

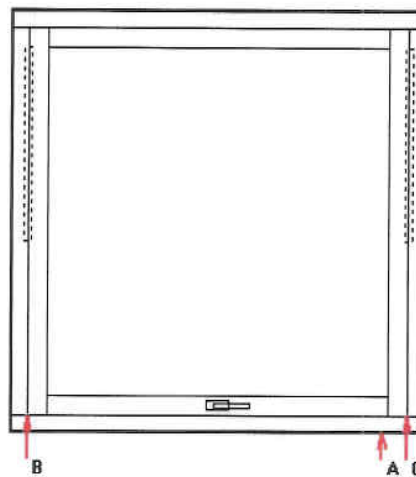
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KINGAS
Priekulu pag
Cesu rajons
LV-4126
LATVIA

Determination of air permeability and water tightness and resistance to wind load

Test object (see appendix)

Manufacturer: KINGAS
Type: 13 x 13 wood window with aluminium cladding
Size: 1280 x 1280 mm
Condition at arrival: No visible damage
Date of arrival: 2008-10-14
Date of testing: 2008-10-22
SP's serial number: 996



Water tightness according to SS-EN 1027 metod A up to 600 Pa (see attached pictures)

Point A: Leakage

Leakage degree 2 after ten minutes at 0 Pa

Point B: Leakage between frame and sash

Leakage degree 2 immediately at 250 Pa
Leakage degree 3 immediately at 600 Pa

Point C: Leakage between frame and sash

Leakage degree 2 immediately at 250 Pa

Leakage grading

0 No leakage	3 Minor run
1 One or a few drops	4 Minor flow
2 Several drops	5 Considerable flow

Resistance to wind load

Test with repeated pressure change up to 600 Pa and storm resistance up to 1800 Pa

No damage noted

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Testing according to SS-EN 12211 class 3

Deformation test up to 1200 Pa (test 1, vertical sash members)

Pressure, Pa	Deflection, mm	
	LHS vertical sash member (measurement length = 1114 mm)	RHS vertical sash member (measurement length = 1114 mm)
0	-0,3	-0,1
1200 positive pressure	-0,1	-0,1
1200 negative pressure	-1,0	-0,8

The maximum relative frontal deflection was 0,60 per mille (requirement: <3,3 per mille according to SS-EN 12210 class C)

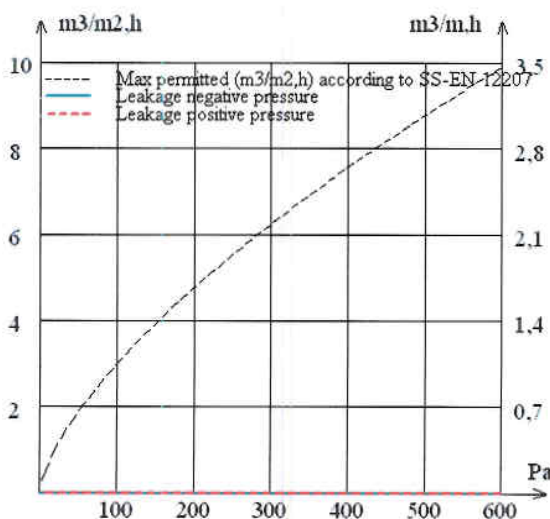
Deformation test up to 1200 Pa (test 2, horizontal sash members)

Pressure, Pa	Deflection, mm	
	Top horizontal sash member (measurement length = 1114 mm)	Bottom horizontal sash member (measurement length = 1114 mm)
0	0,1	-0,5
1200 positive pressure	0,7	0,1
1200 negative pressure	-0,6	-1,3

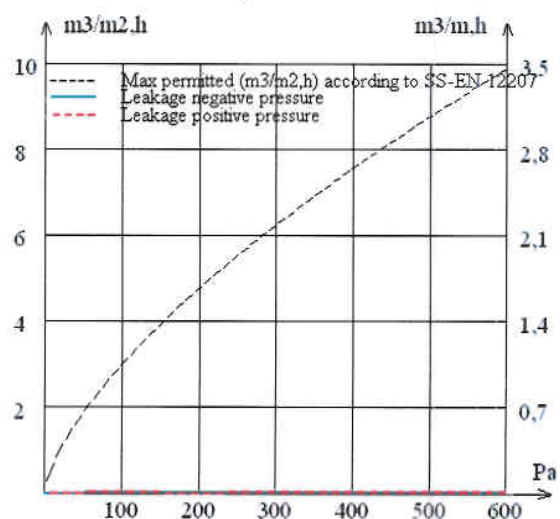
The maximum relative frontal deflection was 0,75 per mille (requirement: <3,3 per mille according to SS-EN 12210 class C)

Air permeability

Testing according to SS-EN 1026 up to 600 Pa



After wind loading: Testing according to SS-EN 1026 up to 600 Pa



Conditions of test

The test results refer only to the tested object.

