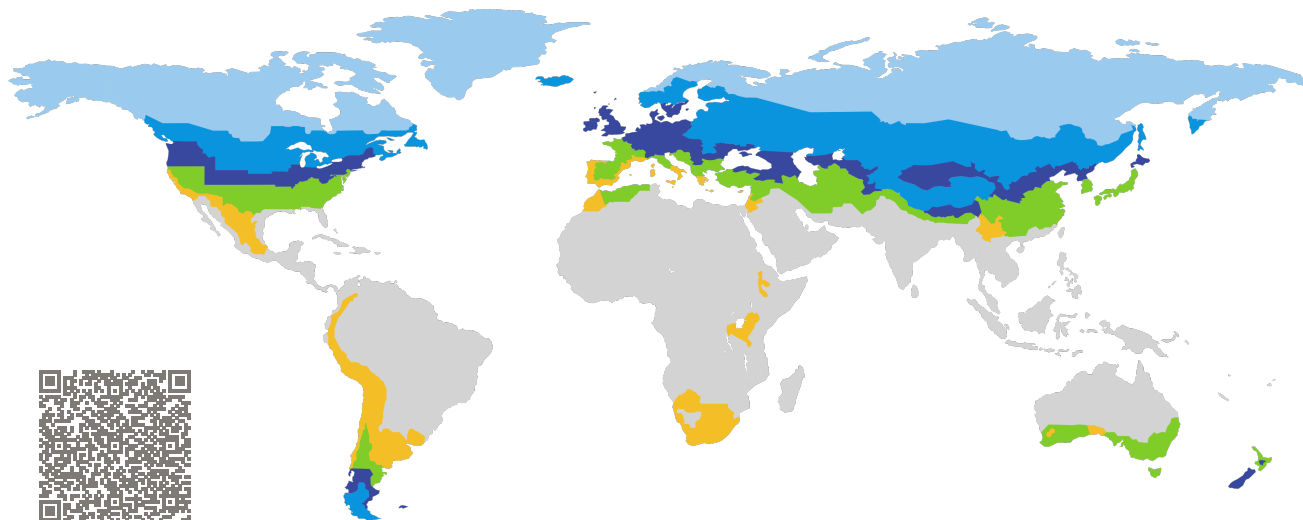


CERTIFICATE

Certified Passive House Component

Component-ID 1546sp01 valid until 31st December 2023

Passive House Institute
Dr. Wolfgang Feist
64283 Darmstadt
Germany



Category: **Spacer for low-E-glazing**

Manufacturer: **Technoform Glass Insulation GmbH,
Lohfelden,
Germany**

Product name: **Technoform-Spacer SP16**

This certificate was awarded based on the following criteria:

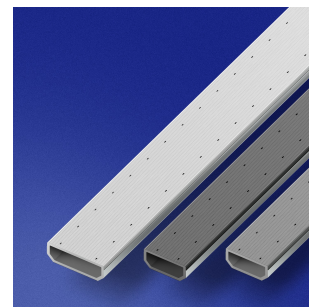
Depending on the climatic region, the spacer prevents high surface temperatures, which can cause mould. At least 3 out of the 7 reference frames fulfilled the spacer hygiene criteria for the relevant climatic region.

Hygiene $f_{Rsi} \geq 0.80$

The specific resistance of the spacer's edges is greater than the climate-independent minimum requirement.

Efficiency $R_E = 5.10 \text{ m} \cdot \text{K/W} \geq 1.50 \text{ m} \cdot \text{K/W}$

Type
All-Plastic
Height Box 2
6.50 mm
Thermal conductivity Box 2
0.140 W/(m · K)



arctic climate



**CERTIFIED
COMPONENT**

Passive House Institute

Passive House
efficiency class

phE

phD

phC

phB

phA

phA+

www.passivehouse.com

Description

The SP16 is a glass fibre reinforced plastic spacer. The diffusion barrier is made from a metallised multi-layer polyester film.

Spacer height: 6.50 mm

Thermal conductivity: 0.140 W/(m · K) (WA 17/1, ift Rosenheim)

Available spacer widths: 8, 10, 12, 14, 15, 16, 18, 20, 22 and 24 mm

Appropriate secondary seal	Specific edge resistance R_E	Efficiency class
Polysulfide	5.10 m · K/W	phA
Polyurethane	5.10 m · K/W	phA
Silicone	5.50 m · K/W	phA
Hotmelt Butyl	6.70 m · K/W	phA+

Explanation

Spacers are categorized into different efficiency classes based on the resistance of their edges R_E . A secondary polysulfide sealant is typically used, unless the spacer is not approved for polysulfide. A detailed report with the calculations is available from either the manufacturer or the Passive House Institute.

The Passive House Institute has defined global component requirements for seven climate regions. In principle, components that have been certified for climates with higher requirements can also be used in climates with lower requirements. This may be economically advantageous.

Use in PHPP:

If individually calculated values are not available then the thermal bridge loss coefficient specified in this document can be used. In this case, the appropriate reference frame must be selected and a 10 % safety margin should be applied.

Further information regarding certification is available on www.passivehouse.com and www.passipedia.org.

