

Tunnel Fire Protection

Tecbor boards, Tecwool mortars

This brochure is addressed to tunnel professionals to present **the fire protection systems and products for tunnels available from Mercor Group** and to show solutions used in the projects completed by the Group.

This brochure presents technical solutions using **Tecbor tunnel boards** and **Tecwool 825 mortars** specially developed for passive protection against hydrocarbon fire in industrial plants and tunnels.

Tecbor boards and Tecwool mortars are manufactured by the Spanish company MercorTecresa, which joined the Mercor Group in February 2008. MercorTecresa has invested a great deal of effort in order to design new fire protection solutions. Already the Tecbor and Tecwool brand names are well-established on the market and have a great reputation for quality, value, and performance on a global scale.



Mercor has been on the market since 1988. With its subsidiaries: MercorTecresa in Spain, Mercor-Proof LLC in Russia, Mercor Czech Republic s.r.o. in the Czech Republic, Mercor Slovakia s.r.o. in Slovakia, Mercor Ukraina Sp. z o.o. in Ukraine, Mercor Fire Protection Systems s.r.l. in Romania, and Dunamenti Tűzvédelem Zrt. in Hungary, it forms a capital group which is one of the leading companies in Europe in the field of passive fire protection systems. Mercor has also been strengthening its position outside the European markets, i.e. in Asia, Africa and South America.

Currently, Mercor products set the standard for many domestic and foreign projects.

Company product portfolio includes:

- **fire protection systems for building structures and tunnels** (spraying protection systems, board systems, intumescent coating systems, service penetration systems),
- **fire ventilation systems** (fire dampers, cut-off fire dampers, smoke exhaust fans, intake and exhaust fans, overpressure systems for staircases, jet fan systems for garages, control units),
- **natural smoke and heat exhaust systems** (smoke vents, smoke and ventilation dampers, louver vents, skylights, smoke curtains, roof hatches, rooflights, window smoke exhaust systems, control systems).

The Mercor Group continually enhances its product range, offering its customers the most innovative solutions available on the market. The products are certified according to a wide range of standards and are tested in accredited laboratories.

The Group has over 500 qualified employees. It offers “tailor-made” products and provides comprehensive customer service, namely design consulting, pricing, production, supply, installation and servicing as well as product training.



Mercor - nearly 30 years of experience!

DESCRIPTION

Tecwool 825 is a mortar made of rock wool, cement and additives, specifically designed for fire protection in industrial facilities and tunnels. It looks like a monolithic block, highly resistant to erosion and semi-exposed or partially covered areas.

TESTS

Tecwool 825 has been tested in laboratories certified by ENAC or identical international entities pursuant to UNE EN, ASTM or similar standards.

Likewise, real scale tests have been performed in tunnels under particularly limiting conditions such as hydrocarbons modified curve (HMC) and RWS curve.

Tecwool 825 is manufactured with inorganic components such as rock wool, classified according to European Directive 67/548/EEC as Xi; R-38 (health risk-free).

FIRE REACTION

Tecwool 825 is classified as A1 (non combustible) pursuant to European Standard EN 13501-1 and British Standard BS 476: Part 4.

FINISHES

Tecwool 825 can provide different finishes: row, smooth, painted according to different aesthetic requirements.

Once the application is completed in order to obtain a smooth finish, a roller could be used and pressed slightly over the wet mortar until the desired finish is obtained.

It is possible to paint the mortar with elastic acrylic coatings to form a moisture barrier. Before painting the mortar should be completely dry (28 days).

TECHNICAL CHARACTERISTICS AND SPECIFICATIONS

Composition	Cement, rock wool and additives.
Fire reaction	A1
Bulk mortar density	385 Kg/m ³ ± 10%
Dry density (after 28 days)	613 Kg/m ³ ± 10%
Spraying density (wet)	1070 Kg/m ³ ± 10%
Alkalinity (pH value)	12.5
Resistance to fungi	Immune.
Marketing	30 kg sacks in 720 kg pallets.
Thermal Conductivity	Max. 0.045 W/m ² K at 20°C



TECBOR TUNNEL BOARDS

DESCRIPTION

Tecbor boards are rigid fire protection panels made of magnesium oxide, silicates, and other additives, finished with a fibreglass mesh on both sides. They can be left as a stand alone finish or can be painted if required. Tecbor boards provide a wide array of construction solutions for passive fire protection in building and industrial applications.

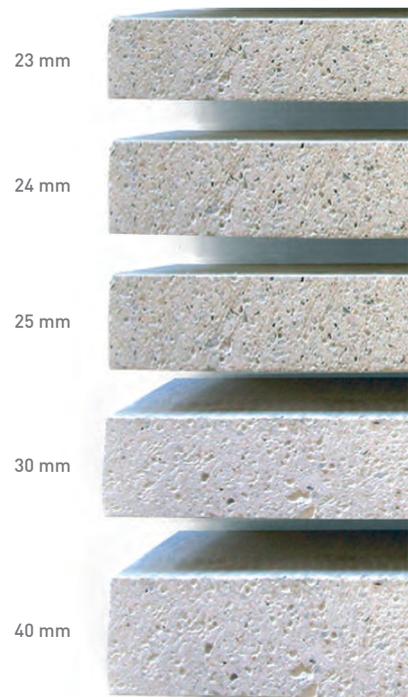
TESTS

Tecbor boards have CE marking. All tests have been conducted in certified labs pursuant to EN standards as per DITE 018-4 specifications approved by EOTA.

Tecbor boards do not contain hazardous substances according to the Commission's Database DS041/051. Given our concern to make Tecbor an integral solution, we conduct real-scale tests in tunnels, hydrocarbon curve tests, RWS curve tests or tests under the American UL standard.

