

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-17/0970
of 19 November 2021

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

Superfoam 300 SF, Superfoam 500 SF and
Superfoam 700 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

SUPERGLASS DÄMMSTOFFE
Zweigniederlassung der SAINT-GOBAIN ISOVER G+H
Aktiengesellschaft
Industriestraße 12
64297 Darmstadt
DEUTSCHLAND

Manufacturing plant

Werk 1
Werk 2

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 040650-00-1201

This version replaces

ETA-17/0970 issued on 3 January 2018

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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. 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:

- "Superfoam 300 SF",
- "Superfoam 500 SF" and
- "Superfoam 700 SF".

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

- Nominal thicknesses: 50 mm to 200 mm
("Superfoam 700 SF" 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 with boards "Superfoam 300 SF" and "Superfoam 700 SF" from 80 mm thickness and "Superfoam 500 SF" from 50 mm thickness up
- 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>"Superfoam 300 SF"</p> <p>thickness $80 \text{ mm} \leq d \leq 200 \text{ mm}$</p> <p>"Superfoam 500 SF"</p> <p>"Superfoam 700 SF"</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 $\leq 120 \text{ mm}$</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>$\geq 300 \text{ kPa}$</p> <p>$\geq 500 \text{ kPa}$</p> <p>$\geq 700 \text{ kPa}$</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>"Superfoam 300 SF"</p> <p>thickness $80 \text{ mm} \leq d \leq 100 \text{ mm}$</p> <p>thickness $d=120 \text{ mm}$</p> <p>thickness $140 \text{ mm} \leq d \leq 200 \text{ mm}$</p> <p>"Superfoam 500 SF"</p> <p>thickness $50 \text{ mm} \leq d \leq 100 \text{ mm}$</p> <p>thickness $120 \text{ mm} \leq d \leq 200 \text{ mm}$</p>	<p>$\sigma_{0,05} = 322 \text{ kPa}$ (n= 50; $\sigma_{\text{mean}} = 363 \text{ kPa}$; $s_{\sigma} = 23 \text{ kPa}$)</p> <p>$\sigma_{0,05} = 343 \text{ kPa}$ (n= 50; $\sigma_{\text{mean}} = 389 \text{ kPa}$; $s_{\sigma} = 26 \text{ kPa}$)</p> <p>$\sigma_{0,05} = 366 \text{ kPa}$ (n= 50; $\sigma_{\text{mean}} = 440 \text{ kPa}$; $s_{\sigma} = 43 \text{ kPa}$)</p> <p>$\sigma_{0,05} = 526 \text{ kPa}$ (n= 50; $\sigma_{\text{mean}} = 572 \text{ kPa}$; $s_{\sigma} = 26 \text{ kPa}$)</p> <p>$\sigma_{0,05} = 511 \text{ kPa}$ (n= 50; $\sigma_{\text{mean}} = 566 \text{ kPa}$; $s_{\sigma} = 30 \text{ kPa}$)</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>"Superfoam 700 SF"</p> <p>thickness $80 \text{ mm} \leq d < 120 \text{ mm}$</p> <p>thickness $120 \text{ mm} \leq d \leq 200 \text{ mm}$</p>	<p>$\sigma_{0,05} = 706 \text{ kPa}$ (n= 50; $\sigma_{\text{mean}} = 745 \text{ kPa}$; $s_{\sigma} = 22 \text{ kPa}$)</p> <p>$\sigma_{0,05} = 704 \text{ kPa}$ (n= 50; $\sigma_{\text{mean}} = 737 \text{ kPa}$; $s_{\sigma} = 18 \text{ kPa}$)</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>"Superfoam 300 SF", thickness 200 mm</p> <p>"Superfoam 700 SF", 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>"Superfoam 300 SF" thickness $80 \text{ mm} \leq d \leq 200 \text{ mm}$</p> <p>"Superfoam 500 SF"</p> <p>"Superfoam 700 SF"</p>	<p>density range:</p> <p>$30 \text{ kg/m}^3 - 40 \text{ kg/m}^3$</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 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>"Superfoam 300 SF" thickness 50 mm thickness 60 mm thickness 60 < d ≤ 120 mm thickness 120 < d ≤ 160 mm thickness 160 < d ≤ 200 mm</p> <p>"Superfoam 500 SF" thickness 50 mm thickness 60 mm thickness 60 < d ≤ 120 mm thickness 120 < d ≤ 160 mm thickness 160 < d ≤ 200 mm</p> <p>"Superfoam 700 SF" thickness 80 ≤ d ≤ 120 mm thickness 120 < d ≤ 160 mm thickness 160 < d ≤ 200 mm</p> <p>Moisture conversion coefficient</p>	<p>$\lambda_{D(90d)} = 0,032 \text{ W/(m} \cdot \text{K)}$ $\lambda_{D(90d)} = 0,033 \text{ W/(m} \cdot \text{K)}$ $\lambda_{D(90d)} = 0,035 \text{ W/(m} \cdot \text{K)}$ $\lambda_{D(90d)} = 0,037 \text{ W/(m} \cdot \text{K)}$ $\lambda_{D(90d)} = 0,038 \text{ W/(m} \cdot \text{K)}$</p> <p>$\lambda_{D(90d)} = 0,032 \text{ W/(m} \cdot \text{K)}$ $\lambda_{D(90d)} = 0,033 \text{ W/(m} \cdot \text{K)}$ $\lambda_{D(90d)} = 0,035 \text{ W/(m} \cdot \text{K)}$ $\lambda_{D(90d)} = 0,037 \text{ W/(m} \cdot \text{K)}$ $\lambda_{D(90d)} = 0,038 \text{ W/(m} \cdot \text{K)}$</p> <p>$\lambda_{D(90d)} = 0,035 \text{ W/(m} \cdot \text{K)}$ $\lambda_{D(90d)} = 0,037 \text{ W/(m} \cdot \text{K)}$ $\lambda_{D(90d)} = 0,038 \text{ W/(m} \cdot \text{K)}$</p> <p>No performance assessed</p>
<p>Water absorption Long term water absorption by total immersion test acc. to EN 12087:2013 (method 2A) "Superfoam 300 SF", "Superfoam 500 SF", "Superfoam 700 SF"</p> <p>Long term water absorption by diffusion test acc. to EN 12088:2013 "Superfoam 300 SF", "Superfoam 500 SF", "Superfoam 700 SF"</p>	<p>WL(T)0,7 ($W_{it} \leq 0,7 \text{ Vol.}\%$)</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>"Superfoam 300 SF", "Superfoam 500 SF", "Superfoam 700 SF"</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>"Superfoam 300 SF", "Superfoam 500 SF", "Superfoam 700 SF"</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>"Superfoam 300 SF", "Superfoam 500 SF", "Superfoam 700 SF"</p> <p>thickness $\leq 120 \text{ mm}$ thickness $> 120 \text{ mm}$</p> <p>Length, width</p> <p>test acc. EN 822:2013</p> <p>"Superfoam 300 SF", "Superfoam 500 SF", "Superfoam 700 SF"</p> <p>Squareness</p> <p>in direction of length and width; in direction of thickness test acc. EN 824:2013</p> <p>"Superfoam 300 SF", "Superfoam 500 SF", "Superfoam 700 SF"</p> <p>Flatness</p> <p>in direction of length and width test acc. EN 825:2013</p> <p>"Superfoam 300 SF", "Superfoam 500 SF", "Superfoam 700 SF"</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
<p>Compressive stress at 10 % deformation or compressive strength</p> <p>test acc. to EN 826:2013</p> <p>"Superfoam 300 SF" thickness 50 mm ≤ d < 80 mm</p>	<p>Level</p> <p>≥ 300 kPa</p>
<p>Deformation under specified compressive load and temperature conditions</p> <p>test acc. to EN 1605:2013</p> <p>"Superfoam 300 SF", "Superfoam 500 SF", "Superfoam 700 SF"</p>	<p>load: 40 kPa; temperature: (70 ± 1) °C; time: (168 ± 1) h</p> <p>≤ 5 %</p>
<p>Dimensional stability under specified conditions</p> <p>test acc. to EN 1604:2013</p> <p>"Superfoam 300 SF", "Superfoam 500 SF", "Superfoam 700 SF"</p>	<p>temperature: 70 °C and 90% R.H.</p> <p>DS(70,90) (Δε_i ≤ 5 %, Δε_b ≤ 5 %, Δε_d ≤ 5 %)</p>
<p>Tensile strength perpendicular to faces</p> <p>test acc. to EN 1607:2013</p> <p>"Superfoam 300 SF", "Superfoam 500 SF", "Superfoam 700 SF"</p>	<p>TR150 (σ_{mt} ≥ 150 kPa)</p>
<p>Density</p> <p>test acc. to EN 1602:2013</p> <p>"Superfoam 300 SF" thickness 50 mm ≤ d < 80 mm</p>	<p>density range:</p> <p>29 kg/m³ - 34 kg/m³</p>
<p>Volume percentage of closed cells</p> <p>test acc. to EN ISO 4590:2003 (method 1 with correction)</p> <p>"Superfoam 300 SF", "Superfoam 500 SF", "Superfoam 700 SF"</p>	<p>≥ 95%</p>