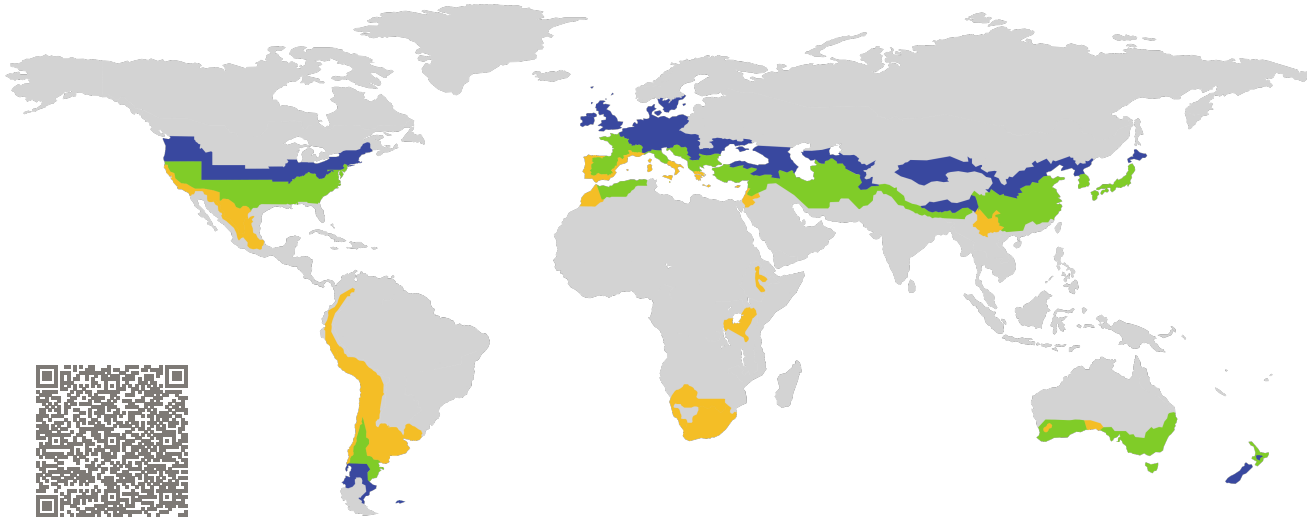
Climate	Reference frames calculated with Polysulfide				
	Arctic ✓	Cool ✓	Cool temperate ✓	Warm temperate ✓	Warm ✓
Glass	Quadruple	Triple	Triple	Triple	Double
Glass package	4/12/3/12/3/12/4	6/18/2/18/6	6/16/6/16/6	6/16/6/16/6	6/16/6
Glass U-value	0.35 W/(m ² · K)	0.52 W/(m ² · K)	0.70 W/(m ² · K)	0.70 W/(m ² · K)	1.20 W/(m ² · K)
Timber-aluminium integral frame					
U_f [W/(m ² · K)]	0.48	0.62	0.73	0.87	1.03
Ψ_g [W/(m · K)]	0.028	0.030	0.031	0.030	0.035
f_{Rsi} [-]	0.80 ✓	0.76 ✓	0.72 ✓	0.70 ✓	0.60 ✓
Timber-aluminium					
U_f [W/(m ² · K)]	0.54	0.57	0.75	0.97	1.19
Ψ_g [W/(m · K)]	0.030	0.031	0.032	0.032	0.038
f_{Rsi} [-]	0.77	0.74	0.70 ✓	0.67 ✓	0.55 ✓
Timber					
U_f [W/(m ² · K)]	0.51	0.53	0.78	0.86	0.99
Ψ_g [W/(m · K)]	0.026	0.029	0.030	0.030	0.035
f_{Rsi} [-]	0.77	0.74	0.70 ✓	0.67 ✓	0.55 ✓
Vinyl					
U_f [W/(m ² · K)]	0.70	0.75	0.82	1.02	1.16
Ψ_g [W/(m · K)]	0.031	0.033	0.033	0.035	0.040
f_{Rsi} [-]	0.79	0.76 ✓	0.74 ✓	0.73 ✓	0.61 ✓
Aluminium					
U_f [W/(m ² · K)]	0.60	0.61	0.71	0.73	1.17
Ψ_g [W/(m · K)]	0.031	0.034	0.036	0.036	0.043
f_{Rsi} [-]	0.80 ✓	0.79 ✓	0.77 ✓	0.77 ✓	0.63 ✓
Curtain wall timber					
U_f [W/(m ² · K)]	0.60	0.65	0.66	0.71	1.11
Ψ_g [W/(m · K)]	0.044	0.043	0.045	0.045	0.056
f_{Rsi} [-]	0.75	0.74	0.71 ✓	0.71 ✓	0.57 ✓
Curtain wall aluminium					
U_f [W/(m ² · K)]	0.67	0.73	0.75	0.79	1.33
Ψ_g [W/(m · K)]	0.051	0.051	0.054	0.054	0.076
f_{Rsi} [-]	0.83 ✓	0.82 ✓	0.78 ✓	0.79 ✓	0.68 ✓

CERTIFICATE

Certified Passive House Component

Component-ID 1547sp03 valid until 31st December 2023

Passive House Institute
Dr. Wolfgang Feist
64283 Darmstadt
Germany



Category: **Spacer for low-E-glazing**

Manufacturer: **Technoform Glass Insulation GmbH,
Lohfelden,
Germany**

Product name: **Technoform-Spacer SP12, SP13, SP14**

This certificate was awarded based on the following criteria:

Depending on the climatic region, the spacer prevents high surface temperatures, which can cause mould. At least 3 out of the 7 reference frames fulfilled the spacer hygiene criteria for the relevant climatic region.

