REPORT

issued by an Accredited Testing Laboratory

1002
ISO/IEC 17025

Date	Reference	Page
2009-04-14	P902026	1 (1)
Rev.date		
2009-05-15		

Handled by, department
Eva-Lotta Kurkinen
Energy Technology
+46 10 516 51 77, Eva-Lotta.Kurkinen@sp.se

Drewexim Sp.z o.o.
ul. Szczecinska 44
PL-75-137 KOSZALIN
Polen

Determination of thermal transmittance using the guarded hot-box method in accordance with EN ISO 12567

(2 appendices)

Test specimen

The test specimen was a wooden window with outer dimensions 1.20 m x 1.20 m (see appendix 1 and 3) The window arrived undamaged at SP, ETi in March 11, 2009.

Test procedure

The window was mounted in a 150 mm thick wall made of expanded polystyrene flush with the warm face. Natural convection was used in the metering box, and forced convection on the cold side. See appendix 2.

Results

The thermal transmittance for the window was found to be:

$$U = 1.2 \text{ W/(m}^2 \text{ K)}$$

The results which only refer to the tested product are shown in greater detail in appendix 3.

SP Technical Research Institute of Sweden
Energy Technology - Building Physics and Indoor Environment

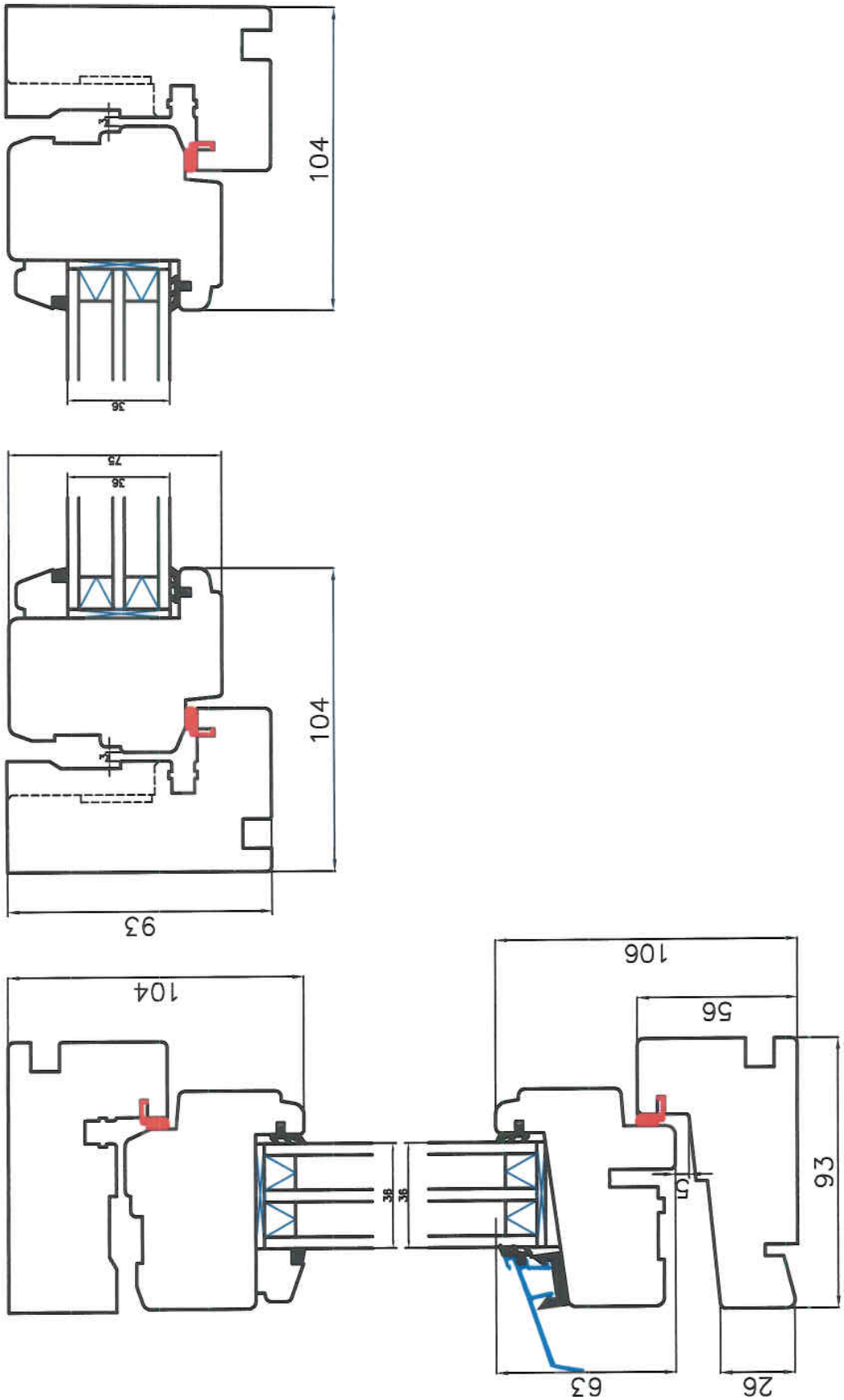
Bertil Jonsson
Technical Manager

Eva-Lotta Kurkinen
Technical Officer

Wer.	Uwagi	Data	Podpis	Spr.

