in small and irregular openings with **ZZ® 391 Fire Protection Putty Pad** is carried out in accordance with the specifications of the current test report (see attachment). The dimensions of the installations, etc., can also be found in this test report.

4. SUMMARY

- Fire protection measures using **ZZ® 391 Fire Protection Putty Pad** can be implemented in rail vehicles after verifying the boundary conditions.
- **ZZ® 391 Fire Protection Putty Pad** achieves fire-resistance with compartmentalization of 30 minutes and up to 20 minutes of thermal insulation. These values are in accordance with **EI20** classification.
- The examples (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 FIRE PROTECTION SEAL 1

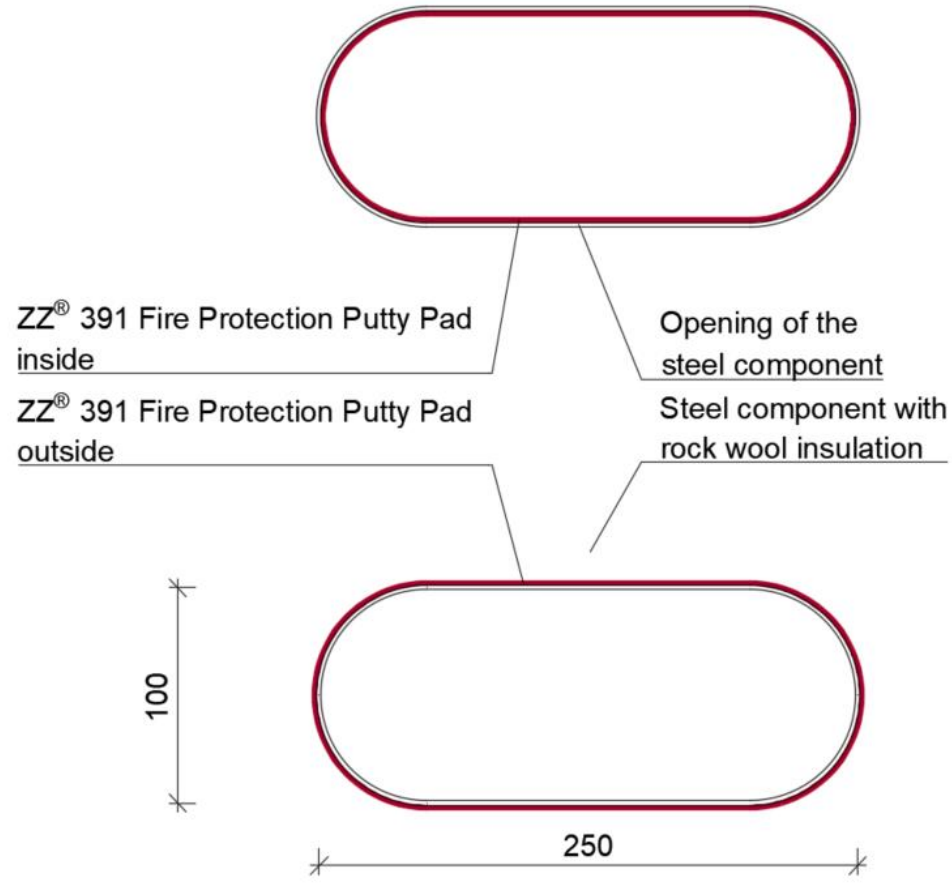
FOR FIRE PROTECTION OF SOCKETS IN RAIL VEHICLES WITH

