CERTIFICATE OF APPROVAL
No. ME0165

This is to certify that the referenced products of

PROMAT MIDDLE EAST

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have been assessed against the requirements of the *warringtonfire – mideast certification scheme* and are approved for use within the scope of the test and/or assessment report(s) referenced.

Promatect H tunnel fire protection systems

Certificate Reference	Valid Until
CERTIFIRE Certificate CF548	8th October 2013

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Promat UK Ltd – Promatect H Fire Protection Systems for Tunnel Linings

This approval relates to the ability of Promatect H fire protection systems for reinforced concrete tunnel linings to maintain their performance in terms of Integrity and Insulation as defined in TNO report No. 1998-CVB-R1161 (rev 1): Fire protection for tunnels: Part 1: Fire test procedures, for periods of up to 120 minutes, when subjected to the RWS temperature/time furnace heating conditions.

The performance criteria described within the test procedure are as follows:

- During the 120-minute heating period the protection material must not fall away as a result of failure of the fixing system.
- During the 120-minute heating period the following temperatures shall not be exceeded:
  a) 380°C for each measuring point at the interface of the concrete and the protection material.
  b) 250°C for each measuring point located 25mm above the bottom of the concrete slab (thermocouples fixed to the underside of the reinforcement).

Lost formwork system

The Promatect H boards, 27.5mm thick, are laid on the load-bearing formwork for the tunnel lining with the smooth face down. The boards are laid next to each other with butted joints. Where the tunnel is designed with sloped sections, the edges of the boards are cut at an angle and butt-jointed. The boards can either be installed using staggered joints or straight joints.

The locations of the screws, forming the connection between the boards and the concrete, are marked on the boards. Prior to the installation of the screws the first layer of steel reinforcement for the concrete lining is installed on spacer blocks. The stainless steel (grade A2) screws with a countersunk head are 5.0mm x 50mm-long chipboard screws. Each screw is inserted into the Promatect H board to a depth of 20mm, with the remaining 30mm protruding from the board. These form the anchorage to the concrete after it has been poured. For wall and ceiling applications the screws are fitted at a minimum rate of 12 screws per m^2. The screws are positioned as evenly as possible across the boards and along the boards, with the screws adjacent to the edges of the boards being 50mm from the edge.

When the lost formwork system is used for wall applications the Promatect H boards are temporarily connected to the vertical formwork by means of four screws per board.

Before the concrete is poured the boards may be moistened to humidify the boards and minimise the water extracted from the concrete mixture. Once the concrete has cured sufficiently the formwork is removed.

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Post-fixed method

For wall and ceiling applications the Promatect H boards may be installed after the concrete tunnel walls and roofs have been constructed. The boards are fastened to the concrete with Fischer FNA 6x30/30 A4 stainless steel anchors (or equivalent). The FNA anchors are installed in combination with a circular washer, 30mm diameter x 1.2mm thick, stainless steel (grade A4) with a hole diameter of 7.5mm. For wall and ceiling applications the screws are fitted at a minimum rate of 4.5 to 5 anchors per m^2. The anchors are positioned as evenly as possible across the boards and along the boards, with the anchors adjacent to the edges of the boards being 100mm from the edge.

The Promatect H boards, 27.5mm thick, are installed with the smooth face towards the tunnel. The boards are installed next to each other with butted joints. Where the tunnel is designed with sloped sections, the edges of the boards are cut at an angle and butt-jointed. The boards can either be installed using staggered joints or straight joints.

Tunnel expansion joints

Expansion joints are kept watertight by means of a rubber profile that is embedded in the concrete. The maximum gap size is 35mm. The gap in the Promatect H board lining is covered by a strip of Promatect H board 27.5mm thick. The cover strip overlaps the board on one side of the gap by at least 200mm and is fastened to the lining board with two rows of stainless steel screws (the same as for the lost formwork system) at 300mm nominal centres. The cover strip overlaps the lining board on the opposite side of the gap by at least 100mm but is not fastened to it.

Repair of minor damage

In the case of minor surface damage or gaps between the Promatect H boards in excess of 2mm, these are filled with Promatect T compound.

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Smoke and toxicity

No claim made.

Durability

Evidence of durability is based on tests conducted in accordance with EN 12467. The following test evidence has been presented for Promatect H board:

- Resistance to deterioration caused by water - EN 12467, Clause 7.3.5 – the ratio R_L was determined to be greater than 0.75 and therefore acceptable.
- Resistance to soak/dry - EN 12467, Clause 7.3.6 - the ratio R_L was determined to be greater than 0.75 and therefore acceptable.
- Resistance to freeze/thaw - EN 12467, Clause 7.4.1 - the ratio R_L was determined to be greater than 0.75 and therefore acceptable.
- Resistance to heat/rain - EN 12467, Clause 7.4.2 – no performance determined.

Signed for and on behalf of Warrington Certification

Sir Ken Knight
Chairman - Management Council

Issued: 12th February 2009
Valid to: 8th October 2013