

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

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European Technical Assessment

ETA-17/0909
of 22 November 2017

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General Part

Technical Assessment Body issuing the
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

Austrotherm XPS TOP 30,
Austrotherm XPS TOP 50 and
Austrotherm XPS TOP 70

Product family
to which the construction product belongs

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

Manufacturer

Austrotherm GmbH
Friedrich-Schmid-Straße 165
2754 Waldegg/Wopfing
ÖSTERREICH/AUSTRIA

Manufacturing plant

Werk 1
A-7083 Purbach
Werk 2
DE-20322 Wittenberge

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

EAD No 040650-00-1201

European Technical Assessment

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Page 2 of 13 | 22 November 2017

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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. The 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 designation:

"Austrotherm XPS TOP 30",

"Austrotherm XPS TOP 50" and

"Austrotherm XPS TOP 70".

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

Nominal thicknesses: 50 mm to 200 mm
("Austrotherm XPS TOP 70" 80 mm to 200 mm)

Nominal length: 1250 mm

Nominal widths: 600 mm

The European Technical Assessment has been issued for the product 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 and even on the substrate to which they are applied. In particular the following applications are covered:

- Load bearing and thermal insulation underneath foundation slabs
- 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 thermal insulation 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 thermal insulation boards, also the respective national regulations shall be observed.

Where the thermal insulation 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.

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
<p>Compressive stress at 10 % deformation or compressive strength</p> <p>test acc. to EN 826:2013</p> <p>"Austrotherm XPS TOP 30"</p> <p>"Austrotherm XPS TOP 50"</p> <p>"Austrotherm XPS TOP 70"</p> <p>Slip deformation (until the conventional elastic zone (distinct straight portion of the force-displacement curve)) in case of 2-3 layer installation thickness of the single boards ≤ 120 mm</p> <p>Compressive stress or compressive strength in the transverse and longitudinal directions</p>	<p>Level (individual values may fall below this level up to 10 %):</p> <p>≥ 300 kPa</p> <p>≥ 500 kPa</p> <p>≥ 700 kPa</p> <p>See Annex A</p> <p>No performance assessed</p>
<p>Characteristic value of compressive stress or compressive strength</p> <p>5%-fractile value for a one-sided confidence level of 75 % under unknown or known variance using ISO 12491:1997</p> <p>"Austrotherm XPS TOP 30"</p> <p>thickness $50 \text{ mm} \leq d < 100 \text{ mm}$</p> <p>thickness $100 \text{ mm} \leq d < 160 \text{ mm}$</p> <p>thickness $160 \text{ mm} \leq d \leq 200 \text{ mm}$</p> <p>"Austrotherm XPS TOP 50"</p> <p>thickness $50 \text{ mm} \leq d < 100 \text{ mm}$</p> <p>thickness $100 \text{ mm} \leq d < 160 \text{ mm}$</p> <p>thickness $160 \text{ mm} \leq d \leq 200 \text{ mm}$</p>	<p>$\sigma_{0,05} = 300$ kPa (n= 50; $\sigma_{\text{mean}} = 331$ kPa; $s_{\sigma} = 20$ kPa)</p> <p>$\sigma_{0,05} = 348$ kPa (n= 50; $\sigma_{\text{mean}} = 394$ kPa; $s_{\sigma} = 27$ kPa)</p> <p>$\sigma_{0,05} = 410$ kPa (n= 50; $\sigma_{\text{mean}} = 436$ kPa; $s_{\sigma} = 15$ kPa)</p> <p>$\sigma_{0,05} = 516$ kPa (n= 22; $\sigma_{\text{mean}} = 565$ kPa; $s_{\sigma} = 28$ kPa)</p> <p>$\sigma_{0,05} = 525$ kPa (n= 50; $\sigma_{\text{mean}} = 556$ kPa; $s_{\sigma} = 18$ kPa)</p> <p>$\sigma_{0,05} = 518$ kPa (n= 15; $\sigma_{\text{mean}} = 556$ kPa; $s_{\sigma} = 20$ kPa)</p>

