Evidence of Performance

Testing the joint characteristics of a sealing system between window and building structure in new condition and after a series of simulated short-time exposures

Test Report
No. 16-003313-PR02
(PB-E03-020310-en-02)

Client	Soudal N. V. Everdongenlaan 18-20 2300 Turnhout Belgium	
Product	Sealing system between window and building structure	
Designation	Sealing internal:	Brushable and sprayable joint sealing membrane Soudatight LQ/SP ①
	Sealing external:	Brushable and sprayable joint sealing membrane on hybrid basis Soudatight Hybrid ②
	Joint insulation:	Polyurethane foam Flexifoam B2 ③
Installation position Boundary conditions	Hollow block wall with flush reveal. PVC window 1,230 mm x 1,480 mm, mounted to centre of wall reveal. Attachment to sides and top of building structure using frame anchors without plug. Fasteners on sides spaced at ≤ 700 mm. Dead load accommodation via setting blocks at bottom. Side positions secured by diagonal blocking. External and internal seal using brushable joint sealing membranes. Joints filled on four sides with polyurethane foam (in-situ foam) Processing as specified by client	
Scope	Internal airtight and external watertight joint between external wall and window / casement doors in PVC with equivalent details, as described above.	
Special features	Air permeability was tested with external seal and filled joints. Watertightness was tested with filled joints	

Result

Air permeability up to ± 1,000 Pa in new condition

$a < 0.1\ m^3/[m\ h\ (daPa)^{2/3}]$

Watertightness up to 600 Pa in new condition

No water penetration

Air permeability up to ± 1,000 Pa after simulated short-term exposures (temperature, wind, use)

$a < 0.1\ m^3/[m\ h\ (daPa)^{2/3}]$

Watertightness up to 600 Pa after simulated short-term exposures (temperature, wind, use)

No water penetration

ift Rosenheim
20.07.2017

Thomas Stefan, Dipl.-Ing. (FH)
Head of Testing Department
Building Component Testing

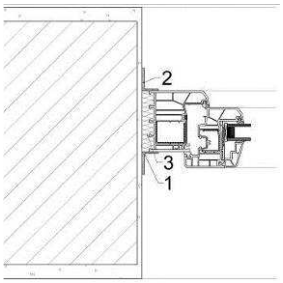
Thomas Krichbaumer
Operating Testing Officer
Building Component Testing

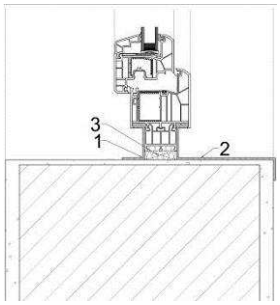
Basis:

ift Guideline MO-01/1 : 2007-01 Wall connection of windows, Part 1: Verfahren zur Ermittlung der Gebrauchstauglichkeit von Abdichtungssystemen, 2007-01 (Wall connection of windows, Part 1: Determination of fitness for use of sealing systems)

Test Report 16-003313-PR02 (PB-E03-020310-de-02) dated 03.02.2017

Representation





Instructions for use

This test report serves to demonstrate the above characteristics.

Validity

The data and results given relate solely to the tested and described specimen.

Notes on publication

The ift Guidance Sheet "Conditions and Guidance for the Use of ift Test Documents" applies.
The cover sheet can be used as an abstract.

Contents

The report comprises a total of 24 pages.

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1 Object

1.1 Description of test specimen

The test specimen comprises a bricked-in steel frame with a wall opening designed for installing a window. A single tilt-turn window was mounted to the wall opening. The test specimen comprised two sealing variants. This test report covers the half section on the left side (seen from inside).

Test specimen	component frame to evaluate a sealing system in new condition and after short-time exposure.
Wall construction	
Manufacturer	ift Rosenheim GmbH
Masonry	hollow block wall, bond pattern
Overall dimensions in mm	1,800 mm x 2,100 mm
Wall thickness	24 cm
Reveal	flush
Thermal insulation composite system	without
Smooth render	in place
Clear wall opening	1,250 mm x 1,510 mm
Rendering	masonry rendered on both sides, painted on outside
Window	
Type	single tilt-turn window
Sealing system	rebate sealing system
Material	plastic - PVC-U/white
Overall dimensions, frame member	1,230 mm x 1,480 mm (incl. 30 mm window sill connecting profile)
Glass configuration	float 4 mm / cavity 16 mm / float 4 mm
Installation position in wall	at centre of wall reveal
Joint width	on sides approx. 10 mm / at top and bottom approx. 15 mm
Installation of the window	
Manufacturer / Date of manufacture	the window was mounted by the ift Rosenheim on 08.11.2016
Fixing method/fasteners	frame anchors without plugs
Number of fasteners	on each side 3, at top 1
Fixing centres spaced	≤ 700 mm
Setting blocks / load accommodation	dead load is transmitted by setting blocks at bottom, side positions secured by diagonal blocking
External seal	
Manufacturer / Date of manufacture	the joint was sealed by the client on 10.11.2016
Product name	sprayable and brushable joint sealing membrane Soudatight Hybrid
Manufacturer	Soudal N. V.

Material / Basis	synthetic dispersion
Installation	on sides approx. 10 mm applied to frame member / approx. 30 mm applied to reveal applied at bottom to window sill connecting profile, applied to parapet as well as approx. 30 mm over wall edge, see photo 3
Corner details	on four sides around perimeter
Joint filling	
Manufacturer / Date of manufacture	joints filled by the client on 10.11.2016
Designation / Type / Item No.	Soudal Flexifoam B2
Manufacturer	Soudal N. V.
Material	1-C-polyurethane foam (in-situ foam)
Internal seal	
Manufacturer / Date of manufacture	joints sealed by the client on 10.11.2016
Product name	sprayable and brushable joint sealing membrane Soudatight LQ/SP
Manufacturer	Soudal N. V.
Material / Basis	synthetic dispersion
Installation/application	on sides approx. 10 mm applied to frame member / approx. 30 mm applied to reveal applied at bottom to window sill connecting profile and approx. 30 mm to parapet, see photo 5
Corner details	on four sides around perimeter
Preparation of bonding surfaces	all coarse dirt deposits were removed from the adjoining bonding surfaces before installation/application

The description is based on information provided by the client and inspection of the test specimen at the **ift** (item designations / numbers as well as material specifications were provided by the client unless stated *"**ift** checked"*).

