

# MEYCO<sup>®</sup> Fireshield 1350

## Cementitious based passive fire protection barrier for underground structures

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### Product description

MEYCO<sup>®</sup> Fireshield 1350 is a specially formulated and patent applied cementitious based, high strength mortar for fire protection of both existing and new-build underground concrete structures, preventing the need for extensive and expensive structural repairs to underground support structures.

MEYCO<sup>®</sup> Fireshield 1350 is available for sprayed application using wet mix sprayed concrete equipment. It can be hand sprayed or applied by robotic manipulator. MEYCO<sup>®</sup> Fireshield 1350 may also be pre-cast and cast in-situ.

MEYCO<sup>®</sup> Fireshield 1350 consists of a mineral/organic main components, Portland cement, water, admixtures and accelerator. All of the product components are environmentally favourable, with no single component being more harmful than the cement.

MEYCO<sup>®</sup> Fireshield 1350 not only prevents the continual cycle of explosive spalling of structural concrete when it is exposed to high heating rates, but also vitally prevents the mechanical deterioration of both structural concrete and structural steel reinforcement exposed to fires above 300°C.

### Fields of application

- Fire protection of existing plain and reinforced concrete and masonry lined tunnels
- Fire protection of new build tunnel linings, including:
  - pre-cast concrete linings
  - cast in-situ concrete linings
  - sprayed concrete linings
- Fire protection to the insulating polyethylene sheets for frost free water drainage in cold climate tunnels
- Fire protection of underground facilities, e.g. mine workshops, M&E rooms etc

### Features and benefits

MEYCO<sup>®</sup> Fireshield 1350 has been successfully fire tested under many fire load scenarios, examples of which are shown in Figure 1. With its high insulation properties, and being spray

applied, MEYCO<sup>®</sup> Fireshield 1350 can be applied in relatively thin layers. The required level of protection and thickness for specific fire load scenarios can be determined by referring to the Summary Design Guide available from the local UGC Representative.

MEYCO<sup>®</sup> Fireshield 1350 offers the following project benefits:

- Relatively high compressive strength in comparison to conventional fire protection mortars/plasters
- Applied to the design thickness in one application layer
- Fast application rates
- Can be used as a fully bonded system, or in combination with steel mesh reinforcement
- Durable during service life of structure and not effected by moisture or water ingress
- Easy to repair
- Environment friendly product
- No toxic products emitted during tunnel fires. MEYCO<sup>®</sup> Fireshield 1350 conforms to latest European requirements.
- Maintenance inspection of the structural lining is made possible with a fully bonded MEYCO<sup>®</sup> Fireshield 1350

For large area application, laser guided robotic application using MEYCO<sup>®</sup> Robojet Logica system maybe selected for rapid and controlled application with a thickness tolerance of +/- 4mm.

As MEYCO<sup>®</sup> Fireshield 1350 is composed of a fine-grained aggregate, and applied with MEYCO<sup>®</sup> Robojet Logica equipment, the quality of surface finish may be considered sufficient for many tunnel structures without the need for screeding or hand floating measures etc.

If a high quality surface finish and reflectance is required, a final thin coat of MEYCO<sup>®</sup> Fireshield 1350 may be applied after the final set has occurred. This coat can be float and screed finished as necessary. This surface can be readily over painted with systems suitable for tunnel environments.



## Packaging

MEYCO® Fireshield 1350 is available in 20kg bags and 1305kg big bags.

## Technical data (spray applied)

Compressive strength (28 days)	15 to 20 N/mm <sup>2</sup>
Tensile strength (28 days)	2 ± 0.5 N/mm <sup>2</sup>
Density (28 days) (application method dependent)	1450 ± 100 kg/m <sup>3</sup>
Maximum particle size	4 mm
Fire protection performance and required thickness	Please refer to the Summary Design Guide

## Bonding to Substrate

MEYCO® Fireshield 1350 may be bonded to a concrete substrate in three ways depending on the design requirements for the underground structure:

### 1. Fully bonded without steel mesh

MEYCO® Fireshield 1350 as a sprayed concrete can uniquely be bonded to a structural concrete tunnel lining without the need for steel mesh reinforcement, offering significant benefits to the project.

To fulfil this approach, adequate substrate preparation, typically by the hydromilling process, is a pre-requisite as with any cementitious-cementitious bond approach, coupled with suitable curing conditions – e.g. Average relative humidity above 50%, average temperature above 10°C.

UGC can advise on this method in more detail based on the requirements for each specific project.

### 2. Mechanical bond with steel mesh reinforcement

MEYCO® Fireshield 1350 may conventionally be mechanically bonded to a structural concrete lining using a lightweight steel reinforcement mesh, (such as 50x50x1.5mm mesh depending on requirements).

The concrete substrate should be cleaned thoroughly before application of MEYCO® Fireshield 1350.

### 3. Bonding through combination of 1 & 2 above

Projects may benefit from the unique combination offered by

MEYCO® Fireshield1350 of being both fully bonded and mechanically ed using steel mesh reinforcement to the structural concrete as described in 1 and 2 above.

### Steel mesh quality

Typically a stainless steel mesh (grade A316) is used, however, based on length of service life and expected environmental exposure, lower grades may be considered by the tunnel design team.