FIRE REACTION

Tecbor is classified as A1 (non combustible) pursuant to European Standard EN 13501-1 and British Standard BS 476: Part 4.



QUALITY

Tecbor boards bear the CE Mark (ETA 09/0057) pursuant to the specifications of the ETAG 018-4 Guide approved by EOTA.

TECHNICAL CHARACTERISTICS AND SPECIFICATIONS

SPECIFICATIONS	TECBOR	NORMATIVE
Composition	Magnesite based, silicate & other additives	-
Fire Performance	Non-combustible Euroclass A1	UNE - EN 13501- 1:2002
Dry Density (40°C)	900 kg/m ³ ±10%	UNE - EN 12467
Density (23°C y 50% HR)	925 kg/m ³ ±10%	UNE - EN 12467
Thermal Conductivity	0.31 W/mk	UNE - EN 12664
Alkalinity pH	8-10	UNE - EN 13468
Water absorption capacity	4.5 kg/m ²	EN 1609
Steam permeability	3 x 10 ⁻⁹ (Kg/m ² sPa)	UNE - EN ISO 12572
Lengthwise tolerance	± 5 mm	UNE - EN 12467
Widthwise tolerance	± 3 mm	UNE - EN 12467
Thermal expansion (20-100°C)	3	UNE - EN ISO 10.545-8/97
Thickness margin	+2 mm -1 mm	UNE - EN 12467
Edge straightness	Level I - 0.1%	UNE - EN 12467
Organic matter content	3.3%	UNE 103 204/93
Resistance to water erosion	R _L < 0.75	UNE - EN 12467
Modulus of rigidity E Flexion	475 MPa	UNE - EN 12089, UNE -EN 310
Flexural strength MOR	4.74 MPa	EN- 12467
Tensile strength perpendicular to fibre	1.47 MPa	EN - 1607
Compressive strength	9.61 MPa	EN - 826
Dimensional stability	≤ 0.25%	UNE - EN 326-1
Tensile strength paralell to fibre	0.99 MPa	EN 1608
Microbial proliferation	No	EN 13403
Life	25 years Z2 (internal use)	Dite 09/0057

Some values quoted relate to internal testing across the size range. Individual test certificates are available upon request. We reserve the right to improve product performance at any time and without prior reference. Stricter board tolerances can be achieved to suit specific project requirements.

All data and technical parameters given in herewith catalogue were estimated and provided according to the best technical knowledge and available internal tests and expertise. Data in details will be accompanied by relevant technical tests upon request, which tests will be carried out in laboratories and research establishments entitled to proceed such.

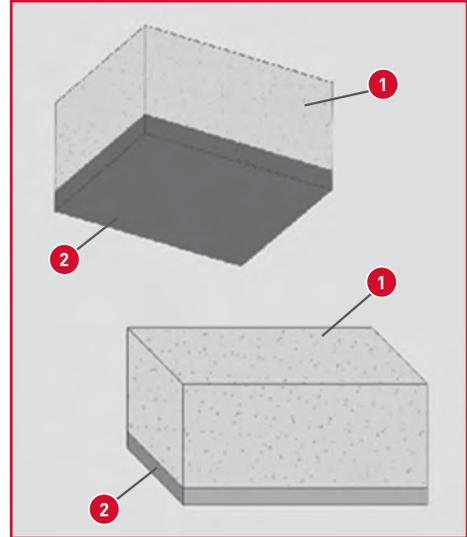
PRODUCT FORMAT, TRANSPORT AND STORAGE

Boards are commercialized in secured edge-protected pallets, perfectly identified with a mark indicating Tecbor type, production date, pallet number and quantity of boards per pallet.

When moved manually, Tecbor should be in a vertical position. Tecbor boards must be stored in the original pallets as delivered from the factory, under cover, not exposed to rain and in a dry place.

TUNNEL SOLUTIONS

1. TECWOOL 825 – REI 180 SPRAYED MORTAR APPLICATION



TESTS

► **Standard:** RWS Fire Curve ► **Laboratory:** Efectis Nederland ► **Test No.:** 2010-Efectis-R0531

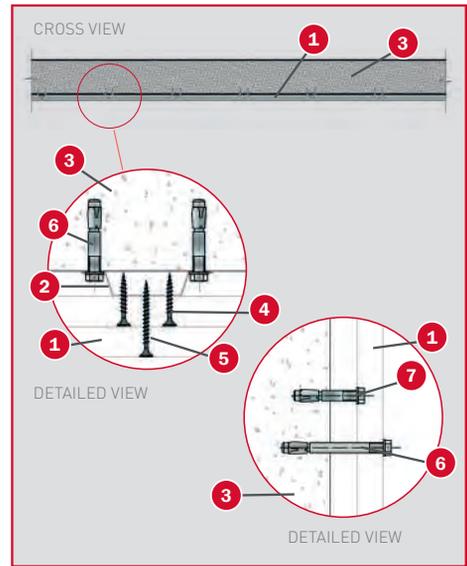
SOLUTION

1 Concrete structure / slabs. 2 Tecwool 825 (thickness dependent on the required fire resistance and construction features).

APPLICATION

Tecwool 825 is sprayed with a pneumatic machine according to the following technical specifications: The surface to be protected requires no prior primer, mesh or any other type of support in order to ensure the mortar adherence. The surface to be protected shall be free from dust, oil, waste, poorly attached particles, paint leftovers, etc. It is recommended to water with the application hose to wash the dirt away from the faces. This will also help achieve a thermal balance between the mortar and the applied surface.