Test specimen representations are documented in the Annex "Representation of product/test specimen". The design details were examined solely for the characteristics / performance to be classified. The drawings are based on unchanged documentation provided by the client unless stated otherwise. Photos taken by the ift Rosenheim, unless stated otherwise.

1.2 Sampling

The below data on sampling were provided to the ift:

The samples (joint filling materials) were selected by the client.

Date of delivery: 16.11.2016

ift test specimen No: 16-003313-PK04 / WE: 42511-001

Details: The client detailed the connecting joints as specified in the relevant processing / installation instructions.

2 Procedure

2.1 Basis *) and methods

Test

ift Guideline MO-01/1 : 2007-01 Wall connection of windows,
Part 1: Verfahren zur Ermittlung der Gebrauchstauglichkeit von Abdichtungssystemen, 2007-01 (Wall connection of windows, Part 1: Determination of fitness for use of sealing systems)
Clause 5, Test of joint characteristics)

EN 12114:2000-04
Air permeability of building components and building elements - Laboratory test method

EN 1027:2000-06
Windows and doors - Watertightness - Test method

EN 12211:2000-06
Windows and doors - Resistance to wind load - Test method

EN 1191:2012-12
Windows and doors - Resistance to repeated opening and closing - Test method

Classification / Evaluation

ift Guideline MO-01/1 : 2007-01 Wall connection of windows,
Part 1: Verfahren zur Ermittlung der Gebrauchstauglichkeit von Abdichtungssystemen, 2007-01 (Wall connection of windows, Part 1: Determination of fitness for use of sealing systems)
Clause 5, Test of joint characteristics:

*) and the corresponding national versions, e.g. DIN EN

2.2 Test sequence

The test sequence was based on the **ift**-Guideline MO-01/1, Clause 5.3.

Table 1 Test sequence

No.	Procedure	Test method/s
	Initial test	
1	Visual inspection of test specimen	- / -
2	Watertightness test of connecting joint	based on EN 1027
3	Air permeability test of connecting joint	EN 12114
	Load test	
4	Thermal cycling - external face (+60 °C / -15 °C, 10 cycles)	**ift** method
5	Mechanical durability (turn - tilt – close, 10,000 cycles)	based on EN 1191
6	Exposure to alternating positive/negative pressure (± 1,000 Pa, 200 cycles)	based on EN 12211
	Final test/evaluation	
7	Air permeability test of connecting joint	EN 12114
8	Watertightness test of connecting joint	based on EN 1027
9	Dismounting and visual inspection of test specimen	- / -

2.3 Principle

Watertightness based on EN 1027

Watertightness is tested in accordance with EN 1027 up to the maximum test pressure difference. Using a row of nozzles located at the top, the external face of the test specimen is subjected to constant spraying of water at a flow rate of approx. 2 l/min per nozzle while increments of positive test pressure are applied at regular intervals. (Figure 1)

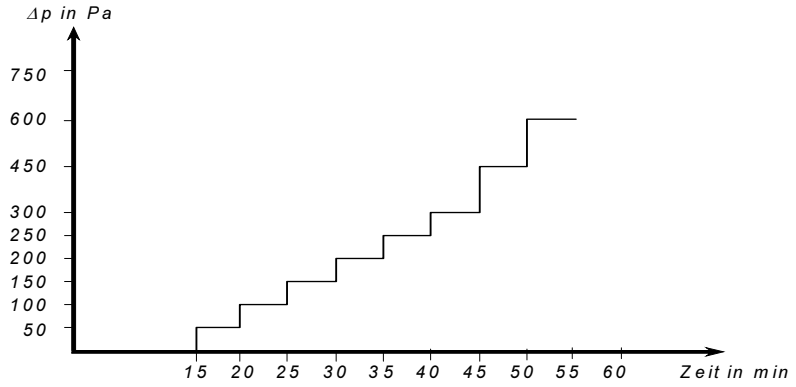


Figure 1 Test sequence of watertightness test

Air permeability - EN 12114

The air permeability of the sealing system is tested as per DIN EN 12114 at positive and negative pressures, in steps up to a maximum test pressure difference of 1,000 Pa (Figure 2).

The joints between casement and frame members and the joints along the glazing beads were sealed. Any air leakages in the wall system were taken into account by comparative measurements. It follows that only the air flow through the connecting joint was measured, regardless of any air leakages of the window and the external wall system.

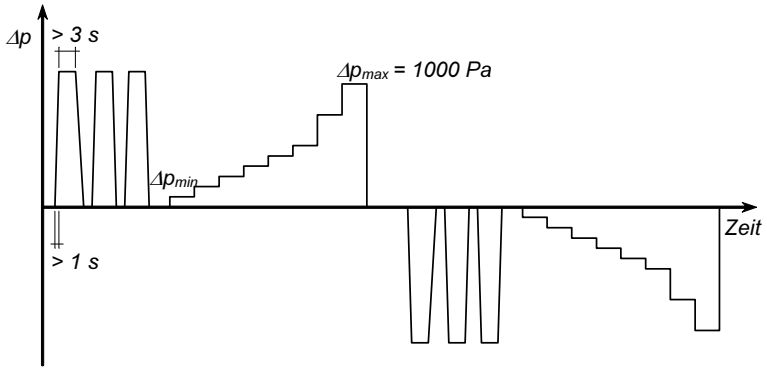


Figure 2 Air permeability test - exposure at positive and negative pressures

Thermal cycling

The external face of the test specimen is exposed to 10 thermal cycles of alternating temperatures as shown in the diagram in Figure 3. During this exposure, the internal face of the test specimen is exposed to room climate.

During and after the exposures, the joining system was checked by visual inspection for any changes. The displacements of the frame member relative to the building fabric perpendicular to the window plane were recorded continually by the linear potentiometers.

