European Technical Assessment

ETA-17/0970
of 3 January 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	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	SAINT-GOBAIN ISOVER G+H AG Bürgermeister-Grünzweig-Straße 1 67059 Ludwigshafen 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

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This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission in accordance with Article 25(3) of Regulation (EU) No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 (CO_2), 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:

"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
- 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
Compressive stress at 10 % deformation or compressive strength	Level (individual values may fall below this level up to 10 %):
test acc. to EN 826:2013	
"Superfoam 300 SF"	≥ 300 kPa
"Superfoam 500 SF"	≥ 500 kPa
"Superfoam 700 SF"	≥ 700 kPa
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	See Annex A
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	
"Superfoam 300 SF"	
thickness 50 mm ≤ d < 100 mm	$\sigma_{0,05}$ = 300 kPa (n= 50; σ_{mean}= 331 kPa; s_σ= 20 kPa)
thickness 100 mm ≤ d < 160 mm	$\sigma_{0,05}$ = 348 kPa (n= 50; σ_{mean}= 394 kPa; s_σ= 27 kPa)
thickness 160 mm ≤ d ≤ 200 mm	$\sigma_{0,05}$ = 410 kPa (n= 50; σ_{mean}= 436 kPa; s_σ= 15 kPa)
"Superfoam 500 SF"	
thickness 50 mm ≤ d < 100 mm	$\sigma_{0,05}$ = 516 kPa (n= 22; σ_{mean}= 565 kPa; s_σ= 28 kPa)
thickness 100 mm ≤ d < 160 mm	$\sigma_{0,05}$ = 525 kPa (n= 50; σ_{mean}= 556 kPa; s_σ= 18 kPa)
thickness 160 mm ≤ d ≤ 200 mm	$\sigma_{0,05}$ = 518 kPa (n= 15; σ_{mean}= 556 kPa; s_σ= 20 kPa)

Essential characteristic	Performance
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 "Superfoam 700 SF" thickness 80 mm ≤ d ≤ 120 mm thickness 120 mm < d ≤ 200 mm	 $\sigma_{0,05}$ = 725 kPa (n= 11; σ_{mean}= 772 kPa; s_σ= 23 kPa) $\sigma_{0,05}$ = 718 kPa (n= 28; σ_{mean}= 754 kPa; s_σ= 20 kPa)
Compressive creep	See Annex A
Behaviour under shear load (large-sized specimen) test acc. to the EAD and the guidelines in EN 12090:2013 "Superfoam 300 SF", thickness 200 mm "Superfoam 700 SF", thickness 200 mm	 τ_{large} = 147 kPa τ_{large} = 181 kPa
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
Density test acc. to EN 1602:2013 "Superfoam 300 SF" "Superfoam 500 SF" "Superfoam 700 SF"	 density range: 30 kg/m³ - 37 kg/m³ 33 kg/m³ - 40 kg/m³ 36 kg/m³ - 43 kg/m³

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	
"Superfoam 300 SF"	
thickness $50 \leq d \leq 60$mm	$\lambda_{D(90d)} = 0{,}032$ W/(m·K)
thickness $60 < d \leq 100$mm	$\lambda_{D(90d)} = 0{,}034$ W/(m·K)
thickness $100 < d \leq 120$mm	$\lambda_{D(90d)} = 0{,}035$ W/(m·K)
thickness $120 < d \leq 160$mm	$\lambda_{D(90d)} = 0{,}037$ W/(m·K)
thickness $160 < d \leq 200$mm	$\lambda_{D(90d)} = 0{,}038$ W/(m·K
"Superfoam 500 SF"	
thickness $50 \leq d \leq 60$mm	$\lambda_{D(90d)} = 0{,}032$ W/(m·K)
thickness $60 < d \leq 100$mm	$\lambda_{D(90d)} = 0{,}034$ W/(m·K)
thickness $100 < d \leq 120$mm	$\lambda_{D(90d)} = 0{,}035$ W/(m·K)
thickness $120 < d \leq 160$mm	$\lambda_{D(90d)} = 0{,}037$ W/(m·K)
thickness $160 < d \leq 200$mm	$\lambda_{D(90d)} = 0{,}038$ W/(m·K
"Superfoam 700 SF"	
thickness $80 < d \leq 100$mm	$\lambda_{D(90d)} = 0{,}034$ W/(m·K)
thickness $100 < d \leq 120$mm	$\lambda_{D(90d)} = 0{,}035$ W/(m·K)
thickness $120 < d \leq 160$mm	$\lambda_{D(90d)} = 0{,}037$ W/(m·K)
thickness $160 < d \leq 200$mm	$\lambda_{D(90d)} = 0{,}038$ W/(m·K
Moisture conversion coefficient	No performance assessed
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"	WL(T)0,7 ($W_{lt} \leq 0{,}7$ Vol.%)
Long term water absorption by diffusion	
test acc. to EN 12088:2013	
"Superfoam 300 SF", "Superfoam 500 SF" "Superfoam 700 SF"	WD(V)3 ($W_{dV} \leq 3{,}0$ Vol.%)

