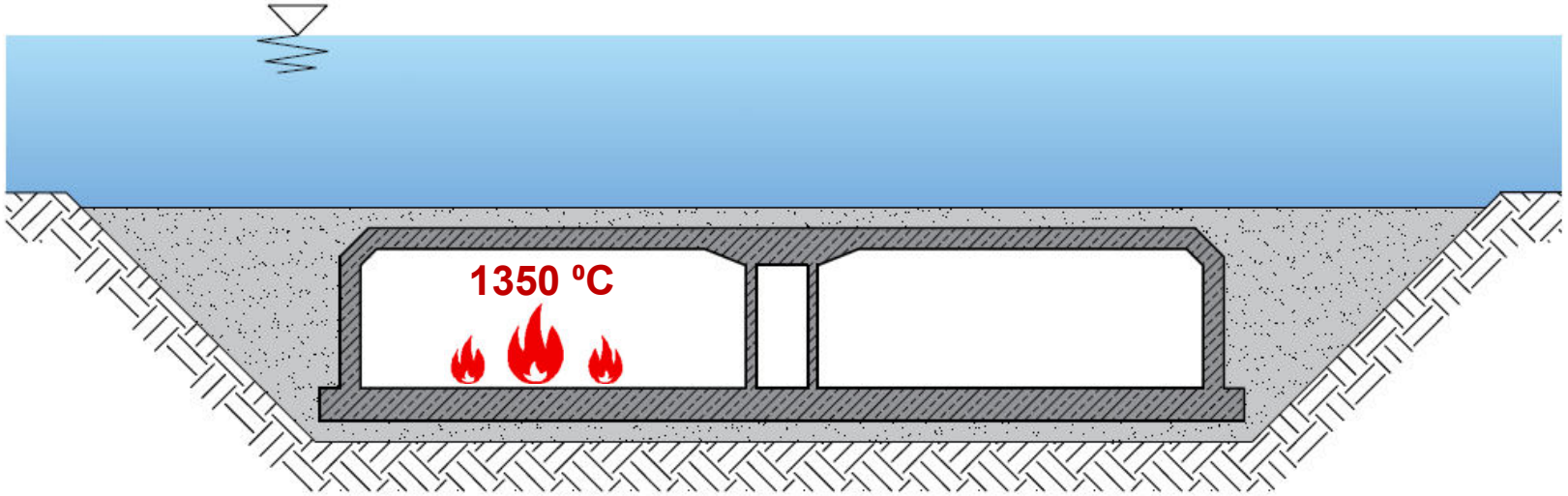
SkamoTunnel

Passive fire protection of tunnel linings

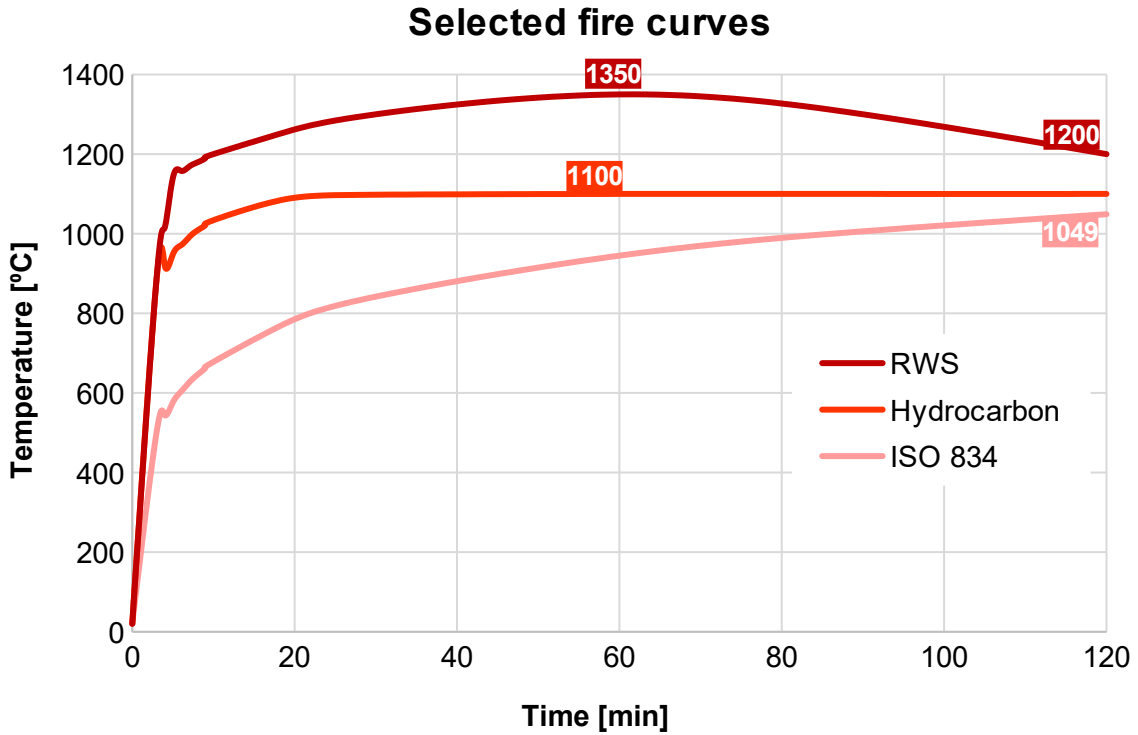
skamol

Introduction



RWS fire curve:

- 50m³ fuel, oil or petrol tanker will catch fire
- A fire load of 300 MW



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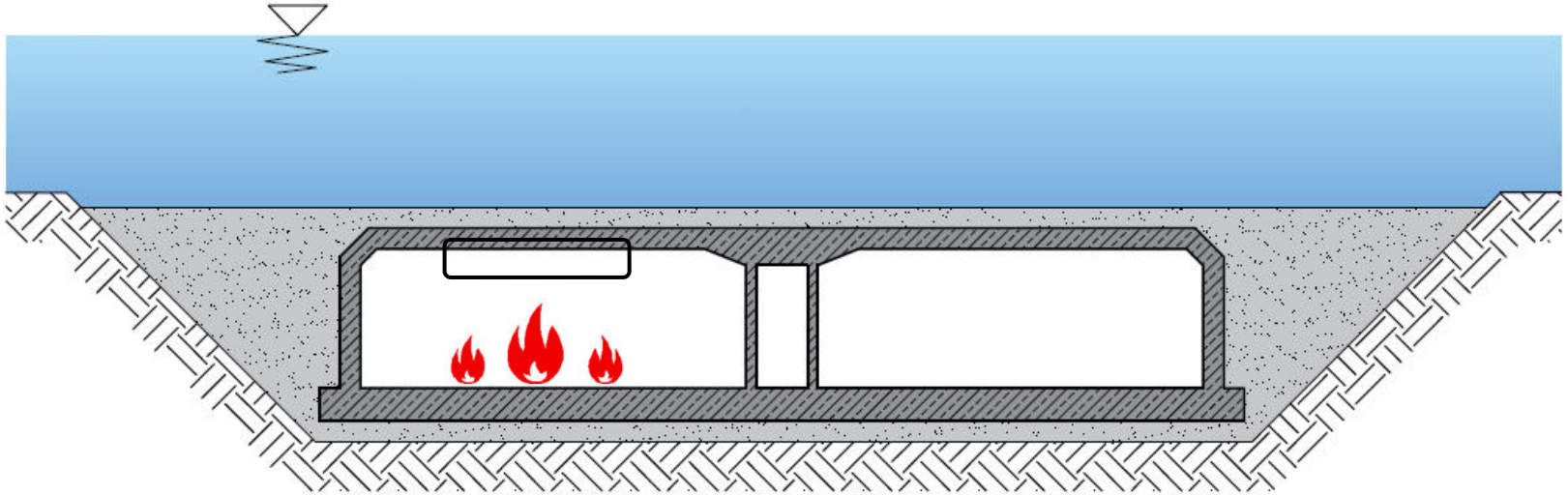

