

2014-06-20

REPORT

U_D-Analysis

of

PASSIVE Europa 92 door

with

44mm & 48mm glazing

for

Zyle Fenster UAB

J. Jasinskio 16a

LT-03163

Lithuania

IG Passivhus Sverige

Tel: 0470-70 51 75 | Fax: 0470-70 51 79

Adress: Honnörsgatan 16, 352 36 Växjö

E-post: ingo@igpassivhus.se

Organisationsnummer: 556862-5635

Bankgiro: 809-3015

Företaget innehar F-skattesedel.

Table of Contents

BACKGROUND AND ASSIGNMENT	3
RESERVATIONS.....	3
FLIXO	3
INPUT	4
MATERIALS	4
INPUT DRAWINGS & THERMAL SIMULATION GRAPHS.....	5
RESULTS.....	9
U_D WITH 44MM-GLAZING:.....	9
U_D WITH 48MM-GLAZING:.....	10
APPENDIX – CONSTRUCTION DRAWINGS.....	11

Background and assignment

IG Passivhus Sverige has been commissioned by *Zyle Fenster UAB* to analyse the door U-values (U_D) for their *Europa* door with 44mm respectively 48mm glazing.

The U_D will be determined for the uninstalled door.

Reservations

Simulations and calculations are based on the drawings and information received on 12-06-2014 and 16-06-2014. The drawings have been transferred into the simulation program *Flixo*, which in turn has been developed by the Swiss company *Infomind GmbH*.

Material properties and border conditions used for the simulation can be found under “Input” below.

Hardware (e.g. hinge fixings etc.) is not included in the U-value calculations.

According to EN ISO 10077-2, there needs to be a gap of at least 5mm between the mask (representing the glazing) and the frame. For the U_f -calculations, this requirement has been fulfilled. Since this gap is then filled with an EPDM strip, the influence of this strip has been included in the calculations for the Ψ_g .





Flixo

The analysis program *Flixo 7.0* is used for the calculation of the thermal bridges and U-values. This software is validated to the EN ISO 10077-2:2012 standard, which forms – together with EN ISO 673 and EN ISO 6946 (for the outside temperature) – the basis for this analysis.

Input

Materials

Specifications			Comments / sources
	Scandinavian soft wood	0.110 W/(m·K)	PHI-certificate <i>Europa window</i> EN ISO 10077-2 (2012) EN ISO 10456 (2007/2009)
	Mask (panel)	0.035 W/(m·K)	
	Aluminium alloy	160.0 W/(m·K)	
	PIR foam insulation	0.038 W/(m·K)	∅ of values on manufacturer's data sheet
	Polysulphide	0.400 W/(m·K)	PHI-certificate <i>Europa window</i>
	PE-foam	0.033 W/(m·K)	PHI-certificate <i>Europa window</i>
	EPDM	0.250 W/(m·K)	EN ISO 10456 (2007/2009)
	Silicone	0.350 W/(m·K)	EN ISO 10456 (2007/2009)
	Spacer-Substitute	0.190 W/(m·K)	PHI-certificate <i>Europa window</i>
	Glass	1.0 W/(m·K)	EN ISO 10077-2 (2012)

Border Conditions			Comments / sources
	External (outside) standard R_{se}	0.04 (m ² K)/W; - 10°C	EN ISO 6946
	Internal (inside) frame R_{si} respectively (reduced at edges)	0.13 (m ² K)/W; + 20°C respectively	EN ISO 10077-2 (border condition assistant)
		0.20 (m ² K)/W; + 20°C	
	Symmetry / section	$q = 0 \text{ W/m}^2$	