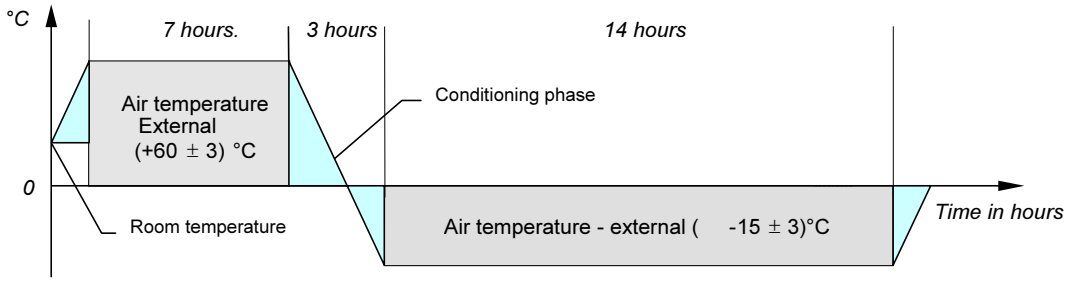


Figure 3 Representation of one thermal cycle of exposure to alternating temperatures

Simulated use, mechanical durability

Simulated operation via 10,000 hardware operations based on DIN EN 1191. The casement is brought 10,000 times into the tilt position, closed, opened in turn position, closed.

During and after the exposures, the joint was checked by visual inspection for any detectable changes.

Wind load in the form of alternating positive/negative pressure pulses

The wind load is applied to the test specimen in the form of alternating negative/positive pressure pulses based on EN 12211; 200 cycles of ± 1,000 Pa, as shown in the diagram of Figure 4, were applied.

During and after the exposures, the joining system was checked by visual inspection for any changes. The displacements of the frame member relative to the building fabric perpendicular to the window plane were recorded continually by the linear potentiometers by comparing the 1st cycle to the 200th cycle.

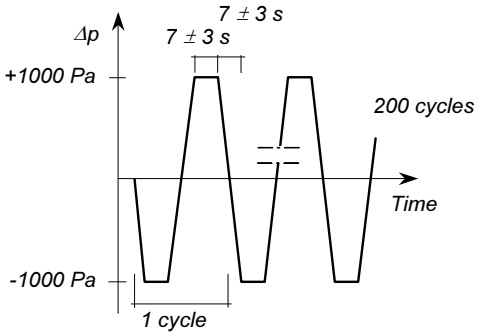


Figure 4 Representation of alternating positive/negative pressure pulses

Final visual inspection

After completion of tests, the joint areas were opened up and checked by visual inspection for any changes.

3 Expression of results

Watertightness in new condition

Project-No.	16-003313-PR01
Basis	ift-Richtlinie MO-01-1 2007-01 Baukörperanschluss von Fenstern - Teil 1 Verfahren zur Ermittlung der Gebrauchstauglichkeit von Abdichtungssystemen
Test equipment	Pst/022999 - LWW-Prüfstand Fensterprüfstand 2
Test specimen	Wall connection with brushable joint sealing membrane and joint insulation
Test specimen No.	42511-001
Date of test	16.11.2016
Test engineer in charge	Thomas Stefan
Test engineer	Thomas Stefan
Implementation of tests	
Deviations	There have been the following deviations from the test method specified in the standard/basis: The test is made following EN 1026, as the scope is not applicable.
Ambient conditions	Temperature 22.0 °C Air humidity 41 % Air pressure 969,5 hPa The ambient conditions are in accordance with the standard/basis requirements.

Measurement data/Results

Test state:	The test was performed with internal connection and joint filling.
Clear opening of surround panel:	1250 mm x 1510 mm
Number of spray nozzles:	4
Amount of water:	480 l/h 0.48 m³/h

Three pressure pulses with 660 Pa where applied.

Result in new condition:

There was no water penetration determined until 600 Pa over the evaluated area.

Air permeability in new condition

Project-No.	16-003313-PR01
Basis	EN 12114:2000-03 Thermal performance of buildings - Air permeability of building components and building elements - Laboratory test method ift-Richtlinie MO-01-1 2007-01 Baukörperanschluss von Fenstern - Teil 1 Verfahren zur Ermittlung der Gebrauchstauglichkeit von Abdichtungssystemen
Test equipment	Pst/022999 - LWW-Prüfstand Fensterprüfstand 2
Test specimen	Wall connection with brushable joint sealing membrane and joint insulation
Test specimen No.	42511-001
Date of test	22.11.2016
Test engineer in charge	Thomas Krichbaumer
Test engineer	Thomas Krichbaumer
Implementation of tests Deviations	There have been no deviations from the test method as specified in the standard/basis.
Ambient conditions	Temperature 21.6 °C Air humidity 35,5 % Air pressure 957 hPa The ambient conditions are in accordance with the standard/basis requirements.

Measurement data/Results

Casement size	1230 mm	x	1480 mm
Joint length	2,71 m		
Initial load before positive / negative wind pressure	1100 Pa		

Air permeability at positive wind pressure

Table A: Zero measurement, installation gaps bonded

Pressure difference in Pa	**50**	**73**	**106**	**154**	**224**	**325**	**473**	**688**	**1000**
Flow rate in m³/h	0,6	0,8	1,0	1,4	1,9	2,5	3,4	4,6	6,1

Table B: Air measurement, installation gaps not bonded

Pressure difference in Pa	**50**	**73**	**106**	**154**	**224**	**325**	**473**	**688**	**1000**
Flow rate in m³/h	0,6	0,7	1,0	1,4	1,9	2,5	3,4	4,6	6,1

Table C: Difference, Table B - Table A

Pressure difference in Pa	**50**	**73**	**106**	**154**	**224**	**325**	**473**	**688**	**1000**
Flow rate in m³/h	*)	*)	*)	*)	*)	*)	*)	*)	*)
Flow rate in m³/hm	*)	*)	*)	*)	*)	*)	*)	*)	*)

*) no measurable air flow

Air permeability at negative wind pressure

Table A: Zero measurement, installation gaps bonded

Pressure difference in Pa	**50**	**73**	**106**	**154**	**224**	**325**	**473**	**688**	**1000**
Flow rate in m³/h	0,5	0,7	0,9	1,3	1,7	2,3	3,2	4,3	5,7