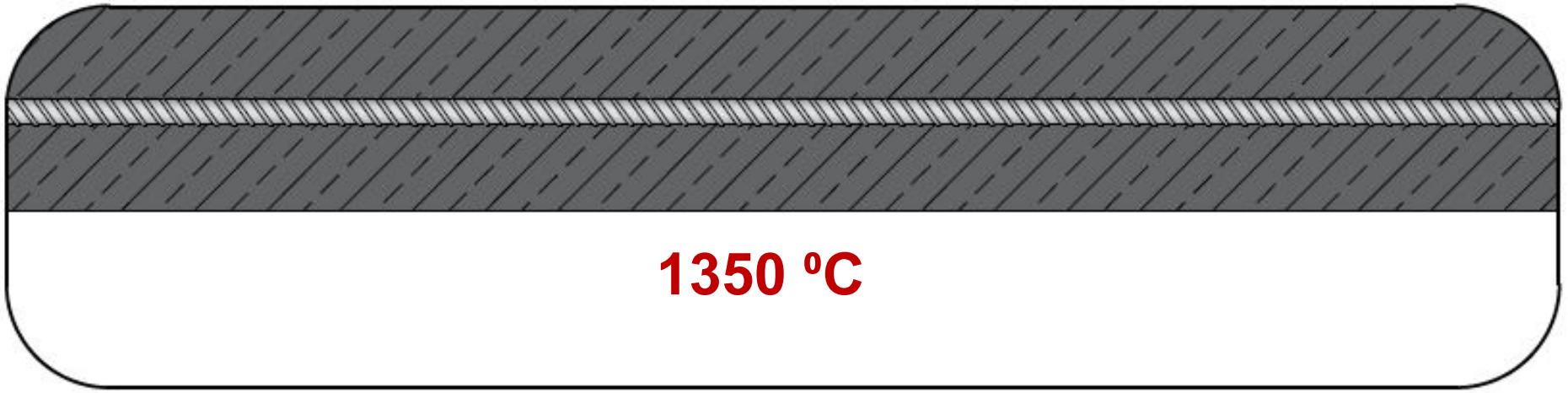

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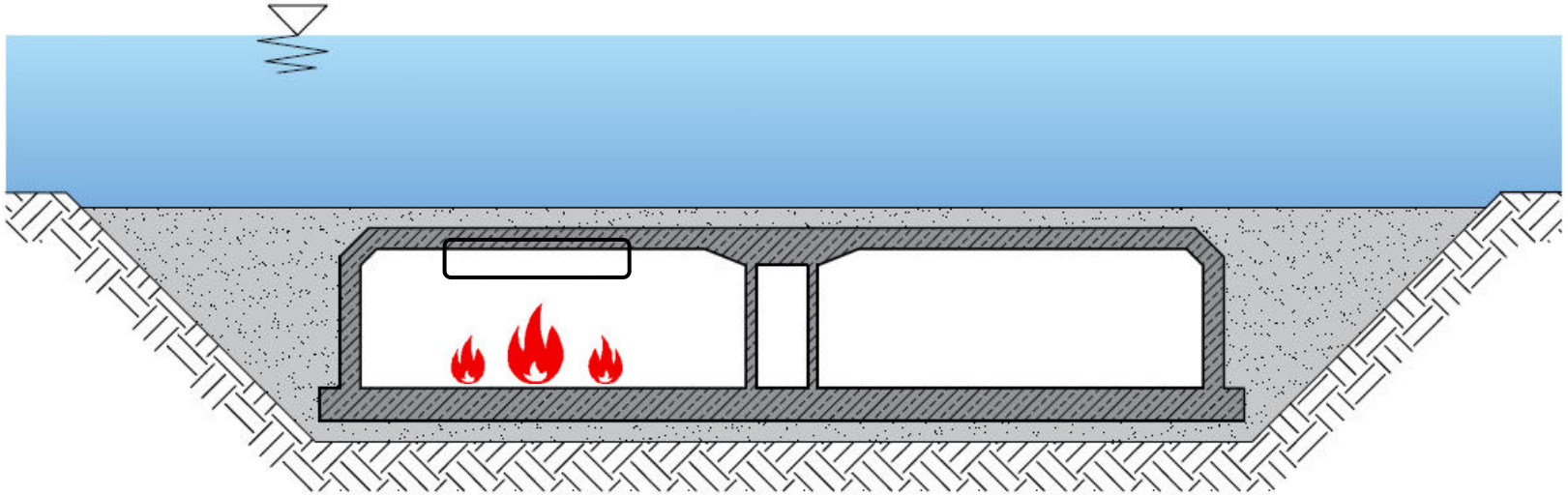
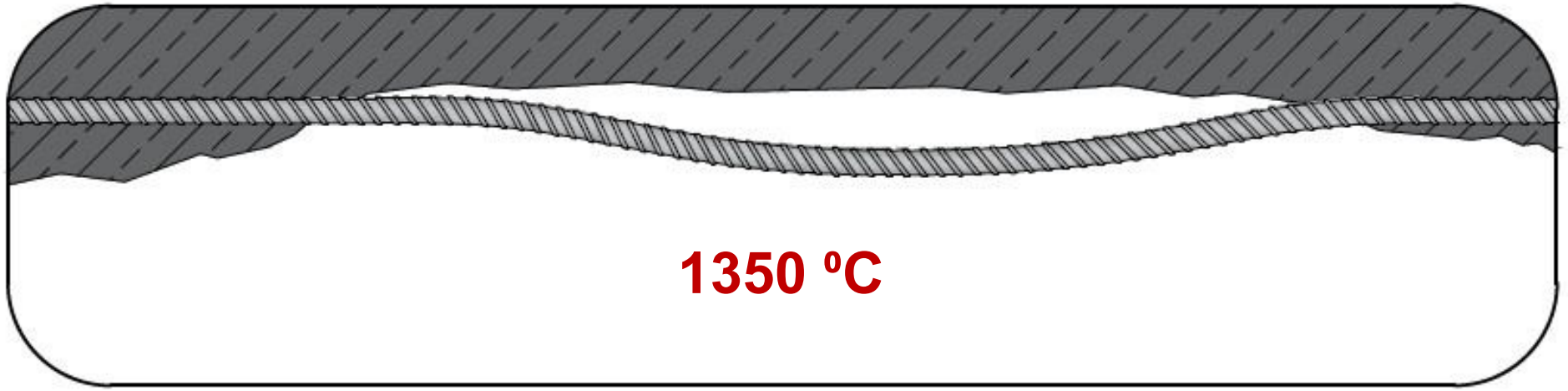