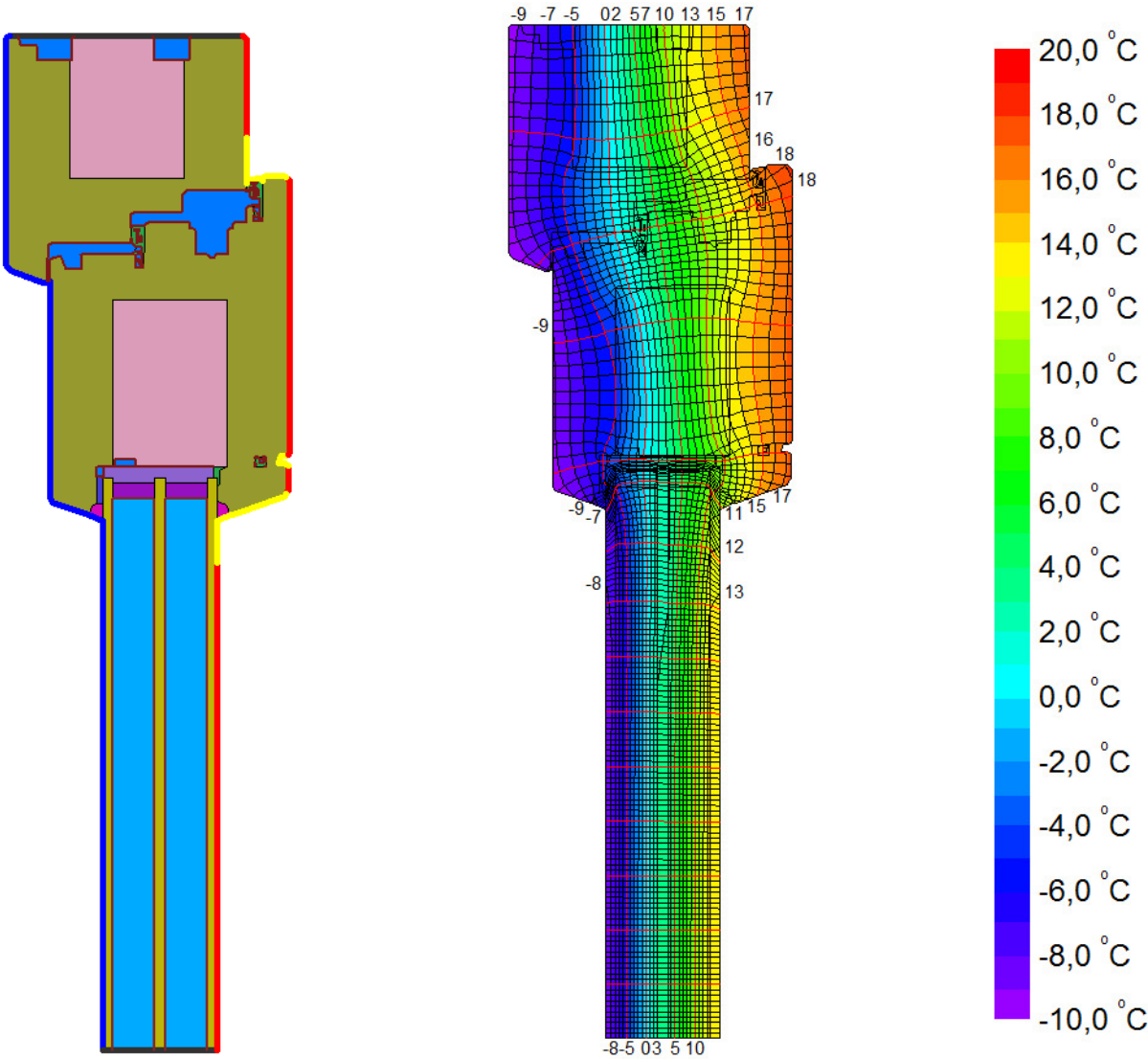
Both types of doors have a frame width of 184mm on top and sides as well as 154mm at the bottom. With a standard size of 1100mm width and 2200mm height, the resulting glazing area is 1.363m² and the circumference of the glazing area 5.188m.

The simulation has been done with the spacer bar "Swisspacer ULTIMATE".

