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Testing laboratory of physical properties of materials, structures and buildings – Zlín, Testing laboratory No. 1007.1, accredited by the CIA.
L 1007.1

Test report
No. 312/15
Determination of thermal transmittance according to ČSN EN 12412-2

Order No.:	**563 744**	*Number of pages including the annexes:*	**6**
		Number of copies:	**3**
		Copy No.:	**2**

Customer: **GEALAN Fenster-Systeme GmbH**
Hofer Straße 80
95145 Oberkotzau, Deutschland

Manufacturer: **See customer**

Test subject:	**The frame profiles of S 8000 IQ , PVC Tilt and Turn window (Pos. 3)**
Test result:	**U_f = 1,2 W/(m².K)**

Date of receiving specimens: 11. 9. 2015

Date of test performing: 16. 9. – 17. 9. a 22. 9. – 23. 9. 2015

Test performed by: Building thermal engineering laboratory

Technical laboratory head: Ing. Nizar Al-Hajjar .....

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

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30. 9. 2015

1. Test purpose

On the basis of the customer order and the order No. 563 744, Testing laboratory of physical properties of materials, structures and buildings – Zlín, Testing laboratory No. 1007.1, carried out for the customer GEALAN Fenster-Systeme GmbH, Hofer Straße 80, 95145 Oberkotzau, Deutschland, thermal transmittance test of the frame profiles of S 8000 IQ systém (pos. 3), PVC Tilt and Turn window with insulating infill panel according to ČSN 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 ČSN 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:

$$U_f = \frac{U_{m,t}\, A_t\, \Delta\theta_n - \Lambda_{fi}\, \Delta\theta_{s,fi}\, A_{fi}}{A_f\, \Delta\theta_n} \qquad W/(m^2 \cdot K)$$

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

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;

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

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

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

3. Description of testing products – Test specimen 229/15

Frame and sash	Frame 8001 00, 66 mm wide and 74 mm thick; frame reinforcement 8716 51, 1,5 mm thick; sash 8095 00, 78 mm wide and 74 mm thick; reinforcement 8716 51, 1,5 mm thick; manufacturer and supplier of main PVC and reinforcement profiles GEALAN, Germany
Other profiles	glazing bead 7116 00 with extruded gasket
Insulating panel	Sandwich panel 35,8 mm thick:1,5 mm PVC – 32,8 mm thermal insulation from hard foam - 1,5 mm PVC
Sealing	outer gasket 8186 92; inner gasket 8187 92; outer glazing gasket 8156 92; manufacturer of main sealing profiles GEALAN, Germany
Decompression and drainage	Decompression and Drainage of the sash 2 holes (28 x 5) mm; frame drainage: 2 inlet holes (28 x 5) mm, 2 outlet holes (28 x 5) mm; frame decompression: Not performed
Hardware	All-Peripheral Hardware Siegenia TITAN AF, 6 point closure, 2 tilt and turn hinges, handle

One specimen of 500 mm x 500 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 50 and P 51) Z 07 1001 and Z 07 1003 according to ISO 8302. The average measured value of thermal resistance of the infill panel is: R = 1,174 m^2.K/W for mean temperature $t_{stř}$ = 9,75 °C.

Test specimen cross section – see annex No. 1 and the photos of the cut profiles and the photos of the mounted specimen in the testing frame - see annex No.2.

Size:	Window frame:	1 230 mm x 1 480 mm
	Sash:	1 155 mm x 1 405 mm
	Infill:	1 000 mm x 1 250 mm

Condition of samples upon receipt: without apparent deficiencies.

4. TESTING REGULATIONS USED AND TESTING EQUIPMENT

4.1 Regulations

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

4.2 Used apparatus and equipment

- Vertical chamber	Z 07 3008
– Plate apparatus P 50	Z 07 1001
– Plate apparatus P 51	Z 07 1003
- 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: 22,9 °C
Average relative humidity in the laboratory: 45,0 %