Introduction

Regulation of the Minister of Infrastructure of August 1, 2019 amending the regulation on the technical conditions to be met by road engineering structures and their location (Journal of Laws of 2019, item 1642)

2. The load-bearing structure of the tunnel used to carry out the road intended for the traffic of vehicles other than bicycles should have a fire load capacity of not less than 120 minutes, determined in relation to the tunnel temperature-time curve, the value of which is specified in the table:

6. The tunnel referred to in sec. 2, of concrete structural elements should be designed and constructed in such a way that in the fire conditions referred to in paragraph. 2, there was no risk of concrete spalling.

Time [min]	Temperature [ºC]
0	20
3	890
5	1140
10	1200
30	1300
60	1350
90	1300
120	1200

Introduction

Requirements for passive fire protection systems of tunnel linings

Fire protection
Ochrona przeciwpożarowa

Material strength
Wytrzymałość materiału

Freeze/thaw resistance
Odporność na cykle zamrażania/rozmrażania

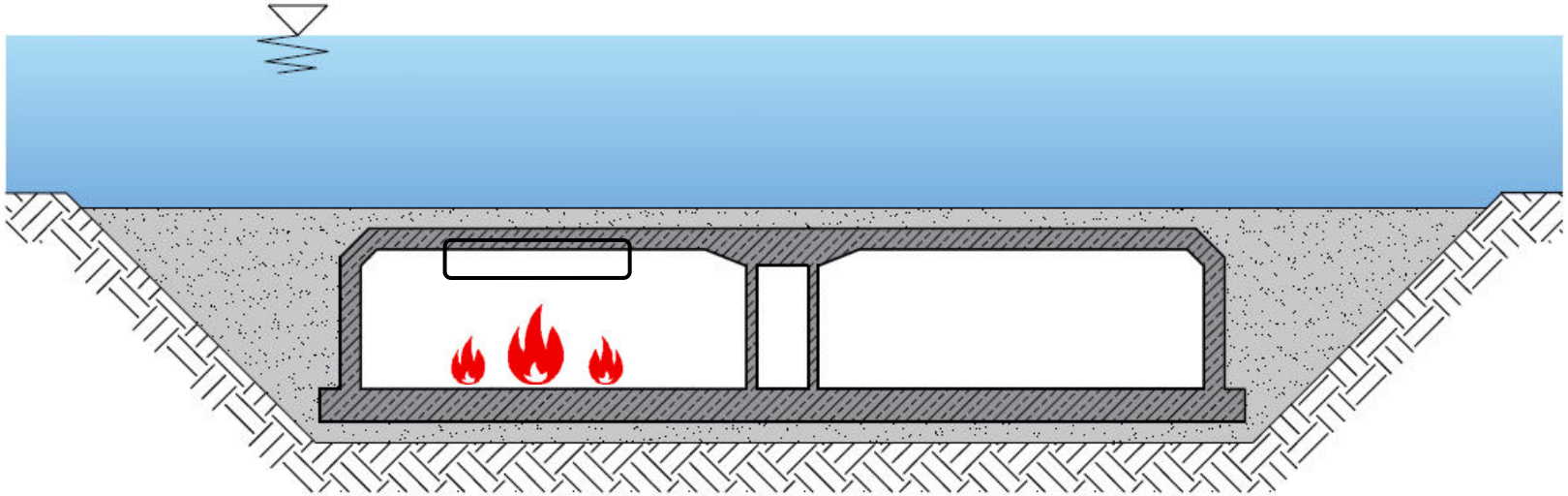
Washability
Zmywalność

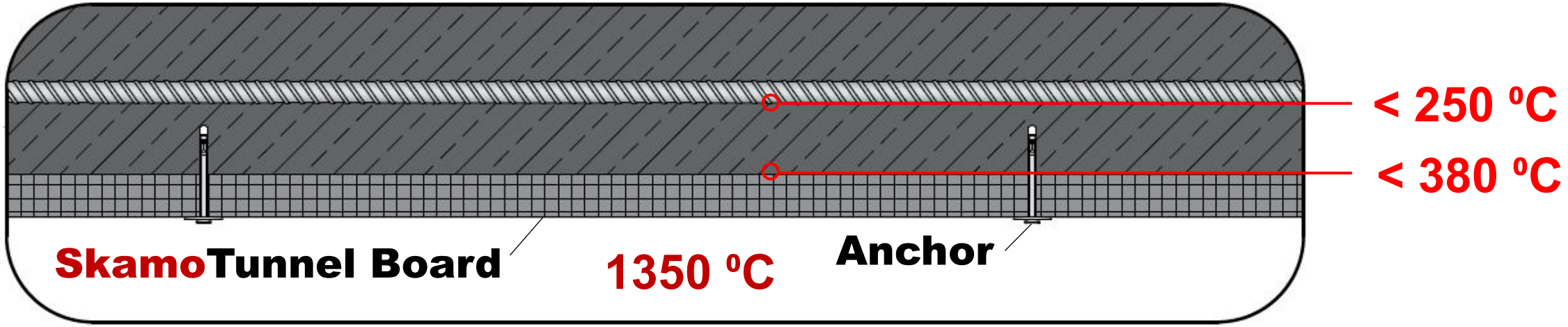
Inspection possibilities
Możliwość inspekcji