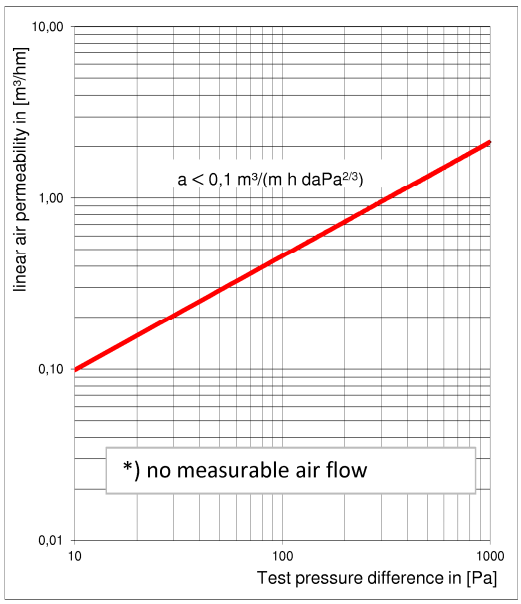
Table B: Air measurement, installation gaps not bonded

Pressure difference in Pa	**50**	**73**	**106**	**154**	**224**	**325**	**473**	**688**	**1000**
Flow rate in m³/h	0,5	0,7	0,9	1,3	1,7	2,3	3,2	4,3	5,7

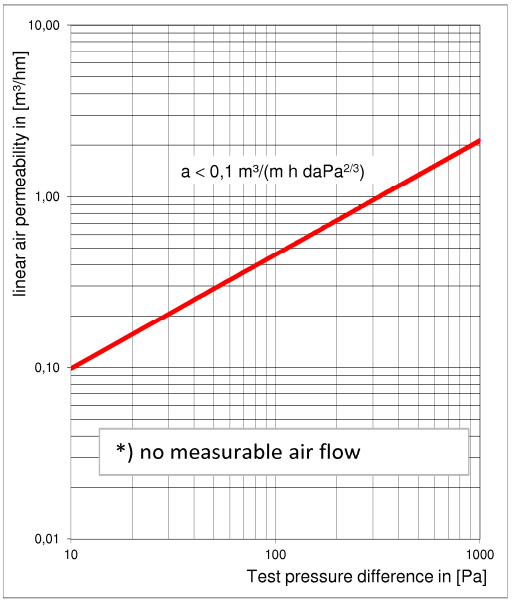
Table C: Difference of air permeability, Table B - Table A

Pressure difference in Pa	**50**	**73**	**106**	**154**	**224**	**325**	**473**	**688**	**1000**
Flow rate in m³/h	*)	*)	*)	*)	*)	*)	*)	*)	*)
Flow rate, in m³/hm	*)	*)	*)	*)	*)	*)	*)	*)	*)

*) no measurable air flow



Graphics at positive wind pressure



Graphics at negative wind pressure

Result: Q10= 0,00
Q100= 0,00

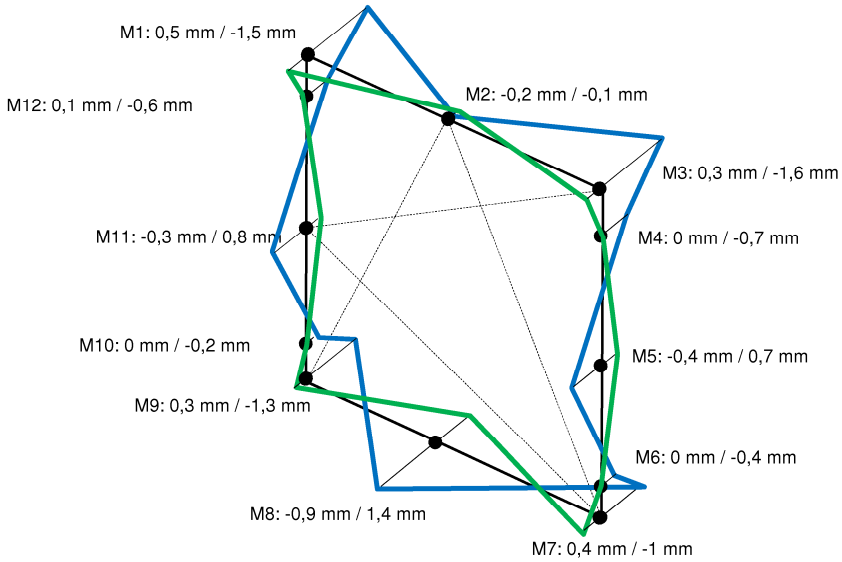
Result: Q10= 0,00
Q100= 0,00

Thermal cycling

Project-No.	16-003313-PR01
Basis	ift-Richtlinie MO-01-1 2007-01 Baukörperanschluss von Fenstern - Teil 1 Verfahren zur Ermittlung der Gebrauchstauglichkeit von Abdichtungssystemen
Test equipment	Pst/020094 - Messdatenerfassung Bauteile 16 Poti TM/023030 - Temperaturwechselprüfstand mobil
Test specimen	Wall connection with brushable joint sealing membrane and joint insulation
Test specimen No.	42511-001
Date of test	KW 47 / KW 48, 2016
Test engineer in charge	Thomas Krichbaumer
Test engineer	Thomas Hannover

Implementation of tests
Deviations — There have been no deviations from the test method as specified in the standard/basis.

Measurement data/Results



Temperature	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16
+60 °C	0,5	-0,2	0,3	0,0	-0,4	0,0	0,4	-0,9	0,3	0,0	-0,3	0,1				
-15 °C	-1,5	-0,1	-1,6	-0,7	0,7	-0,4	-1,0	1,4	-1,3	-0,2	0,8	-0,6				
Residual deformation	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16
	-1,0	-0,2	-1,6	-1,0	0,5	-0,5	-0,7	0,6	-1,0	-0,2	0,5	-0,3				

All dimensions in mm

Result:

At the test specimen were no visually detectable changes detected.

Durability test

Project-No.	16-003313-PR01
Basis	EN 1191:2000-02 Windows and doors - Resistance to repeated opening and closing - Test method ift-Richtlinie MO-01-1 2007-01
Test equipment	Pst/022203 - Beschlagstestgerät 2 weiß
Test specimen	Wall connection with brushable joint sealing membrane and joint insulation
Test specimen No.	42511-001
Date of test	KW 49, 2016
Test engineer in charge	Thomas Krichbaumer
Test engineer	Thomas Hannover
Implementation of tests Deviations	There have been the following deviations from the test method specified in the standard/basis:
Ambient conditions	The ambient conditions are in accordance with the standard/basis requirements.

