FIBERMESH® 150 Fibres

The solution to explosive spalling in concrete

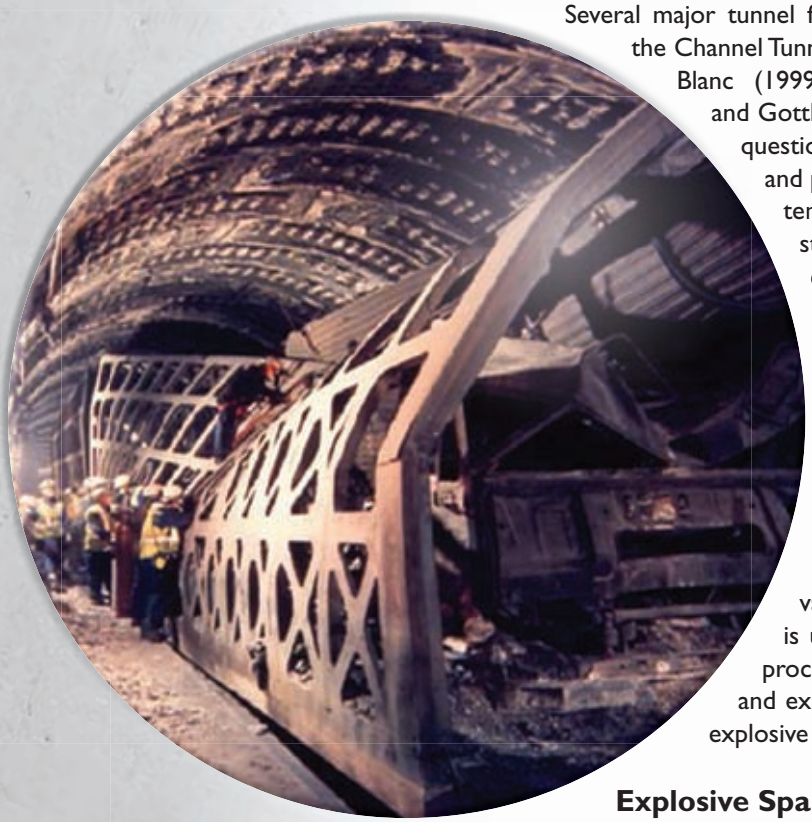
PROPEX®

CONCRETE SYSTEMS

Explosive Problem.

EXPLOSIVE SPALLING

As the world's most widely used construction material, concrete offers many advantages to building and civil engineering projects including versatility, strength and durability. However, it is known to present problems when exposed to high temperature fires.



Several major tunnel fires including the Channel Tunnel (1996), Mont Blanc (1999), Kaprun (2000) and Gotthard (2001) have raised questions about the properties of concrete in fire situations and prompted much research into its behaviour at high temperatures. Investigations into fires in concrete structures have determined that a significant loss of cross-sectional area in the tunnel lining can occur due to the explosive spalling of concrete when exposed to very high temperatures.

Explosive Spalling occurs when moisture in the concrete is heated faster than it can migrate from the heat due to a rapid temperature rise, as in hydrocarbon fuelled fires. As the heat of the concrete increases, moisture in the concrete pores experiences a phase change to vapour. This vapour causes an increase in pore pressure, which is unable to escape from the concrete mass. As this process continues, vapour pressure rapidly builds up and exceeds the tensile capacity of the concrete causing explosive spalling.

Explosive Spalling in concrete creates three main consequences:

1) A health & safety risk for the emergency services
2) The structural integrity of the tunnel is placed at risk
3) Huge economic damage caused by major disruption and enormous repair costs

FIBERMESH® 150 Fibres

Effective Solution.

FIBERMESH® 150

Propex Concrete Systems has spent many years researching how micro polypropylene fibres function in concrete when exposed to fire. We have built up a very detailed understanding of the mechanism by which certain types of fibre can provide this valuable function.

This research knowledge has been utilized to develop Fibermesh® 150, a quality assured fibre that provides the highest performance against explosive spalling yet at the same time, is user friendly to the concrete producer and contractor.

Unlike several other competitor's fibres that are offered for this application, Fibermesh® 150 has minimal effect both on the workability and the air content of the concrete.