2. TECBOR 20+20 – REI 60 CONCRETE PROTECTION INSIDE TUNNEL



TESTS

► **Laboratory:** Tunnel Safety Testing S.A. (TST) ► **Test No.:** Real Test1

SOLUTION

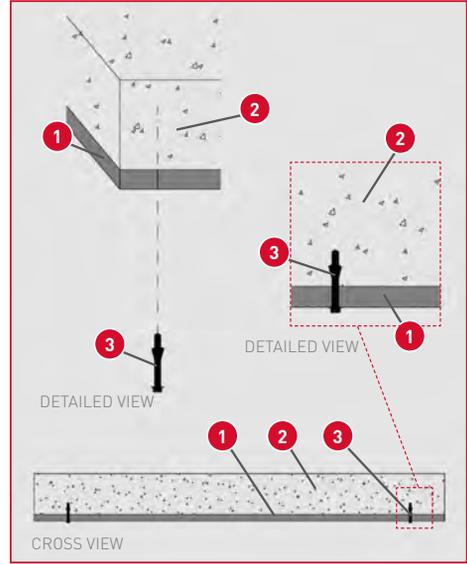
1 Tecbor 20 mm boards. 2 15x45x0.5 mm Omega. 3 Slab. 4 3.5x45 mm self-tapping screws. 5 4.2x55 mm self-tapping screws. 6 8x46 mm metal anchors. 7 8x76 mm metal anchors. 8 Tecbor joint paste.

DESCRIPTION OF ASSEMBLY

The ceiling is protected with 2 Tecbor 20 mm boards. First, attach 15x45x0.5 mm omega metal profiles every 610 mm, directly to concrete slab using an 8x46 mm metal anchor. Then attach the first Tecbor 20 mm board with the 3.5x45 mm self-tapping screws. The second Tecbor B 20 mm board is fixed with 4.2x55 mm self-tapping screws. Walls are protected using Tecbor 20 mm boards anchored directly to the concrete. To fix the first board, use 8x46 mm metal anchors. For the second board, use 8x76 mm metal anchors. Apply Tecbor paste to joints between boards, both in the ceiling and the walls.

TUNNEL SOLUTIONS

3. TECBOR 20 – EI 120 TUNNEL SUSPENDED CEILING



TESTS

► **Standard:** EN 1364-2 Standard. Hydrocarbon Heating Curve ► **Laboratory:** Cidemco ► **Test No:** 17566-1/-2-a-M1

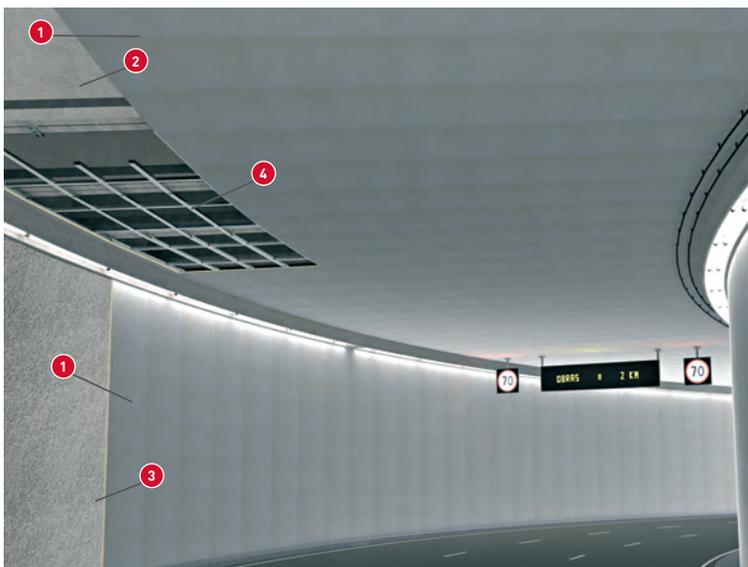
SOLUTION

- 1 Tecbor 20 mm boards.
- 2 120 mm thick slab.
- 3 10x60 mm metal plug.
- 4 Tecbor joint paste.

DESCRIPTION OF ASSEMBLY

Attach Tecbor 20 mm board directly to concrete slab using a 10x60 mm metal plug. Apply Tecbor paste to joints between boards, both in the ceiling and the walls.

4. TECBOR 40 – EI 120 AND EI-180 TUNNEL SUSPENDED CEILING ON METAL STRUCTURE



EI-120

TESTS

► **Standard:** RWS Fire Curve ► **Laboratory:** Efectis Nederland
 ► **Test No:** 2009-Efectis-R0998

SOLUTION

- 1 Tecbor 40 mm boards.
- 2 Slabs.
- 3 Concrete wall.
- 4 Metal profiles.

EI-180

TESTS

► **Standard:** RWS Fire Curve ► **Laboratory:** Efectis Nederland
 ► **Test No:** 2009-Efectis-R0999

SOLUTION

- 1 Tecbor 40 mm boards.
- 2 Slabs.
- 3 Concrete wall.
- 4 Metal profiles.

TUNNEL SOLUTIONS

ASSEMBLY OPTIONS

SOLUTION 1

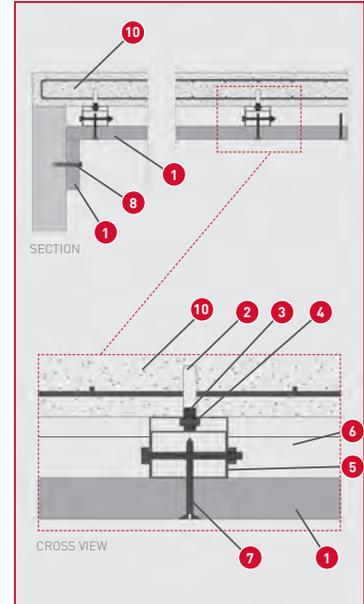
- 1 Tecbor 40 mm boards.
- 2 Expanding metal anchor with inner thread.
- 3 Steel threaded rod \varnothing 12 mm.
- 4 Zinc coated nut \varnothing 12 mm.
- 5 75x46x1.2 mm metal profile.
- 6 75x40x1.2 mm metal profile.
- 7 5.5x73 mm screw.
- 8 Plug anchoring + 10x100 mm screw.
- 9 Tecsel Intumescent Mastic for joints.
- 10 Reinforced concrete slab.