Measurement data/Results

The test specimen was submitted to a durability test with 10,000 operation procedures.

The sash was brought 10,000 times in tilt position, closed, opened in turn mode, closed.

Changes in the area of the installation gap
At the test specimen were no changes in the area of the installation gap visually detected.

Resistance to wind load - Alternating positve / negative pressures

Project-No.	16-003313-PR01
Basis	ift-Richtlinie MO-01-1 2007-01 Baukörperanschluss von Fenstern - Teil 1 Verfahren zur Ermittlung der Gebrauchstauglichkeit von Abdichtungssystemen EN 12211:2016-03 Windows and doors - Resistance to wind load - Test method
Test equipment	Pst/020094 - Messdatenerfassung Bauteile 16 Poti Pst/022999 - LWW-Prüfstand Fensterprüfstand 2
Test specimen	Wall connection with brushable joint sealing membrane and joint insulation
Test specimen No.	42511-001
Date of test	15.12.2016
Test engineer in charge	Thomas Krichbaumer
Test engineer	Martin Heßler

Implementation of tests

Deviations

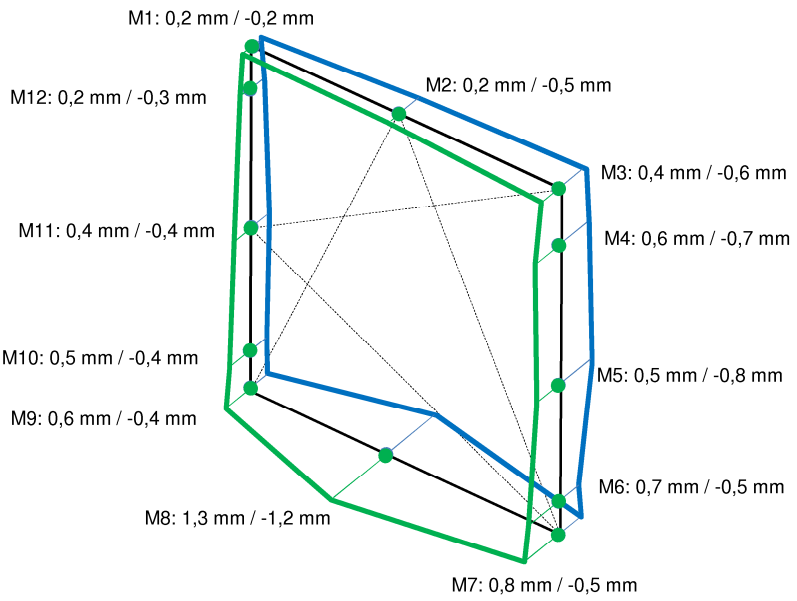
There have been the following deviations from the test method specified in the standard/basis:
The test was made following EN 12211 as the scope is not applicable.

Ambient conditions

Temperature 18.0 °C Air humidity 44 % Air pressure 974 hPa

The ambient conditions are in accordance with the standard/basis requirements.

Measurement data/Results



First cycle	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16
+1000 Pa	0,2	0,1	0,3	0,4	0,4	0,6	0,7	1,2	0,5	0,4	0,3	0,2				
-1000 Pa	-0,2	-0,4	-0,5	-0,6	-0,7	-0,5	-0,5	-1,2	-0,4	-0,4	-0,4	-0,3				

Last cycle	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16
+1000 Pa	0,2	0,2	0,4	0,6	0,5	0,7	0,8	1,3	0,6	0,5	0,4	0,2				
-1000 Pa	-0,2	-0,5	-0,6	-0,7	-0,8	-0,5	-0,5	-1,2	-0,4	-0,4	-0,4	-0,3				

Residual deformation	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16
	0	0	0,2	0,2	0,2	0,1	0,1	0,2	0,1	0,1	0,1	0,0				

All dimensions in mm

Result:

At the test specimen were no visually detectable changes detected.

Air permeability after load

Project-No.	16-003313-PR01
Basis	EN 12114:2000-03 Thermal performance of buildings - Air permeability of building components and building elements - Laboratory test method ift-Richtlinie MO-01-1 2007-01 Baukörperanschluss von Fenstern - Teil 1 Verfahren zur Ermittlung der Gebrauchstauglichkeit von Abdichtungssystemen
Test equipment	Pst/022999 - LWW-Prüfstand Fensterprüfstand 2
Test specimen	Wall connection with brushable joint sealing membrane and joint insulation
Test specimen No.	42511-001
Date of test	15.12.2016
Test engineer in charge	Martin Heßler
Test engineer	Martin Heßler
Implementation of tests Deviations	There have been no deviations from the test method as specified in the standard/basis.
Ambient conditions	Temperature 18.0 °C Air humidity 44 % Air pressure 974 hPa The ambient conditions are in accordance with the standard/basis requirements.

Measurement data/Results

Casement size	1230 mm	x	1480 mm
Joint length	2,71 m		
Initial load before positive / negative wind pressure	1100 Pa		

Air permeability at positive wind pressure

Table A: Zero measurement, installation gaps bonded

Pressure difference in Pa	**50**	**73**	**106**	**154**	**224**	**325**	**473**	**688**	**1000**
Flow rate in m³/h	0,6	0,7	1,0	1,3	1,7	2,3	3,2	4,5	6,0

Table B: Air measurement, installation gaps not bonded

Pressure difference in Pa	**50**	**73**	**106**	**154**	**224**	**325**	**473**	**688**	**1000**
Flow rate in m³/h	0,6	0,7	1,0	1,3	1,7	2,3	3,2	4,5	6,0

Table C: Difference, Table B - Table A

Pressure difference in Pa	**50**	**73**	**106**	**154**	**224**	**325**	**473**	**688**	**1000**
Flow rate in m³/h	*)	*)	*)	*)	*)	*)	*)	*)	*)
Flow rate in m³/hm	*)	*)	*)	*)	*)	*)	*)	*)	*)