Cavities and hollow spaces have been determined in accordance with EN ISO 10077-2, as is the R_{si} of 0.20 (m²K)/W - which is higher at the edges of the frame than the standard R_{si} of 0.13 (m²K)/W. Gas fillings of the glazing packages were based on EN ISO 673.

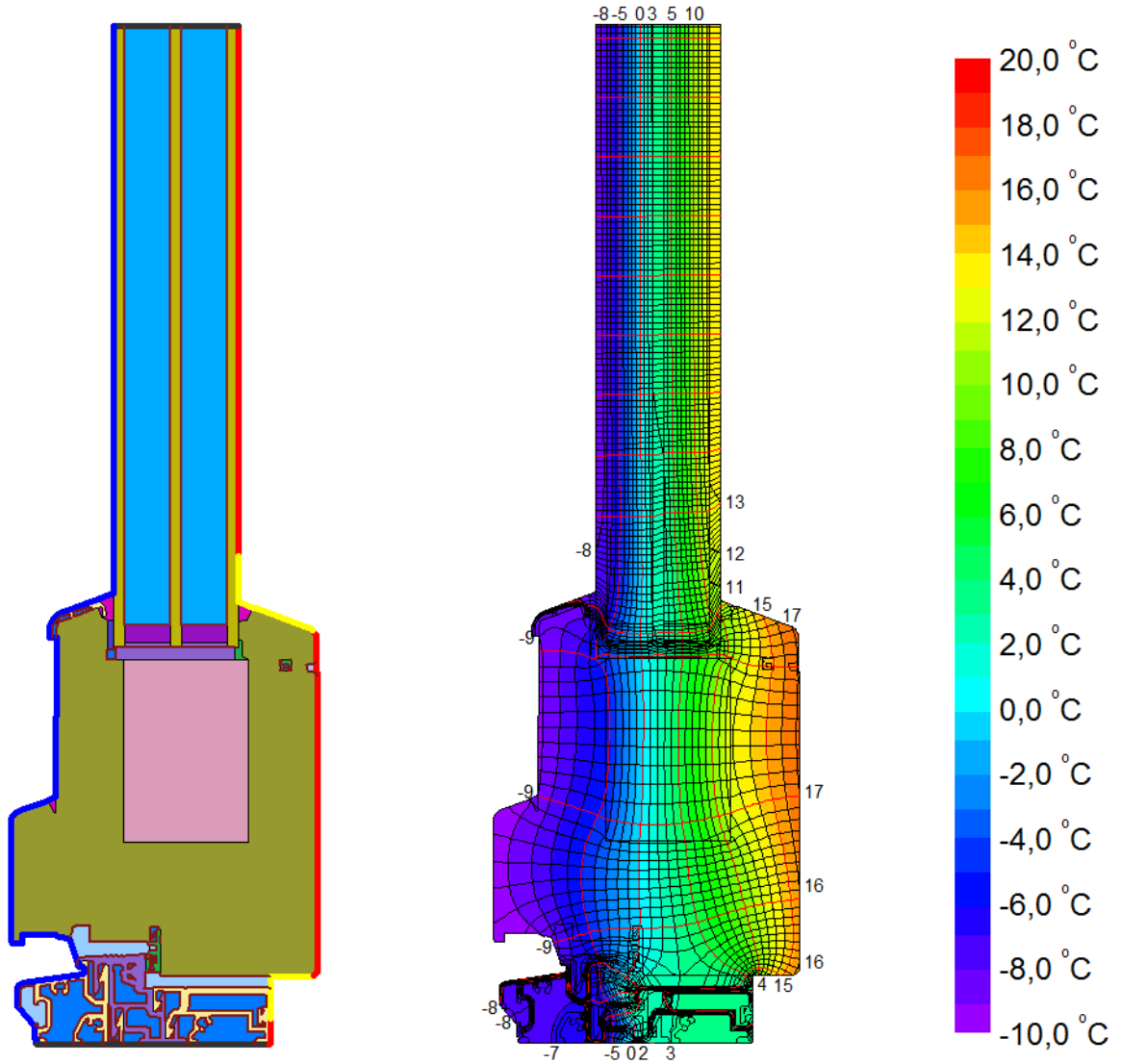
Input drawings & thermal simulation graphs