Incorporating a relatively small amount of Fibermesh® 150 fibre provides a 3 dimensional protection system throughout the concrete and ONLY when there is a fire, do they create the correct form of permeability that is required to relieve the steam pressure that is created inside the concrete. Despite the claims of some manufacturers, it is not only the number of fibres that determines how much resistance to explosive spalling is provided, it is the optimized balance of the best type of fibre and the number of fibres - and that has been built into Fibermesh® 150.

The ability of Fibermesh® 150 fibres to prevent explosive spalling of concrete has been independently verified at several internationally renowned fire test laboratories including SP Technical Research Institute (Sweden), Efectis/TNO (Netherlands), IBS (Austria), Hagerbach Test Gallery (Switzerland) and BRE (United Kingdom).

Fibermesh® 150 micro-synthetic fibres are manufactured to ISO 9001 Quality Assured Standards from 100% virgin polypropylene containing no reprocessed materials and are engineered specifically for use as concrete reinforcement. Fibermesh® 150 micro-synthetic fibres are European Standard EN 14889-2:2006 compliant and carry CE marking.

In addition to providing explosive spalling resistance, Fibermesh® 150 fibres will provide resistance to early age shrinkage cracking, improve impact and abrasion resistance and reduce rebound in sprayed concrete applications.

PROPEX®
CONCRETE SYSTEMS

Big expertise. Big experience.

CHANNEL TUNNEL RAIL LINK – UK (CONTRACT 250)

This £130m project is part of the Channel Tunnel Rail Link (CTRL) high-speed rail link which runs for 108km between the Channel Tunnel and central London. The project has over 40km of 7.15m diameter, precast concrete lined bored tunnels, sections which are constructed in water bearing sand. Fibermesh® 150 fibres at a dosage of 1kg/m³ were used in the production of the precast tunnel lining segments which also included Novocon steel fibres in a total fibre reinforced solution.

GOTTHARD BASE TUNNEL - SWITZERLAND

The Gotthard Base Tunnel with a length of 57km will be the longest tunnel in the world upon completion in 2015. Fibermesh® 150 fibres were tested and approved for use on this project at the world renowned Hagerbach Test Gallery in Sargans, Switzerland. Since commencement of the project, Fibermesh® 150 fibre at a dosage of 2kg/m" has been the preferred fibre of contractors on various sections of this 11.7 billion Swiss Franc project.

VOMP TERFENS - AUSTRIA

This 8.4km two & three track rail tunnel in the Austrian Tyrol forms part of the main Munich to Verona railway line and is the longest NATM tunnel in the Brenner axis upgrade project. Joint Venture group - Zublin AG, Hoctief AG & Strabag Bau-AG selected Fibermesh® 150 fibre for the passive fire protection of the final tunnel lining after conducting extensive fire testing and concrete mix trials. A dosage rate of 2kg/m" was specified by the project engineers.

WEEHAWKEN TUNNEL - NEW JERSEY, USA

Tunnel engineers Parsons Brinkerhoff selected the use of Fibermesh® 150 fibres for the tunnel lining on the Weehawken twin-track light-rail project in preference to other fibre products after establishing that they did not adversely affect the level of air entrainment within the specified concrete. Fibermesh® 150 fibres were used at a dosage rate of 1.2kg/m³. Novocon steel fibres were also used to increase the flexural toughness of the tunnel lining.

EASTLINK TUNNEL – MELBOURNE, AUSTRALIA

In keeping with the focus on safety, tunnel engineers specified the inclusion of Fibermesh® 150 fibres at a dosage rate of 2kg/m³ in both shotcrete and cast insitu tunnel linings for this twin-bore 1.6km long road tunnel. Fibermesh® 150 fibre was chosen in preference to other fibres because of it's certified performance and because it did not adversely affect the workability and air content of the concrete. Joint Venture group - Theiss John Holland were the contractors on this $3.8 billion project.

North America
Propex Operating Company LLC.
6025 Lee Highway, Suite 425
PO Box 22788
Chattanooga, TN 37422
USA
Tel: 423 892 8080
Fax: 423 892 0157

International
Propex House, 9 Royal Court,
Basil Close
Chesterfield, Derbyshire
S41 7SL.
United Kingdom
Tel +44 (0) 1246 564200
Fax: +44 (0) 1246 465201

PROPEX®
CONCRETE SYSTEMS