CENTRUM STAVEBNÍHO INŽENÝRSTVÍ, a. s.
CENTRE OF BUILDING CONSTRUCTION ENGINEERING,
Joint Stock Company
Workplace Zlín, K Cihelně 304, 764 32 Zlín - Louky
Door and window testing laboratory, heat and acoustical engineering No. 1007.1, accredited by the Czech Accreditation Institute, o.p.s

Test report
No. 184/13
Determination of thermal transmittance according to ČSN EN ISO 12567-1

Order No.: **363 855**

Number of pages including the annex: **6**
Number of copies: **3**
Copy No.: **1**

Customer: **ADOPEN PLASTİK ve İNŞAAT SANAYİ A.Ş.**
Organize sanayi 2. Etap
07040 Antalya, TÜRKİYE

Manufacturer: **See customer**

Test subject:	**Composite tilt and turn window, 752 PENWOOD system**
Test result:	**U_{st} = 1,1 W/(m^2.K)**

Date of receiving specimens: 4.6.2013

Date of test performing: 14. 6. – 15. 6. 2013

Test performed by: Building thermal engineering laboratory

Laboratory head: Ing. Nizar Al-Hajjar .....

Head of test laboratory No. 1007.1: Ing. Miroslav Figalla .....

Datum: 25.6.2013

1. Test purpose

On the basis of the customer order and the order No. 363 855 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 ADOPEN PLASTİK ve İNŞAAT SANAYİ A.Ş., Organize sanayi 2. Etap, Antalya, Turkiye, the test of thermal transmittance of composite tilt and turn window, 752 PENWOOD system according to ČSN EN ISO 12567-1.

2. Description of test subject

The test purpose is determination of the thermal transmittance U_{st}, in W/(m^2.K) according to ČSN EN ISO 12567-1" Thermal performance of windows and doors – Determination of thermal transmittance by hot box method – Part 1: Complete windows and doors". From the measured value U_m is determined the standardized thermal transmittance value U_{st}, in W/(m^2.K)**:**

$$U_{\mathrm{m}} = \frac{q_{\mathrm{sp}}}{\Delta\theta_{\mathrm{n}}} \tag{1}$$

$$U_{\mathrm{st}} = \left[U_{\mathrm{m}}^{-1} - R_{\mathrm{s,t}} + R_{(\mathrm{s,t}),\mathrm{st}}\right]^{-1} \tag{2}$$

where $\Delta\theta_{\mathrm{n}}$ is the difference between environmental temperatures on each side of the test specimen, in K;

q_{sp} heat flow density through the test specimen, in W/m^2

$R_{\mathrm{s,t}}$ total surface thermal resistance on warm and cold side during the measurement, in m^2·K/W

$R_{(\mathrm{s,t}),\mathrm{st}}$ standardized total surface thermal resistance on warm and cold side, its value according to ČSN 73 0540-3 is 0.17 m^2.K/W.

3. 3. Description of testing products - Test specimen No. 179/13

Technical documentation: Test specimen cross section and profile photos - see annex No.1.

Description:

Frame and sash	Frame - 77109-11000, composite material (PVC + wood); sash - 77109-15000, composite material (PVC + wood; manufacturer: ADOPEN
Other profile	Glazing bead 20101-07600 with coeextruded sealing; manufacturer: ADOPEN
Glazing	Double glass unit: EUROFLOAT 4 mm/ENplus – spacer TGI 10 mm, argon 90 – EUROFLOAT 4 mm – spacer TGI 10 mm, argon 90 – ENplus/EUROFLOAT 4 mm; U_g = 0,8 W/(m^2.K)
Sealing	inner – 34024 - 32021; outer gasket – 34024 - 31021; infilling panel outer gasket – 34024 - 31021; manufacturer: ADOPEN
Drainage and decompression	Drainage and decompression of the sash – 2 holes with (30 x 5) mm size, frame drainage – 3 intake holes with (30 x 5) mm size and 2 outlet holes with (30 x 5) mm size, decompression of the frame – 3 intake holes with (30 x 5) mm size
Hardware	All-Peripheral hardware – ROTO NT, 10-point closure, safety-catch, handle, manufacturer ROTO FRANK NT, Germany

The cross-section of the tested window and the photo of installed specimen in the testing frame - see annexes No. 1 and 2.

Size: Window frame: 1 230 mm x 1 480 mm
Sash: 1 165 mm x 1 415 mm
Glazing: 995 mm x 1 245 mm

Condition of samples upon receipt: without apparent deficiencies.

