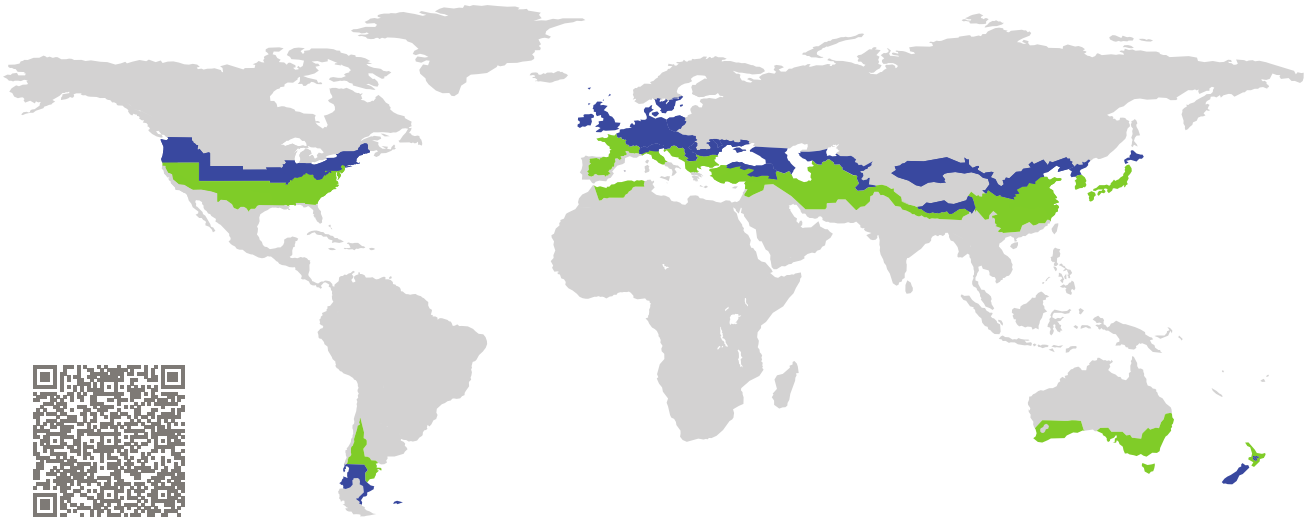
CERTIFICATE

Certified Passive House Component

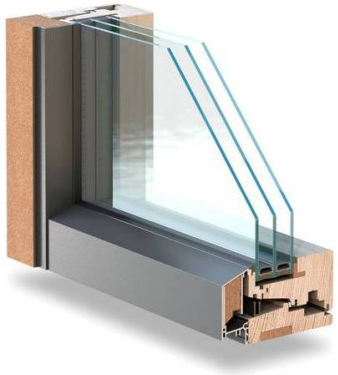
Component-ID 2444ws03 valid until 31st December 2026

Passive House Institute
Dr. Wolfgang Feist
64283 Darmstadt
Germany



Category:	**Window system**
Manufacturer:	**pro Passivhausfenster GmbH, Oberaudorf, Germany**
Product name:	**smartwin**

This certificate was awarded based on the following criteria for the cool, temperate climate zone



Comfort	U_W = 0.78	≤	0.80 W/(m² K)
	$U_{W,\text{installed}}$	≤	0.85 W/(m² K)
	with U_g	=	0.70 W/(m² K)
Hygiene	$f_{Rsi=0.25}$	≥	0.70
Airtightness	Q_{100} = 0.11	≤	0.25 m³/(h m)