1.) 44mm – sides & top



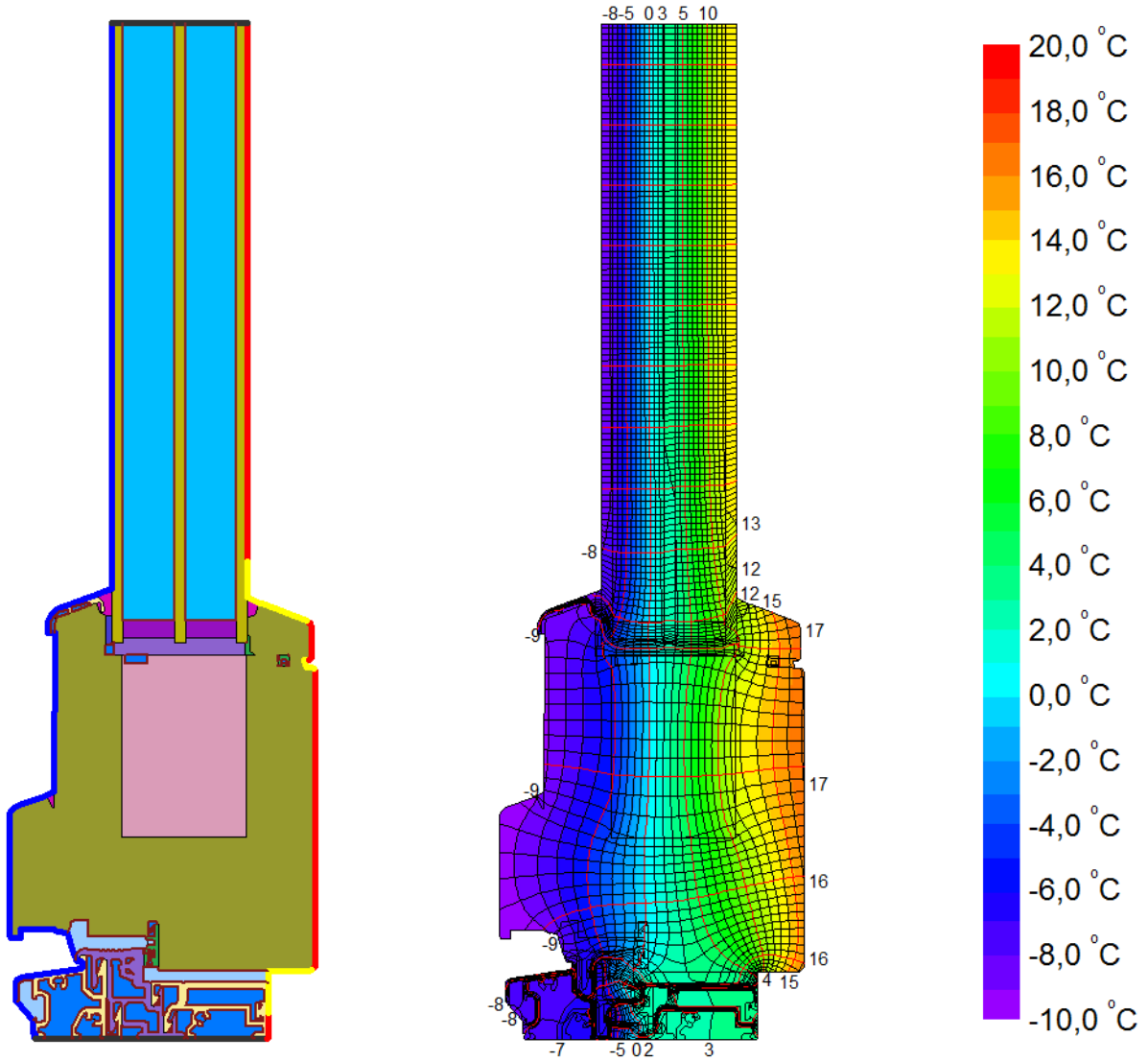
$$U_{f, \text{side\&top}} = 0.73 \text{ W}/(\text{m}^2 \cdot \text{K})$$

