iBMB MPA TU BRAUNSCHWEIG
Institut für Baustoffe, Massivbau und Brandschutz
Materialprüfanstalt für das Bauwesen

# Certificate
# No. MPA-BS 6000/088/15

## Product

Fire protective board cladding system to be installed on concrete walls and ceilings consisting of boards, backing strips and concrete anchors (trade name: POST-FIXED) or for installation upon formwork or as formwork (trade name: SET-IN-CONCRETE) to be used for passive fire protection purposes in road tunnels made of reinforced concrete.

## Supplier

Fermacell GmbH
Düsseldorfer Landstraße 395
D-47259 Duisburg
Germany

## Tests of resistance to fire

The product was tested according to a specific test procedure for concrete tunnel linings with a maximum temperature of about 1,350°C according to the RWS (Rijkswaterstaat) curve. The main performance parameter of some cladding systems in the tests was the thermal insulation property, i.e. the question of how effectively the surface of the concrete and the reinforcing steel were protected at high temperatures.

Note: Details on the tests and the application of the fire protective board cladding system are given in an annex to this certificate.

## Certification procedure

The product has been assessed against the requirements of the MPA General Requirements for Certification of Fire Protection Products on the basis of test reports as well as expert judgment. Reference was made to ISO/IEC 17067 type 1a.

MPA Braunschweig runs accredited test laboratories according to ISO/IEC 17025 and an accredited certification body according to ISO/IEC 17065 both focusing on fire protection.

## Validity

This certificate consists of five pages. It shall be valid until the 03-07-2019 as a maximum, provided that the product is not subject to changes.

Braunschweig, 04-07-2017

Materialprüfanstalt f. d. Bauwesen
MPA BS 6
Braunschweig

Dr.-Ing. Hinrichs
Head of Certification

DAkkS Deutsche Akkreditierungsstelle D-ZE-11267-01-00



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Notified body (0761-CPR)
MPA Braunschweig is accredited against ISO/IEC17025 (testing and calibration), ISO/IEC17020 (inspection) and ISO/IEC17065 (certification).

## TEST RESULTS AND CRITERIA FOR FIRE-RESISTANCE IN ROAD TUNNELS

Test results including calculation on an interpolation basis are given below for maximum measured temperatures after 120 min or 180 min, respectively, of Aestuver-Tx boards and Aestuver-T boards. The criteria referred to in the charts are maximum acceptable temperatures at different depths tested with a RWS fire curve.

- Nominal thickness of 21 mm and 10 mm joint cover strip and fixed with screws

| Position | Maximum measured temperature | | Requirement[1)] |
|---|---|---|---|
| | 120 min | 180 min | |
| Interface | 370 | 430 | ≤ 380°C |
| 25 mm from the interface | 253 | 321 | ≤ 380°C / ≤ 250°C |
| 45 mm from the interface | 204 | 246 | ≤ 380°C / ≤ 250°C |
| 70 mm from the interface | 174 | 194 | ≤ 380°C / ≤ 250°C |

- Nominal thickness of 25 mm and 10 mm joint cover strip and fixed with screws

| Position | Maximum measured temperature | | Requirement[1)] |
|---|---|---|---|
| | 120 min | 180 min | |
| Interface | 324 | 384 | ≤ 380°C |
| 25 mm from the interface | 221 | 262 | ≤ 380°C / ≤ 250°C |
| 45 mm from the interface | 179 | 212 | ≤ 380°C / ≤ 250°C |
| 70 mm from the interface | 152 | 181 | ≤ 380°C / ≤ 250°C |

- Nominal thickness of 30 mm and 10 mm joint cover strip and fixed with screws

| Position | Maximum measured temperature | | Requirement[1)] |
|---|---|---|---|
| | 120 min | 180 min | |
| Interface | 323 | 425 | ≤ 380°C |
| 25 mm from the interface | 221 | 290 | ≤ 380°C / ≤ 250°C |
| 45 mm from the interface | 178 | 235 | ≤ 380°C / ≤ 250°C |
| 70 mm from the interface | 152 | 200 | ≤ 380°C / ≤ 250°C |

[1)] according to Efectis 0695 guideline (≤ 380°C for concrete, ≤ 250°C for steel)

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- Nominal thickness of 35 mm and 10 mm joint cover strip and directly placed in concrete

| Position | Maximum measured temperature | | Requirement[1)] |
|---|---|---|---|
| | 120 min | 180 min | |
| Interface | 259 | 337 | ≤ 380°C |
| 25 mm from the interface | 177 | 252 | ≤ 380°C / ≤ 250°C |
| 45 mm from the interface | 143 | 193 | ≤ 380°C / ≤ 250°C |
| 70 mm from the interface | 122 | 152 | ≤ 380°C / ≤ 250°C |