cool, temperate climate

phA

CERTIFIED COMPONENT

Passive House Institute

Passive House efficiency class	phE	phD	phC	phB	phA

www.passivehouse.com

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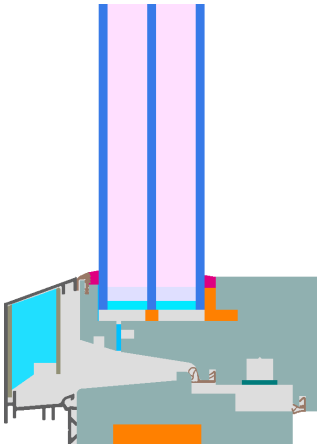
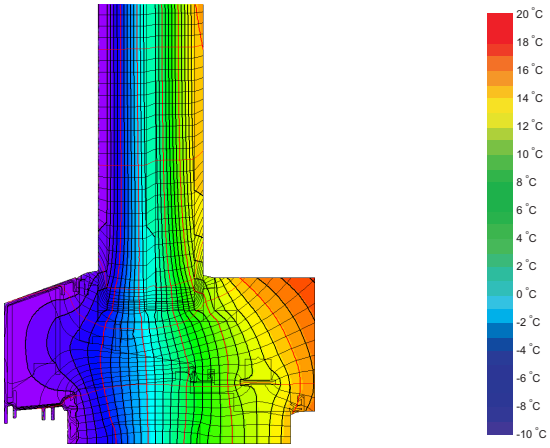
☎ +49 8033 / 30 40 98 | ✉ ff@propassivhausfenster.net | http://www.passivhausfenster.com |



Calculation model



Isothermal

Description

Aluminum clad timber frame (Spruce/Fir, 0.11 W/(mK)), insulated by low density wood fibre board (0.05 & 0.04 W/(mK)) & PU insulation (0.03 W/(mK)) Pane thickness: 48 mm (4/18/4/18/4), rebate depth: 15 mm. Spacer: SWISSPACER Ultimate with polyurethane as secondary seal.

Explanation

The window U-values were calculated for the test window size of 2.46 m × 1.48 m with U_g = 0.70 W/(m^2 K). If a higher quality glazing is used, the window U-values will improve as follows:

Glazing	U_g =	0.70	0.64	0.58	0.52	W/(m^2 K)
		↓	↓	↓	↓	
Window	U_W =	0.78	0.73	0.68	0.63	W/(m^2 K)

Transparent building components are classified into efficiency classes depending on the heat losses through the opaque part. The frame U-Values, frame widths, thermal bridges at the glazing edge, and the glazing edge lengths are included in these heat losses. A more detailed report of the calculations performed in the context of certification is available from the manufacturer.
The Passive House Institute has defined international component criteria for seven climate zones. In principle, components which have been certified for climate zones with higher requirements may also be used in climates with less stringent requirements. In a particular climate zone it may make sense to use a component of a higher thermal quality which has been certified for a climate zone with more stringent requirements.

Further information relating to certification
can be found on www.passivehouse.com and passipedia.org.

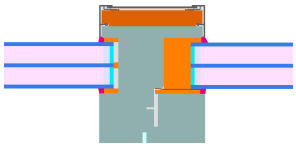
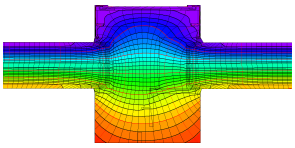
Frame values			Frame width b_f mm	U-value frame U_f W/(m² K)	Ψ-glazing edge Ψ_g W/(m K)	Temp. Factor $f_{Rsi=0.25}$ [-]
Mullion fixed	(0M1)		110	0.66	0.023	0.73
Mullion fixed	(0M2)		110	0.78	0.022	0.71
Transom fixed	(0T1)		110	0.80	0.023	0.71
Transom fixed	(0T2)		110	0.79	0.022	0.71
Mullion 1 casement	(1M1)		110	0.77	0.023	0.81
Mullion 1 casement	(1M2)		110	0.92	0.022	0.70
Mullion 1 casement	(1M3)		89	0.79	0.023	0.72
Mullion 1 casement	(1M4)		89	0.92	0.022	0.71
Transom 1 casement	(1T1)		110	0.94	0.022	0.70
Transom 1 casement	(1T2)		110	0.94	0.022	0.70
Mullion 2 casements	(2M1)		142	0.75	0.022	0.82
Mullion 2 casements	(2M2)		142	0.92	0.022	0.71
Transom 2 casements	(2T1)		142	0.91	0.022	0.71
Transom 2 casements	(2T2)		142	0.93	0.022	0.71
Corner	(CO1)		160	0.25	0.022	0.73
Door side	(DS1)		146	0.72	0.022	0.72
Bottom fixed	(FB1)		76	0.72	0.022	0.81
Top fixed glazing	(FH1)		71	0.57	0.023	0.73
Jamb fixed glazing	(FJ1)		71	0.57	0.023	0.73

