Technical Data Sheet

Elasto Plastic Concrete

Fire Resistance

Reduced Spalling at High Temperatures

Product: BarChip F passive fire protection fibre

Introduction

Explosive spalling of concrete occurs when, during exposure to fire, moisture is converted to steam creating pore pressures which exceed the tensile strength of the concrete. Explosive spalling presents immediate risks to emergency response personnel in fire situations and the exposure of underlying steel can result in rapid deterioration of strength and load capacity.

Concept

The incorporation of fine denier engineered polypropylene fibres into concrete, when added in specific volumes and distributed uniformly, will provide upon melting a series of pressure relief pores sufficient to significantly reduce the risk of tensile forces causing explosive failure to the parent concrete when exposed to the most rigorous fire.

Experimental Program

Hydrocarbon fire curves, when applied in testing, seek to generate a fire which simulates a worst case scenario for a major fire in a tunnel. Temperatures exceeding 1100 degrees C are reached in less than 30 minutes into the test and testing can continue at this exposure for defined periods.

In recent testing in Australia, using the CSIRO test facility, subjecting locally cast 50 MPa panels to a four hour fire in a pilot furnace adopting the Hydrocarbon fire curve, plain concrete specimens exhibited severe spalling to a depth of 100 mm. Specimens containing 1.5 kg/m3 of BarChip F showed little or no damage when subjected to the same test.

Conclusion

The inclusion of BarChip F fibre significantly reduces the risk of explosive spalling in concrete subjected to severe fire loading.

Concrete Panel Ready for Test

Testing in Furnace

Damage to Specimen without BarChip F

Specimen Containing 1.5Kg/m3 BarChip F

BARCHIP CARBON FOOTPRINT CO_2 70% LESS THAN STEEL

Elasto Plastic Concrete

www.elastoplastic.com

EPC Australia	call +61 1300 131 158	email australia@elastoplastic.com
EPC Europe	call +44 (0) 77 8070 2642	email europe@elastoplastic.com
EPC Asia	call +65 6835 7716	email asia@elastoplastic.com
EPC N. America	call +1 704 843 8401	email na@elastoplastic.com
EPC S. America	call +56 32 271 5118	email sa@elastoplastic.com

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