Essential characteristic	Performance
<p>Characteristic value of compressive stress or compressive strength</p> <p>5%-fractile value for a one-sided confidence level of 75 % under unknown or known variance using ISO 12491:1997</p> <p>"Austrotherm XPS TOP 70"</p> <p>thickness $80 \text{ mm} \leq d \leq 120 \text{ mm}$</p> <p>thickness $120 \text{ mm} < d \leq 200 \text{ mm}$</p>	<p>$\sigma_{0,05} = 725 \text{ kPa}$ ($n= 11$; $\sigma_{\text{mean}}= 772 \text{ kPa}$; $s_{\sigma}= 23 \text{ kPa}$)</p> <p>$\sigma_{0,05} = 718 \text{ kPa}$ ($n= 28$; $\sigma_{\text{mean}}= 754 \text{ kPa}$; $s_{\sigma}= 20 \text{ kPa}$)</p>
Compressive creep	See Annex A
<p>Behaviour under shear load (large-sized specimen)</p> <p>test acc. to the EAD and the guidelines in EN 12090:2013</p> <p>"Austrotherm XPS TOP 30", thickness 200 mm</p> <p>"Austrotherm XPS TOP 70", thickness 200 mm</p>	<p>$\tau_{\text{large}} = 147 \text{ kPa}$</p> <p>$\tau_{\text{large}} = 181 \text{ kPa}$</p>
Creep under shear load	See Annex A
Creep under combined compressive and shear load	See Annex A
Compressive modulus of elasticity	No performance assessed
Adhesion behaviour under compressive and shear load on large-sized samples	No performance assessed
Shear strength	No performance assessed
<p>Density</p> <p>test acc. to EN 1602:2013</p> <p>"Austrotherm XPS TOP 30"</p> <p>"Austrotherm XPS TOP 50"</p> <p>"Austrotherm XPS TOP 70"</p>	<p>density range:</p> <p>$30 \text{ kg/m}^3 - 37 \text{ kg/m}^3$</p> <p>$33 \text{ kg/m}^3 - 40 \text{ kg/m}^3$</p> <p>$36 \text{ kg/m}^3 - 43 \text{ kg/m}^3$</p>

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
<p>Reaction to fire</p> <p>test acc. to EN ISO 11925-2:2010</p>	<p>Class E</p> <p>acc. to EN 13501-1:2007 + A1:2009</p>