Spacer: SWISSPACER Ultimate Secondary seal: Polyurethan

Frame values		Frame width b_f mm	U-value frame U_f W/(m² K)	Ψ-glazing edge Ψ_g W/(m K)	Temp. Factor $f_{Rsi=0.25}$ [-]
Flying Mullion	(FM1)	110	0.77	0.022	0.73
Flying Mullion	(FM2)	110	0.89	0.022	0.72
Bottom	(OB1)	76	0.93	0.022	0.71
Head	(OH1)	71	0.74	0.022	0.73
Jamb	(OJ1)	71	0.74	0.022	0.73
Threshold	(OT2)	76	0.96	0.022	0.79
Spacer: SWISSPACER Ultimate			Secondary seal: Polyurethan		

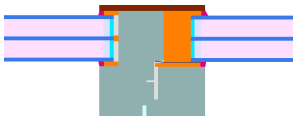
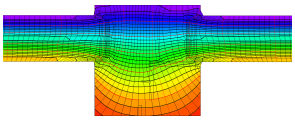
Mullion
fixed

b_f = 110 mm
U_f = 0.66 W/(m² K)
Ψ_g = 0.023 W/(m K)
f_{Rsi} = 0.73

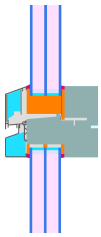
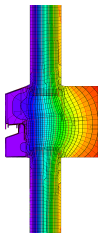
Mullion
fixed

b_f = 110 mm
U_f = 0.78 W/(m² K)
Ψ_g = 0.022 W/(m K)
f_{Rsi} = 0.71

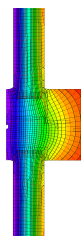
Transom
fixed

b_f = 110 mm
U_f = 0.80 W/(m² K)
Ψ_g = 0.023 W/(m K)
f_{Rsi} = 0.71

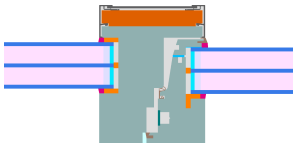
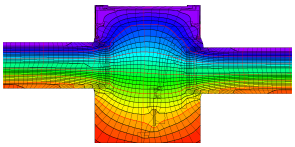
Transom
fixed

b_f = 110 mm
U_f = 0.79 W/(m² K)
Ψ_g = 0.022 W/(m K)
f_{Rsi} = 0.71

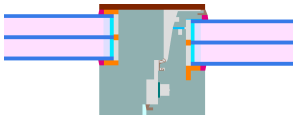
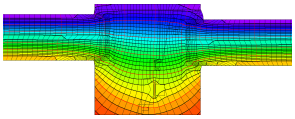
Mullion
1 casement

b_f = 110 mm
U_f = 0.77 W/(m² K)
Ψ_g = 0.023 W/(m K)
f_{Rsi} = 0.81

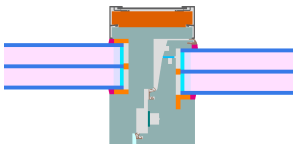
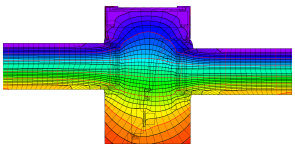
Mullion
1 casement

b_f = 110 mm
U_f = 0.92 W/(m² K)
Ψ_g = 0.022 W/(m K)
f_{Rsi} = 0.70

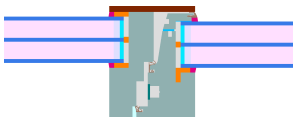
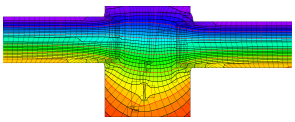
Mullion
1 casement

b_f = 89 mm
U_f = 0.79 W/(m² K)
Ψ_g = 0.023 W/(m K)
f_{Rsi} = 0.72

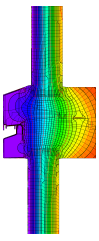
Mullion
1 casement

b_f = 89 mm
U_f = 0.92 W/(m² K)
Ψ_g = 0.022 W/(m K)
f_{Rsi} = 0.71

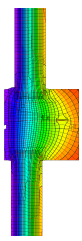
Transom
1 casement

b_f = 110 mm
U_f = 0.94 W/(m² K)
Ψ_g = 0.022 W/(m K)
f_{Rsi} = 0.70

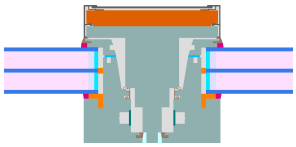
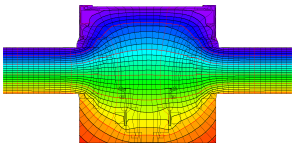
Transom
1 casement

