CENTRUM STAVEBNÍHO INŽENÝRSTVÍ, a. s.
CENTRE OF BUILDING CONSTRUCTION ENGINEERING,
Joint Stock Company
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L 1007.1

Door and window testing laboratory, heat and acoustical engineering No. 1007.1, accredited by the Czech Accreditation Institute, o.p.s.

Test report
No. 188/12
Determination of thermal transmittance according to ČSN EN 12412-2

Order No.: **263 102**

Number of pages including the annex: **5**
Number of copies: **3**
Copy No.: **1**

Customer: **DECEUNINCK NV**
Bruggesteenweg 164
B-8830 Hooglede – Gits, Belgium

Manufacturer: **See customer**

Test subject:	**The frame profiles of Zendow PVC Tilt and Turn window (P5001/P5041)**
Test result:	**U_f = 1,0 W/(m².K)**

Date of receiving specimens: June 21, 2012

Date of test performing: June 25 - 26, 2012 and June 27 - 28, 2012

Test performed by: Building thermal engineering laboratory
Laboratory head: Ing. Nizar Al-Hajjar .....
Head of test laboratory No. 1007.1: Ing. Miroslav Figalla .....

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CENTRUM STAVEBNÍHO INŽENÝRSTVÍ, a.s. pracoviště ZLÍN – Laboratoř otvorových výplní, stavební tepelné techniky a akustiky č.1007.1 – AKREDITOVANÁ národním akreditačním orgánem

Date: July 17, 2012

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1. Test purpose

On the basis of the customer order and the order No. 263 102 the test laboratory of opening infillings, building thermal engineering and acoustics No. 1007.1 CSI Prague, a.s. (Center of Building Construction Engineering, Joint Stock Company) with the place of work in Zlin carried out for the customer DECEUNINCK NV, Bruggesteenweg 164, B-8830 Hooglede – Gits, Belgium, thermal transmittance test of the frame profiles of Zendow PVC Tilt and Turn window (P5001/P5041) with insulating infill panel according to SN EN ISO 12412-2.

2. Description of test subject

The test purpose is determination of the thermal transmittance U_f found by measurement according to SN EN 12 412-2, article 5.3.1 *"Thermal performance of windows, doors and shutters - Determination of thermal transmittance by hot box method - Part 2: frames* ". The measured value of thermal transmittance U_f is determined on the basis of following equation:

$$U_f = \frac{U_{m,t} A_t \quad _n - \quad _{fi} \quad _{s,fi} A_{fi}}{A_f \quad _n} \qquad W/(m^2 K)$$

where $U_{m,t}$ is the measured thermal transmittance of the infill insulation and the frame, in W/(m^2 K);

A_f the frame area; frame area is the larger of two projected areas seen from both sides, in m^2;

A_{fi} the remaining area of the infill insulation ($A_{fi} = A_t - A_f$), in m^2

A_t the projected metering area, in m^2;

$_n$ the difference between the environmental temperature on each side of the test specimen under test, in K;

$_{fi}$ the thermal conductance of the infill insulation, in W/(m^2 K);

$_{s,fi}$ the surface difference temperature of the infill insulation, in K.

3. Description of testing products - Test specimen No. 175/12

Frame and sash	Frame P 5001, sash P 5041; frame thermal reinforcement P 5202; sash thermal reinforcement P 5220, the main chamber of the frame and the sash filled with PUR foam; manufacturer Deceuninck NV Belgium
Insulating panel	Sandwich infill panel with total thickness 23,5 mm consist of: 1,5 mm PVC / 21 mm thermal insulation / 1,5 mm PVC
Sealing	inner and outer gasket between the sash and the frame P 3299, welded in the corners; outer gasket of the glazing P 3299, welded in the corners, manufacturer Deceuninck NV Belgium
Other profiles	glazing bead P 3024 with anextruded gasket, cut in the corners
Drainage and decompression	Drainage and decompression of the sash 2 holes (27x5) mm; frame drainage 2 holes (27x5) mm
Hardware	All-Peripheral Hardware GU – Unijet, 8 point closure, 2 tilt and turn hinges, handle

One specimen of 800 mm x 800 mm size was prepared from infill insulating panel after profile thermal transmittance test. Thermal resistance test was performed on this specimen by means of guarded hot plate (P 80) Z 07 3010 according to ISO 8302. The average measured value of Thermal resistance of the infill panel is: R = 0,6531 m^2.K/W for mean temperature t_{st} = 10,29 °C.

Test specimen cross section and the photo of the cut profile - see annex No.1.

Size: Window frame: 1 200 mm x 1 500 mm
Sash: 1 130 mm x 1 430 mm
Glazing: 965 mm x 1 265 mm

Condition of samples upon receipt: without apparent deficiencies.