ZZ® 391 FIRE PROTECTION PUTTY PAD

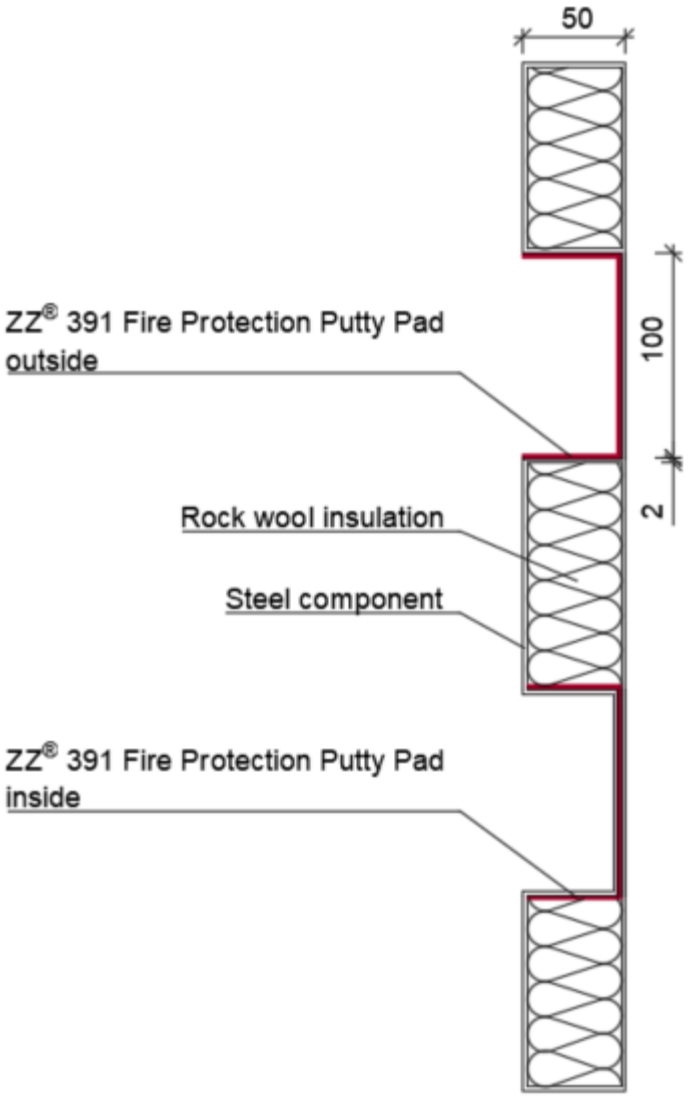
The illustrations depict the fundamental principle of fire protection using and implementation of **ZZ® 390 Fire Protection Putty** in electrical sockets. It is important to note that a minimum thickness of insulating material must be used to achieve the fire resistance class of the surrounding component.

A 5 mm thick lining of **ZZ® 391 Fire Protection Putty Pad** applied on the outside achieves a room closure of 30 minutes (**E30**) and a thermal insulation of 20 minutes (**I20**), corresponding to **EI20**. The same lining on the inside achieves **EI10**.

