

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-18/1128
of 14 November 2023

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

X-Foam HBT 300,
X-Foam HBT 500 and
X-Foam HBT 700

Product family
to which the construction product belongs

Extruded polystyrene foam boards as load bearing layer
and/or thermal insulation outside the waterproofing

Manufacturer

Ediltec Bayern GmbH
Ottostraße 5
92442 Wackersdorf
DEUTSCHLAND

Manufacturing plant

Ediltec Bayern GmbH
Ottostraße 5
92442 Wackersdorf
DEUTSCHLAND

This European Technical Assessment
contains

13 pages including 1 annex which form an integral part of
this assessment

This European Technical Assessment is
issued in accordance with Regulation (EU)
No 305/2011, on the basis of

040650-00-1201

This version replaces

ETA-18/1128 issued on 1 June 2021

The European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and shall be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may only be made with the written consent of the issuing Technical Assessment Body. Any partial reproduction shall be identified as such.

This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission in accordance with Article 25(3) of Regulation (EU) No 305/2011.

Specific Part

1 Technical description of the product

The extruded polystyrene foam boards are made of rigid cellular plastics material extruded from polystyrene or one of its copolymers and which has a closed cell structure. The blowing agent mixture is carbon dioxide (CO₂), isobutene and additives. Extruded polystyrene foam boards have a skin on both surfaces and a special edge treatment (shiplap).

The extruded polystyrene foam boards do not contain Hexabromocyclododecane (HBCD).

The extruded polystyrene foam boards have the following designations:

- "X-FOAM HBT 300",
- "X-FOAM HBT 500" and
- "X-FOAM HBT 700".

The extruded polystyrene foam boards are manufactured with the following dimensions:

Nominal thicknesses:

- "X-FOAM HBT 300" 50 mm to 160 mm
- "X-FOAM HBT 500" 50 mm to 120 mm
- "X-FOAM HBT 700" 50 mm to 120 mm

Nominal length: 1250 mm

Nominal widths: 600 mm

The European Technical Assessment has been issued for the products on the basis of agreed data/information, deposited with Deutsches Institut für Bautechnik, which identifies the product that has been assessed. The European Technical Assessment applies only to products corresponding to this agreed data/information.

2 Specification of the intended use in accordance with the applicable European Assessment Document

The extruded polystyrene foam boards are intended to be used as load bearing layer and/or thermal insulation outside the waterproofing. The boards are laid uniformly on the substrate to which they are applied. In particular the following applications are covered:

- Load bearing and thermal insulation underneath foundation slabs for extruded polystyrene foam boards "X-FOAM HBT 300" (thickness 60 to 160 mm), "X-FOAM HBT 500" and "X-FOAM HBT 700"
- External horizontal and vertical thermal insulation of in-ground constructions in non-structural applications (also in case of groundwater)
- Inverted roof insulation (including park deck and green roof applications)

The performance according to section 3 only applies if the boards are installed according to the manufacture's installation instructions and if they are protected from precipitation, wetting or weathering during transport and storage before installation.

Concerning the application of the boards, also the respective national regulations shall be observed.

Where the boards are fixed by using adhesives, only such adhesions shall be used, which are suitable for this purpose. The assessment of these fixings is not subject of this European Technical Assessment.

English translation prepared by DIBt

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the extruded polystyrene foam boards of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

For sampling, conditioning and testing the provisions of the EAD No 040650-00-1201 "Extruded polystyrene foam boards as load bearing layer and/or thermal insulation outside the waterproofing" apply.