b_f = 110 mm
U_f = 0.94 W/(m² K)
Ψ_g = 0.022 W/(m K)
f_{Rsi} = 0.70

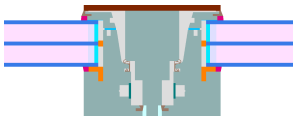
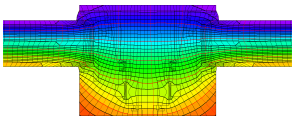
Mullion
2 casements

b_f = 142 mm
U_f = 0.75 W/(m² K)
Ψ_g = 0.022 W/(m K)
f_{Rsi} = 0.82

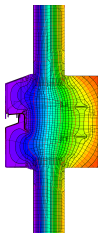
Mullion
2 casements

b_f = 142 mm
U_f = 0.92 W/(m² K)
Ψ_g = 0.022 W/(m K)
f_{Rsi} = 0.71

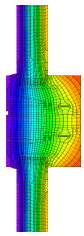
Transom
2 casements

b_f = 142 mm
U_f = 0.91 W/(m² K)
Ψ_g = 0.022 W/(m K)
f_{Rsi} = 0.71

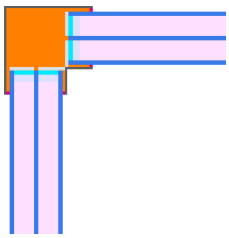
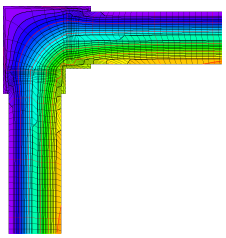
Transom
2 casements

b_f = 142 mm
U_f = 0.93 W/(m² K)
Ψ_g = 0.022 W/(m K)
f_{Rsi} = 0.71

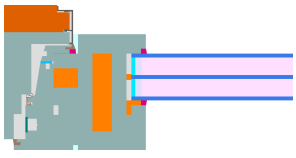
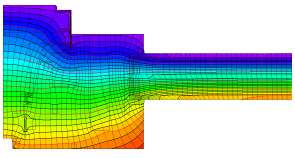
Corner

b_f = 160 mm
U_f = 0.25 W/(m² K)
Ψ_g = 0.022 W/(m K)
f_{Rsi} = 0.73

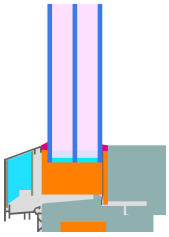
Door side

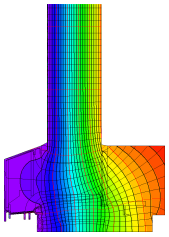
b_f = 146 mm
U_f = 0.72 W/(m² K)
Ψ_g = 0.022 W/(m K)
f_{Rsi} = 0.72

Bottom
fixed

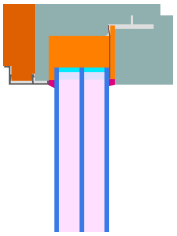
b_f = 76 mm
U_f = 0.72 W/(m² K)
Ψ_g = 0.022 W/(m K)
f_{Rsi} = 0.81

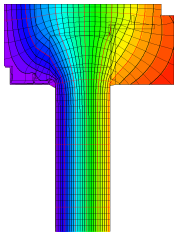




Top
fixed glazing

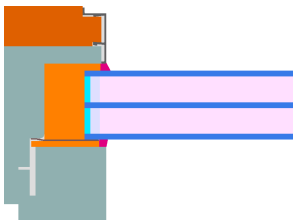
b_f = 71 mm
U_f = 0.57 W/(m² K)
Ψ_g = 0.023 W/(m K)
f_{Rsi} = 0.73

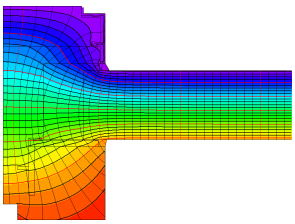




Jamb
fixed glazing

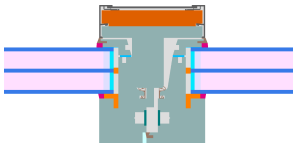
b_f = 71 mm
U_f = 0.57 W/(m² K)
Ψ_g = 0.023 W/(m K)
f_{Rsi} = 0.73