*) no measurable air flow

Air permeability at negative wind pressure

Table A: Zero measurement, installation gaps bonded

Pressure difference in Pa	**50**	**73**	**106**	**154**	**224**	**325**	**473**	**688**	**1000**
Flow rate in m³/h	0,5	0,6	0,8	1,2	1,5	2,0	2,6	3,7	4,8

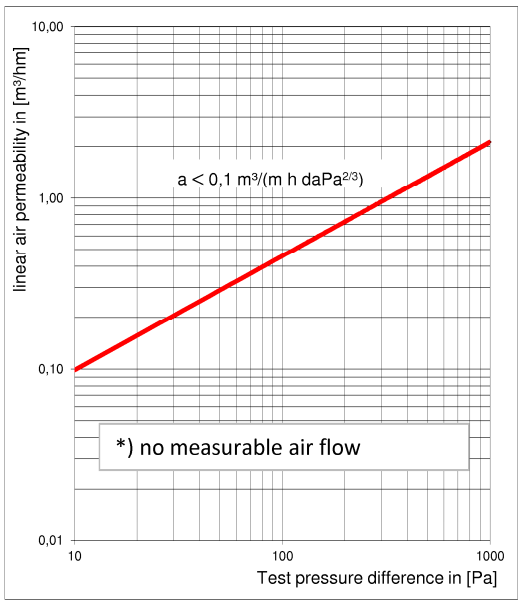
Table B: Air measurement, installation gaps not bonded

Pressure difference in Pa	**50**	**73**	**106**	**154**	**224**	**325**	**473**	**688**	**1000**
Flow rate in m³/h	0,5	0,6	0,8	1,2	1,5	2,0	2,6	3,7	4,8

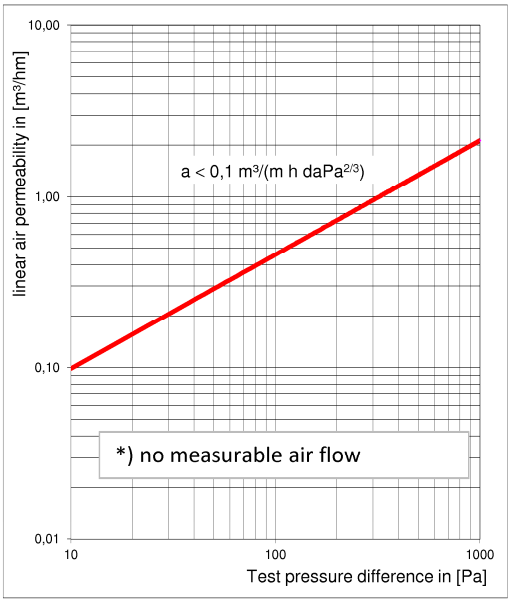
Table C: Difference of air permeability, Table B - Table A

Pressure difference in Pa	**50**	**73**	**106**	**154**	**224**	**325**	**473**	**688**	**1000**
Flow rate in m³/h	*)	*)	*)	*)	*)	*)	*)	*)	*)
Flow rate, in m³/hm	*)	*)	*)	*)	*)	*)	*)	*)	*)

*) no measurable air flow



Graphics at positive wind pressure



Graphics at negative wind pressure

Result: Q10= 0,00
Q100= 0,00

Result: Q10= 0,00
Q100= 0,00

Watertightness after load

Project-No.	16-003313-PR02
Basis	ift-Richtlinie MO-01-1 2007-01 Baukörperanschluss von Fenstern - Teil 1 Verfahren zur Ermittlung der Gebrauchstauglichkeit von Abdichtungssystemen
Test equipment	Pst/020920 - LWW-Prüfstand Fensterprüfstand 1
Test specimen	Soudatight in Kombination mit Flexifoam
Test specimen No.	Wall connection with brushable joint sealing membrane and joint insulation
Date of test	12.01.2017
Test engineer in charge	Martin Heßler
Test engineer	Martin Heßler

Implementation of tests

Deviations: There have been the following deviations from the test method specified in the standard/basis:
The test is made following EN 1026, as the scope is not applicable.

Ambient conditions: Temperature 19.0 °C Air humidity 53 % Air pressure 946 hPa
The ambient conditions are in accordance with the standard/basis requirements.

Measurement data/Results

Test state: The test was made with internal connection.

Clear opening of surround panel: 1250 mm x 1510 mm

Number of spray nozzles: 4

Amount of water: 480 l/h
0.48 m³/h

Three pressure pulses with 660 Pa were applied.

Result after loading:

There was no water penetration determined until 600 Pa over the evaluated area.

Visual assessment

Project-No.	16-003313-PR01
Basis	ift-Richtlinie MO-01-1 2007-01 Baukörperanschluss von Fenstern - Teil 1 Verfahren zur Ermittlung der Gebrauchstauglichkeit von Abdichtungssystemen
Test specimen	Wall connection with brushable joint sealing membrane and joint insulation
Test specimen No.	42511-001
Date of test	15.12.2016
Test engineer in charge	Thomas Krichbaumer
Test engineer	Martin Heßler

Implementation of tests

Deviations	There have been no deviations from the test method as specified in the standard/basis.