3.3 Energy economy and heat retention (BWR 6)

Essential characteristic	Performance
<p>Thermal conductivity</p> <p>at mean reference temperature of 10 °C</p> <p>test acc. to EN 12667:2001 or EN 12939:2001 and aging procedure acc. EN 13164:2012+A1:2015, Annex C with deviating storage time period (sliced specimen) of (90 +2/-2) days prior to testing</p> <p>"Austrotherm XPS TOP 30"</p> <p>thickness 50 ≤ d ≤ 60mm</p> <p>thickness 60 < d ≤ 100mm</p> <p>thickness 100 < d ≤ 120mm</p> <p>thickness 120 < d ≤ 160mm</p> <p>thickness 160 < d ≤ 200mm</p> <p>"Austrotherm XPS TOP 50"</p> <p>thickness 50 ≤ d ≤ 60mm</p> <p>thickness 60 < d ≤ 100mm</p> <p>thickness 100 < d ≤ 120mm</p> <p>thickness 120 < d ≤ 160mm</p> <p>thickness 160 < d ≤ 200mm</p> <p>"Austrotherm XPS TOP 70"</p> <p>thickness 80 < d ≤ 100mm</p> <p>thickness 100 < d ≤ 120mm</p> <p>thickness 120 < d ≤ 160mm</p> <p>thickness 160 < d ≤ 200mm</p> <p>Moisture conversion coefficient</p>	<p>$\lambda_{D(90d)} = 0,032 \text{ W}/(\text{m} \cdot \text{K})$</p> <p>$\lambda_{D(90d)} = 0,034 \text{ W}/(\text{m} \cdot \text{K})$</p> <p>$\lambda_{D(90d)} = 0,035 \text{ W}/(\text{m} \cdot \text{K})$</p> <p>$\lambda_{D(90d)} = 0,037 \text{ W}/(\text{m} \cdot \text{K})$</p> <p>$\lambda_{D(90d)} = 0,038 \text{ W}/(\text{m} \cdot \text{K})$</p> <p>$\lambda_{D(90d)} = 0,032 \text{ W}/(\text{m} \cdot \text{K})$</p> <p>$\lambda_{D(90d)} = 0,034 \text{ W}/(\text{m} \cdot \text{K})$</p> <p>$\lambda_{D(90d)} = 0,035 \text{ W}/(\text{m} \cdot \text{K})$</p> <p>$\lambda_{D(90d)} = 0,037 \text{ W}/(\text{m} \cdot \text{K})$</p> <p>$\lambda_{D(90d)} = 0,038 \text{ W}/(\text{m} \cdot \text{K})$</p> <p>$\lambda_{D(90d)} = 0,034 \text{ W}/(\text{m} \cdot \text{K})$</p> <p>$\lambda_{D(90d)} = 0,035 \text{ W}/(\text{m} \cdot \text{K})$</p> <p>$\lambda_{D(90d)} = 0,037 \text{ W}/(\text{m} \cdot \text{K})$</p> <p>$\lambda_{D(90d)} = 0,038 \text{ W}/(\text{m} \cdot \text{K})$</p> <p>No performance assessed</p>
<p>Water absorption</p> <p>Long term water absorption by total immersion</p> <p>test acc. to EN 12087:2013 (method 2A)</p> <p>"Austrotherm XPS TOP 30", "Austrotherm XPS TOP 50", "Austrotherm XPS TOP 70"</p> <p>Long term water absorption by diffusion</p> <p>test acc. to EN 12088:2013</p> <p>"Austrotherm XPS TOP 30", "Austrotherm XPS TOP 50", "Austrotherm XPS TOP 70"</p>	<p>WL(T)0,7 ($W_{lt} \leq 0,7 \text{ Vol.}\%$)</p> <p>WD(V)3 ($W_{dV} \leq 3,0 \text{ Vol.}\%$)</p>

Essential characteristic	Performance
<p>Freeze-thaw resistance test acc. to EN 12091:2013 using the wet test specimens from having done the water diffusion test in accordance with EN 12088:2013</p> <p>"Austrotherm XPS TOP 30", "Austrotherm XPS TOP 50", "Austrotherm XPS TOP 70"</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>"Austrotherm XPS TOP 30", "Austrotherm XPS TOP 50", "Austrotherm XPS TOP 70"</p>	<p>FTCD1 ($W_v \leq 1,0 \text{ Vol.}\%$)</p> <p>$\leq 10 \%$</p>
Water vapour diffusion resistance factor	No performance assessed
<p>Geometrical properties</p> <p>Thickness</p> <p>test acc. EN 823:2013 (clause 7.2, figure 2, measuring set-up 3)</p> <p>"Austrotherm XPS TOP 30", "Austrotherm XPS TOP 50", "Austrotherm XPS TOP 70"</p> <p>Thickness $\leq 120 \text{ mm}$ Thickness $> 120 \text{ mm}$</p> <p>Length, width</p> <p>test acc. EN 822:2013</p> <p>"Austrotherm XPS TOP 30", "Austrotherm XPS TOP 50", "Austrotherm XPS TOP 70"</p> <p>Squareness</p> <p>in direction of length and width; in direction of thickness test acc. EN 824:2013</p> <p>"Austrotherm XPS TOP 30", "Austrotherm XPS TOP 50", "Austrotherm XPS TOP 70"</p> <p>Flatness</p> <p>in direction of length and width test acc. EN 825:2013</p> <p>"Austrotherm XPS TOP 30", "Austrotherm XPS TOP 50", "Austrotherm XPS TOP 70"</p> <p>Thickness $\leq 120 \text{ mm}$ Thickness $> 120 \text{ mm}$</p>	<p>tolerance</p> <p>$\pm 2 \text{ mm}$ $+4/-2 \text{ mm}$</p> <p>$\pm 8 \text{ mm}$</p> <p>5 mm/m</p> <p>2 mm 3 mm</p>

