Inwido
Fabriksvej 4
9640 Farsø

Order no.	0108/690551
Page	1 of 3
Appendices	2
Initials	btl/msvd

CE 1235

EU Notified Body

Calculation report – ITC (Initial Type Calculation)

Object: Calculation of energy data for product system

2-lags Træ-Alu B (Sokolka)

System description was sent by the customer 16.03.09.

Input data: The calculations have been based on the customer submitted description of the product system (Appendix 2) and the resulting calculated cross section values (page 3).
See report from Danish Technological Institute 0108/690551a_Calculation of energy data for frame/sash cross sections_Energydata.pdf".

Method: EN 14351-1:2006+A1:2010; EN ISO 10077-1:2006;
EN ISO 10077-2:2012; EN 673:2011, see Appendix 1.

Period: The calculation was carried out on 2016-04-06.

Results: See page 2-3.

Terms: The report may only be extracted with written approval from the Danish Technological Institute.
Results are valid only for the treated subjects.

2016-04-06, Danish Technological Institute, Sustainable Building and Construction
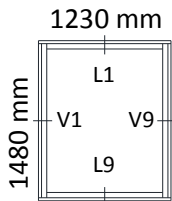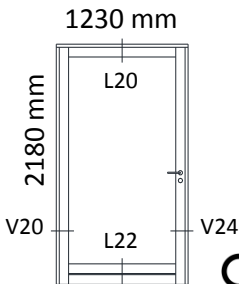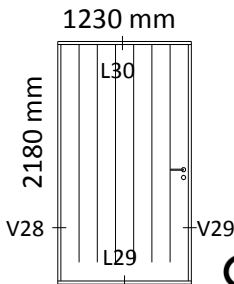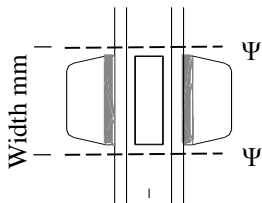
Bent Lund Nielsen
Senior Consultant, M. Sc.

Telephone: +45 7220 1147
E-mail: btl@teknologisk.dk

Mikkel Svane Dalegaard
Consultant

Telephone: +45 7220 1665
E-mail: msvd@teknologisk.dk

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Energy data for product system (see Appendix 1 – calculation basis)

2-lags Træ-Alu B (Sokolka)			Træ		
Name, product system			Material		
Standard B-rude	4-16-4		1.17	0.73	0.82
Name, standard pane, hinged	Dimension		U_g-value	g_g-value	LT_g-value
Name, standard pane, fixed	Dimension		U_g-value	g_g-value	LT_g-value
Chromatech Ultra F	0.40/0.28	/ 0.4/0.28	58 mm		
Name, standard spacer, standard pane	λ_k hinged	λ_k fixed	Type and width, standard door leaf		
25 mm alu					
Name, standard spacer, standard glazing bar					

Hinged window with standard pane	Framed door with standard pane - outward	Leaf door with standard door leaf-outward	
1230 mm 1480 mm L1 V1 V9 L9 CE	1230 mm 2180 mm L20 V20 L22 V24 CE	1230 mm 2180 mm L30 V28 L29 V29 CE	
U_w (W/m²·K) = **1.34**	U_d (W/m²·K) = **1.35**	U_d **0.71**	
g_w = **0.5548**	g_d = **0.4964**	U_{leaf} **0.52**	
F_f = **0.76**	F_f = **0.68**		
Min.t_{oi} (°C) = **12.1**	Min.t_{oi} (°C) = **12.5**		
E_{ref} (kWh/m²) = **-12.1**	E_d (kWh/m²) = **-24.5**		
Standard glazing bar Width mm Ψ Ψ			
B_{width} (mm) = **25**			
Ψ (W/m·K) = **0.016**			
Min.t_{oi} (°C) = **15.1**			

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Energy data for frame/sash cross section:

2-lags Træ-Alu B (Sokolka)

Snit	Bredde [mm]	U_f [W/m²K]	Ψ [W/mK]	t_{oi} [°C]	10077-1	10077-2
L9	87	1.45	0.044	12.1		X
L1	87	1.35	0.043	12.2		X
V1	87	1.43	0.044	12.2		X
V9	87	1.43	0.044	12.2		X
L29	85	1.50	0.000	-		X
L30	85	1.37	0.000	-		X
V28	85	1.37	0.000	-		X
V29	85	1.37	0.000	-		X
L22	136	1.51	0.045	12.6		X
L20	136	1.38	0.045	12.5		X
V20	136	1.44	0.046	12.5		X
V24	136	1.44	0.046	12.5		X
L5	25	1.17	0.016	15.1		X

*) see appendix 1

Calculations have been performed according to 10077-2, 2nd edition thus:

1. The actual overlap for the pane has been used.

2. Length of the glazing gasket is included in the frame/sash length.

3. Linear thermal transmittance is calculated using the 2-box method in ift-Guideline WA-08engl/1

4. U_f is always indicated to 2 decimal places.

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Appendix 1 – Calculation basis
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Calculations according to 10077-1

The calculations were performed using Fig. 1. Frame/sash section dimensions are not performed according to EN 10077-1, but according to the formular:

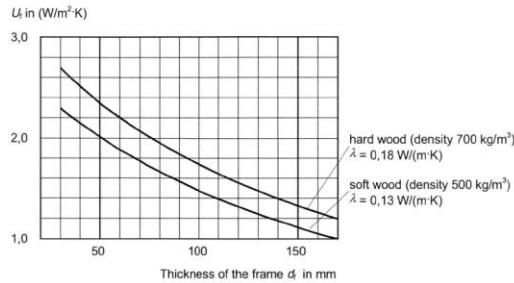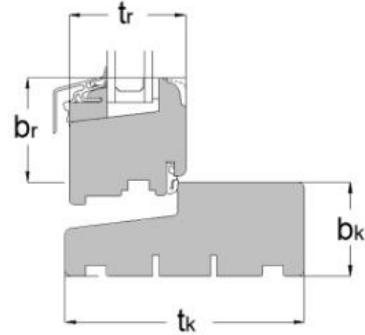$$t = \frac{t_r \times b_r + t_k \times b_k}{b_r + b_k}$$

Fig. 1

Calculations according to 10077-2

Calculations of the individual section values were performed using the PC-programme: Flixo ver. 7.0.612.1.

In determining the U-value for frame/sash (U_f) an insulation panel is used with $\lambda_P = 0.035$ W/m K, with a dimension corresponding to the specified standard glazing unit and with an overlap in sash corresponding to the submitted drawings.

$$U_f = \frac{U_{tot}^{panel} \times \ell_{tot} - U_P \times \ell_P}{\ell_f} \qquad \& \qquad \Psi_g = U_{tot}^{glazing} \times \ell_{tot} - U_f \times \ell_f - U_g \times \ell_g$$

where U_{tot}^{panel} = thermal transmittance for total construction (W/m² K)

U_P = thermal transmittance for insulation panel (W/m² K)

ℓ_{tot} = construction total length (m)

ℓ_f = frame/sash length (m), including glazing gasket

ℓ_p = insulation panel length in m (general choice $\ell_p = 0.19$ m)

Ψ_g = linear thermal transmittance for the spacer of the glazing unit (W/m K)

U_f = thermal transmittance for frame/sash section (W/m² K)

U_g = thermal transmittance of the central area of the glazing (W/m² K)

ℓ_g = length of glazing unit in m (general choice $\ell_g = 0.19$ m).

Linear thermal transmittance is determined using the "box method" described in ift-Guideline WA-08engl/1. For the glazing bar $U_f = U_g$.