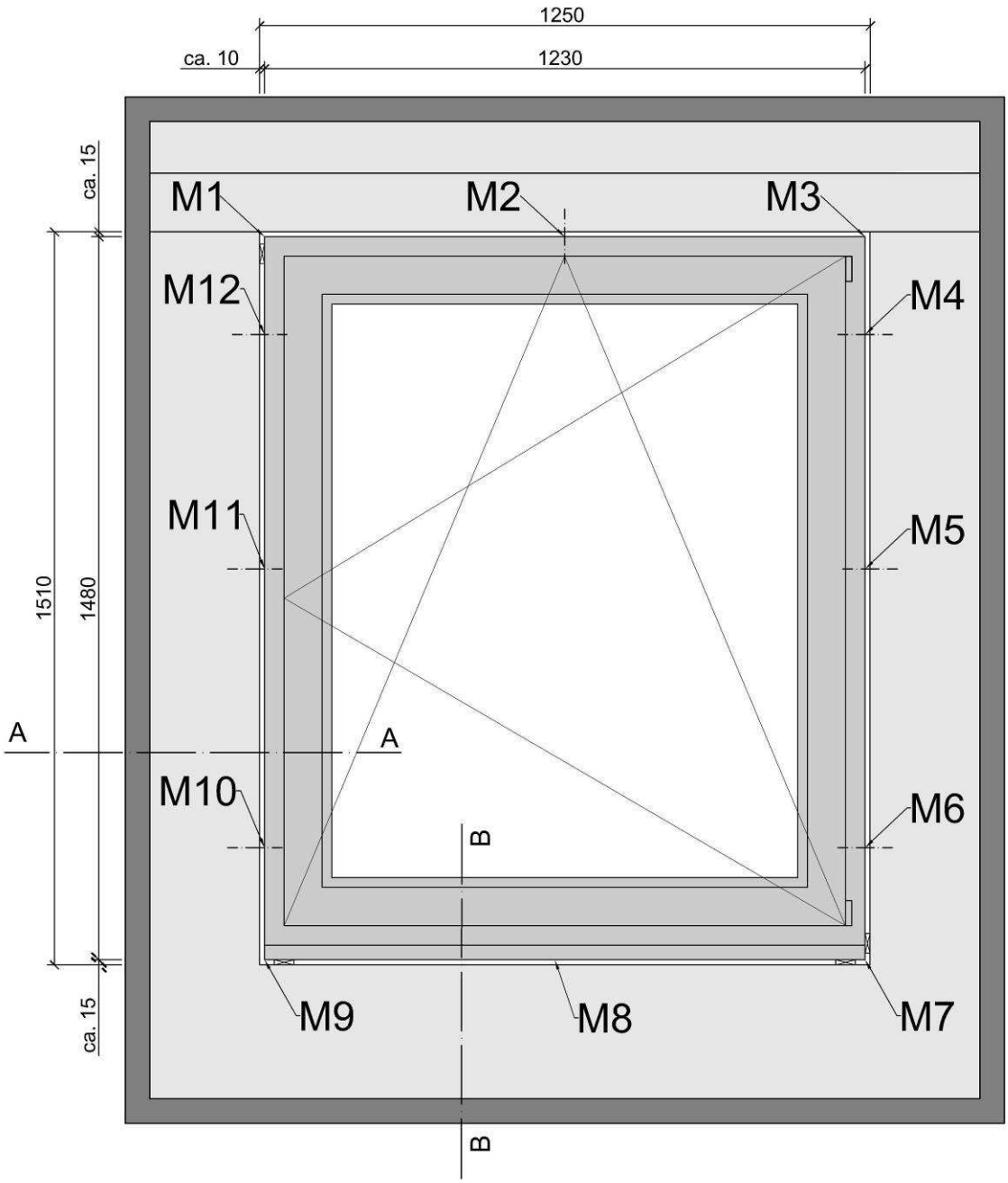
Measurement data/Results

The connection area was opened after the executed tests, the window has been removed and in doing so visually checked for changes or separations.

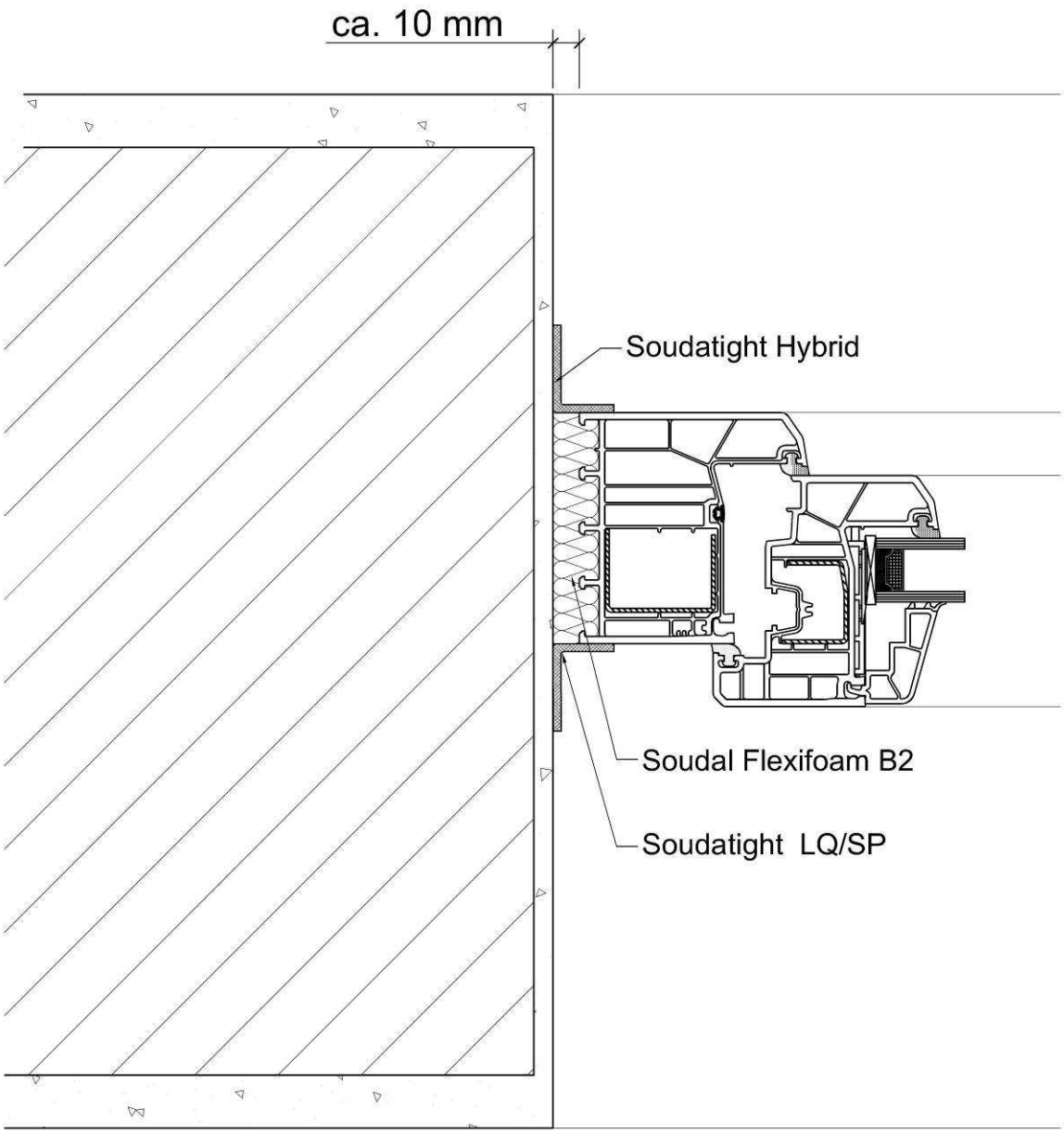
Changes in the area of the installation gap

At the test specimen were no changes in the area of the installation gap visually detected.