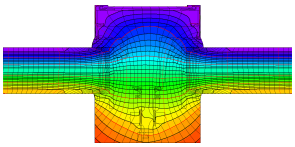




Flying
Mullion

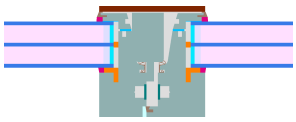
b_f = 110 mm
U_f = 0.77 W/(m² K)
Ψ_g = 0.022 W/(m K)
f_{Rsi} = 0.73

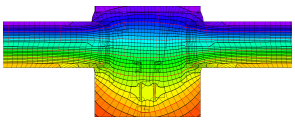




Flying
Mullion

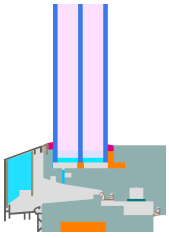
b_f = 110 mm
U_f = 0.89 W/(m² K)
Ψ_g = 0.022 W/(m K)
f_{Rsi} = 0.72

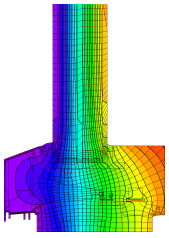




Bottom

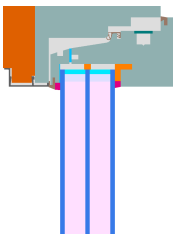
b_f = 76 mm
U_f = 0.93 W/(m² K)
Ψ_g = 0.022 W/(m K)
f_{Rsi} = 0.71

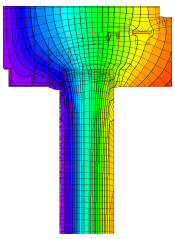




Head

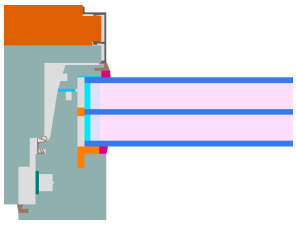
b_f = 71 mm
U_f = 0.74 W/(m^2 K)
Ψ_g = 0.022 W/(m K)
f_{Rsi} = 0.73

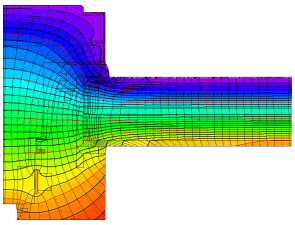




Jamb

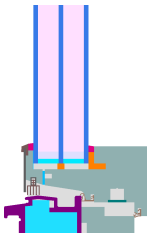
b_f = 71 mm
U_f = 0.74 W/(m^2 K)
Ψ_g = 0.022 W/(m K)
f_{Rsi} = 0.73

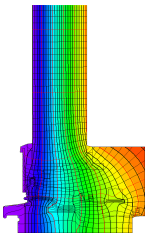




Threshold

b_f = 76 mm
U_f = 0.96 W/(m^2 K)
Ψ_g = 0.022 W/(m K)
f_{Rsi} = 0.79

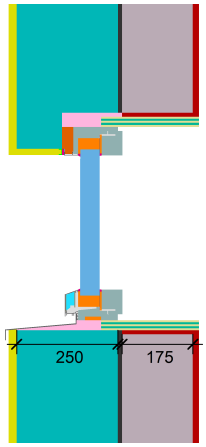




Validated installations

Exterior insulation and finishing system (EIFS) (fixed glazed)

U_{Wall} = 0.13 W/(m² K)

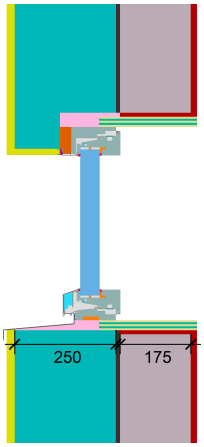


$\Psi_{install}$	W/(m K)
Top	0.004
Left	0.004
Right	0.004
Bottom	0.021

$U_{W,installed}$ = 0.80 W/(m² K)

Exterior insulation and finishing system (EIFS) (operable)

U_{Wall} = 0.13 W/(m² K)