2.) 44mm – bottom



$$U_{f, \text{bottom}} = 1.35 \text{ W}/(\text{m}^2 \cdot \text{K})$$

4.) 48mm – bottom



$$U_{f, \text{bottom}} = 1.36 \text{ W}/(\text{m}^2 \cdot \text{K})$$

Results

The U_D of the uninstalled door is calculated according to the following formula:

$$U_D = \frac{A_g \cdot U_g + A_f \cdot U_f + l_g \cdot \Psi_g}{A_g + A_f}$$

where: A_g Glazing area [m²] U_g Average glazing U-value [W/(m²K)]
 A_f Frame area [m²] U_f Average frame U-value [W/(m²K)]
 l_g Length of edge bond [m] Ψ_g Av. th. bridge of edge bond [W/(mK)]

The U-values are rounded to 2 decimals, Ψ -values to 3 decimals.

U_D with 44mm-glazing:

	Top	Left	Right	Bottom
U_f [W/(m ² ·K)]	0.73	0.73	0.73	1.35
Frame width [mm]	184	184	184	154
$\Psi_g^{*)}$ [W/(m·K)]	0.026	0.026	0.026	0.029
l_g [m]	5.188			
A_g [m ²]	1.363			
U_g [W/(m ² ·K)]	0.70			
U_D [W/(m²·K)]	0.81			

^{*)} This value includes the Polysulphide-strip around the glazing package as well as the spacer bar

U_D with 48mm-glazing:

	Top	Left	Right	Bottom
U _f [W/(m ² ·K)]	0.73	0.73	0.73	1.36
Frame width [mm]	184	184	184	154
Ψ _g ^{*)} [W/(m·K)]	0.026	0.026	0.026	0.027
L _g [m]	5.188			
A _g [m ²]	1.363			
U _g [W/(m ² ·K)]	0.50			
U_D [W/(m²·K)]	0.70			

^{*)} This value includes the Polysulphide-strip around the glazing package as well as the spacer bar