DESCRIPTION OF ASSEMBLY

Install the metal structure that will support the suspended ceiling forming a grid (refer to Technical Department for sizes) with primary profiles and secondary profiles sized 75x46x1.2 mm and 75x40x1.2 mm respectively.

Once the metal structure is in place, attach the Tecbor 40 mm board to it using 5.5x73 mm self-drilling screws. Apply Tecsel Intumescent Mastic for joints.

For different assembly options please contact the Technical Department.



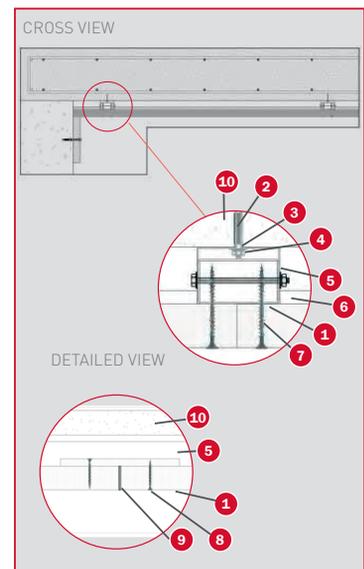
SOLUTION 2

- 1 Tecbor 40 mm boards for tunnel.
- 2 Expanding metal anchor with inner thread.
- 3 Steel threaded rod \varnothing 12 mm.
- 4 Zinc coated nut \varnothing 12 mm.
- 5 75x46x1.2 mm metal profile.
- 6 Tecbor 12 mm boards.
- 7 6.3x65 mm screw.
- 8 4.5x50 mm Hi-Low screw.
- 9 Tecsel Intumescent Mastic for joints.
- 10 Reinforced concrete slab.

DESCRIPTION OF ASSEMBLY

Install the metal structure that will support the suspended ceiling forming a grid (refer to Technical Department for sizes) using primary profiles 75x46x1.2 mm in size. The secondary profile is replaced with a strip of Tecbor 12 mm board 150 mm wide. Once the metal structure is in place, attach the Tecbor 40 mm board to it using 6.3x65 mm self-drilling screws.

For different assembly options please contact the Technical Department.



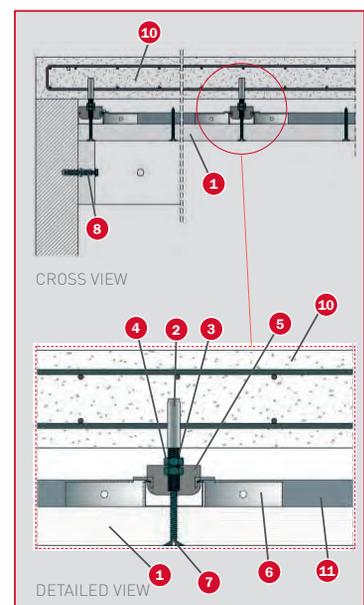
SOLUTION 3

- 1 Tecbor 40 mm boards.
- 2 Metal runner for anchoring.
- 3 Steel threaded rod \varnothing 12 mm.
- 4 Zinc coated nut \varnothing 12 mm.
- 5 80x40x1.5 mm primary profile.
- 6 80x40x1.5 mm secondary profile.
- 7 6.3x65 mm screw.
- 8 Clamp support.
- 9 Tecsel Intumescent Mastic for joints.
- 10 Concrete slab.

DESCRIPTION OF ASSEMBLY

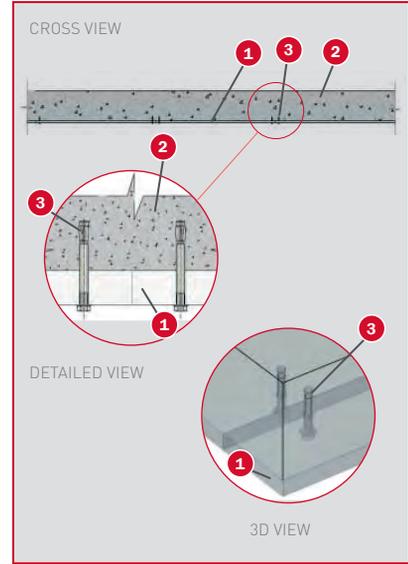
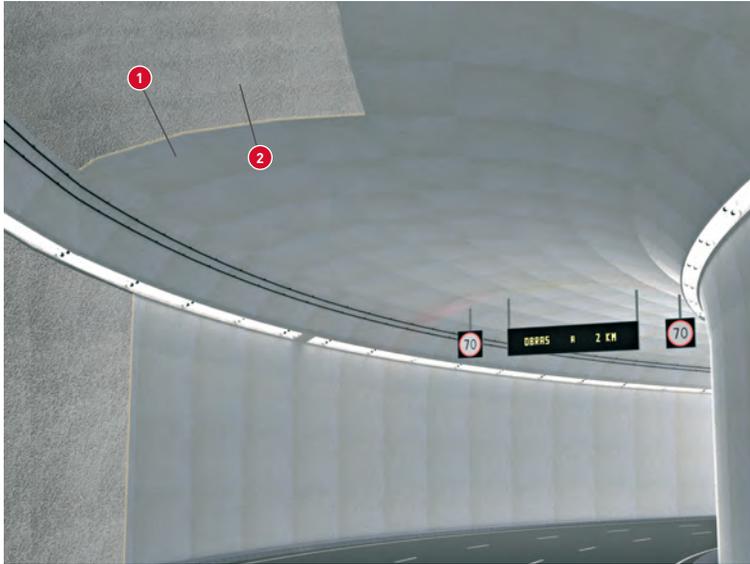
Install the metal structure that will support the suspended ceiling forming a grid (refer to Technical Department for sizes) with primary profiles and secondary profiles sized 75x46x1.2 mm and 75x40x1.2 mm respectively. Secondary profile should rest on primary one without fixation. This solution is highly versatile since the secondary profile is mobile, thus allowing to correct any flaws in the joints. Once the metal structure is in place, attach the Tecbor 40 mm board to it using 6.3x65 mm self-drilling screws.