Easy instalation
Łatwa instalacja

Sustainable waste management
Zrównoważona gospodarka odpadami

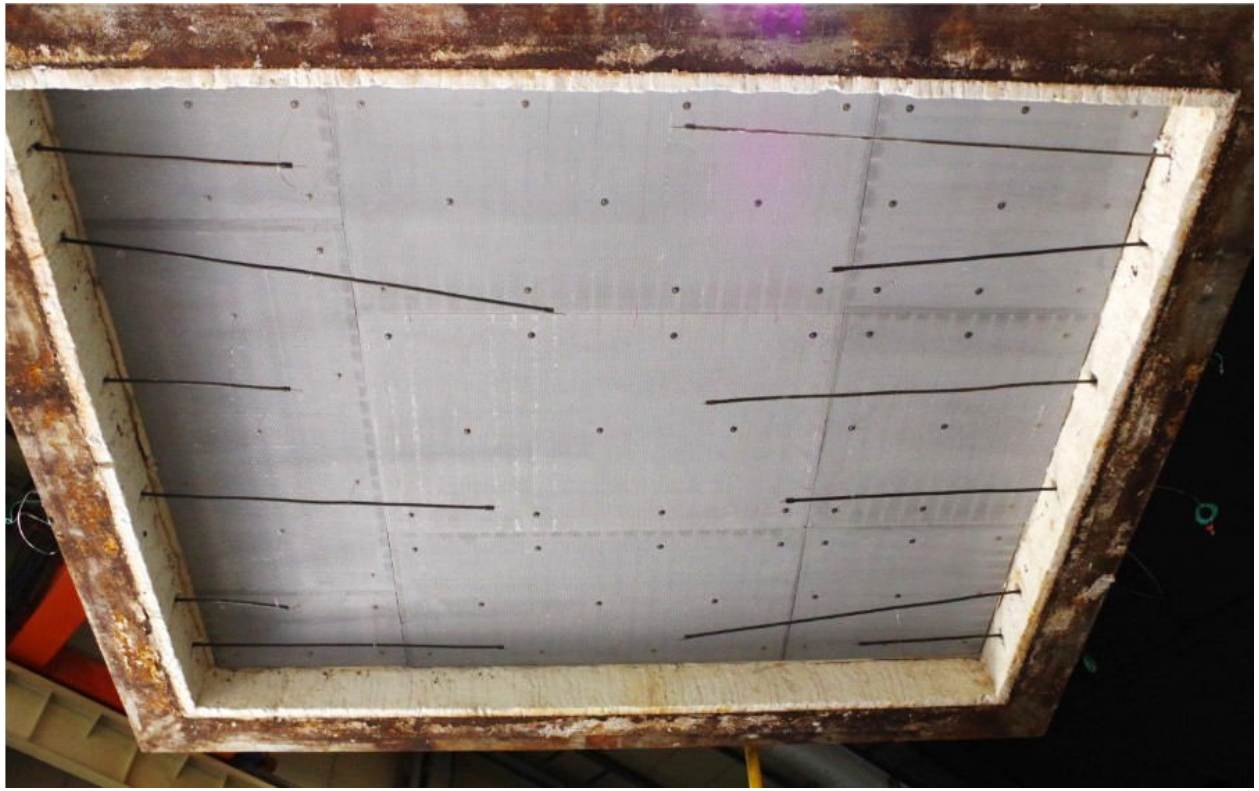
1. Fire protection

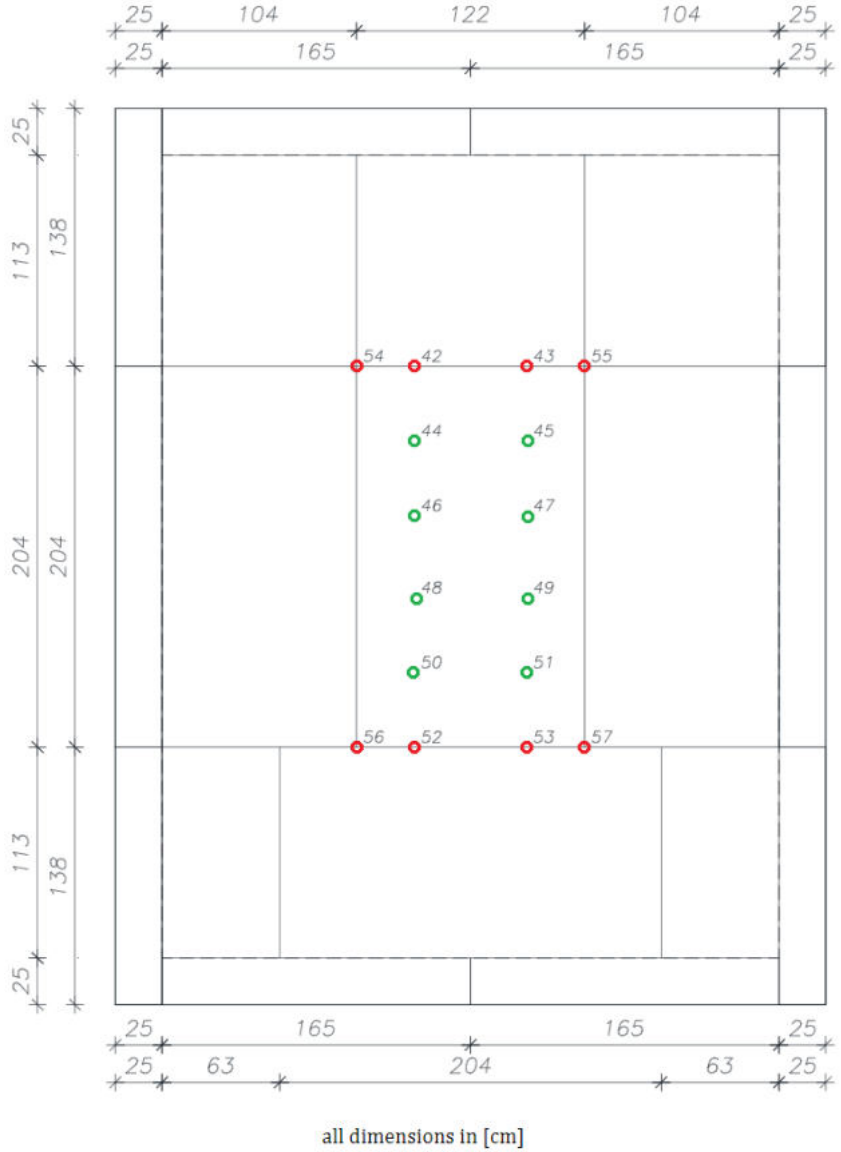




1. Fire protection

- Instytut Techniki Budowlanej
- Efectis-R0695:2020 – new location of thermocouples
- Drastically increased acceptance criteria for a passive fire protection system for tunnels.
- Increased structural safety in case of fire.

