General Directorate of Infrastructure, Transport and Sea

FRANCE

Tunnels Study Center

ASSOCIATION INTERNATIONALE DES TRAVAUX EN SOUTERRAIN AITES — ITA INTERNATIONAL TUNNELLING ASSOCIATION

FIREBARRIER 0135

Main characteristics (technical specifications)

Cementitious product designed to provide fire protection for applications requiring a strong, smooth, weather resistant exterior finish. When mixed with water, can be applied by spray equipment to a wide variety of substrates.
Its high adhesion capacity leads to a very low wastage of material during spray applications.

Can be washed: ☐ **Low/medium/high pressure** **Can be painted:** ☐

Information on the composition

Refractory formulation
SiO2 (25,5%) Al2O3(45,8%) CaO free lime (14,5%) CaO total (24,8%) Fe2O3 (15%)
TiO2 (0,7%) MgO + K2O +NaO2O3 (1,5%)

Fire Test reports (cross the relevant boxes)

ISO (1050°C 2h 1160°C 4h) ☒	HC (1100°C, ref. EC1.1.2) ☐	HCM (1300°C, HC*1300/1100) ☒
RABT/ZTV (Germany) (1200°C) ☐	RWS (1350°C) ☒	Others : ☐

Characteristics of the tested samples, report number and possible comments:

- TNO fire test in October 98 under RWS conditions on 15cm thickness RC slabs with 55mm and 38,5mm FIREBARRIER 135 protection including steel wire mesh and dowels.
- SINTEF fire test in February 2000 under RWS conditions on 40cm thickness RC slabs representative of EL AZHAR CAIRO tunnel lining segment with FIREBARRIER 135 47mm, 49mm and 57mm thickness including steel galvanised/plastified wire mesh and dowels.
- CSI fire test in 2001 under HCM conditions on 20cm RC slabs with 28mm and 32 mm FIREBARRIER 135 protection including steel wire mesh and dowels.
- TNO fire test under HCM conditions on 20cm RC slabs with 28mm and 35mm FIREBARRIER 135 protection including steel wire mesh and dowels.
- CSI fire test in 2005 (DC02/009/F05) under 4h ISO conditions on 15 cm RC slabs with 28 mm FIREBARRIER 135 protection including steel wire mesh and dowels.

Application procedures — Board ☐ Mortar ☒

FIREBARRIER spray (1050 kg/m3) in one layer after wire mesh fixed by dowels and manual smoothing with a rule.

Present application field

Fire protection to concrete tunnel linings ; Structural Steel Fire Protection; Vessel fire protection

Resources, territories and habitats · Energy and climate · Sustainable development · Infrastructures, transports and sea · Risk prevention

Here for the future

25, avenue F. Mitterrand – case n°1 – 69674 BRON cedex – FRANCE - Tél : +33 472 14 34 00 – Fax : +33 472 14 34 30

Possible use in tunnels	Civil engineering works references
Concrete structures lining including segments Shelters, cables rooms of pulling	El Azhar Cairo Road Tunnel (Egypt) Mont Blanc Tunnel (shelters) Foix Tunnel (France) Epine Tunnel (France) Sinard Tunnel (France) Verla di Giovo Tunnel(Italy) De Lecco Tunnel (Italy)

Physical and thermal data

Reaction to fire
(French/European classification): **A1**

Main thermal data: (at 20°C and possibly variation with temperature)

Thermal conductivity λ ($W.m^{-1}.K^{-1}$) =
0,18 (20°) 0,185 (200°) 0,195 (400°)

-
- 2 out of the 4 following values
  - Specific heat c ($J.\ kg^{-1}.K^{-1}$) = **950**
  - Density ρ (kg/m^3) = **1550**
  - Volumic specific heat C ($J.m^{-3}.K^{-1}$) = ρc=
  - Diffusivity a (en $m^2.s^{-1}$) = $\lambda/\rho c$ =
- Resulting emissivity (adimensionnall) : ε_{res} =

Other thermal data :
Reflection coefficient (adimensionnal) :
or
Absorption coefficient (adimensionnal) :

Main mechanical data:
E modulus (MPa) =
Compressive strength (MPa) = **9**
(3 at 72h)

Complementary data:
Porosity :
Shore hardness :
Adhesion strength (MPa) = **0,67**
Tensile Strenght (MPa)= **0,39**

Durability

Pull out : 0.67 MPa

PH 8

Product and company identification/Commercial name/ Applicators

Albert BENHAMOU
INNOVATIVE FIRE SYSTEMS
5 RUE GAMBETTA
57 100 THIONVILLE
FRANCE
TEL : +33 688 03 49 41
FAX : +33 382 85 66 36

Documentation/References

site http://www.innovativefiresystems.com