Essential characteristic	Performance
Deformation under specified compressive load and temperature conditions test acc. to EN 1605:2013 "Austrotherm XPS TOP 30", "Austrotherm XPS TOP 50", "Austrotherm XPS TOP 70"	load: 40 kPa; temperature: (70 ± 1) °C; time: (168 ± 1) h ≤ 5 %
Dimensional stability under specified conditions test acc. to EN 1604:2013 "Austrotherm XPS TOP 30", "Austrotherm XPS TOP 50", "Austrotherm XPS TOP 70"	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 test acc. to EN 1607:2013 "Austrotherm XPS TOP 30", "Austrotherm XPS TOP 50", "Austrotherm XPS TOP 70"	TR150 ($\sigma_{mt} \geq 150 \text{ kPa}$)
Volume percentage of closed cells test acc. to EN ISO 4590:2003 (method 1 with correction) "Austrotherm XPS TOP 30", "Austrotherm XPS TOP 50", "Austrotherm XPS TOP 70"	≥ 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/EC

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 22 November 2017 by Deutsches Institut für Bautechnik

Prof. Gunter Hoppe
Head of Department

beglaubigt:
Wendler

**Austrotherm XPS TOP 30,
Austrotherm XPS TOP 50 and
Austrotherm XPS TOP 70**

Annex A

1. Compressive stress

Slip deformation

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

Austrotherm XPS TOP 30 ($\rho = 35 \text{ kg/m}^3$)		
thickness (mm)	2x100	3x100
compressive stress, σ_a	52	44
initial displacement X_a (mm)	0,37	0,39
Austrotherm XPS TOP 70 ($\rho = 41 \text{ kg/m}^3$)		
thickness (mm)	2x100	3x100
compressive stress, σ_a	166	196
initial displacement X_a (mm)	1,44	2,12

2. Compressive creep

2.1 Compressive creep (single-layer board)

Austrotherm XPS TOP 30	thickness 50 mm			thickness 120 mm		
density (kg/m^3)	32			33		
compressive stress/ deformation acc. EN 826 (kPa / %)	370/3			561/8		
load stage (kPa)	110	130	170	110	130	170
X_0 (mm)	0,30	0,37	0,46	0,55	0,61	0,80
X_{ct} (mm)	0,22	0,28	0,50	0,43	0,47	0,65
X_{ct50} (mm)	0,58	0,77	1,30	1,44	1,50	1,90
X_{t50} (mm)	0,88	1,14	1,76	1,99	2,11	2,70
Austrotherm XPS TOP 30						
	thickness 200 mm					
density (kg/m^3)	35					
compressive stress/ deformation acc. EN 826 (kPa / %)	516/-					
load stage (kPa)	103	155	206			
X_0 (mm)	0,63	0,80	1,23			
X_{ct} (mm)	0,56	0,92	1,31			
X_{ct50} (mm)	2,76	3,14	3,84			
X_{t50} (mm)	3,39	3,94	5,07			