## Summary Design Guide

The required thickness of MEYCO® Fireshield 1350 is dependent on the following criteria:

- The magnitude of the fire load and duration, e.g. RWS, Hydrocarbon curve EC 1, Modified Hydrocarbon (HCM), ISO 834 etc (see also Figure 1)
- The composition and material properties of the structure to be protected, e.g. plain concrete, reinforced concrete, high strength concrete, steel and pre-stressed steel etc
- The required interface temperature between the MEYCO® Fireshield 1350 and the structure
- Critical heating rates

The Summary Design Guide for MEYCO® Fireshield 1350 is a set of tables for each fire load curve that identifies the required thickness for each of the structural lining types. Furthermore, the Summary Design Guide gives MEYCO® Fireshield 1350 thicknesses for critical heating rates.

The Summary Design Guide is available from your local UGC Representative.

## Application procedure

A monopump capable of spraying up to 8mm aggregate is recommended for this process.

The recommended mix design for application via the wet mix process is as follows for 100kg of dry powder:

MEYCO® Fireshield 1350	100 kg
Water	29 to 33 kg
MEYCO® TCC 735	0.4 kg

At spray nozzle add:  
MEYCO® SA 160

15 to 25 kg per  
m<sup>3</sup> of wet mix



### Mixing

MEYCO® Fireshield 1350 can be mixed in all standard concrete batching and mixing equipment, including mixer trucks. The required mixing time shall be determined by site trials using the type of mixer employed on site. The volume of material batched should be applied within two hours. It is important to check that the MEYCO® Fireshield 1350 is thoroughly mixed with the water and MEYCO® TCC 735 before transferring to the sprayed concrete pump.

### Dosing system

A MEYCO® Mixa is the recommended dosing system for the MEYCO® SA-160 alkali-free accelerator to the nozzle, or other adequate dosing systems.

### Storage

When stored in original closed bags, in ventilated dry areas, MEYCO® Fireshield 1350 has a shelf life as follows:

Big bag (1305kg)	1 year
20kg bags	6 months

Other packaging options may be available on request.

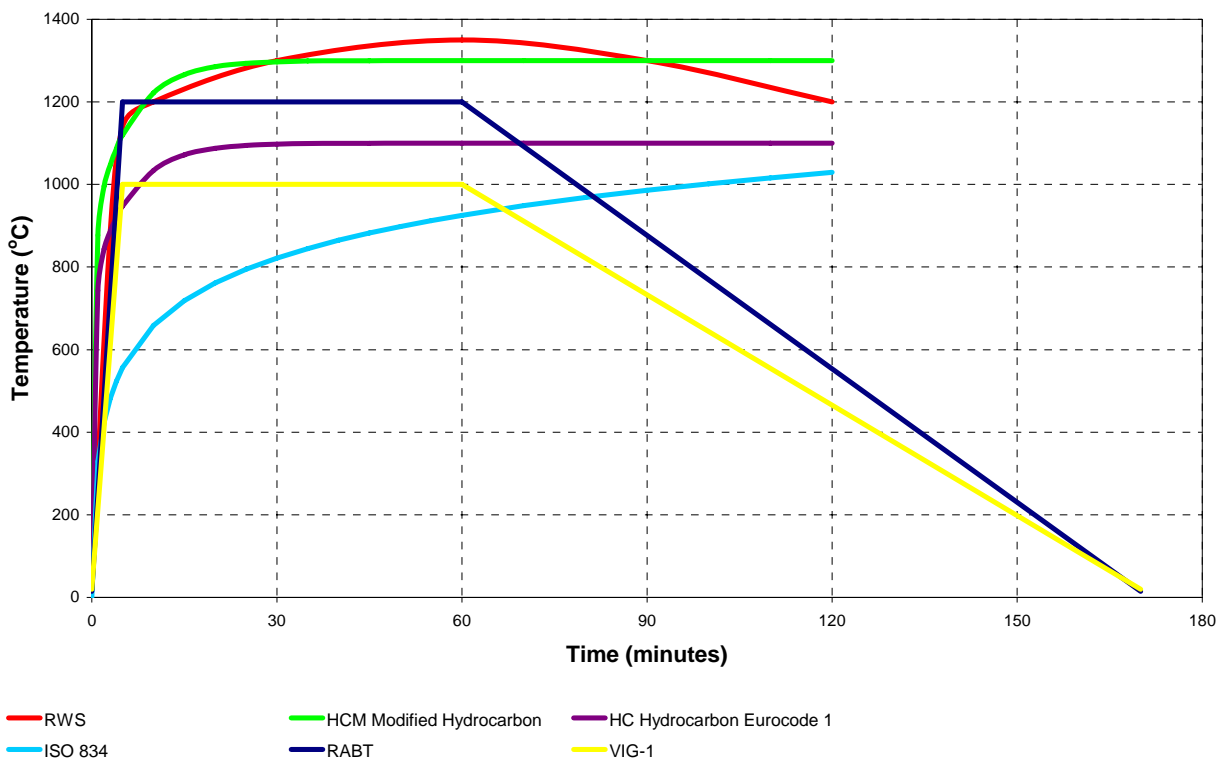
### Safety precautions

Any physical contact made with MEYCO® Fireshield 1350 should be avoided, as the cement content may cause irritation, or burns.

If such contact occurs, the affected area should be washed with plenty of clean water. In case of eye contact, seek immediate medical advice.

Please refer to the Material Safety Data Sheet.

Figure 1: Examples of fire load curve scenarios considered in the Summary Design Guide





The Chemical Company

The information given here is true, represents our best knowledge and is based not only on laboratory work but also on field experience. However, because of numerous factors affecting results, we offer this information without guarantee and no patent liability is assumed. For additional information or questions, please contact your local UGC representative.

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