For different assembly options please contact the Technical Department.



TUNNEL SOLUTIONS

5. TECBOR 30 – EI 180 TUNNEL POST FIXED APPLICATION



TESTS

► **Standard:** RWS Fire Curve ► **Laboratory:** Efectis Nederland ► **Test No:** 2011-Efectis-R0386

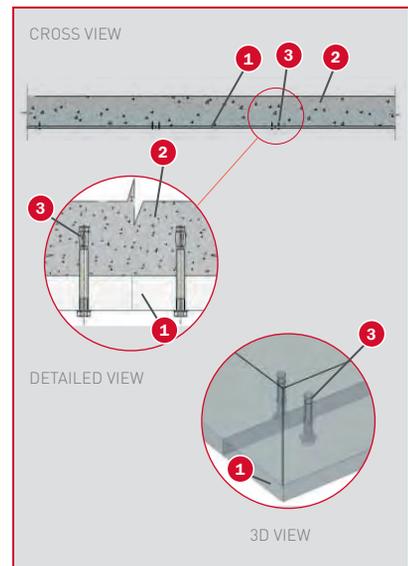
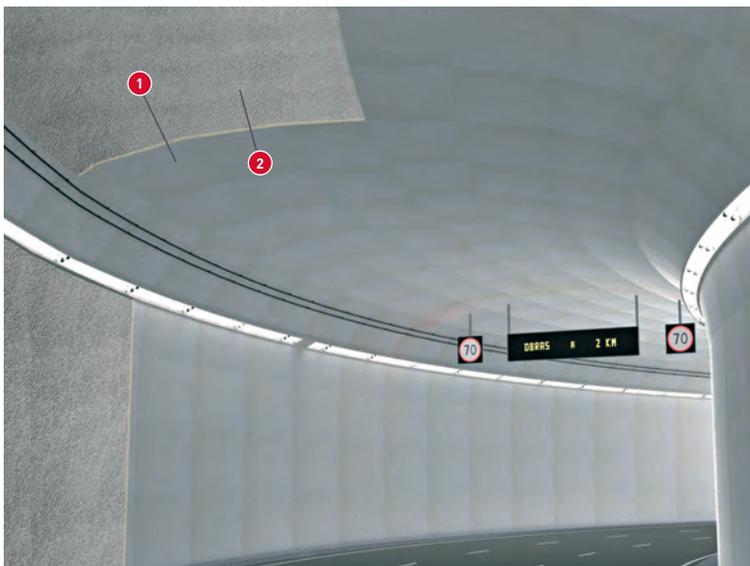
SOLUTION

- 1 Tecbor 30 mm boards.
- 2 Concrete slab.
- 3 Min. M6x85 metal anchor.

DESCRIPTION OF ASSEMBLY

Attach Tecbor 30 mm board directly to concrete slab using a M6x85 mm metal anchor. Apply Tecsels intumescent mastic to joints when required, both in the ceiling and the walls.

6. TECBOR 40 – EI 180 TUNNEL POST FIXED APPLICATION



TESTS

► **Standard:** RWS Fire Curve ► **Laboratory:** Efectis Nederland ► **Test No:** 2011-Efectis-R0280

SOLUTION

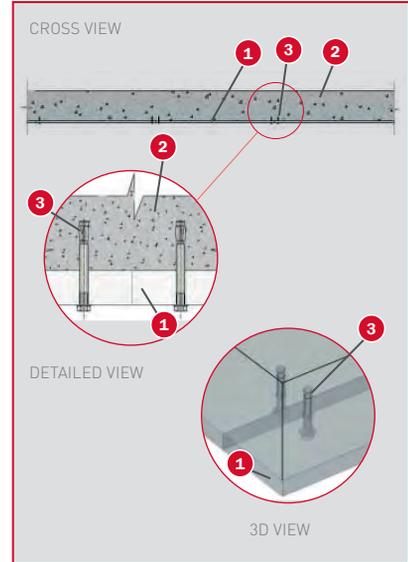
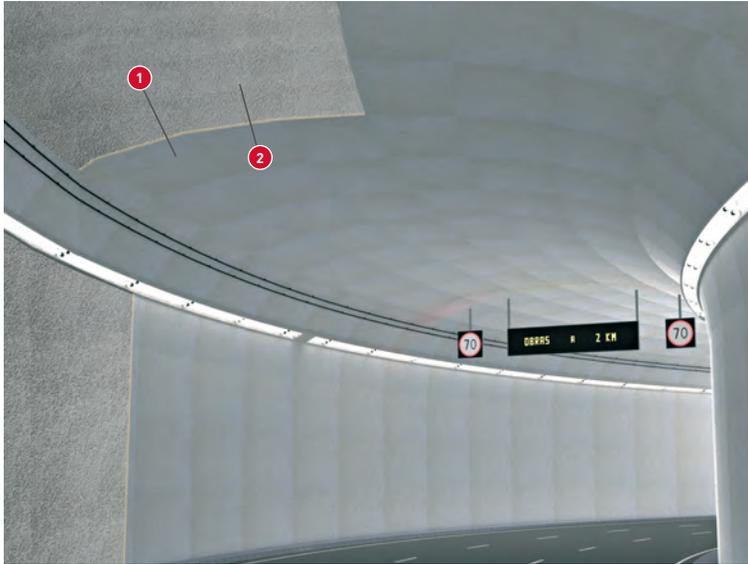
- 1 Tecbor 40 mm boards.
- 2 Concrete slab.
- 3 Min. M6x85 metal anchor.