4. TESTING REGULATIONS USED AND TESTING EQUIPMENT

4.1 Regulations

- ČSN EN ISO 12567-1 Testing standard
- ČSN 73 0540 Related standard

4.2 Used apparatus and equipment

- Vertical chamber Z 07 3008
- guarded hot plate apparatus (P 51) Z 07 1003
- guarded hot plate apparatus (P 50) Z 07 1001
- 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: 22,6 °C
Average relative humidity in the laboratory: 44,0 %

Table of measured values

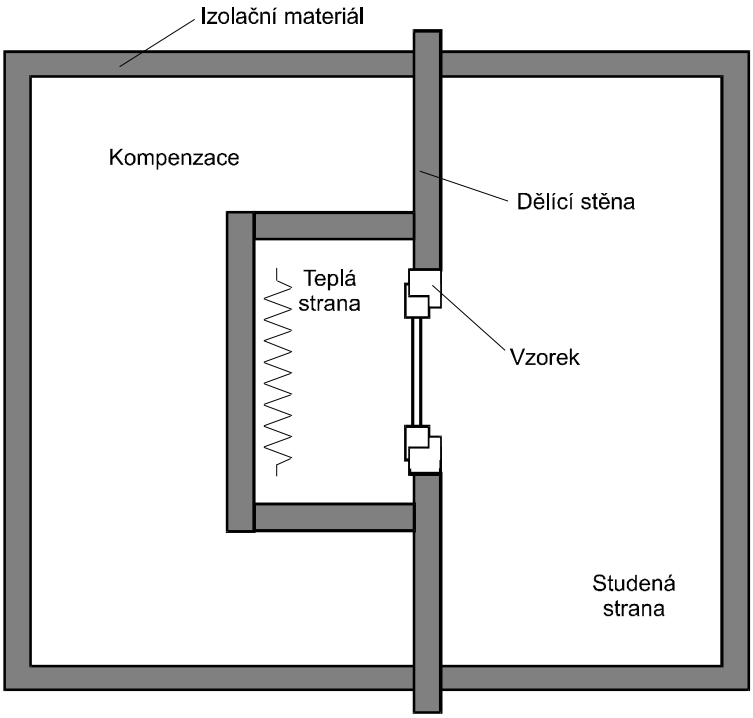
Measured quantity		Physical unit	Measurement results Test specimen No. 179/12
Inside air temperature	θ_{ni}	℃	21,28
Outer air temperature	θ_{ne}	℃	0,88
Input power to hot box	Φ_{in}	W	44,249
Surround panel heat flow	Φ_{sur}	W	1,714
The heat flow rate through the edge zone	Φ_{edg}	W	1,727
Test specimen heat flow	Φ_{sp}	W	13,905
Total surface thermal resistance	$R_{s,t}$	m^2.K/W	0,159
Measured thermal transmittance	U_m	W/(m^2.K)	1,137
Standardized thermal transmittance	U_{st}		
Time of measuring in stable state		hod	8
Projected test specimen area	A_f	m^2	0,5816
Relative frame and sash area	A_f / A_t	%	32,0

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:

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

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;
$\theta_{me,sur}$ the mean temperature value of both surfaces of testing surround panel in ℃.

Linear thermal transmittance Ψ_{edge} = 0,01739 W/(m·K), frame installing depth in the surround panel *w* = 70 mm.
The scheme of the testing equipment is in figure1.



Key: Kompenzace: Compensation; Dělicí stěna: Surround Panel; izolační 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_f [W/(m^2.K)]	ČSN 73 0540 Part 2 Recommended thermal transmittance $U_{rec,20} \leq 1,3$	ČSN EN 12412-2	178/13	1,1 Conformity

