REPORT

issued by an Accredited Laboratory

Date	Reference	Page
2010-11-17	PX07445-A	1 (9)

1002
ISO/IEC 17025

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SIA "Stali"
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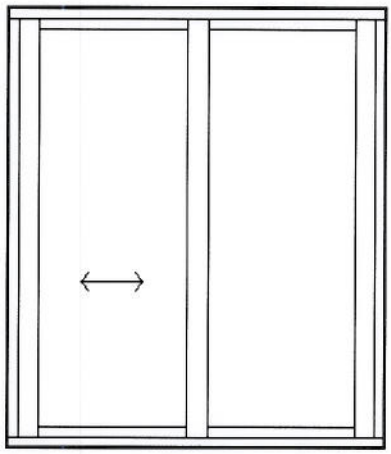
Determination of air permeability, watertightness and resistance to wind load

Test object
(see attached drawings and pictures)

Manufacturer: SIA "Stali"
Type: Wooden sliding patio door
Size: 1780 x 2085 mm
Condition at arrival: No visible damage
Date of arrival: 2010-11-01
Date of testing: 2010-11-11
SP's serial number: 1231

The test object was supplied by the client and mounted in the test frame by SP.



Watertightness according to SS-EN 1027 method A up to 900 Pa

No leakage

The test object meets the requirements for class E900 according to SS-EN 12208.

Resistance to wind load according to SS-EN 12211 class 3

Deflection test up to 1200 Pa

Pressure, Pa	Deflection, mm	
	Lock side vertical sash member (measuring length = 1420 mm)	Middle vertical sash member (measuring length= 1420 mm)
0	0,2	-0,1
1200 positive pressure	0,7	0,7
1200 negative pressure	-0,2	-0,8

The maximum relative frontal deflection was 0,61 per mille (requirement: <3,3 per mille according to SS-EN 12210 class C)

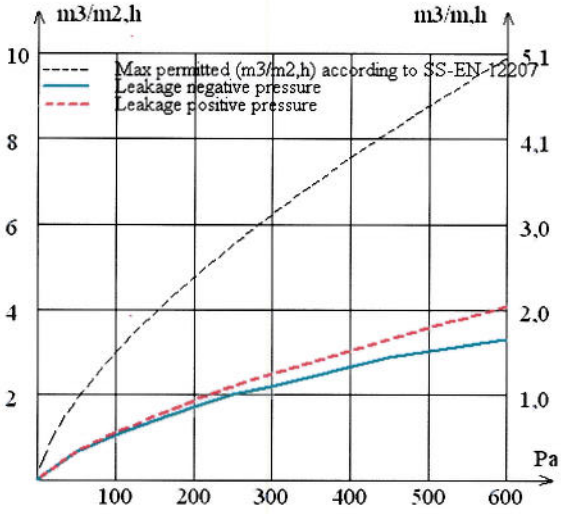
Repeated pressure test up to 600 Pa and safety test up to 1800 Pa

No damage noted.

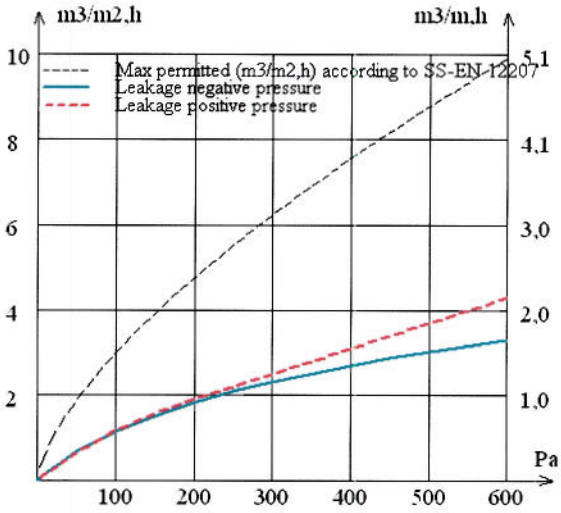
The test object meets the requirements for class 3 according to SS-EN 12210.