- Nominal thickness of 20 mm without joint cover strip and fixed with screws

| Position | Maximum measured temperature[2)] | | Requirement[1)] |
|---|---|---|---|
| | **120 min** | **180 min** | |
| Interface | 419 | 507 | ≤ 380°C |
| 25 mm from the interface | 287 | 379 | ≤ 380°C / ≤ 250°C |
| 45 mm from the interface | 232 | 291 | ≤ 380°C / ≤ 250°C |
| 70 mm from the interface | 198 | 229 | ≤ 380°C / ≤ 250°C |

- Nominal thickness of 25 mm without joint cover strip and fixed with screws

| Position | Maximum measured temperature[2)] | | Requirement[1)] |
|---|---|---|---|
| | **120 min** | **180 min** | |
| Interface | 374 | 469 | ≤ 380°C |
| 25 mm from the interface | 256 | 351 | ≤ 380°C / ≤ 250°C |
| 45 mm from the interface | 207 | 269 | ≤ 380°C / ≤ 250°C |
| 70 mm from the interface | 176 | 211 | ≤ 380°C / ≤ 250°C |

- Nominal thickness of 30 mm without joint cover strip and fixed with screws

| Position | Maximum measured temperature[2)] | | Requirement[1)] |
|---|---|---|---|
| | **120 min** | **180 min** | |
| Interface | 329 | 430 | ≤ 380°C |
| 25 mm from the interface | 225 | 322 | ≤ 380°C / ≤ 250°C |
| 45 mm from the interface | 182 | 246 | ≤ 380°C / ≤ 250°C |
| 70 mm from the interface | 155 | 194 | ≤ 380°C / ≤ 250°C |

[1)] according to Efectis 0695 guideline (≤ 380°C for concrete, ≤ 250°C for steel)

[2)] All interpolated values

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## APPLICATION GUIDANCE

The Aestuver-Tx boards and Aestuver-T boards are applicable to protect the concrete and the reinforcing steel for at least 120 min. The fire protective board cladding system with the trade names POST-FIXED and SET-IN-CONCRETE may be used for passive fire protection purposes in road tunnels made of reinforced concrete. The fire protective board cladding system may be used only on concrete between C20/25 and C50/60 according to EN 206 or similar. Aestuver-Tx boards or Aestuver-T boards should only be applied in areas with an appropriate concrete cover.

## MANUFACTURER'S MANUAL

The assembled construction is installed with the appropriate wall or ceiling connections according to the detailed prescriptions in the manual of the manufacturer.

## PERSONNEL

Prior to assembly and installation the personnel must be instructed.

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## DOCUMENTATION

- Interpolation report: Determination of the thermal behaviour of a concrete slab protected by Aestuver Tx boards exposed to the RWS fire curve (report No. 2017-Efectis-R000833 of June 2017)
- Determination of the thermal behaviour of a concrete slab protected by Aestuver Tx boards with a nominal thickness of 20 mm exposed to the RWS fire curve (report No. 2017-Efectis-R000778 of May 2017)
- Determination of the thermal behaviour of a concrete slab protected by Aestuver Tx boards exposed to the RWS fire curve (report No. 2014-Efectis-R0160 of June 2014)
- Fire testing according to the RWS fire curve on a small concrete slab protected with Aestuver-T boards (report No. 2012-Efectis-R9348c of March 2013)
- Determination of the thermal behaviour of a concrete slab protected by AESTUVER Tx boards with a nominal thickness of 30 mm exposed according to the RWS fire curve (report No. 2014-Efectis-000974 of January 2015)
- fischer nail anchor FNA II, load controlled expansion anchor for multiple use for non-structural applications in cracked and uncracked concrete (European Technical Approval ETA-06/0175 of 30 May 2013)

- HECO Multi-Monti® screw anchor MMS-P for multiple fastening of dicon® tu or AESTUVER fire protection boards in cracked and uncracked concrete (General building regulation approval Z-21.1-1728 of 25 September 2012)
- Fire testing Procedure for Concrete Tunnel Linings (report No. 2008-Efectis-R0695 of September 2008)
- Additional technical contractual prescriptions for the construction of road tunnels (ZTV-ING construction engineering, part 5, tunnelling, of March 2012)

---------------------------------------------------------- End of the certificate ----------------------------------------------------------

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