Ingo Theoboldt
IG Passivhus AB

IG Passivhus Sverige

Tel: 0470-70 51 75 | Fax: 0470-70 51 79

Adress: Honnörsgatan 16, 352 36 Växjö

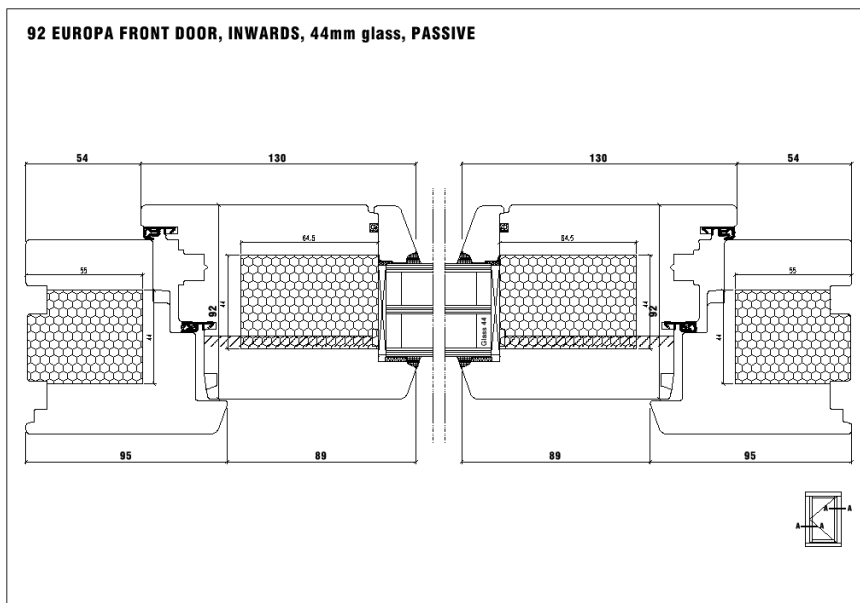
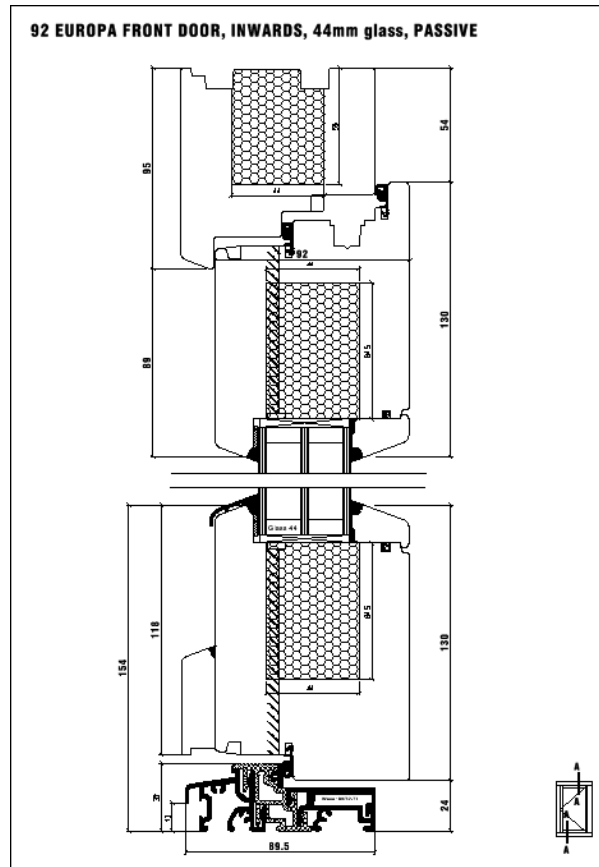
E-post: ingo@igpassivhus.se

Organisationsnummer: 556862-5635

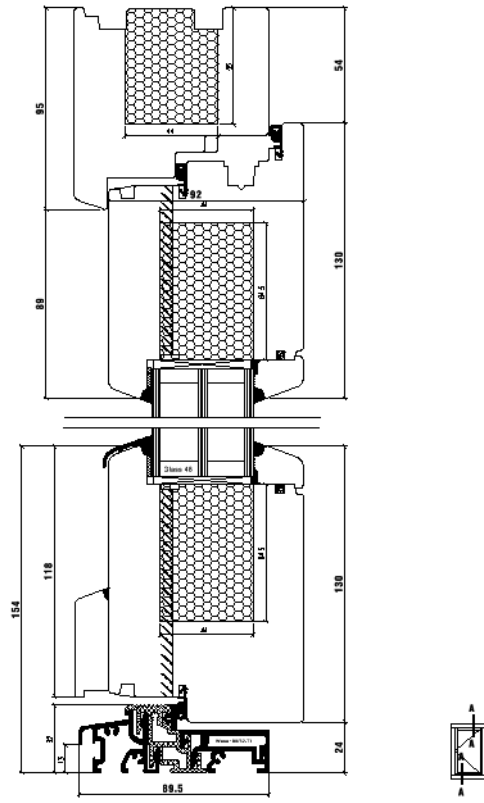
Bankgiro: 809-3015

Företaget innehar F-skattesedel.

Appendix – Construction drawings



92 EUROPA FRONT DOOR, INWARDS, 48mm glass, PASSIVE



92 EUROPA FRONT DOOR, INWARDS, 48mm glass, PASSIVE