English translation prepared by DIBt

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 19 November 2021 by Deutsches Institut für Bautechnik

Frank Iffländer
Referatsleiter

beglaubigt:
Wendler

**Superfoam 300 SF, Superfoam 500 SF and
Superfoam 700 SF**

Anlage A

1. Compressive stress

Slip deformation

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

Superfoam 300 SF ($\varphi = 35 \text{ kg/m}^3$)		
thickness (mm)	2x100	3x100
compressive stress, σ_a	52	44
initial displacement X_a (mm)	0,37	0,39
Superfoam 700 SF ($\varphi = 41 \text{ kg/m}^3$)		
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)

Superfoam 300 SF	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
Superfoam 300 SF						
	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			

Superfoam 300 SF, Superfoam 500 SF and
Superfoam 700 SF

Annex A

Superfoam 500 SF	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

Superfoam 500 SF	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

Superfoam 700 SF	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

Superfoam 700 SF	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

Superfoam 300 SF, Superfoam 500 SF and
Superfoam 700 SF

Annex A

2.2. Compressive creep (multi-layer installation)

Superfoam 300 SF	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
Superfoam 700 SF	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

Superfoam 300 SF	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

Superfoam 300 SF, Superfoam 500 SF and
Superfoam 700 SF

Annex A

4. Creep under combined compressive and shear load

Superfoam 300 SF		
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_{τt50}/X_{t50}(mm)	4,63	3,23