Example Schematic 1 – Face View



Example Schematic 1 – Section View



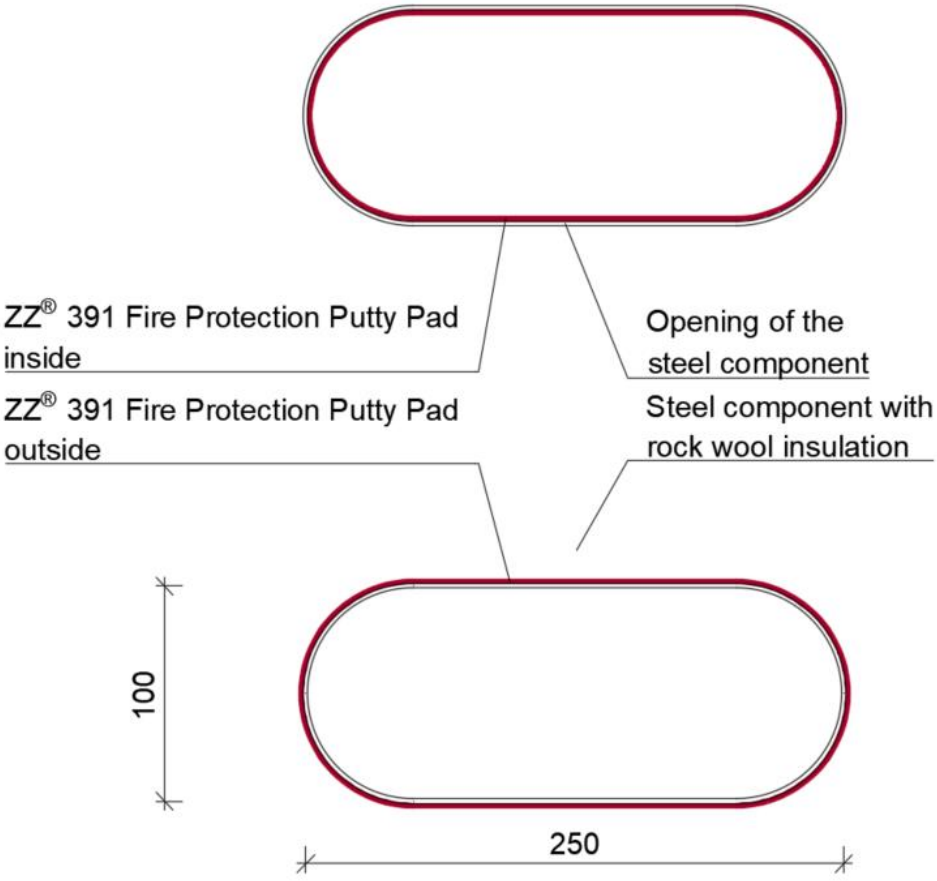
EXAMPLE FIRE PROTECTION SEAL 2

FOR FIRE PROTECTION OF CASINGS IN RAIL VEHICLES WITH **ZZ® 391 FIRE PROTECTION PUTTY PAD**

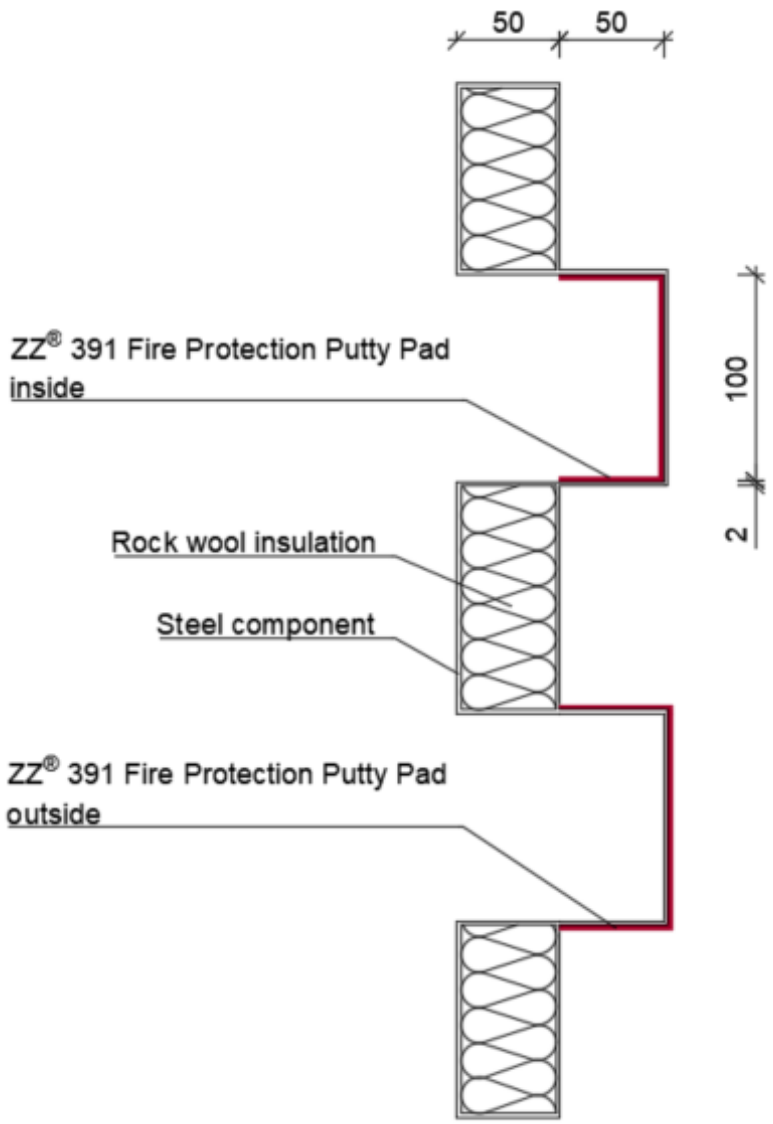
The illustrations depict the fundamental principle of fire protection using and implementation of **ZZ® 391 Fire Protection Putty Pad** for the protection of casings. It is important to note that a minimum thickness of insulating material must be used to achieve the fire resistance class of the surrounding component.

A 5 mm thick lining made of **ZZ® 391 Fire Protection Putty Pad** applied on the outside achieves a room closure of 30 minutes and a thermal insulation of 10 minutes, i.e. **EI10**. The same lining on the inside achieves **EI20**.

Example Schematic 2 – Face View



Example Schematic 2 – Section View



FOUNDATIONS OF THIS TECHNICAL INFORMATION

This technical information on **ZZ® 391 Fire Protection Putty Pad** in rail vehicles is based on the following documents:

- Test Report Nr. R23-0711B, Currenta, issued 13.12.2023
- R22, R23 nach EN 45545-2
  - Classification Report Nr. 21/0546, Currenta
  - Test Report Nr. 21/0545 ISO 4589-2
  - Test Report Nr. 21/0416 ISO 5659-2
- DIN EN 45545-3: 2013
- DIN EN 1364-1: 2015
- EN 1366-3: 2021
- Construction diagrams according to example

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