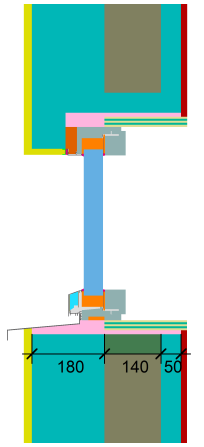


$\Psi_{install}$	W/(m K)
Top	0.004
Left	0.004
Right	0.004
Bottom	0.022

$U_{W,installed}$ = 0.80 W/(m² K)

Formwork blocks (fixed)

U_{Wall} = 0.15 W/(m² K)

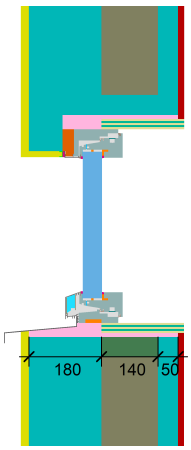


$\Psi_{install}$	W/(m K)
Top	0.004
Left	0.004
Right	0.004
Bottom	0.019

$U_{W,installed}$ = 0.80 W/(m² K)

Formwork blocks (operable)

U_{Wall} = 0.15 W/(m² K)

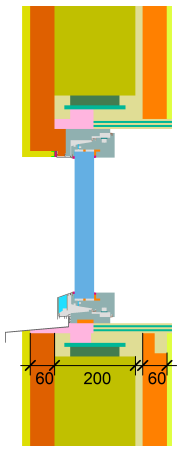


$\Psi_{install}$	W/(m K)
Top	0.005
Left	0.005
Right	0.005
Bottom	0.020

$U_{W,installed}$ = 0.80 W/(m² K)

Lightweight timber (operable)

U_{Wall} = 0.13 W/(m² K)

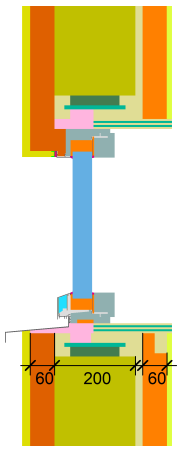


$\Psi_{install}$	W/(m K)
Top	0.019
Left	0.017
Right	0.017
Bottom	0.034

$U_{W,installed}$ = 0.83 W/(m² K)

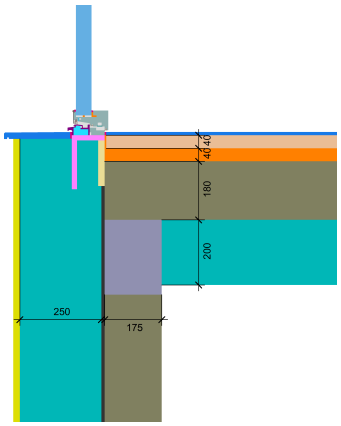
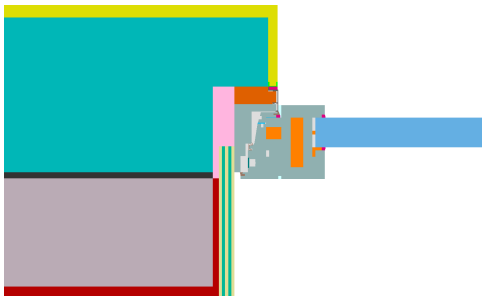
Lightweight timber (fixed glazed)

U_{Wall} = 0.13 W/(m² K)



$\Psi_{install}$	W/(m K)
Top	0.019
Left	0.016
Right	0.016
Bottom	0.033

$U_{W,installed}$ = 0.83 W/(m² K)

Threshold balcony door	Exterior insulation and finishing system (EIFS) jamb (operable)
U_1 = 0.13 U_2 = 0.14 [W/(m² K)]	U_1 = 0.13 [W/(m² K)]
	
$\Psi_{install}$ = 0.050 W/(m K)	$\Psi_{install}$ = 0.006 W/(m K)

Disclaimer: The Passive House Institute GmbH (PHI) conducts heat-transfer analyses in accordance with the standards set out in Criteria and Algorithms for Certified Passive House Components: Transparent Building Components and Opening Elements in the Building Envelope, based on information provided by the manufacturer. PHI does not verify on-site implementation. It is the responsibility of the project leader to ensure that installed components match the certified specifications in terms of geometry, configuration, and materials. Manufacturers must make full product information available upon request to parties involved in a construction project. These parties may compare the provided information with project documentation and perform on-site inspections as part of the quality-assurance process.