Evidence of Performance

Calculation of thermal transmittance

Test Report
No. 13-000237-PR02
(PB-K20-06-de-01)

Client

Selectron Elektrokimya San. ve Tic. Ltd. Sti.
(Arbor Wood Windows)
Atatürk Bulvari Köstemir
yolu No:74
34570 Silivri - Istanbul
Turkey

Product

wood-metal frame profile
Profile combination: casement - frame

Designation: FLAT 68f

Performance-relevant product details: Material soft wood (500 kg/m³) / aluminium; View width W in mm 125; Sealing system 1 x gasket in facing, 1 x rebate gasket, 1 x middle gasket, 1 x overlap gasket; Casement; Width in mm 80 (wood profile: 80); Thickness in mm 99 (wood profile: 68); Facing profile / glazing bead; Designation Uniform LA 860; Frame; Width in mm 93 (wood profile: 70); Thickness in mm 83 (wood profile: 68); Facing profile; Designation Uniform LA 746; replacement panel; Edge cover in mm 15; Thickness in mm 51.5

Special features: gaskets partly made of rubber foam / elastomeric foam

Results

Calculation of thermal transmittance according to
EN ISO 10077-2:2012-02

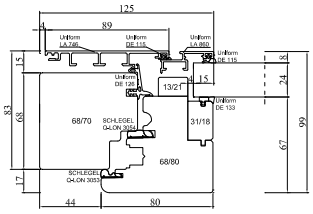
U_f = 1.3 W/(m²K)

Basis *)

EN ISO 10077-2:2012-02
SG 06-verpflichtend
NB-CPD/SG06/11/083 2011-09

*) and the equivalent national versions (e. g. DIN EN)

Representation



Instruction for use

The present test report serves to demonstrate the thermal transmittance U_f.

Validity

The data and results refer solely to the tested and described test specimen.

This test does not allow any statement to be made on any further characteristics regarding performance and quality of the construction presented.

Notes on publication

The **ift**-Guidance Sheet "Advertising with **ift** test documents" applies. The cover sheet can be used as an abstract.

Contents

The report contains a total of 6 pages and annex (1 page).

ift Rosenheim
12.03.2013

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Test Report 13-000237-PR02 (PB-K20-06-de-01) dated 12. März 2013
Client: Selectron Elektrokimya San. ve Tic. Ltd. Sti. (Arbor Wood Windows), 34570 Silivri - Istanbul (Turkey)

1 Object

1.1 Description of test specimen

Wood-metal frame profile
Profile combination: casement - frame

Manufacturer	Selectron Elektrokimya San. ve Tic. Ltd Sti. (Arbor Wood Windows); 34570 Silivri – Istanbul (Turkey)
Designation	FLAT 68f
Material	soft wood (500 kg/m³) / aluminium
View width B in mm	125
Sealing system	1 x gasket in facing 1 x rebate gasket 1 x middle gasket 1 x overlap gasket
Handling, internal, length in mm	185
Handling, external, length in mm	170
Special features	gaskets partly made of rubber foam / elastomeric foam
Casement member	
Profile section, width in mm	80 (wood profile: 80)
Profile section, thickness in mm	99 (wood profile: 68)
Facing profile / Glazing bead	
Designation	Uniform LA 860
Profile section, width in mm	38
Profile section, thickness in mm	15
Frame member	
Profile section, width in mm	93 (wood profile: 70)
Profile section, thickness in mm	83 (wood profile: 68)
Facing profile	
Designation	Uniform LA 746
Profile section, width in mm	89
Profile section, thickness in mm	12
Replacement panel	
Length in mm	240
Edge cover in mm	15
Thickness in mm	51.5
Thermal conductivity in W/(m K)	0.035

The description is based on information provided by the client and inspection of the test specimen at **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 on the basis of the characteristics / performance to be classified;
The drawings are based on unchanged documentation provided by the client unless stated otherwise.

1.2 Sampling

The below sampling data were provided to the ift:

Sampling by:	Selectron Elektrokimya San. ve Tic. Ltd. Sti. (Arbor Wood Windows), 34570 Silivri - Istanbul (Turkey)
Date:	05.03.2013
Verification:	A sampling report has not been provided to the **ift**.
ift-sp-Number:	13-000237-PK02

2 Procedure

2.1 Basis *) referring to the test methods

EN ISO 10077-2:2012-02
Thermal performance of windows, doors and shutters - Calculation of thermal transmittance - Part 2 - Numerical method for frames

SG 06-verpflichtend NB-CPD/SG06/11/083 2011-09
EN 14351-1:2006 Treatment of unventilated rectangular cavities when calculating thermal properties to EN ISO 10077-2

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

2.2 Brief description of procedure

Calculation of thermal transmittance U_f
The profile section is subdivided into a sufficient number of elements; with subdivision into smaller elements not having any effects on the total heat flow. The relevant materials / boundary conditions are determined and the total heat flow measured. The heat flow is used to determine the thermal transmittance.

