

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
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European Technical Assessment

ETA-18/0262
of 10 July 2018

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the
European Technical Assessment:

Trade name of the construction product

Product family
to which the construction product belongs

Manufacturer

Manufacturing plant

This European Technical Assessment
contains

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

Deutsches Institut für Bautechnik

Efyos XPS SL, Efyos XPS 500 and Efyos XPS 700

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

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

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 (CO₂) 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 designations:

- "Efyos XPS SL",
- "Efyos XPS 500" and
- "Efyos XPS 700".

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

Nominal thicknesses:	50 mm to 160 mm for Efyos XPS SL, 60 mm to 120 mm for Efyos XPS 500, 60 mm to 120 mm for Efyos XPS 700
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 for boards up to 120 mm thickness
- 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.

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 "Efyos XPS SL" "Efyos XPS 500" "Efyos XPS 700"	Level (individual values may fall below this level up to 10 %): ≥ 300 kPa ≥ 500 kPa ≥ 700 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 "Efyos XPS SL" thickness 50 mm ≤ d < 100 mm thickness 100 mm ≤ d ≤ 120 mm "Efyos XPS 500" thickness 60 mm ≤ d < 120 mm "Efyos XPS 700" thickness 60 mm ≤ d ≤ 120 mm	 $\sigma_{0,05} = 331 \text{ kPa}$ (n= 50; $\sigma_{\text{mean}}= 387 \text{ kPa}$; $s_{\sigma}=32 \text{ kPa}$) $\sigma_{0,05} = 386 \text{ kPa}$ (n= 50; $\sigma_{\text{mean}}= 460 \text{ kPa}$; $s_{\sigma}=43 \text{ kPa}$) $\sigma_{0,05} = 485 \text{ kPa}$ (n= 50; $\sigma_{\text{mean}}= 551 \text{ kPa}$; $s_{\sigma}= 39 \text{ kPa}$) $\sigma_{0,05} = 686 \text{ kPa}$ (n= 48; $\sigma_{\text{mean}}= 738 \text{ kPa}$; $s_{\sigma}= 29 \text{ kPa}$)
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	No performance assessed

Essential characteristic	Performance
load on large-sized samples	
Shear strength	No performance assessed
Density test acc. to EN 1602:2013 "Efyos XPS SL" "Efyos XPS 500" "Efyos XPS 700"	density range: 31 kg/m ³ - 36 kg/m ³ 33 kg/m ³ - 40 kg/m ³ 39 kg/m ³ - 47 kg/m ³

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
Thermal conductivity 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 "Efyos XPS SL" thickness 50 mm ≤ d ≤ 60 mm thickness 60 mm < d ≤ 100 mm thickness 100 mm < d ≤ 160 mm "Efyos XPS 500" thickness 60 mm thickness 60 mm < d ≤ 120 mm "Efyos XPS 700" thickness 60 mm thickness 60 mm < d ≤ 120 mm	$\lambda_{D(90d)} = 0,034 \text{ W/(m} \cdot \text{K)}$ $\lambda_{D(90d)} = 0,036 \text{ W/(m} \cdot \text{K)}$ $\lambda_{D(90d)} = 0,037 \text{ W/(m} \cdot \text{K)}$ $\lambda_{D(90d)} = 0,034 \text{ W/(m} \cdot \text{K)}$ $\lambda_{D(90d)} = 0,037 \text{ W/(m} \cdot \text{K)}$ $\lambda_{D(90d)} = 0,034 \text{ W/(m} \cdot \text{K)}$ $\lambda_{D(90d)} = 0,037 \text{ W/(m} \cdot \text{K)}$
Moisture conversion coefficient	No performance assessed
Water absorption Long term water absorption by total immersion test acc. to EN 12087:2013 (method 2A) Long term water absorption by diffusion test acc. to EN 12088:2013	WL(T)0,7 ($W_{it} \leq 0,7 \text{ Vol.}\%$) WD(V)3 ($W_{dV} \leq 3,0 \text{ Vol.}\%$)

Essential characteristic	Performance
<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>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 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>$\pm 2 \text{ mm}$</p> <p>$\pm 8 \text{ mm}$</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: $(70 \pm 1) \text{ }^\circ\text{C}$; time: $(168 \pm 1) \text{ h}$</p> <p>$\leq 5 \%$</p>
<p>Dimensional stability under specified conditions test acc. to EN 1604:2013</p>	<p>temperature: $70 \text{ }^\circ\text{C}$ and 90 % R.H.</p> <p>DS(70,90) ($\Delta\epsilon_l \leq 5 \%$, $\Delta\epsilon_b \leq 5 \%$, $\Delta\epsilon_d \leq 5 \%$)</p>
Tensile strength perpendicular to faces	No performance assessed
<p>Volume percentage of closed cells test acc. to EN ISO 4590:2016 (method 1 with correction)</p>	$\geq 95 \%$

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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 10 July 2018 by Deutsches Institut für Bautechnik

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beglaubigt:
Wendler

¹ as amended

Efyos XPS SL, Efyos XPS 500 and Efyos XPS 700

Annex A

1 Compressive creep

1.1 Compressive creep (single-layer board)

Efyos XPS SL	thickness 60 mm			thickness 120 mm		
density (kg/m ³)	31,1			31,9		
compressive stress/ deformation acc. EN 826:2013 (kPa / %)	434/3			587/5		
load stage (kPa)	100	130	180	100	130	180
X ₀ (mm)	0,34	0,40	0,51	0,54	0,65	0,73
X _{ct} (mm)	0,27	0,32	0,47	0,28	0,34	0,50
X _{ct50} (mm)	0,72	0,80	1,27	0,77	0,87	1,37
X_{t50}(mm)	1,06	1,20	1,78	1,30	1,51	2,10
Efyos XPS 500						
	thickness 60 mm			thickness 120 mm		
density (kg/m ³)	36,8			33,2		
compressive stress/ deformation acc. EN 826:2013 (kPa / %)	589/3			635/4		
load stage (kPa)	130	180	250	130	180	250
X ₀ (mm)	0,33	0,40	0,51	0,59	0,75	1,00
X _{ct} (mm)	0,26	0,34	0,55	0,32	0,48	0,77
X _{ct50} (mm)	0,80	0,96	1,49	0,84	1,40	2,14
X_{t50}(mm)	1,13	1,36	2,00	1,43	2,15	3,13
Efyos XPS 700						
	thickness 60 mm			thickness 120 mm		
density (kg/m ³)	42,0			37,1		
compressive stress/ deformation acc. EN 826:2013 (kPa / %)	735/2			756/3		
load stage (kPa)	180	250	350	180	250	350
X ₀ (mm)	0,36	0,45	0,57	0,67	0,85	1,20
X _{ct} (mm)	0,28	0,43	0,79	0,39	0,56	1,41
X _{ct50} (mm)	0,90	1,40	2,67	1,01	1,54	4,02
X_{t50}(mm)	1,25	1,86	3,24	1,69	2,39	5,22