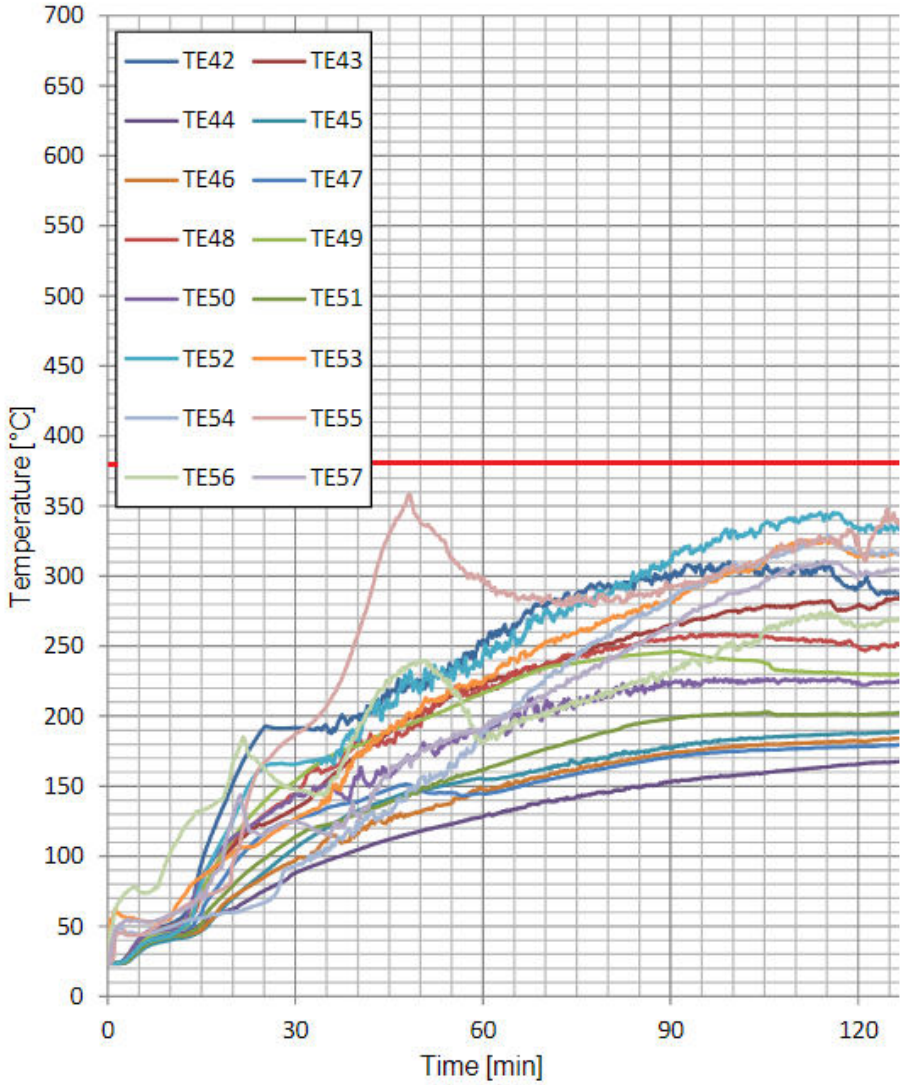




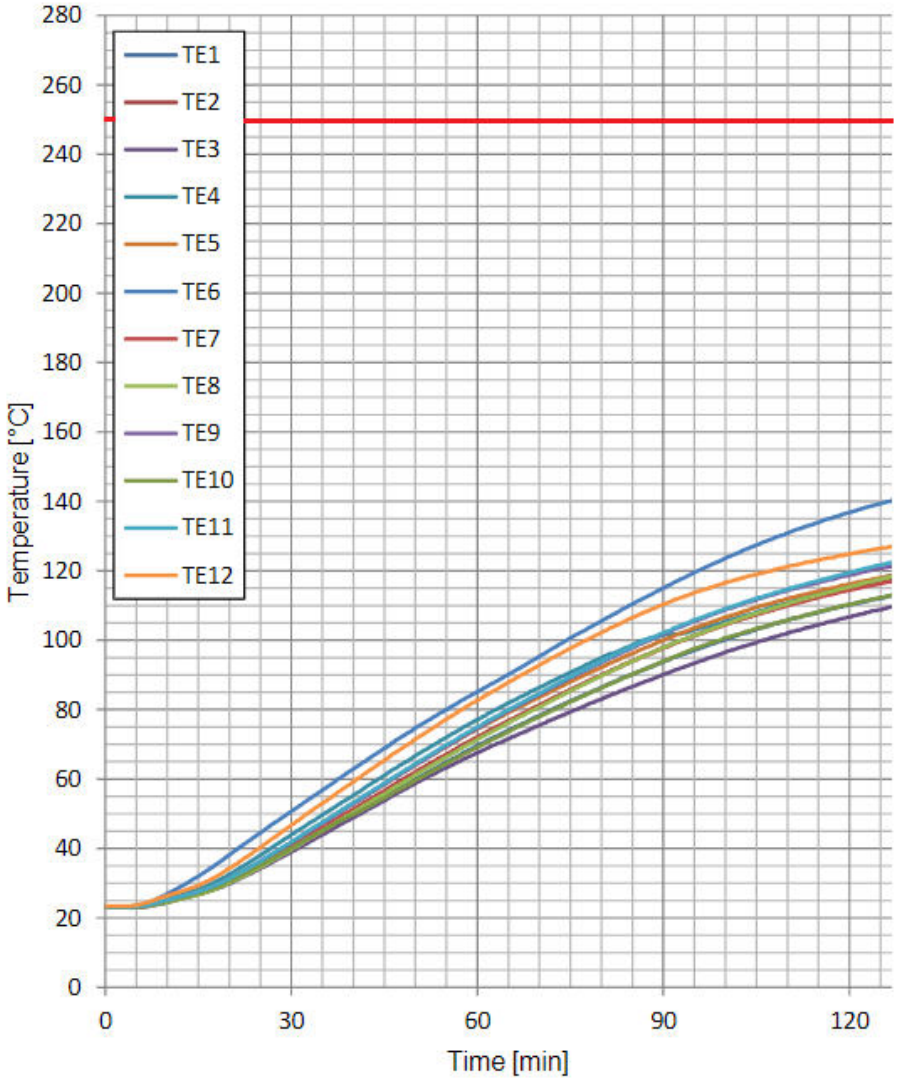
all dimensions in [cm]

Fig. 1. Locations of temperature measurement points under fire protection board – bottom concrete surface on the interface with fire protection material(a = 0 mm)