Equipment used:	Test rig invnr 202206 and measuring equipment invnr 200746
Estimated error margin:	Air pressure difference ± 2 Pa, air flow ± 5 % and deformation (wind load) $\pm 0,1$ mm
Test climate:	Air temperature 18 °C, RH 40 %, air pressure 990 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

Hans Brolin
Technical Manager

Richard Dawson
Technical Officer

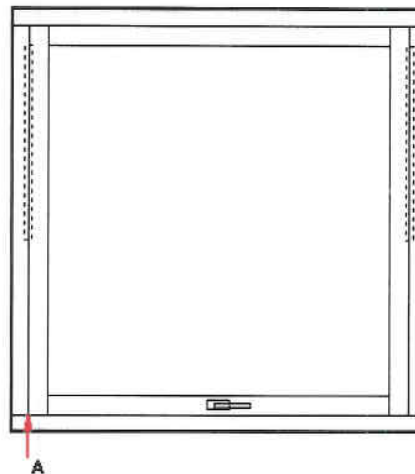
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Determination of air permeability and water tightness and resistance to wind load

Test object (see appendix)

Manufacturer: KINGAS
Type: 13 x 13 träfönster
Size: 1280 x 1280 mm
Condition at arrival: No visible damage
Date of arrival: 2008-10-14
Date of testing: 2008-10-20
SP's serial number: 995



Water tightness according to SS-EN 1027 metod A up to 600 Pa

Point A: Leakage between frame and sash
Leakage degree 1 immediately at 450 Pa
(see attached picture)

Leakage grading

0 No leakage	3 Minor run
1 One or a few drops	4 Minor flow
2 Several drops	5 Considerable flow

Resistance to wind load

Testing according to SS-EN 12211 class 3

Deformation test up to 1200 Pa (test 1, vertical sash members)

Pressure, Pa	Deflection, mm	
	LHS vertical sash member (measurement length = 1130 mm)	RHS vertical sash member (measurement length = 1130 mm)
0	-0,5	0,0
1200 positive pressure	-0,2	0,2
1200 negative pressure	-1,2	-0,6

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

Deformation test up to 1200 Pa (test 2, top horizontal sash member)

Pressure, Pa	Deflection, mm	
	Top horizontal sash member (measurement length = 1130 mm)	
0	-0,1	
1200 positive pressure	0,6	
1200 negative pressure	-0,8	

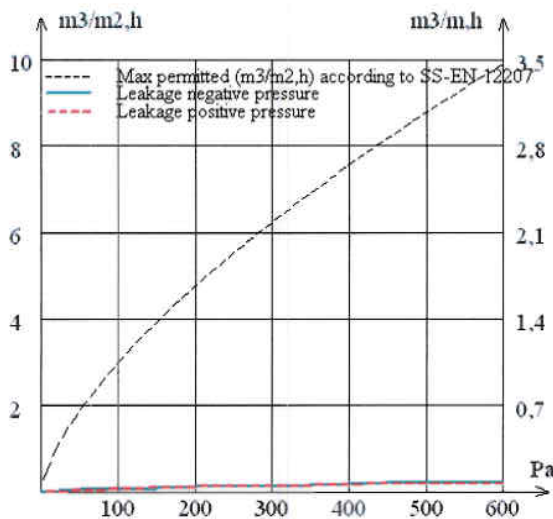
The maximum relative frontal deflection was 0,60 per mille (requirement: <3,3 per mille according to SS-EN 12210 class C)