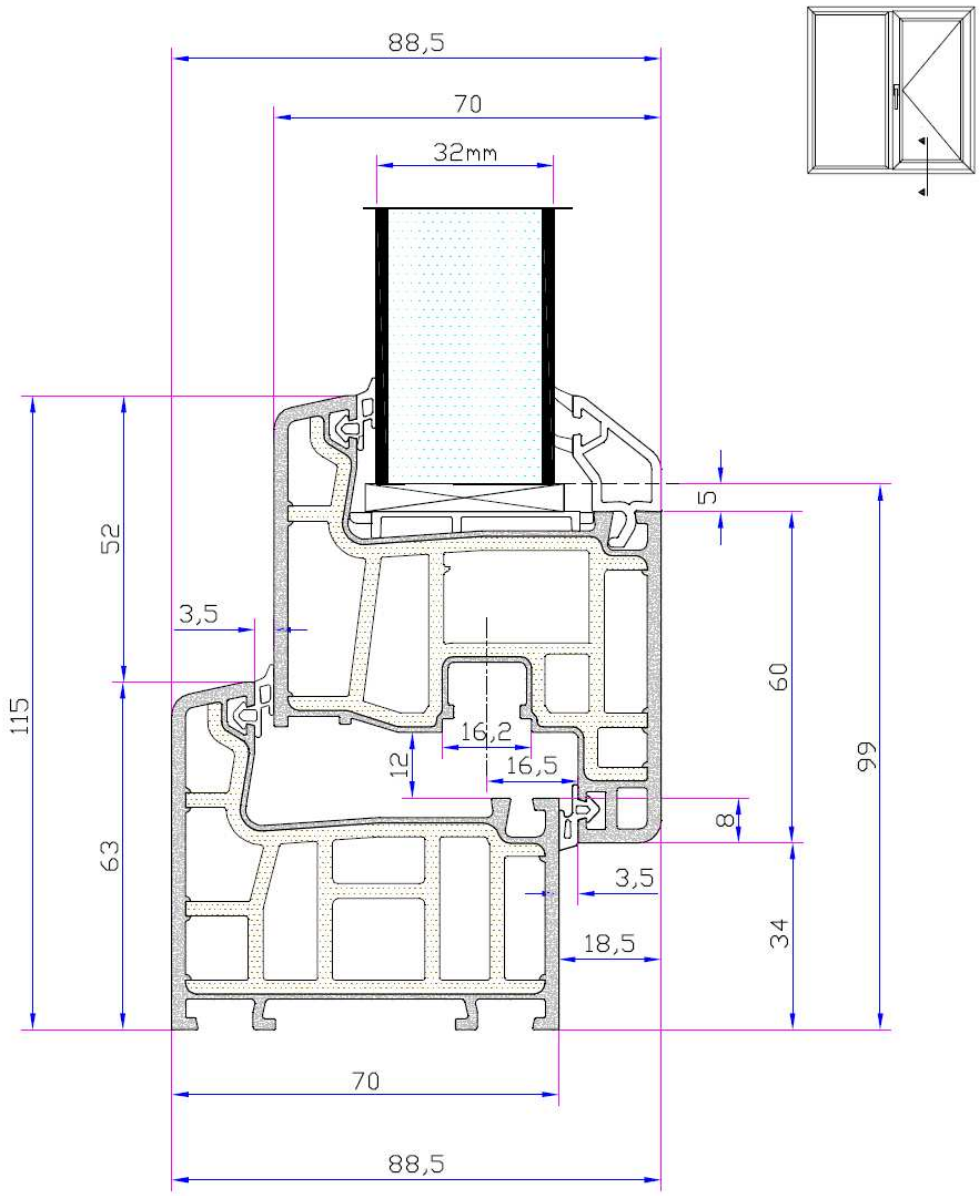
The conformity test result evaluation with the requirement is given in accordance with the document ILAC – G8:2009: "Instructions for conformity interpretation with the specification"

The extended measurement uncertainty of thermal transmittance is $U_U = \pm 3,0$ %.

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

Annex No. 1

SYSTEM OF PENWOOD (W 750)



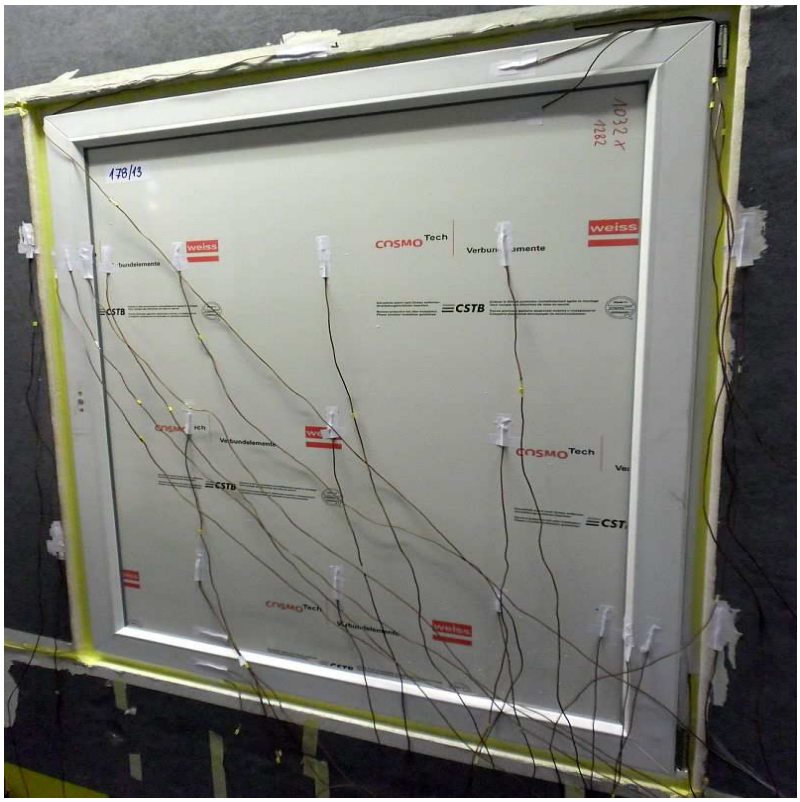
Profiles System " 12 / 20 - 13 "

WINTECH PVC WINDOW-DOOR -SHUTTER SYTEM	SCALE : 1 \ 1	750 PENWOOD SYSTEM	WINTECH	PAGE	NO: 6

Annex No. 2

Cold side

Warm side



Annex No. 3