3.1 Mechanical resistance and stability (BWR 1)

| Essential characteristic | Performance |
|--|--|
| Compressive stress at 10 % deformation or compressive strength test acc. to EN 826:2013 "X-FOAM HBT 300" thickness 60 mm ≤ d ≤ 160 mm "X-FOAM HBT 500" thickness 50 mm ≤ d ≤ 120 mm "X-FOAM HBT 700" thickness 50 mm ≤ d ≤ 120 mm Slip deformation Compressive stress or compressive strength in the transverse and longitudinal directions | Level (individual values may fall below this level up to 10 %): ≥ 300 kPa ≥ 500 kPa ≥ 700 kPa See Annex A No performance assessed |
| Characteristic value of compressive stress or compressive strength 5 %-fractile value for a one-sided confidence level of 75 % under unknown or known variance using ISO 12491:1997 "X-FOAM HBT 300" thickness 60 mm ≤ d ≤ 80 mm thickness 100 mm ≤ d ≤ 160 mm "X-FOAM HBT 500" thickness 50 mm ≤ d ≤ 80 mm thickness 100 mm ≤ d ≤ 120 mm "X-FOAM HBT 700" thickness 50 mm ≤ d ≤ 120 mm | $\sigma_{0,05} = 386 \text{ kPa}$ (n= 30; $\sigma_{\text{mean}} = 412 \text{ kPa}$; $s_{\sigma} = 14 \text{ kPa}$) $\sigma_{0,05} = 415 \text{ kPa}$ (n= 50; $\sigma_{\text{mean}} = 420 \text{ kPa}$; $s_{\sigma} = 6 \text{ kPa}$) $\sigma_{0,05} = 496 \text{ kPa}$ (n= 50; $\sigma_{\text{mean}} = 531 \text{ kPa}$; $s_{\sigma} = 21 \text{ kPa}$) $\sigma_{0,05} = 555 \text{ kPa}$ (n= 32; $\sigma_{\text{mean}} = 587 \text{ kPa}$; $s_{\sigma} = 17 \text{ kPa}$) $\sigma_{0,05} = 775 \text{ kPa}$ (n= 15; $\sigma_{\text{mean}} = 816 \text{ kPa}$; $s_{\sigma} = 24 \text{ kPa}$) |
| Compressive creep | See Annex A |

| Essential characteristic | Performance |
|---|--|
| <p>Thermal conductivity</p> <p>"X-FOAM HBT 700"</p> <p>thickness $50 \leq d < 80$ mm</p> <p>thickness $80 \leq d \leq 100$ mm</p> <p>thickness $100 < d \leq 120$ mm</p> | <p>$\lambda_{D(90d)} = 0.035$ W/(m · K)</p> <p>$\lambda_{D(90d)} = 0.037$ W/(m · K)</p> <p>$\lambda_{D(90d)} = 0.039$ W/(m · K)</p> |
| Moisture conversion coefficient | No performance assessed |
| <p>Water absorption</p> <p>Long term water absorption by total immersion test acc. to EN 12087:2013 (method 2A)</p> <p>Long term water absorption by diffusion test acc. to EN 12088:2013</p> | <p>WL(T)0.7 ($W_{it} \leq 0.7$ Vol.%)</p> <p>WD(V)3 ($W_{dv} \leq 3.0$ Vol.%)</p> |
| <p>Freeze-thaw resistance test acc. to EN 12091:2013</p> <p>using the wet test specimens from having done the water diffusion test in accordance with EN 12088: 2013</p> <p>Reduction in compressive stress at 10 % deformation or in compressive strength of the re-dried specimens, when tested in accordance with EN 826:2013</p> | <p>FTCD1 ($W_v \leq 1.0$ Vol.%)</p> <p>≤ 10 %</p> |
| Water vapour diffusion resistance factor | No performance assessed |
| <p>Geometrical properties</p> <p>Thickness test acc. EN 823:2013 (clause 7.2, figure 2, measuring set-up 3)</p> <p>Length, width test acc. EN 822:2013</p> <p>Squareness in direction of length and width; in direction of thickness test acc. EN 824:2013</p> <p>Flatness in direction of length and width test acc. EN 825:2013</p> | <p>tolerance</p> <p>± 2 mm</p> <p>± 8 mm</p> <p>5 mm/m</p> <p>2 mm</p> |
| <p>Deformation under specified compressive load and temperature conditions test acc. to EN 1605:2013</p> | <p>load: 40 kPa; temperature: (70 ± 1) °C; time: (168 ± 1) h</p> <p>≤ 5 %</p> |

| Essential characteristic | Performance |
|---|---|
| Compressive stress at 10 % deformation or compressive strength test acc. to EN 826:2013 "X-FOAM HBT 300" thickness 50 mm | ≥ 300 kPa |
| Dimensional stability under specified conditions test acc. to EN 1604:2013 | temperature: 70 °C and 90 % R.H. DS (70,90) ($\Delta\varepsilon_l \leq 5 \%$, $\Delta\varepsilon_b \leq 5 \%$, $\Delta\varepsilon_d \leq 5 \%$) |
| Tensile strength perpendicular to faces | No performance assessed |
| Density test acc. to EN 1602:2013 "X-FOAM HBT 300" thickness 50 mm | density range: 30 kg/m ³ - 37 kg/m ³ |
| Volume percentage of closed cells test acc. to EN ISO 4590:2016 (method 1 with correction) | ≥ 95 % |