Table of measured values

Measured quantity		Physical unit	Measurement results Specimen No.
			229/15
Inside air temperature	θ_{ni}	°C	20,44
Outer air temperature	θ_{ne}	°C	0,16
Input power to hot box	Φ_{in}	W	35,765
Surround panel heat flow	Φ_{sur}	W	1,693
The heat flow rate through the edge zone	Φ_{edge}	W	1,825
Test specimen heat flow	Φ_f	W	13,450
Thermal insulation infill heat flow	Φ_{fi}	m^2.K/W	18,797
Total surface thermal resistance	$R_{s,t}$	[W/(m^2.K)]	0,161
Thermal transmittance of the frames	U_f	[W/(m^2.K)]	1,163
Time of measuring in stable state		hod	8
Design test specimen area	A_f	m^2	0,5704
Relative frame and sash area (inner/outer) A_f / A_t		%	31,3

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} = 2,4649m^2.

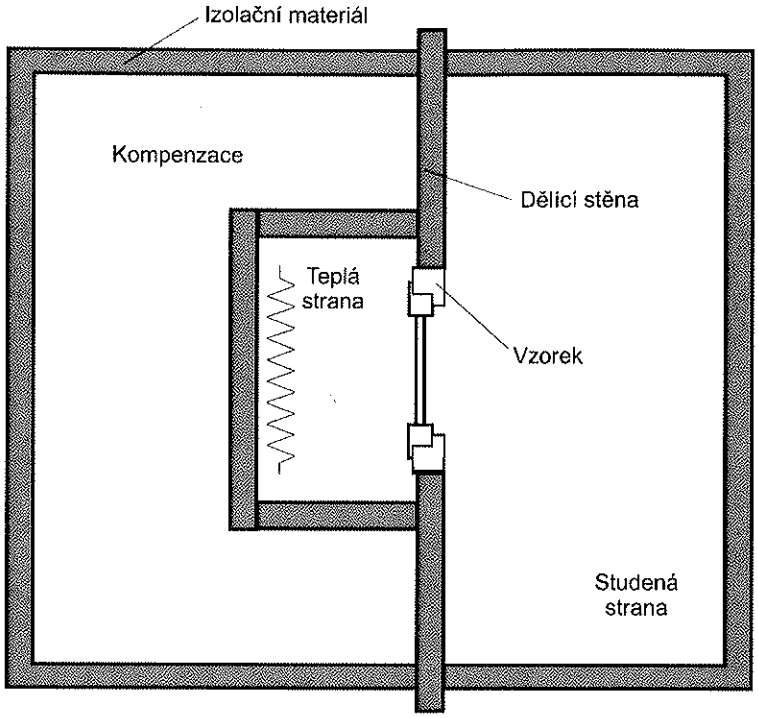
Thermal resistance of surround panel in m^2·K/ W:

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

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 °C.

Linear thermal transmittance Ψ_{edge} = 0,01660 W/(m·K); the frame thickness w = 74,0 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