1. Fire protection

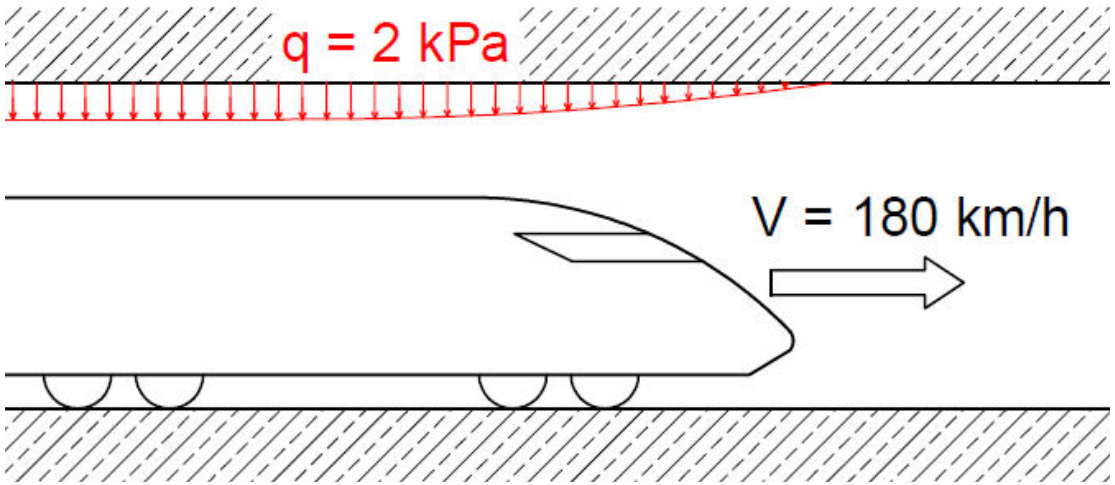


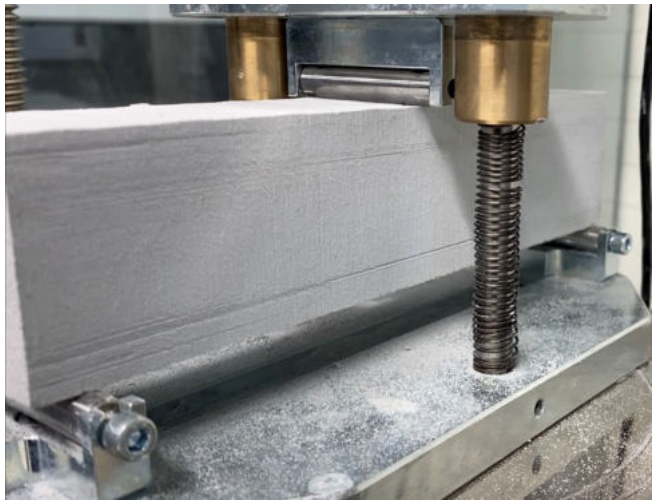
Graphs of temperature in the slab, a=0 mm
(concrete to fire protection interface)



Graphs of temperature in the slab, a=25 mm (reinforcement)

2. Material strength





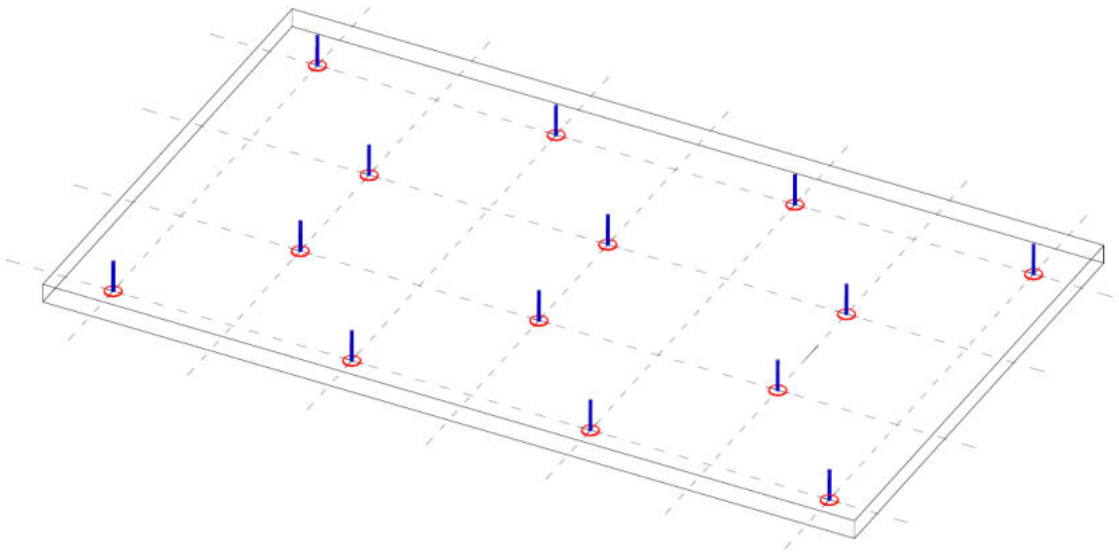
Design values of the effects of actions ≤ Design resistance

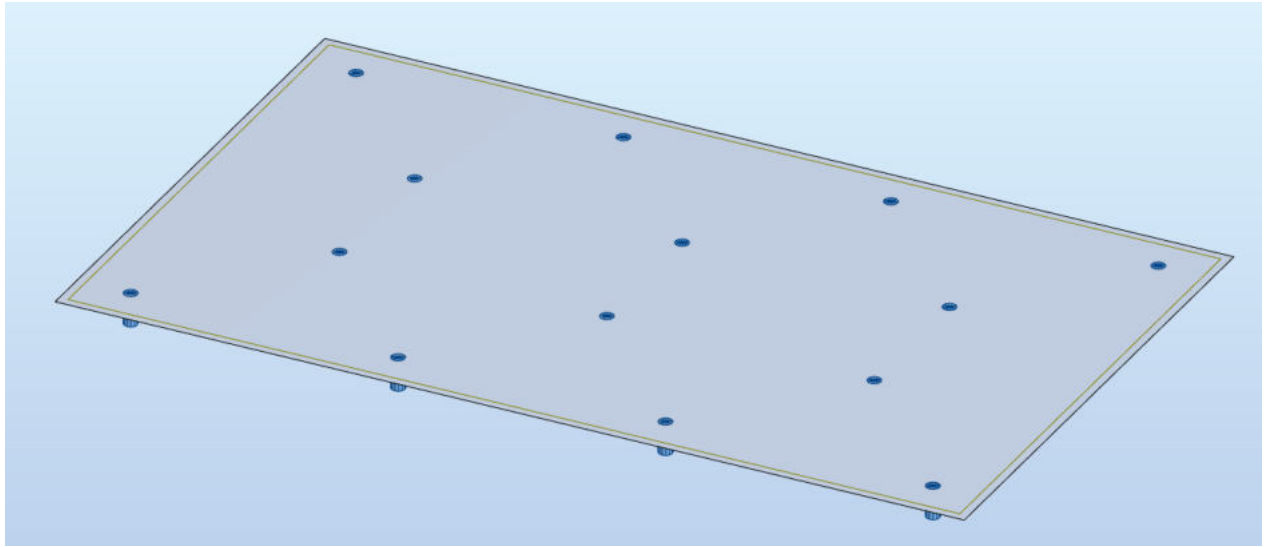
Ultimate limit states (EN 1990 - Eurocode - Basis of structural design)