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with EAD No. 040650-00-1201, the applicable European legal acts are: 1995/467/EC and 1999/91/EC¹

The systems to be applied are:

- System 1 for Essential characteristics concerning Mechanical resistance and stability (BWR 1)
- System 3 all other Essential characteristics

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 14 November 2023 by Deutsches Institut für Bautechnik

Frank Iffländer
Head of Section

beglaubigt:
Wendler

¹ as amended

**X-Foam HBT 300,
X-Foam HBT 500 and
X-Foam HBT 700**

Annex A

1. Compressive stress

Slip deformation

Deformation until the conventional elastic zone (distinct straight portion of the force-displacement curve) is reached

| X-FOAM HBT 300 ($\varphi = 35 \text{ kg/m}^3$) | | | | |
|---|-------------|-------------|-------------|-------------|
| thickness (mm) | 1x100 | 3x100 | 1x 120 | 2x120 |
| compressive stress, σ_a | 106 | 72 | 110 | 33 |
| initial displacement X_a (mm) | 0.55 | 1.20 | 0.42 | 0.48 |
| X-FOAM HBT 700 ($\varphi = 45 \text{ kg/m}^3$) | | | | |
| thickness (mm) | 1x100 | 3x100 | 1x 120 | 2x120 |
| compressive stress, σ_a | 169 | 165 | 169 | 141 |
| initial displacement X_a (mm) | 0.85 | 1.86 | 0.62 | 1.72 |

2. Compressive creep

2.1 Compressive creep (single-layer boards)

test acc. to EN 1606:2013 and EAD 040650-00-1201

| X-FOAM HBT 300 | thickness 60 mm | | | thickness 120 mm | | |
|---|------------------------|-------------|-------------|-------------------------|-------------|-------------|
| density (kg/m^3) | 30.5 | | | 30.6 | | |
| compressive stress/ deformation acc. EN 826:2013 (kPa / %) | 400/2 | | | 377/2 | | |
| load stage (kPa) | 100 | 130 | 180 | 100 | 130 | 180 |
| X_0 (mm) | 0.33 | 0.41 | 0.60 | 0.67 | 0.85 | 1.12 |
| X_{ct}^1 (mm) | 0.16 | 0.20 | 0.33 | 0.22 | 0.26 | 0.47 |
| X_{ct50} (mm) | 0.37 | 0.45 | 0.75 | 0.40 | 0.56 | 1.16 |
| X_{t50}(mm) | 0.70 | 0.86 | 1.35 | 1.07 | 1.41 | 2.28 |

| X-FOAM HBT 300 | thickness 160 mm | | |
|---|-------------------------|-------------|-------------|
| density (kg/m^3) | 34.5 | | |
| compressive stress/ deformation acc. EN 826:2013 (kPa / %) | 429/2 | | |
| load stage (kPa) | 90 | 130 | 190 |
| X_0 (mm) | 0.6 | 0.81 | 1.2 |
| X_{ct}^1 (mm) | 0.24 | 0.33 | 0.65 |
| X_{ct50} (mm) | 0.52 | 0.90 | 1.82 |
| X_{t50}(mm) | 1.33 | 1.72 | 3.02 |

¹ Measured value after the test period of 20 month

**X-Foam HBT 300,
X-Foam HBT 500 and
X-Foam HBT 700**

Annex A

| X-FOAM HBT 500 | thickness 50 mm | | | thickness 120 mm | | |
|--|------------------------|-------------|-------------|-------------------------|-------------|-------------|
| density (kg/m ³) | 36 | | | 37.5 | | |
| compressive stress/ deformation acc. EN 826:2013 (kPa / %) | 606/3 | | | 590/2 | | |
| load stage (kPa) | 150 | 180 | 220 | 150 | 180 | 220 |
| X ₀ (mm) | 0.23 | 0.27 | 0.32 | 0.39 | 0.49 | 0.61 |
| X _{ct} ¹ (mm) | 0.16 | 0.16 | 0.23 | 0.23 | 0.28 | 0.39 |
| X _{ct50} (mm) | 0.34 | 0.42 | 0.49 | 0.58 | 0.69 | 1.05 |
| X_{t50}(mm) | 0.57 | 0.70 | 0.81 | 0.97 | 1.18 | 1.66 |