DESCRIPTION OF ASSEMBLY

Attach Tecbor 40 mm board directly to concrete slab using a M6x85 mm metal anchor. Apply Tecsels intumescent mastic to joints when required, both in the ceiling and the walls.

TUNNEL SOLUTIONS

7. TECBOR 23 – REI 120 TUNNEL POST FIXED APPLICATION



TESTS

► **Standard:** RWS Protocol ► **Laboratory:** Tecnalía ► **Test No.:** 050632-002

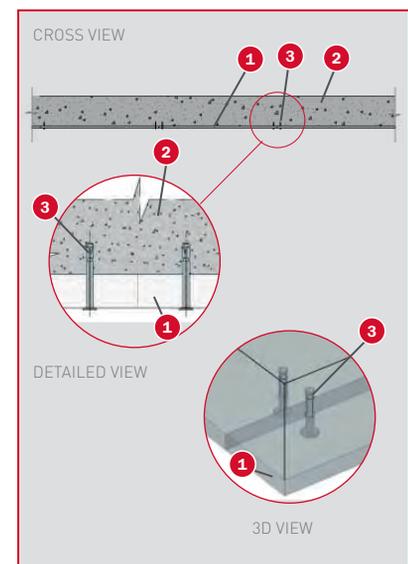
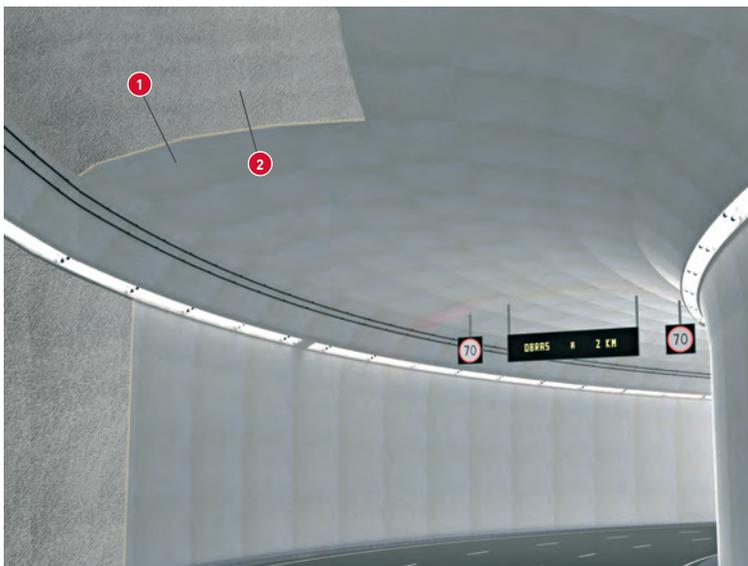
SOLUTION

1 Tecbor 23 mm boards. 2 Concrete slab. 3 M6 metallic dowel.

DESCRIPTION OF ASSEMBLY

Attach Tecbor 23 mm board directly to the concrete slab using a HLC-M 8x70 mm metallic dowel.

8. TECBOR 25 – REI 60-170 TUNNEL POST FIXED APPLICATION



TESTS

► **Standard:** RABT-ZTV Curve ► **Laboratory:** Efectis Nederland ► **Test No.:** 2015 – Efectis - R000909

SOLUTION

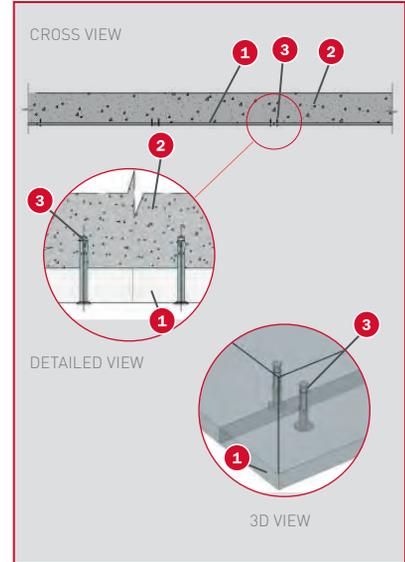
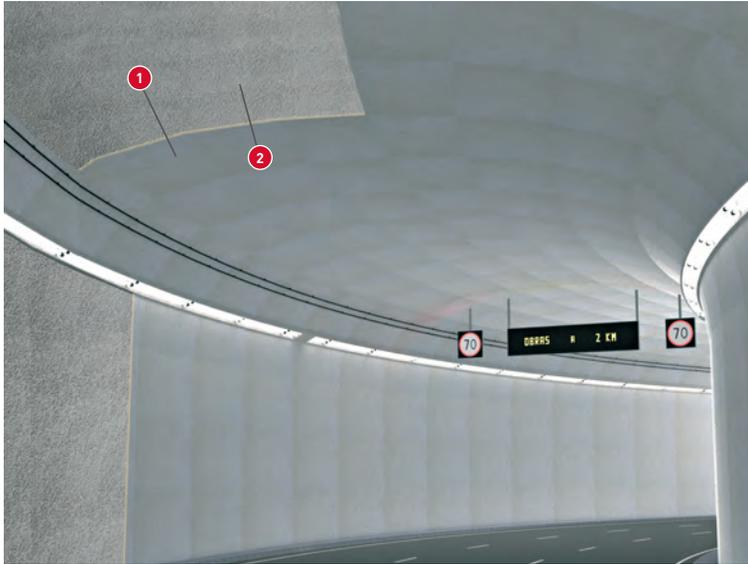
1 Tecbor 25 mm boards. 2 Concrete slab. 3 M6 Metallic dowel.