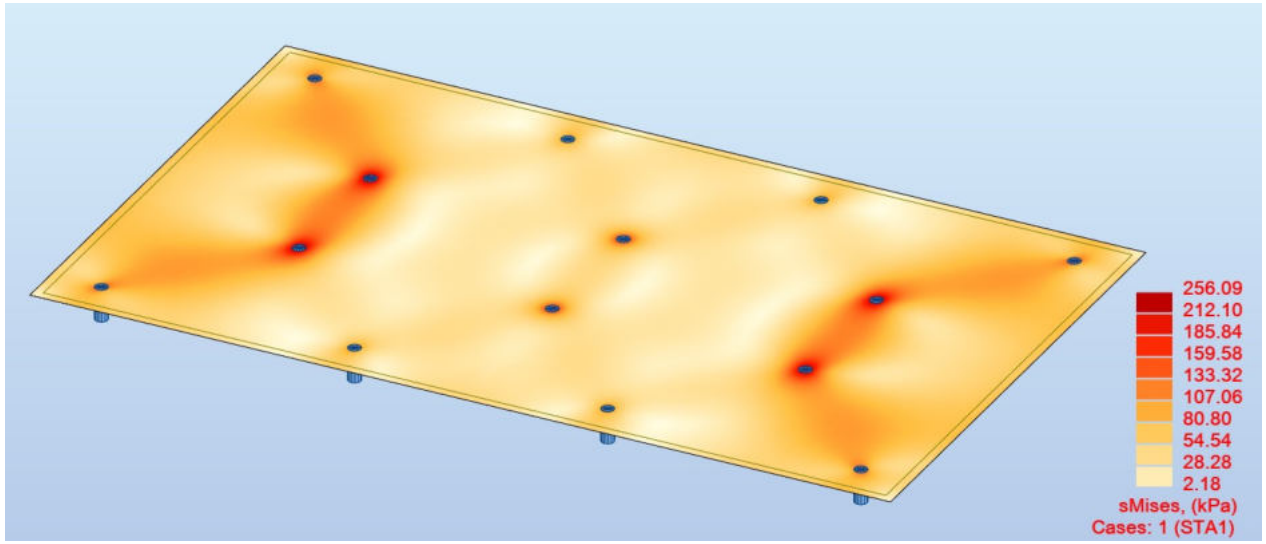
STR – Internal failure of structure or structural member, where the strength of construction materials of the structure governs