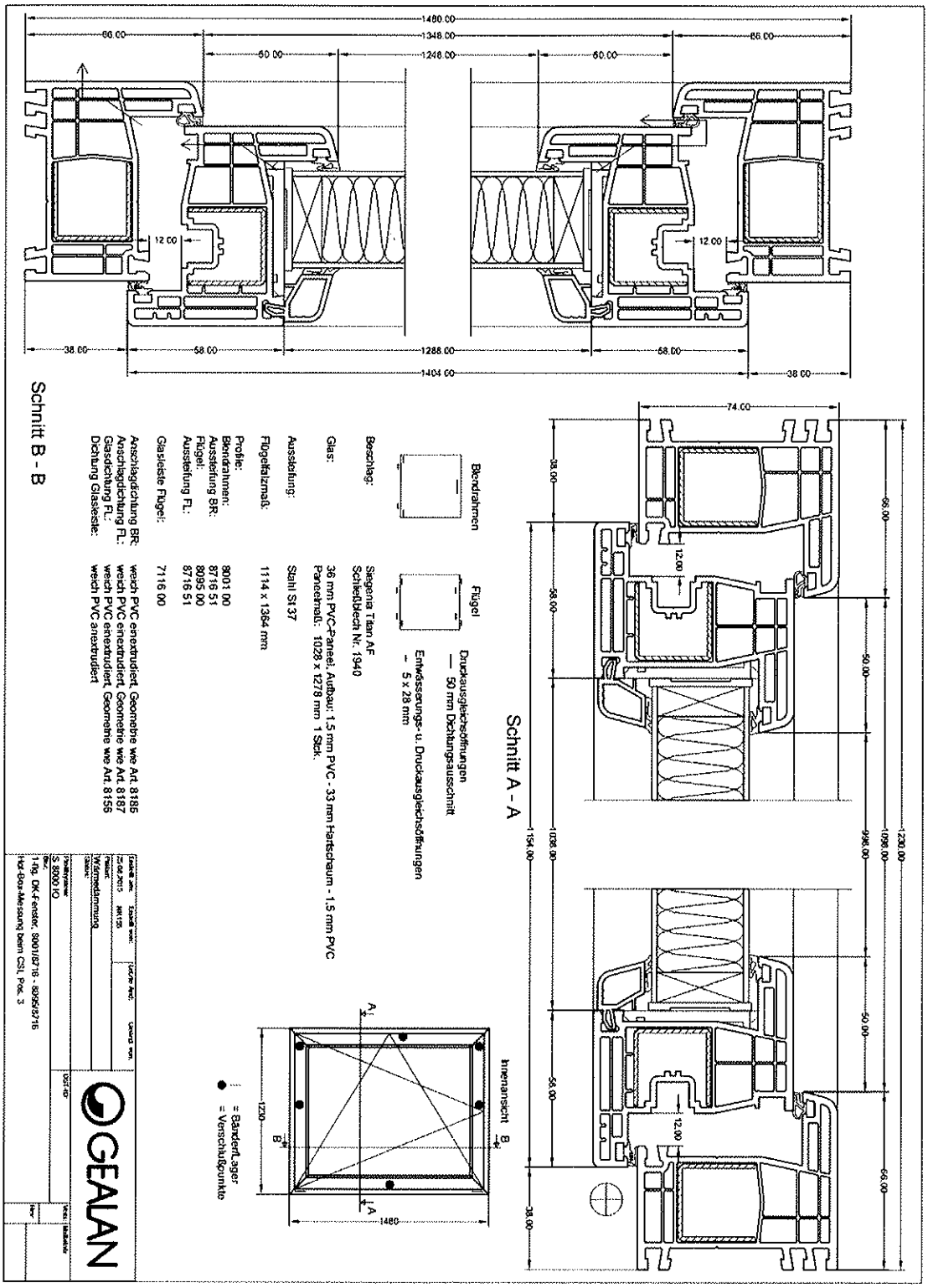
Serial No.	Parameter title	Technical regulation Requirement	Testing method	Test specimen No.	Test result Requirement conformity
1.	Thermal transmittance U_f [W/(m^2.K)]	ČSN 73 0540 - Part 2; recommended thermal transmittance $U_{rec,20}$ = 1,3 W/(m^2.K)	ČSN EN 12412-2	229/15	1,2 Conformity

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


Schnitt B - B
Schnitt A - A
Innenansicht
Blendrahmen
Flügel
Druckausgleichsöffnungen
— 50 mm Dichtungsausschnitt
Entwässerungs- u. Druckausgleichsöffnungen
– 5 x 28 mm
Beschlag: Siegenia Titan AF
Schließblech Nr. 1940
Glas: 36 mm PVC-Paneel; Aufbau: 1,5 mm PVC - 33 mm Hartschaum - 1,5 mm PVC
Paneelmaß: 1028 x 1278 mm 1 Stck.
Aussteifung: Stahl St 37
Flügelfalzmaß: 1114 x 1364 mm
Profile: 9001 00
Blendrahmen: 8716 51
Aussteifung BR: 8095 00
Flügel: 8716 51
Aussteifung FL:
Glasleiste Flügel: 7116 00
Anschlagdichtung BR: weich PVC enextrudiert, Geometrie wie Art. 8185
Anschlagdichtung FL: weich PVC enextrudiert, Geometrie wie Art. 8187
Glasdichtung FL: weich PVC enextrudiert, Geometrie wie Art. 8185
Dichtung Glasleiste: weich PVC enextrudiert
= Bandanschlag
= Verschlußpunkte
GEALAN
1-flg. DK-Fenster, 9001/8716 - 8095/8716
Hof-Box-Messung beim CSI, Pos. 3

Annex No. 2