DESCRIPTION OF ASSEMBLY

Attach Tecbor 25 mm board directly on the concrete slab using a FNA II 6x30/30 mm. metallic dowel.

TUNNEL SOLUTIONS

9. TECBOR 24 – REI 120 TUNNEL POST FIXED APPLICATION



TESTS

► **Standard:** RWS/HCM ► **Laboratory:** Efectis Nederland ► **Test No.:** 2015 – Efectis - R000911

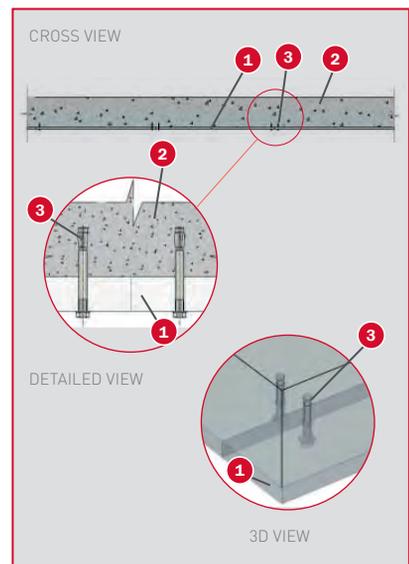
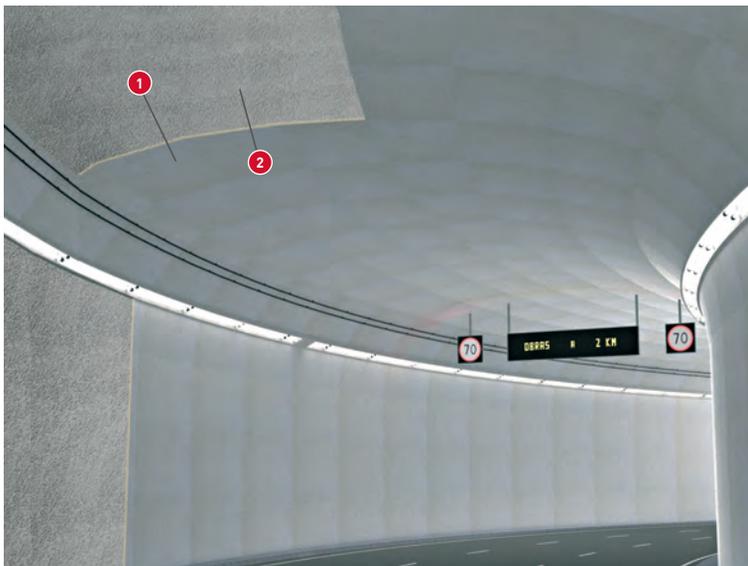
SOLUTION

1 Tecbor 24 mm boards. 2 Concrete slab. 3 M6 metallic dowel.

DESCRIPTION OF ASSEMBLY

Attach Tecbor 24 mm board directly to the concrete slab using a FNA II 6x30/30 mm metallic dowel.

10. TECBOR 25 – REI 240 TUNNEL POST FIXED APPLICATION



TESTS

► **Standard:** Cellulosic curve ISO834 ► **Laboratory:** Efectis Nederland ► **Test No.:** 2015-Efectis R001326

SOLUTION

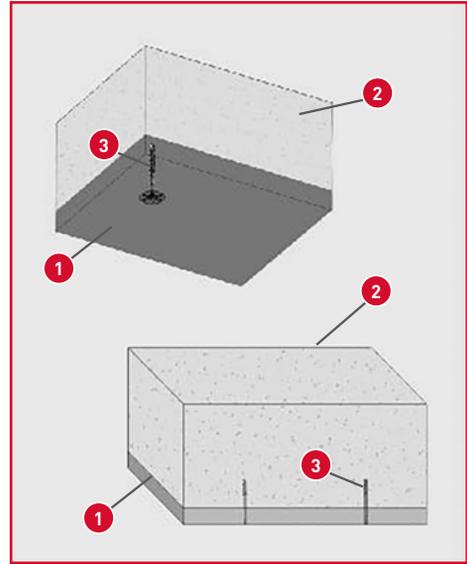
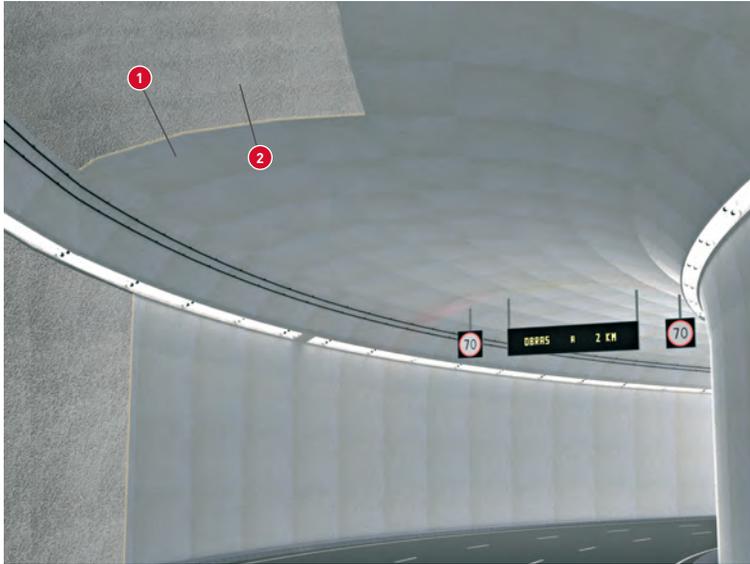
1 Tecbor 25 mm boards. 2 Concrete slab. 3 Metal anchors FNAII 6x30mm A4

DESCRIPTION OF ASSEMBLY

Attach Tecbor 25 mm board to concrete slab using anchors FNAII 6x30/30A4 . Apply Tecsetl intumescent mastic to joints when required, both in the ceiling and the walls.