| X-FOAM HBT 500 | thickness 50 mm | | thickness 120 mm | |
|--|------------------------|-------------|-------------------------|-------------|
| density (kg/m ³) | 36.6 | | 35.9 | |
| compressive stress/ deformation acc. EN 826:2013 (kPa / %) | 683/2 | | 662/2 | |
| load stage (kPa) | 180 | 250 | 180 | 250 |
| X ₀ (mm) | 0.36 | 0.49 | 0.64 | 0.82 |
| X _{ct} ¹ (mm) | 0.21 | 0.33 | 0.24 | 0.35 |
| X _{ct50} (mm) | 0.45 | 0.76 | 0.61 | 0.89 |
| X_{t50}(mm) | 0.81 | 1.25 | 1.25 | 1.71 |

| X-FOAM HBT 700 | thickness 50 mm | | | thickness 120 mm | | | |
|--|------------------------|-------------|-------------|-------------------------|-------------|-------------|-------------|
| density (kg/m ³) | 43 | | | 42 | | | 43 |
| compressive stress/ deformation acc. EN 826:2013 (kPa / %) | 827/2 | | | 921/2 | | | 978/2 |
| load stage (kPa) | 200 | 250 | 320 | 200 | 250 | 320 | 370 |
| X ₀ (mm) | 0.35 | 0.37 | 0.49 | 0.56 | 0.68 | 0.85 | 0.79 |
| X _{ct} ¹ (mm) | 0.17 | 0.20 | 0.34 | 0.23 | 0.28 | 0.36 | 1.29 |
| X _{ct50} (mm) | 0.38 | 0.47 | 0.8 | 0.53 | 0.67 | 0.98 | 1.52 |
| X_{t50}(mm) | 0.72 | 0.85 | 1.29 | 1.08 | 1.34 | 1.83 | 2.31 |

**X-Foam HBT 300,
X-Foam HBT 500 and
X-Foam HBT 700**

Annex A

2.2. Compressive creep (multi-layer installation)

| X-FOAM HBT 300 | thickness 3x 100 mm | | |
|---|----------------------------|-------------|-------------|
| density (kg/m ³) | 34.5 | | |
| compressive stress/ deformation acc. EN 826:2013 (kPa / %) | 492/2 | | |
| load stage (kPa) | 90 | 135 | 190 |
| X ₀ (mm) | 1.04 | 1.4 | 1.81 |
| X _{ct} ¹ (mm) | 0.37 | 0.40 | 0.62 |
| X _{ct50} (mm) | 0.88 | 0.96 | 1.51 |
| X_{t50}(mm) | 1.92 | 2.36 | 3.32 |
| | | | |
| X-FOAM HBT 700 | thickness 3x 100 mm | | |
| density (kg/m ³) | 45 | | |
| compressive stress / deformation acc. EN 826:2013 (kPa) | 780/2 | | |
| load stage (kPa) | 180 | 260 | 370 |
| X ₀ (mm) | 0.91 | 1.46 | 1.82 |
| X _{ct} ¹ (mm) | 0.45 | 0.56 | 0.96 |
| X _{ct50} (mm) | 1.25 | 1.59 | 2.37 |
| X_{t50}(mm) | 2.16 | 3.05 | 4.20 |

3. Creep under shear load

| | X-FOAM HBT 300 thickness 160 mm | X-FOAM HBT 700 thickness 120 mm |
|--|--|--|
| density (kg/m ³) | 35.5 | 45.5 |
| compressive stress/ deformation acc. EN 826 (kPa) | 421/- | 791/- |
| shear strength/ deformation acc. EN 12090 (kPa) | 153/- | 228/- |
| load stage (kPa) | 53.6 | 79.8 |
| X _{τ0} (mm) | 1.53 | 1.75 |
| X _{τct} ¹ (mm) | 0.61 | 1.84 |
| X _{τct50} (mm) | 1.44 | 2.69 |
| X_{τt50}(mm) | 2.97 | 4.44 |