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3 Detailed results

Calculation of thermal transmittance U_f

Project No.	12-000237-PR02	**Task No.**	12-000237
Basis of test	EN ISO 10077-2:2012-02 Thermal performance of windows, doors and shutters - Calculation of thermal transmittance - Part 2 - Numerical method for frames SG 06-compulsory NB-CPD/SG06/11/083 2011-09 EN 14351-1:2006 Treatment of unventilated rectangular cavities when calculating thermal properties to EN ISO 10077-2		
Used test equipment	Sim/020576 - flixo 7.0		
Test specimen	wood-metal frame profile of window system "FLAT 68f" Profile combination: casement - frame		
Test specimen No.	12-000237-PK02		
Date of test	07.03.2013		
Testing personnal in charge	Sebastian Wassermann		
Test engineer	Sebastian Wassermann		

Information on test configuration / Test method

Test method	There are no deviations to the test method according standards/basis

Testing

Number of finite elements	Sp-No.	
	Specimen 01	20163

Boundary conditions

Boundary conditions			Values	Source[1)]
θ_{ni}	Air temperature inside	°C	20	-/-
θ_{ne}	Air temperature outside	°C	0	-/-
ΔT	Temperature difference	°C	20	-/-
R_{si}	Internal heat transfer resistance	(m²·K)/W	0,13	-/-
R_{si}	Internal heat transfer resistance (increased)	(m²·K)/W	0,20	-/-
R_{se}	External heat transfer resistance	(m²·K)/W	0,04	-/-

Material properties

Material properties			Values	Source[1)]
ε_n	Emissivity		0,9	-/-
λ	Thermal conductivity softwood (500 kg/m³)	W/(m·K)	0,13	-/-
λ	Thermal conductivity aluminium (Si-alloy)	W/(m·K)	160	-/-
λ	Thermal conductivity elastomeric foam	W/(m·K)	0,05	-/-
λ	Thermal conductivity EPDM (ethylen-propylendien)	W/(m·K)	0,25	-/-
λ	Thermal conductivity rubber foam	W/(m·K)	0,06	-/-
λ	Thermal conductivity additional panel EN ISO 10077-2	W/(m·K)	0,035	-/-

[1)] Unless stated otherwise, data originate from standards EN ISO 10456 and EN ISO 0077-2

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Determination of thermal transmittance U_f

Thermal transmittance of a frame is calculated as described below:

$$U_f = \frac{L_f^{2D} - U_p \cdot b_p}{b_f}$$

	Definitions	Unit
U_f	Thermal transmittance frame	W/(m²K)
b_f	Projected view width of frame profile	m
b_p	Visible width of infill panel	m
d_p	Thickness of infill panel	m
U_p	Thermal transmittance infill panel	W/(m²K)
Q_{ges}	Joint length-related of heat flow density	W/m
L_f^{2D}	Two-dimensional thermal conductance	W/(mK)

Sp-Number	Description	U_f	Q_{ges}	L_f^{2D}	b_{ges}	b_f	b_{p1}	d_{p1}	U_{p1}
Specimen 01	cas-fr	1,256	6,054	0,303	0,365	0,125	0,240	0,052	0,609