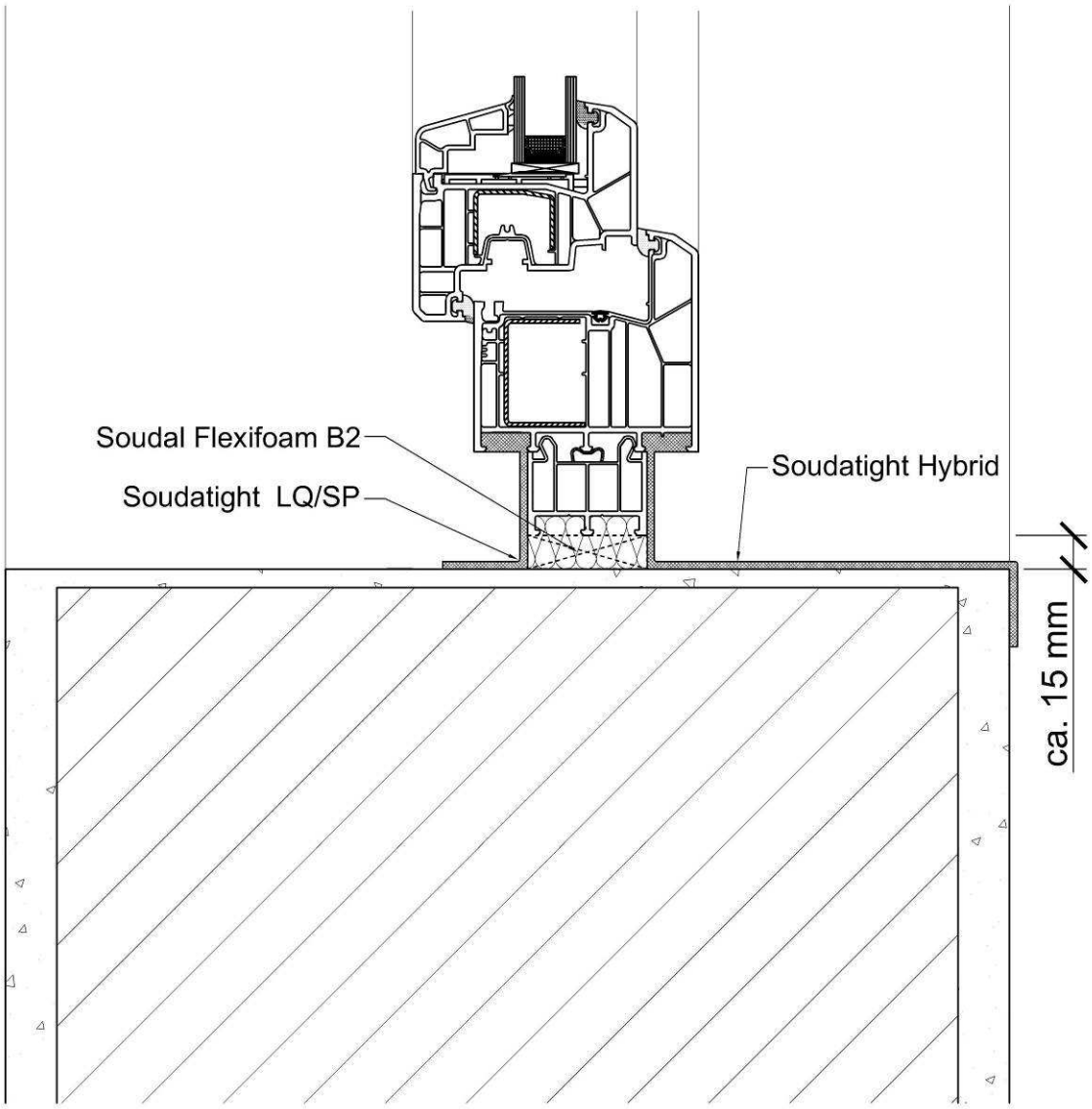
4 Representation of test specimen



Drawing 1
Elevation of test specimen and layout of linear potentiometers
The drawing as schematic representation of the test specimen was prepared by the **ift**-Rosenheim



Drawing 2
Horizontal section A - A
The drawing as schematic representation of the test specimen was prepared by the **ift**-Rosenheim



Drawing 3
Vertical section B-B
The drawing as schematic representation of the test specimen was prepared by the **ift**-Rosenheim

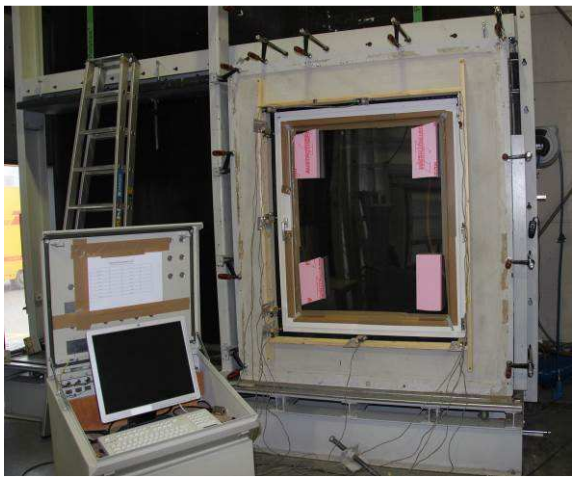


Photo 1
Test specimen on test rig

Photo 2
Test specimen seen from outside

Photo 3
Bottom corner details of external joint

Photo 4
Top corner details of external joint

Photo 5
Bottom corner details of internal joint

Photo 6
Top corner details of internal joint