Poz.	Ilość	Tytuł/nazwa, materiał, wymiary itp.		Numer	Skala
Rysował M.Piechowski		Sprawdził A.Motyka	Zatwierdził – data A.Kozłowski	Plik	Data 21.04.2009	1:1
		Przekrój przez okno norweskie		Nr – 001	Edycja 0	Arkusz A2

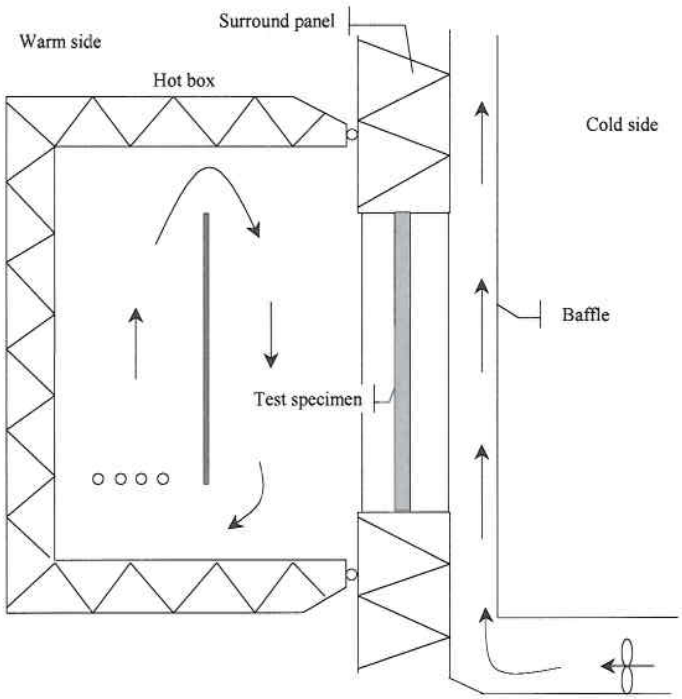
DREWEXIM



Method of measurement, thermal transmittance

The thermal transmittance (U-value) was determined using the Hot-box method as defined in EN ISO 12567-1.

During the test, the specimen was mounted in a 15 cm thick surround wall made of expanded polystyrene separating the warm and the cold spaces.



The specimen is oriented vertical and the direction of the heat flow is horizontal. The air flow (natural convection) along the warm side of the test specimen is directed downwards. The air velocity (upward directed flow) on the cold side is adjusted by fan speed adjustment in the calibration procedure. Then the fan speed settings shall remain constant.

Hot box data

Area, m²	3.17
Depth, m	0.45

Results

Determination of thermal transmittance according to EN ISO 12567-1

Client	Drewexim Sp.z o.o.
Test specimen[1]	Wooden window Top swing Glazing: 4-12ar-4-12ar-4 with low emissivity coatings on both sides Spacer: metal
Test apparatus	Climatic chamber 1 Hot box 3.17 m² Agilent 34980 measure unit
Date of test	2009-03-30—31

Measurement results

	Cold	**Warm**
Air, °C	0.2	20.7
Baffle, °C	0.1	20.0
Surround panel, °C	0.4	19.5
Air flow, m/s	1.8	<0.1

Calibration set

The following regression curves have been derived by least-square fits from the calibration set;

Thermal resistance of the surround panel (R_{sur}) $R_{sur} = 3.902 - 0.0288 \cdot \theta_{me,sur}$

Convective fraction, warm $F_{c,i} = 0.3923 + 0.0021 \cdot q_{sp}$
cold $F_{c,e} = 0.8138 + 0.0002 \cdot q_{sp}$

Total surface resistance ($R_{s,tot}$) $R_{s,tot} = 0.2038 \cdot q_{sp}^{-0.0417}$

q_{sp} = heat flow density of specimen, W/m²
$\theta_{me,sur}$ = mean temperature of surround panel, °C

[1] Information by client

Calculation of the thermal transmittance of the window

Mean temperature of surround panel, °C	9.9
Surround panel resistance, m²K/W	3.61
Area of surround panel, m²	1.73
Ψ_{edge}, W/(mK)	0.0055
Input power in hot box, W	42,8
Surround panel heat flow, W	9.2
Edge zone heat flow, W	0.6
Convective fraction – warm	0.44
Convective fraction – cold	0.82
Total surface resistance, m²K/W	0.179
Radiant temperature – warm, °C	20.0
Radiant temperature – cold, °C	0.1
Environmental temperature – warm, °C	20.3
Environmental temperature – cold, °C	0.2
Environmental temperature difference, °C	20.2
Measured thermal transmittance, W/(m²K)	1.14
Uncertainty of the measurement, %	5
Standardized total surface resistance, m²K/W	0.17
Standardized thermal transmittance, W/(m²K)	1.15