

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

**ETA-18/0619**  
**of 29 August 2018**

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

BACHL XPS 300 C-SF

Product family  
to which the construction product belongs

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

Manufacturer

Karl Bachl Kunststoffverarbeitung GmbH & Co. KG  
Deching 3  
94133 Röhrnbach  
DEUTSCHLAND

Manufacturing plant

Karl Bachl Kunststoffverarbeitung GmbH & Co. KG  
Hörmannsdorf 24  
94104 Tittling  
DEUTSCHLAND

This European Technical Assessment  
contains

8 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 040650-00-1201

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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 (CO<sub>2</sub>), isobutene and additives. The extruded polystyrene foam boards are manufactured as single layer boards (thickness 60 mm) and as double layer boards (thickness ≥ 80 mm), which welded together by full-surface bonding. The 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:

"Bachl XPS 300-C SF".

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

Nominal thicknesses:	60 mm to 120 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 on the substrate to which they are applied. In particular the following applications are intended:

- 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 manufacturer'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
Compressive stress at 10 % deformation or compressive strength test acc. to EN 826:2013	Level (individual values may fall below this level up to 10 %): ≥ 300 kPa
Slip deformation	No performance assessed
Compressive stress or compressive strength in the transverse and longitudinal directions	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 thickness 60 mm thickness 80 mm ≤ d ≤ 120 mm	$\sigma_{0,05} = 310$ kPa (n= 34; $\sigma_{\text{mean}} = 394$ kPa; $s_{\sigma} = 50$ kPa) $\sigma_{0,05} = 285$ kPa (n= 50; $\sigma_{\text{mean}} = 354$ kPa; $s_{\sigma} = 43$ kPa)
Compressive creep	See Annex A
Behaviour under shear load (large-sized specimen)	No performance assessed
Creep under shear load	No performance assessed
Creep under combined compressive and shear load	No performance assessed
Compressive modulus of elasticity	No performance assessed
Adhesion behaviour under compressive and shear load on large-sized samples	No performance assessed
Shear strength test acc. to EN 12090:2013	≥ 200 kPa
Density test acc. to EN 1602:2013	density range: 31 kg/m <sup>3</sup> - 34 kg/m <sup>3</sup>

#### 3.2 Safety in case of fire (BWR 2)

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

### 3.3 Energy economy and heat retention (BWR 6)

Essential characteristic	Performance
<p>Thermal conductivity</p> <p>at mean reference temperature of 10 °C 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>Moisture conversion coefficient</p>	<p><math>\lambda_{D(90d)} = 0,034 \text{ W}/(\text{m} \cdot \text{K})</math></p> <p>No performance assessed</p>
<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 (<math>W_{it} \leq 0,7 \text{ Vol.}\%</math>)</p> <p>WD(V)3 (<math>W_{dv} \leq 3,0 \text{ Vol.}\%</math>)</p>
<p>Freeze-thaw resistance test acc. to EN 12091</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>Reduction in shear strength of the re-dried specimens (double layer boards), when tested in accordance with EN 12090:2013</p>	<p>FTCD1 (<math>W_v \leq 1,0 \text{ Vol.}\%</math>)</p> <p><math>\leq 10 \%</math></p> <p><math>\leq 10 \%</math></p>
<p>Water vapour diffusion resistance factor</p>	<p>See Annex A</p>
<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><math>\pm 2 \text{ mm}</math></p> <p><math>\pm 8 \text{ mm}</math></p> <p>5 mm/m</p> <p>2 mm</p>

Essential characteristic	Performance
Deformation under specified compressive load and temperature conditions test acc. to EN 1605:2013	load: 40 kPa; temperature: $(70 \pm 1)$ °C; time: $(168 \pm 1)$ h $\leq 5 \%$
Dimensional stability under specified conditions test acc. to EN 1604:2013	temperature: 70 °C and 90 % R.H. DS(70,90) ( $\Delta\epsilon_l \leq 5 \%$ , $\Delta\epsilon_b \leq 5 \%$ , $\Delta\epsilon_d \leq 5 \%$ )
Tensile strength perpendicular to faces test acc. to EN 1607:2013	TR150 ( $\sigma_{mt} \geq 150$ kPa)
Volume percentage of closed cells test acc. to EN ISO 4590:2016 (method 1 with correction)	$\geq 95 \%$

**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<sup>1</sup>

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 29 August 2018 by Deutsches Institut für Bautechnik

Prof. Gunter Hoppe  
Head of Department

*beglaubigt:*  
Wendler

<sup>1</sup> as amended

**BACHL XPS 300 C-SF**

**Annex A**

**1. Compressive creep**

**1.1 Compressive creep (single-layer boards)**

<b>BACHL XPS 300 C-SF</b>	<b>thickness 60 mm</b>		
density (kg/m <sup>3</sup> )	30,4	30,5	30,1
compressive stress/ deformation acc. EN 826 (kPa / %)	362/3		
<b>load stage (kPa)</b>	<b>100</b>	<b>120</b>	<b>150</b>
X <sub>0</sub> (mm)	0,37	0,44	0,62
X <sub>ct</sub> (mm)	0,27	0,32	0,72
X <sub>ct50</sub> (mm)	0,76	0,86	1,91
<b>X<sub>t50</sub>(mm)</b>	<b>1,13</b>	<b>1,30</b>	<b>2,53</b>

**1.2 Compressive creep (double-layer boards)**

<b>BACHL XPS 300 C-SF</b>	<b>thickness 80 mm (2x 40 mm)</b>			
density (kg/m <sup>3</sup> )	31,1	31,2	30,8	30,8
compressive stress/ deformation acc. EN 826 (kPa / %)	369/3			
<b>load stage (kPa)</b>	<b>80</b>	<b>100</b>	<b>120</b>	<b>150</b>
X <sub>0</sub> (mm)	0,30	0,39	0,61	0,71
X <sub>ct</sub> (mm)	0,24	0,36	0,51	0,82
X <sub>ct50</sub> (mm)	0,77	0,86	1,35	2,29
<b>X<sub>t50</sub>(mm)</b>	<b>1,07</b>	<b>1,25</b>	<b>1,96</b>	<b>3,00</b>

<b>BACHL XPS 300 C-SF</b>	<b>thickness 120 mm (2x 60 mm)</b>		
density (kg/m <sup>3</sup> )	31,5	31,6	31,3
compressive stress/ deformation acc. EN 826 (kPa / %)	396/2		
<b>load stage (kPa)</b>	<b>100</b>	<b>120</b>	<b>150</b>
X <sub>0</sub> (mm)	0,50	0,62	0,80
X <sub>ct</sub> (mm)	0,36	0,43	0,66
X <sub>ct50</sub> (mm)	0,94	1,24	1,88
<b>X<sub>t50</sub>(mm)</b>	<b>1,44</b>	<b>1,86</b>	<b>2,68</b>

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**BACHL XPS 300 C-SF**

**Annex A**

**2. Water vapour transmission**  
in accordance with EN 12086, climatic condition A

<b>BACHL XPS 300 C-SF</b>	<b>thickness 80 mm (2x 40 mm)</b>	<b>thickness 120 mm (2x 60 mm)</b>
density (kg/m <sup>3</sup> )	32,2	32,3
sliced thickness of the specimens in mm		
Skin layer	4,8/4,9	4,4/4,4
Adhesion layer	9,9	9,3
Core layer	23,8/26,9	45,1/50,4
<b>water vapour diffusion resistance factor (mean values for the sliced thickness)</b>		
$\mu_{skin}$	271/258	293/267
$\mu_{ad}$	164	124
$\mu_{core}$	136/131	90/91