Test result

Calculated thermal transmittance

Sp-Number
Specimen 01 U_f = **1,3 W/(m²K)**

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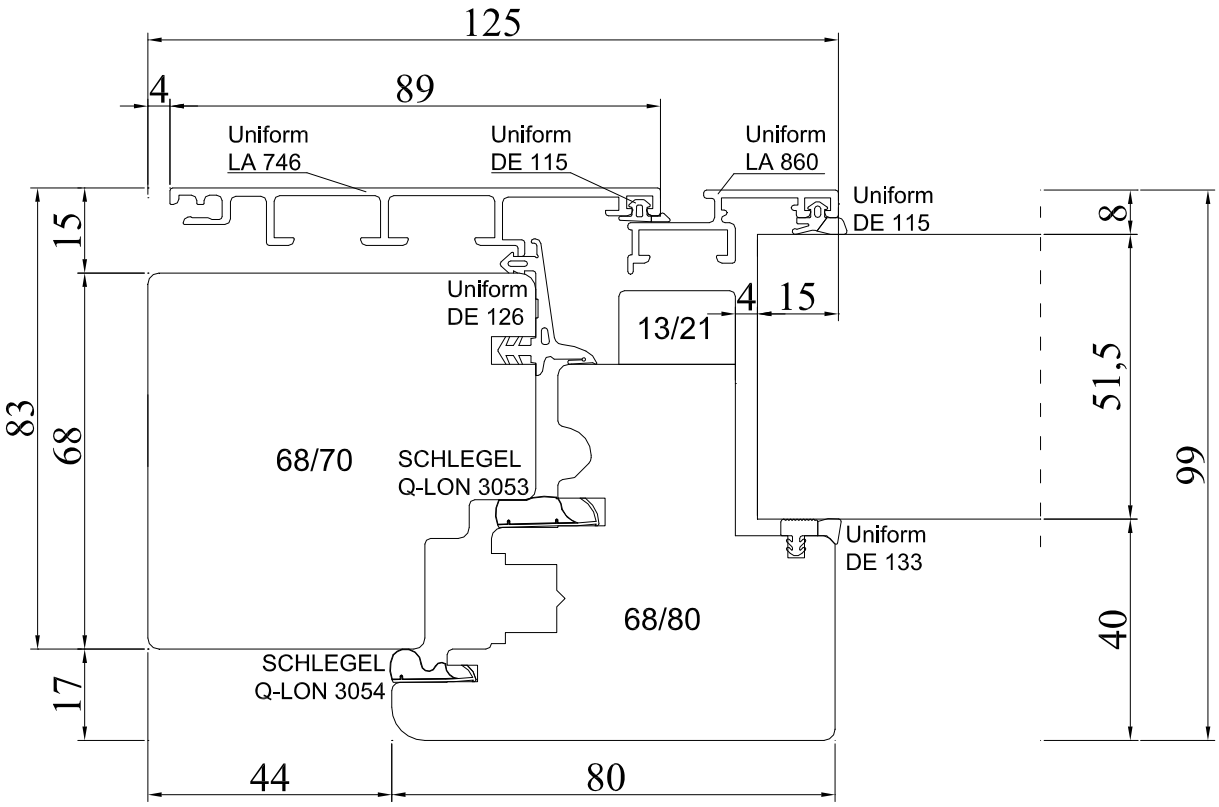

Fig. 1: Profile cross section

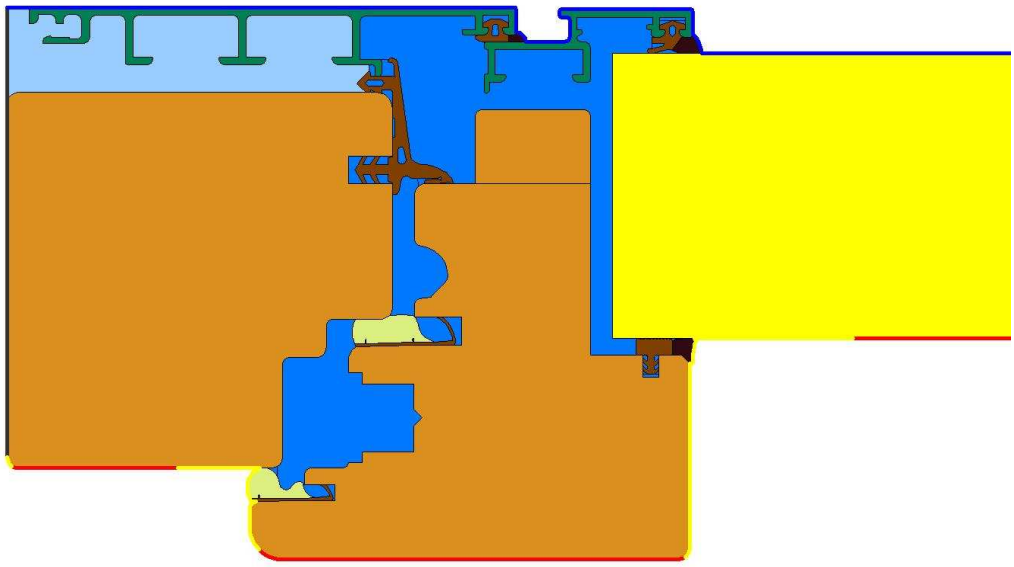

Fig. 2: Simulation model