X-Foam HBT 300,
X-Foam HBT 500 and
X-Foam HBT 700

Annex A

4. Creep under combined compressive and shear load

| X-FOAM HBT 300 | | |
|---|---------------|------------------|
| thickness | 160 mm | |
| density (kg/m ³) | 35.5 | |
| compressive stress/ deformation acc. EN 826 (kPa / %) | 421/- | |
| shear strength/ deformation acc. EN 12090 (kPa) | 153/- | |
| load stage (kPa) | 53.6 | 125.7 |
| deformation under | shear load | compressive load |
| X _{τ0} /X ₀ (mm) | 1.66 | 1.87 |
| X _{τct} /X _{ct} ¹ (mm) | 1.01 | 1.54 |
| X _{τct50} /X _{ct50} (mm) | 2.24 | 3.00 |
| X_{τt50}/X_{t50}(mm) | 3.90 | 4.87 |

| X-FOAM HBT 700 | | |
|---|---------------|------------------|
| thickness | 120 mm | |
| density (kg/m ³) | 45.5 | |
| compressive stress/ deformation acc. EN 826 (kPa / %) | 791/- | |
| shear strength/ deformation acc. EN 12090 (kPa) | 228/- | |
| load stage (kPa) | 79.8 | 242.3 |
| deformation under | shear load | compressive load |
| X _{τ0} /X ₀ (mm) | 1.74 | 1.39 |
| X _{τct} /X _{ct} ¹ (mm) | 1.87 | 1.06 |
| X _{τct50} /X _{ct50} (mm) | 4.16 | 2.52 |
| X_{τt50}/X_{t50}(mm) | 5.90 | 3.58 |

X-Foam HBT 300,
X-Foam HBT 500 and
X-Foam HBT 700

Annex A

5. Adhesion behaviour under compressive and shear load on large-sized samples
acc. to EAD, chapter 2.2.8

| X-Foam HBT 300 | | | |
|--|------------------|-----------|-----------|
| Adhesive friction coefficient between the extruded polystyrene foam boards Acc. EAD chapter 2.2.8, Annex A, A.3.1 | | | |
| thickness | 2x 120 mm | | |
| density (kg/m ³) | 35-37 | | |
| compressive stress acc. EN 826 (kPa) | 473 | | |
| Compression stress – load stage (kPa) | 15 | 45 | 90 |
| Adhesive friction coefficient regarding the compression stress – load stage | 0.55 | 0.62 | 0.64 |
| Adhesive friction coefficient | 0.60 | | |
| Adhesive friction coefficient between the extruded polystyrene foam boards and in-situ concrete as well as a concrete finished part with foil Acc. EAD chapter 2.2.8, Annex A, A.3.2 | | | |
| thickness | 1x 160 mm | | |
| density (kg/m ³) | 35 -36 | | |
| compressive stress acc. EN 826 (kPa) | 419 | | |
| Compression stress – load stage (kPa) | 15 | 45 | 90 |
| Adhesive friction coefficient regarding the compression stress – load stage | 0.41 | 0.46 | 0.60 |
| Adhesive friction coefficient | 0.46 | | |

X-Foam HBT 300,
X-Foam HBT 500 and
X-Foam HBT 700

Annex A

| X-Foam HBT 700 | | | |
|--|------------------|-----------|-----------|
| Adhesive friction coefficient between the extruded polystyrene foam boards Acc. EAD chapter 2.2.8, Annex A, A.3.1 | | | |
| thickness | 2x 120 mm | | |
| density (kg/m ³) | 44 - 45 | | |
| compressive stress acc. EN 826 (kPa) | 803 | | |
| Compression stress – load stage (kPa) | 15 | 45 | 90 |
| Adhesive friction coefficient regarding the compression stress – load stage | 0.67 | 0.66 | 0.64 |
| Adhesive friction coefficient | 0.66 | | |
| Adhesive friction coefficient between the extruded polystyrene foam boards and in-situ concrete as well as a concrete finished part with foil Acc. EAD chapter 2.2.8, Annex A, A.3.2 | | | |
| thickness | 1x 120 mm | | |
| density (kg/m ³) | 44 - 45 | | |
| compressive stress acc. EN 826 (kPa) | 803 | | |
| Compression stress – load stage (kPa) | 15 | 45 | 90 |
| Adhesive friction coefficient regarding the compression stress – load stage | 0.40 | 0.45 | 0.48 |
| Adhesive friction coefficient | 0.44 | | |