4. TESTING REGULATIONS USED AND TESTING EQUIPMENT

4.1 Regulations

- SN EN 412-2	Testing standard
- SN 73 0540	Related standard

4.2 Used apparatus and equipment

- Vertical chamber	Z 07 3008
– Plate apparatus P 80	Z 07 3010
- Push-pulling rule	M 07 1104
- Raking balance weighing machine up to 200kg	M 07 1020
- Digital thickness gauge	M 07 1098
- Digital depth gauge	M 07 1099
- Electric thermometer	M 07 1034
- ELMER, MPE4 type (electrometer)	M 07 1132

5. Deviations from testing methods and procedures

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6. Description of used non-standardized method

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7. Results of measurement

Average air temperature in the laboratory during the measurement: 23,0 °C
Average relative humidity in the laboratory: 48 %

Table of measured values

Measured quantity		Physical unit	Measurement results Test specimen No. 175/12
Inside air temperature	$_{ni}$	°C	20,79
Outer air temperature	$_{ne}$	°C	-0,14
Input power to hot box	$_{in}$	W	46,741
Surround panel heat flow	$_{sur}$	W	1,818
The heat flow rate through the edge zone	$_{edg}$	W	1,964
Test specimen heat flow	$_{sp}$	W	12,393
Total surface thermal resistance	$R_{s,t}$	m^2 K/W	30,567
Measured thermal transmittance	U_m	[W/(m^2.K)]	0,171
Standardized thermal transmittance	U_{st}	[W/(m^2.K)]	1,022
Time of measuring in stable state		hod	8
Design test specimen area	A_{sp}	m^2	0,5793
Relative frame and sash area	A_f / A_{sp}	%	32,2

Air speed on the cold side 1,8 m/s; air flow direction up along the specimen
Air speed on the warm side 0,1-02 m/s; air flow direction up along the specimen
Hot box area A_{HB} = 2,465 m^2.

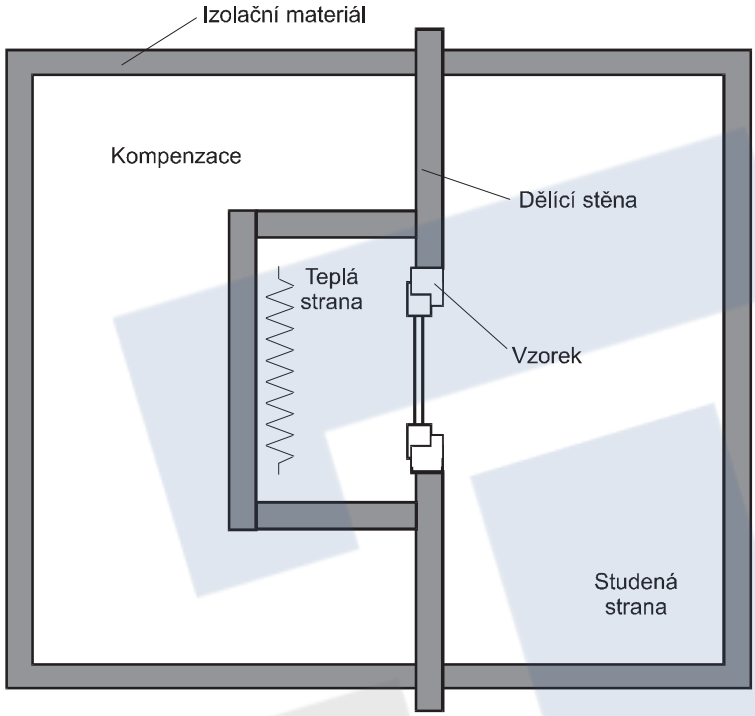
Thermal resistance of surround panel in m^2 K/ W:

$$R_{sur} = (d_{sur} / \lambda_{sur}); \lambda_{sur} = 0{,}03179 + 0{,}00012 \; _{me,sur}$$

Where λ_{sur} is thermal conductivity of testing surround panel in W/(m K);
d_{sur} the thickness of testing surround panel, its value is 0,250 m;

$_{me,sur}$ the mean temperature value of both surfaces of testing surround panel in °C.

Linear thermal transmittance Ψ_{edge} = 0,01738 W/(m K); the frame thickness w = 70 mm.
The scheme of the testing equipment is in figure1.



Key: Kompenzace: Compensation; D lící st na: Surround Panel; izola ní materiál: Insulating material; Vzorek: Specimen; Teplá strana: Warm side; Studená strana: Cold side

figure1 - Testing equipment scheme

8. Evaluation

Serial No.	Parameter title	Technical regulation Requirement	Testing method	Test specimen No.	Test result Requirement conformity
1.	Thermal transmittance U_{st} [W/(m^2.K)]	SN 73 0540 - Part 2 recommended thermal transmittance $U_{rec,20} \leq$ 1,3 W/(m^2.K)	SN EN 12412-2	175/12	1,0 Conformity

The conformity test result evaluation with the requirement is given in accordance with the document ILAC – G8:2009: "Instructions for conformity interpretation with the specification"

The extended measurement uncertainty of thermal transmittance u_U = ± 3,0 %.

Responsible for the test: Petr Pokorný
Report elaborated by: Ing. Nizar Al-Hajjar

Annex No. 1