FAT – Fatigue failure of structure or structural members

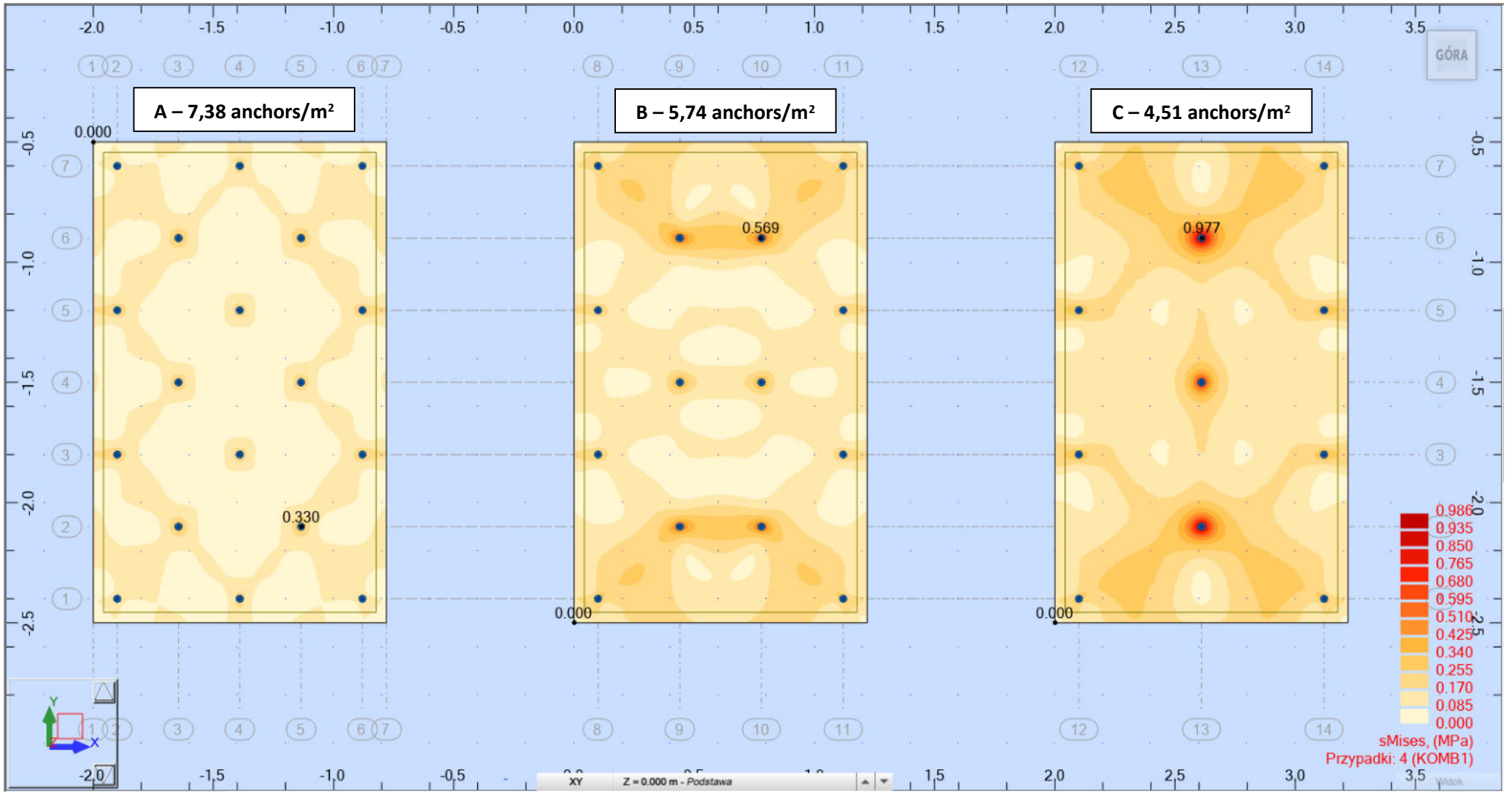
2. Material strength



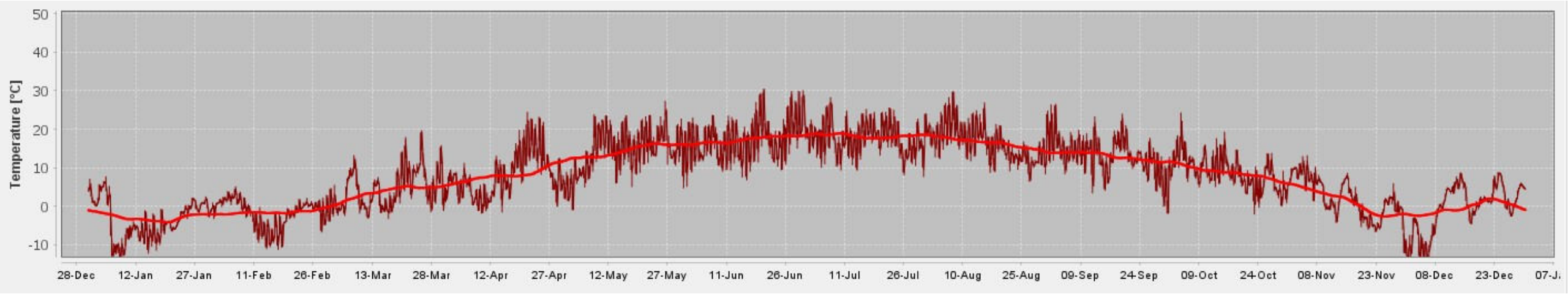




2. Material strength



3. Freeze/thaw resistance



- EAD 350142-00-1106 “Fire protection board, slab, mat products and kits”
- Danish Technological Institute
- Freeze/thaw resistance
- Type Y classification

This classification states that the board can be used for internal and semi-exposure conditions.

4. Washability

According to the Norwegian National Road Directorate

The requirement are as follows:
150 bar
25 l/min
50 cm from nozzle

4. Washability

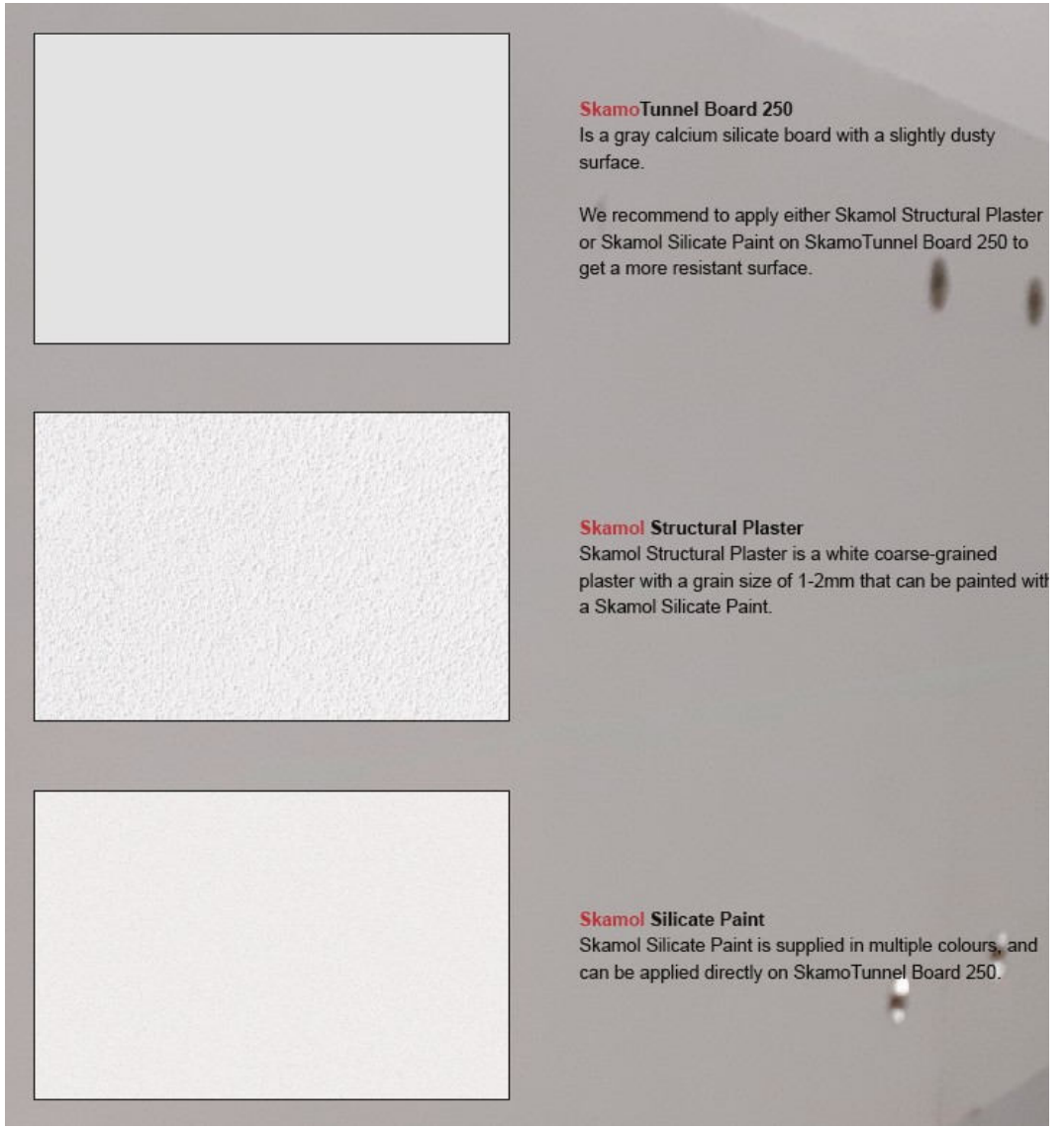
Based on this test, we have 2 different options for washing:

1 option:

This is used where the passive fire protection needs cleaning **2 times** a year for **50 years**. Here the solution would be to apply two layers of Skamol Silicate Paint. This paint can be applied by either spray or roller directly on the board.
No primer is needed.

2 option:

This is used where the passive fire protection will need cleaning for up to **10 times** a year for **50 years**. Here the solution would be to apply Skamol Primer, Skamol Structural Plaster and two layers of Skamol Silicate Paint.



5. Inspection possibilities

The anchors and the board can be removed if necessary.

This is important in two situations:

- An inspection of the structure is necessary.
- The damaged board needs to be replaced.

6. Easy installation

The SkamoTunnel board 250 is very light and weigths around **10 kg na m²** for a 40 mm thick board.

The SkamoTunnel board 250 can be cut with normal wood cutting tools, which makes it easier to customize the boards onsite.

6. Easy installation

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7. Sustainable waste management

SkamoTunnel Board

- System is made of natural materials

Thank You!

For Your Attention

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