Hygiene $f_{Rsi} \geq 0.70$

The specific resistance of the spacer's edges is greater than the climate-independent minimum requirement.

Efficiency $R_E = 3.40 \text{ m} \cdot \text{K/W} \geq 1.50 \text{ m} \cdot \text{K/W}$

Type
Plastic with stainless steel foil
Height Box 2
6.90 mm
Thermal conductivity Box 2
0.310 W/(m · K)



Passive House
efficiency class

phE

phD

phC

phB

phA

phA+

cool, temperate climate



phB



**CERTIFIED
COMPONENT**

Passive House Institute

Description

The SP12, SP13, SP14 is a polymeric/metal hybride spacer for rigid and tight thermally improved edgebonds of insulating glazing.

Spacer height: 6.90 mm

Thermal conductivity: 0.310 W/(m · K) (WA 17/1, ift Rosenheim)

Available spacer widths: 8, 10, 12, 14, 15, 16, 18, 20, 22 and 24 mm

Appropriate secondary seal	Specific edge resistance R_E	Efficiency class
Polysulfide	3.40 m · K/W	phB
Polyurethane	3.40 m · K/W	phB
Silicone	3.60 m · K/W	phB

Explanation

Spacers are categorized into different efficiency classes based on the resistance of their edges R_E . A secondary polysulfide sealant is typically used, unless the spacer is not approved for polysulfide. A detailed report with the calculations is available from either the manufacturer or the Passive House Institute.

The Passive House Institute has defined global component requirements for seven climate regions. In principle, components that have been certified for climates with higher requirements can also be used in climates with lower requirements. This may be economically advantageous.

Use in PHPP:

If individually calculated values are not available then the thermal bridge loss coefficient specified in this document can be used. In this case, the appropriate reference frame must be selected and a 10 % safety margin should be applied.

Further information regarding certification is available on www.passivehouse.com and www.passipedia.org.

Reference frames calculated with Polysulfide					
Climate	Arctic	Cool	Cool temperate ✓	Warm temperate ✓	Warm ✓
Glass	Quadruple	Triple	Triple	Triple	Double
Glass package	4/12/3/12/3/12/4	6/18/2/18/6	6/16/6/16/6	6/16/6/16/6	6/16/6
Glass U-value	0.35 W/(m ² · K)	0.52 W/(m ² · K)	0.70 W/(m ² · K)	0.70 W/(m ² · K)	1.20 W/(m ² · K)
Timber-aluminium integral frame					
U_f [W/(m ² · K)]	0.48	0.62	0.73	0.87	1.03
Ψ_g [W/(m · K)]	0.038	0.040	0.040	0.038	0.043
f_{Rsi} [-]	0.77	0.73	0.70 ✓	0.68 ✓	0.58 ✓
Timber-aluminium					
U_f [W/(m ² · K)]	0.54	0.57	0.75	0.97	1.19
Ψ_g [W/(m · K)]	0.041	0.043	0.042	0.041	0.048
f_{Rsi} [-]	0.73	0.71	0.67	0.64	0.52
Timber					
U_f [W/(m ² · K)]	0.51	0.53	0.78	0.86	0.99
Ψ_g [W/(m · K)]	0.035	0.039	0.039	0.039	0.043
f_{Rsi} [-]	0.75	0.74	0.71 ✓	0.71 ✓	0.60 ✓
Vinyl					
U_f [W/(m ² · K)]	0.70	0.75	0.82	1.02	1.16
Ψ_g [W/(m · K)]	0.041	0.044	0.044	0.045	0.050
f_{Rsi} [-]	0.76	0.73	0.71 ✓	0.70 ✓	0.59 ✓
Aluminium					
U_f [W/(m ² · K)]	0.60	0.61	0.71	0.73	1.17
Ψ_g [W/(m · K)]	0.043	0.048	0.049	0.049	0.055
f_{Rsi} [-]	0.77	0.76 ✓	0.74 ✓	0.74 ✓	0.61 ✓
Curtain wall timber					
U_f [W/(m ² · K)]	0.60	0.65	0.66	0.71	1.11
Ψ_g [W/(m · K)]	0.056	0.065	0.057	0.057	0.069
f_{Rsi} [-]	0.71	0.70	0.67	0.67 ✓	0.53
Curtain wall aluminium					
U_f [W/(m ² · K)]	0.67	0.73	0.75	0.79	1.33
Ψ_g [W/(m · K)]	0.067	0.066	0.070	0.070	0.094
f_{Rsi} [-]	0.80 ✓	0.78 ✓	0.76 ✓	0.76 ✓	0.64 ✓