**Austrotherm XPS TOP 30,
Austrotherm XPS TOP 50 and
Austrotherm XPS TOP 70**

Annex A

Austrotherm XPS TOP 50	thickness 50 mm			thickness 120 mm		
density (kg/m ³)	36			35		
compressive stress/ deformation acc. EN 826 (kPa / %)	703/5			697/7		
load stage (kPa)	150	180	240	150	180	240
X ₀ (mm)	0,25	0,33	0,40	0,58	0,66	0,86
X _{ct} (mm)	0,19	0,26	0,40	0,40	0,48	0,86
X _{ct50} (mm)	0,50	0,75	0,97	1,40	1,58	2,36
X_{t50}(mm)	0,75	1,08	1,37	1,98	2,24	3,22

Austrotherm XPS TOP 50	thickness 200 mm		
density (kg/m ³)	39		
compressive stress/ deformation acc. EN 826 (kPa / %)	683/-		
load stage (kPa)	137	205	273
X ₀ (mm)	0,64	0,88	1,41
X _{ct} (mm)	0,47	1,16	3,87
X _{ct50} (mm)	2,23	3,37	9,90
X_{t50}(mm)	2,87	4,25	11,31

Austrotherm XPS TOP 70	thickness 50 mm			thickness 120 mm		
density (kg/m ³)	38			37		
compressive stress/ deformation acc. EN 826 (kPa / %)	879/5			796/10		
load stage (kPa)	210	240	300	210	240	300
X ₀ (mm)	0,28	0,38	0,48	0,62	0,73	0,94
X _{ct} (mm)	0,28	0,33	0,40	0,47	0,51	0,84
X _{ct50} (mm)	0,71	0,72	0,85	1,31	1,47	2,25
X_{t50}(mm)	0,99	1,10	1,33	1,93	2,20	3,19

Austrotherm XPS TOP 70	thickness 200 mm		
density (kg/m ³)	40		
compressive stress/ deformation acc. EN 826 (kPa / %)	769/-		
load stage (kPa)	154	231	308
X ₀ (mm)	0,67	1,15	1,47
X _{ct} (mm)	0,64	1,45	4,25
X _{ct50} (mm)	2,73	4,53	11,14
X_{t50}(mm)	3,40	5,68	12,61

**Austrotherm XPS TOP 30,
Austrotherm XPS TOP 50 and
Austrotherm XPS TOP 70**

Annex A

2.2. Compressive creep (multi-layer installation)

Austrotherm XPS TOP 30	thickness 3x 100 mm		
density (kg/m ³)	40		
load stage (kPa)	87	130	173
X ₀ (mm)	1,11	1,79	2,29
X _{ct} (mm)	1,27	2,00	4,76
X _{ct50} (mm)	3,86	4,86	9,82
X_{t50}(mm)	4,97	6,65	12,11
Austrotherm XPS TOP 70	thickness 3x 100 mm		
density (kg/m ³)	41		
load stage (kPa)	160	240	320
X ₀ (mm)	1,65	2,52	2,49
X _{ct} (mm)	0,84	1,49	4,81
X _{ct50} (mm)	3,37	5,18	16,79
X_{t50}(mm)	5,02	7,70	19,28

3. Creep under shear load

Austrotherm XPS TOP 30	thickness 200 mm
density (kg/m ³)	34
shear strength/ deformation acc. EN 12090 (kPa)	144
load stage (kPa)	50,4
X _{τ0} (mm)	1,39
X _{τct} (mm)	1,24
X _{τct50} (mm)	3,80
X_{τt50}(mm)	5,19

**Austrotherm XPS TOP 30,
Austrotherm XPS TOP 50 and
Austrotherm XPS TOP 70**

Annex A

4. Creep under combined compressive and shear load

Austrotherm XPS TOP 30		
thickness	200 mm	
density (kg/m ³)	34	
load stage (kPa)	50,4	130
deformation under	shear load	compressive load
X _{τ0} /X ₀ (mm)	1,41	0,67
X _{τct} /X _{ct} (mm)	1,29	1,16
X _{τct50} /X _{ct50} (mm)	3,22	2,56
X_{τ50}/X_{t50}(mm)	4,63	3,23