TUNNEL SOLUTIONS

11. TECBOR 30 – REI 120 LOST FORMWORK



TESTS

► **Standard:** RWS Fire Curve ► **Laboratory:** Tecnalía ► **Test No.:** 29148

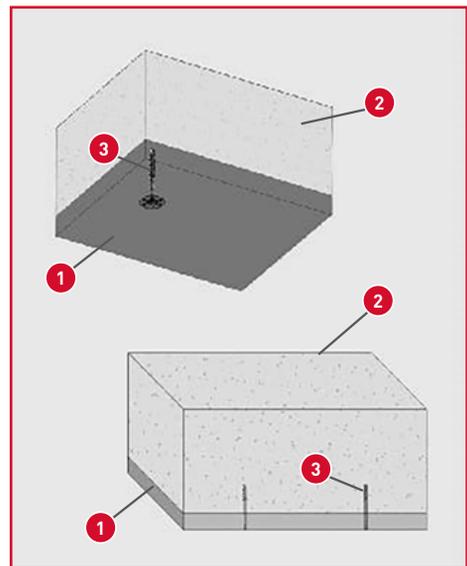
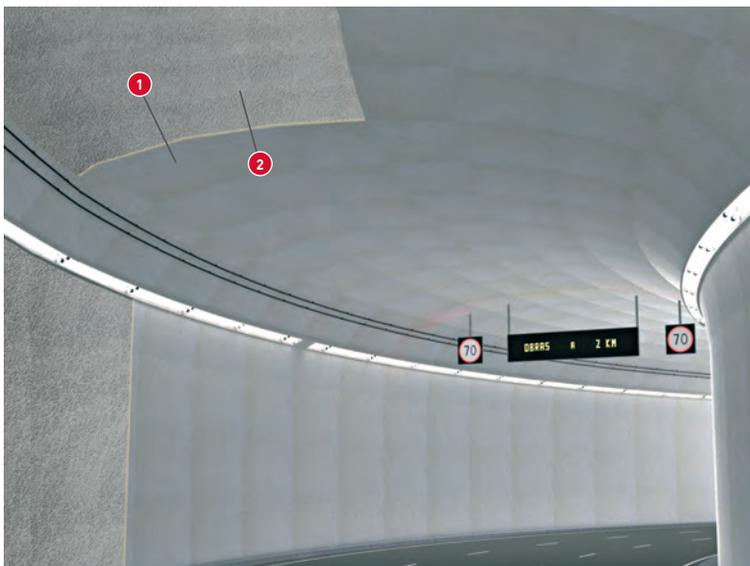
SOLUTION

1 Tecbor 30 mm boards. 2 Concrete slab. 3 IDMR 3/6 Stainless steel anchorage.

DESCRIPTION OF ASSEMBLY

Prior to installation, pre-drill Tecbor 30 mm boards with a M8 drill bit. Insert stainless steel IDMR 3/6 anchorages on the pre-drilled holes and seal the gaps with mastic. Place Tecbor 30 mm boards as a lost formwork with butted joints. Proceed with the concrete discharge afterwards.

12. TECBOR 40 – REI 180 LOST FORMWORK



TESTS

► **Standard:** RWS Fire Curve ► **Laboratory:** Tecnalía ► **Test No.:** 29232

SOLUTION

1 Tecbor 40 mm boards. 2 Concrete slab. 3 IDMR 3/6 Stainless steel anchorage.

DESCRIPTION OF ASSEMBLY

Prior to installation, pre-drill Tecbor 40 mm boards using a M8 drill bit. Insert stainless steel IDMR 3/6 anchorages on the pre-drilled holes and seal the central gaps with mastic. Place Tecbor 40 mm board as lost formwork with butted joints. Proceed to concrete slab casting afterwards.

TUNNEL REFERENCE WORKS

- ▶ Al Salam Street Tunnel in Abu Dhabi, UAE
- ▶ Al Ras Al Akhdar Tunnel in Abu Dhabi, UAE
- ▶ Baynoonah Street Tunnel in Abu Dhabi, UAE
- ▶ Midfield Terminal Tunnel in Abu Dhabi International Airport in Abu Dhabi, UAE
- ▶ Marina Coastal Expressway 482 Tunnel, Singapore
- ▶ M-30 Bypass South Tunnel in Madrid, Spain
- ▶ M-30 Bypass North Tunnel in Madrid, Spain
- ▶ Ronda De Mig Tunnel in Barcelona, Spain
- ▶ San Mamés Football Stadium New Entrance Tunnel in Bilbao, Spain
- ▶ M-40 Pardo Tunnel in Madrid, Spain
- ▶ Sevines Tunnel in Paris, France
- ▶ Puruchuco Tunnel, Peru
- ▶ Polish Railway Tunnel (PKP) in Krakow, Poland
- ▶ Ave High Speed Train Tunnel in Málaga, Spain
- ▶ Railway Tunnel in Málaga, Spain
- ▶ Service Tunnel Terminal 4 of Barajas Airport in Madrid, Spain
- ▶ Metrosur Tunnel in Madrid, Spain
- ▶ Underground Stations in Bilbao, Spain
- ▶ Barcelona Underground Line 9, Spain
- ▶ Málaga Underground, Spain
- ▶ Madrid Underground, Spain
- ▶ Warsaw Underground, Poland
- ▶ Algiers Underground, Algeria
- ▶ Smestad Tunnel in Oslo, Norway
- ▶ La Défense Tunnel in Paris, France



Mercor SA
ul. Grzegorza z Sanoka 2
80-408 Gdańsk, Poland
tel. +48 58 341 42 45
fax +48 58 341 39 85
tunnels@mercor.com.pl

www.mercor.com.pl