Essential characteristic	Performance

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
 	
    "Superfoam 300 SF",
    "Superfoam 500 SF",
    "Superfoam 700 SF"
 	
Reduction in compressive stress at 10 % deformation or in compressive strength of the re-dried specimens, when tested in accordance with EN 826:2013
 	
    "Superfoam 300 SF",
    "Superfoam 500 SF",
    "Superfoam 700 SF"
	FTCD1
	($W_V \leq 1{,}0$ Vol.%)
	
	$\leq 10 \%$

Water vapour diffusion resistance factor	No performance assessed

Geometrical properties
 	
Thickness
 	
test acc. EN 823:2013 (clause 7.2, figure 2, measuring set-up 3)
 	
    "Superfoam 300 SF",
    "Superfoam 500 SF",
    "Superfoam 700 SF"
    Thickness ≤ 120 mm
    Thickness > 120 mm
 	
Length, width
 	
test acc. EN 822:2013
 	
    "Superfoam 300 SF",
    "Superfoam 500 SF",
    "Superfoam 700 SF"
 	
Squareness
 	
in direction of length and width; in direction of thickness
test acc. EN 824:2013
 	
    "Superfoam 300 SF",
    "Superfoam 500 SF",
    "Superfoam 700 SF"
 	
Flatness
 	
in direction of length and width
test acc. EN 825:2013
 	
    "Superfoam 300 SF",
    "Superfoam 500 SF",
    "Superfoam 700 SF"
    Thickness ≤ 120 mm
    Thickness > 120 mm
	tolerance
	
	$\pm$ 2 mm
	+4/-2 mm
	
	$\pm$ 8 mm
	
	5 mm/m
	
	2 mm
	3 mm

Essential characteristic	Performance
Deformation under specified compressive load and temperature conditions test acc. to EN 1605:2013 "Superfoam 300 SF", "Superfoam 500 SF", "Superfoam 700 SF"	load: 40 kPa; temperature: (70 ± 1) °C; time: (168 ± 1) h ≤ 5 %
Dimensional stability under specified conditions test acc. to EN 1604:2013 "Superfoam 300 SF", "Superfoam 500 SF", "Superfoam 700 SF"	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 "Superfoam 300 SF", "Superfoam 500 SF", "Superfoam 700 SF"	TR150 ($\sigma_{mt} \geq 150$ kPa)
Volume percentage of closed cells test acc. to EN ISO 4590:2003 (method 1 with correction) "Superfoam 300 SF", "Superfoam 500 SF", "Superfoam 700 SF"	≥ 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 3 January 2018 by Deutsches Institut für Bautechnik

Prof. Gunter Hoppe   *beglaubigt:*
Head of Department   Wendler

**Deutsches
Institut
für
Bautechnik**

DIBt

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

Annex 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 ($\varphi = 35$ kg/m^3)		
thickness (mm)	2x100	3x100
compressive stress, σa	52	44
initial displacement Xa (mm)	**0,37**	**0,39**

Superfoam 700 SF ($\varphi = 41$ kg/m^3**)**		
thickness (mm)	2x100	3x100
compressive stress, σa	166	196
initial displacement Xa (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**

**Deutsches
Institut
für
Bautechnik**

DIBt

**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**

**Deutsches
Institut
für
Bautechnik**

DIBt

**Superfoam 300 SF, Superfoam 500 SF and Superfoam
700 SFSuperfoam 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**
$X_{\tau 0}$ (mm)	1,39
$X_{\tau ct}$ (mm)	1,24
$X_{\tau ct50}$(mm)	3,80
$X_{\tau t50}$(mm)	**5,19**

Deutsches
Institut
für
Bautechnik

DIBt

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
$X_{\tau 0}$ /X_0 (mm)	1,41	0,67
$X_{\tau ct}$ /X_{ct} (mm)	1,29	1,16
$X_{\tau ct50}$/X_{ct50}(mm)	3,22	2,56
$X_{\tau t50}$/X_{t50}(mm)	**4,63**	**3,23**