Air permeability according to SS-EN 1026 up to 600 Pa.

Before wind loading:



After wind loading:



The test object meets the requirements for class 4 according to SS-EN 12207 both before and after wind loading.

Conditions of test

The test results refer only to the tested object.

Equipment used:	Test rig invnr 202210 and measuring equipment invnr 200746
Estimated error margin:	Air pressure difference ±2 Pa, air flow ±5 % and deformation (wind load) ±0,1 mm
Test climate:	Air temperature 19 °C, RH 30 %, air pressure 970 hPa
Water temperature:	According to the standard
Conditioning:	Laboratory climate after arrival to SP

SP Technical Research Institute of Sweden
Energy Technology – Building Physics and Indoor Environment

Börje Gustavsson
Technical Manager

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REPORT

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Calculation of thermal transmittance (U-value) according to SS-EN ISO 10077-2

(3 appendices)

Work requested

The client supplied drawings of a sliding door for calculation of thermal transmittance. Appendix 3 shows the design of the profile section of the window.

Type:	Sliding door
Glass combination:	CGP-10ar-f-10ar-CGP
Spacer:	Thermix TX.N
Size:	2080 mm x 2080 mm

Calculation

Calculation of the profile section was performed using the FRAME 5.1 program. The composition of the glass part is given by Table 1 Appendix 1. Values of the thermal conductivity have been chosen according to Table 2 Appendix 1.

Calculations have been performed and results are shown in Appendix 2. Cut-off planes (adiabatic) have been placed 190 mm from the visibly glass edge and/or by connected wall. The air temperature and surface resistance have in accordance to SS-EN ISO 10077-2 been taken as ϑ_i = +20 °C and R_{si} = 0.13 m²K/W (0.20 m²K/W for inward corners) on the inside and ϑ_e= 0 °C and R_{se} = 0.04 m²K/W on the outside.

Calculation results

The thermal transmittance was obtained to U_{DOOR} = 1.1 W/(m²·K). The calculations are shown in greater detail in Appendix 1.

The thermal transmittance, which is calculated in this report, is only valid for doors with the same composition as the calculated one. The doors marking must be unambiguous, it has to be clear that the glass structure and profile systems are the same for the current door as for the calculated one.

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Table 1 Data for glass part[1]

Structure:	6.38 mm LamiGlass – 10 mm – 4 mm Clear FloatGlass – 10 mm – 6.38 mm LamiGlass
Cavities:	10 mm argon (90 %) / 10 mm argon (90 %)
Coating (position):	Guardian ClimaGuard Premium (pos. 2, 5)
Corrected emissivity:	0.037

Table 2 Material data

Materials	Thermal conductivity, W/(m·K)	Source
Glass	1.0	1
EPDM	0.25	1
Butyl	0.24	1
Polyisobutylene	0.24	1
Aluminium	160	1
Desiccator	0.13	1
PVC	0.17	1
Stainless steel	17	1
PP (Thermix)	0.23	2
Silicone	0.35	1
Cavity (air)*	Calculated according to EN ISO 10077-2	
Cavity (glass space)	Calculated according to EN 673	

1 = EN 12524
2 = according to manufacturer

The emissivity 0.9 has been used for all materials in the frame.