Test with repeated pressure change up to 600 Pa

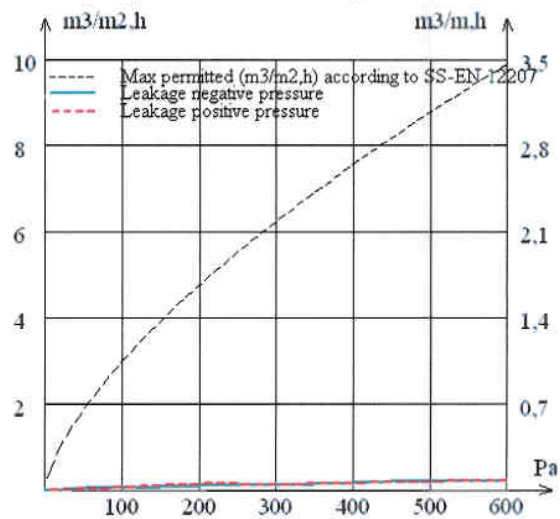
No damage noted.

Air permeability

Testing according to SS-EN 1026 up to 600 Pa



Testing according to SS-EN 1026 up to 600 Pa (after wind loading)



Conditions of test

The test results refer only to the tested object.

- Equipment used: Test rig invnr 202206 and measuring equipment invnr 200746
- Estimated error margin: Air pressure difference ± 2 Pa, air flow ± 5 % and deformation (wind load) $\pm 0,1$ mm
- Test climate: Air temperature 21 °C, RH 40 %, air pressure 980 hPa
- Water temperature: According to the standard
- Conditioning: Laboratory climate after arrival to SP

Description of test window*

Manufacturer:	Stali, Ltd
Type designation:	wooden window
Drawing No:	000009
Type of opening:	top swing (reversible 180°)
Number of lights:	1
Outer dimensions of frame (wxh):	1180x1180 mm
Joint length between sash and frame:	107 mm

Frame and sash

Material:	laminated pine
Surface treatment:	impregnated, painted
Reinforcement profile:	aluminium (Spilka)

Corner joints

Frame (type and tightening):	tenoning
Sash (type and tightening):	tenoning

Tightening strip

Make and type:	Schlegel QL3004
Material:	

Glass

Single glass. Make and type:	
Sealed glazing unit. Make and type:	3-glass unit (4+4+4LowE-12+1xArgon) 36mm
Jointing material:	
Fastening of glass:	

Hardware

Hinges:	Spilka Classic
Closing device:	espagnolette - FIX; handle - Hoppe
Striking plate:	on request - Spilka (end keep head steel)

Supply air device: on request - Spilka spilvent

Mounting instructions: in accordance with supplier of hardware - Spilka instructions

Other comments:

*This technical description is made by the client



REPORT

Date
2010-04-20

Reference
PX03016

Page
1 (1)

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Calculation of thermal transmittance (U-value) according to SS-EN ISO 10077-2 (3 appendices)

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

Glass combination:	CG1.0-16ar-f-16ar-CG1.0+ID
Spacer:	Thermix TX.N
Size:	1.23 m x 1.48 m

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. The calculation includes a Spilka espagnoletto (bottom sash) and for reversible window hinges (jamb/stile) from Spilka (type S6).

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 $\vartheta_i = +20$ °C and $R_{si} = 0.13$ m²K/W (0.20 m²K/W for inward corners) on the inside and $\vartheta_e = 0$ °C and $R_{se} = 0.04$ m²K/W on the outside.

Calculation results

The thermal transmittance was obtained to $U_w = 0.86$ 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 windows with the same composition as the calculated one. The windows marking must be unambiguous, it has to be clear that the glass structure and profile systems are the same for the current window as for the calculated one.

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Determination of thermal transmittance using the guarded hot-box method in accordance with EN ISO 12567

(2 appendices)

Test specimen

The test specimen was a wooden window with two low emissivity coatings and argon in both cavities with outer dimensions 1.185 m x 1.185 m (see appendix 1 and 3) The window arrived undamaged at SP, ETi in w51-2009.

Test procedure

The window was mounted in a 150 mm thick wall made of expanded polystyrene flush with the warm face. Natural convection was used in the metering box, and forced convection on the cold side. See appendix 2.

Results

The thermal transmittance for the window was found to be:

$$U = 1.0 \text{ W}/(\text{m}^2 \text{ K})$$

The results which only refer to the tested product are shown in greater detail in appendix 3.

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