[1] According to manufacturer

Table 3 Calculated ψ-value and thermal transmittance for a sliding door with size 2.08 m x 2.08 m

Part	ψ-value, W/(m·K) under / side / top	U-value, W/(m²K)		
		Glass	Frame under / side / top	Frame width, m under / side / top
Fixed side	0.054 / 0.052 / 0.051	0.83	1.25 / 1.34 / 1.25	0.169 / 0.157 / 0.157
Moveable side	0.054 / 0.052 / 0.052	0.83	1.44 / 1.42 / 1.27	0.169 / 0.157 / 0.157
Mullion	0.101	0.82	1.59	0.112
	$\sum(\psi L) / A_{tot} = 0.13$	$\sum(AU) / A_{tot} = 1.01$		-

$U_{DOOR} = 1.14$ W/(m²·K)

The thermal transmittance of the glass has been calculated according to EN 673. Thermal transmittance of the whole door is calculated by weighting the area with corresponding U-value and correction for ψ-values in accordance to SS-EN 10077-1 and -2.

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Calculation of thermal transmittance (U-value) according to SS-EN ISO 10077-2

(3 appendices)

Work requested

The client supplied drawings of a sliding door for calculation of thermal transmittance. Appendix 3 shows the design of the profile section of the window.

Type:	Sliding door
Glass combination:	CGP-12ar-f-12ar-CGP
Spacer:	Thermix TX.N
Size:	2080 mm x 2080 mm

Calculation

Calculation of the profile section was performed using the FRAME 5.1 program. The composition of the glass part is given by Table 1 Appendix 1. Values of the thermal conductivity have been chosen according to Table 2 Appendix 1.

Calculations have been performed and results are shown in Appendix 2. Cut-off planes (adiabatic) have been placed 190 mm from the visibly glass edge and/or by connected wall. The air temperature and surface resistance have in accordance to SS-EN ISO 10077-2 been taken as ϑ_i = +20 °C and R_{si} = 0.13 m²K/W (0.20 m²K/W for inward corners) on the inside and ϑ_e= 0 °C and R_{se} = 0.04 m²K/W on the outside.

Calculation results

The thermal transmittance was obtained to U_{DOOR} = 1.0 W/(m²·K). The calculations are shown in greater detail in Appendix 1.

The thermal transmittance, which is calculated in this report, is only valid for doors with the same composition as the calculated one. The doors marking must be unambiguous, it has to be clear that the glass structure and profile systems are the same for the current door as for the calculated one.

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Table 1 Data for glass part[1]

Structure:	T4-12
Cavities:	12 mm argon (90 %) / 12 mm argon (90 %)
Coating (position):	Guardian ClimaGuard Premium (pos. 2, 5)
Corrected emissivity:	0.037

Table 2 Material data

Materials	Thermal conductivity, W/(m·K)	Source
Glass	1.0	1
EPDM	0.25	1
Butyl	0.24	1
Polyisobutylene	0.24	1
Aluminium	160	1
Desiccator	0.13	1
PVC	0.17	1
Stainless steel	17	1
PP (Thermix)	0.23	2
Silicone	0.35	1
Cavity (air)*	Calculated according to EN ISO 10077-2	
Cavity (glass space)	Calculated according to EN 673	

1 = EN 12524
2 = according to manufacturer

The emissivity 0.9 has been used for all materials in the frame.

[1] According to manufacturer

Table 3 Calculated ψ-value and thermal transmittance for a sliding door with size 2.08 m x 2.08 m

Part	ψ-value, W/(m·K) under / side / top	U-value, W/(m²K)		
		Glass	Frame under / side / top	Frame width, m under / side / top
Fixed side	0.047 / 0.045 / 0.045	0.72	1.26 / 1.34 / 1.26	0.169 / 0.157 / 0.157
Moveable side	0.047 / 0.045 / 0.045	0.72	1.45 / 1.43 / 1.28	0.169 / 0.157 / 0.157
Mullion	0.087	0.72	1.60	0.112
Door	$\sum(\psi L) / A_{tot} = 0.11$	$\sum(AU) / A_{tot} = 0.94$		-

$U_{DOOR} = 1.05$ W/(m²·K)

The thermal transmittance of the glass has been calculated according to EN 673. Thermal transmittance of the whole door is calculated by weighting the area with corresponding U-value and correction for ψ-values in accordance to SS-EN 10077-1 and -2.