Formulas for determination of E_{ref} and E_w, U_w and t_{oi}

The energy performance E_{ref} for the hinged reference glazing unit size 1.23 m x 1.48 m is calculated using the formula:

$E_{ref} = 196.4 \times F_f \times g_g - 90.36 \times U_w$ kWh/m² year

The energy performance E_w of an arbitrary window is calculated using the formula:

$E_w = 196.4 \times F_f \times g_g - 90.36 \times U_w$ kWh/m² year

The U-value U_w for a window is calculated using the formula: $U_w = \dfrac{A_g \times U_g + A_f \times U_f + \Sigma \ell \times \Psi}{A_w}$ W/m² · K

A_g = glazing area (m²)

U_g = U-value of glazing (W/m²·K)

g_g = solar energy transmittance of glazing (-)

g_w = $F_f \times g_g$ (-)

A_f = frame/sash area (m²)

A_w = $A_g + A_f$ (m²)

U_f = U-value of frame/sash (W/m²·K)

Ψ = linear thermal transmittance (W/m·K)

ℓ = linear thermal transmittance length (m)
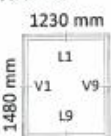
F_f = $\dfrac{A_g}{A_w}$ = glassshare
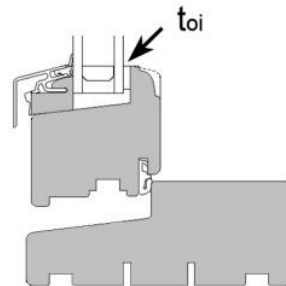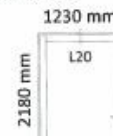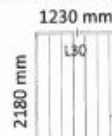
Lowest surface temperature on window sash (min.t_{oi}) is determined at the glazing edge (see figure above) in a cross sectional calculation according to EN 10077-2, see results and comments on page 3. The surface temperature may in special cases (e.g. at alu sills in doors and lock cases) be lower elsewhere in the calculated cross section.

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Oplysningsskema til energiberegninger

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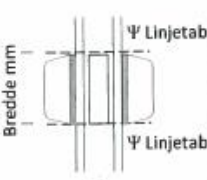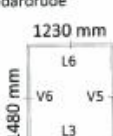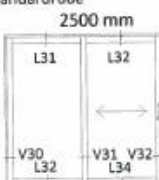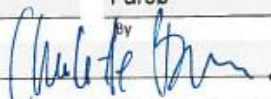| 2-lags Træ-Alu B (Sokolka)		Træ		
Navn på produktsystem		Materiale		
Standard B-rude	4-16-4	1,17	0,73	0,82
Navn på standardrude i oplukkelig ramme	Opbygning af rude	Ug-værdi*	gg-værdi	LTg-værdi
Standard B-rude	4-16-4	1,17	0,73	0,82
Navn på standardrude i fast karm	Opbygning af rude	Ug-værdi*	gg-værdi	LTg-værdi
Chromatech Ultra F	Wienersprosse Alu	25mm		
Navn på afstandsprofil i standardrude	Navn på afstandsprofil i standardsprosse	Bredde på standardsprosse i mm		
68mm plade	68mm			
Navn på standarddørplade	Tykkelse på standarddørplade i mm			

Sæt kryds ved åbningsretning og for beregningsmetode*

Oplukkeligt vindue med standardrude	Rammedør med standardrude	Pladedør med standarddørplade	
1230 mm	1230 mm	1230 mm	
L1 — V1 V9 — L9 / 1480 mm	L20 / V20 L22 V24 / 2180 mm	L30 / V28 L29 V29 / 2180 mm	
C€	C€	C€	

Indadgående vindue ☐	Indadgående dør ☐	Indadgående dør ☐	☐
Udadgående vindue ✓	Udadgående dør ✓	Udadgående dør ✓	
EN 10077-1: ☐	EN 10077-1: ☐	EN 10077-1: ☐	
EN 10077-2: ✓	EN 10077-2: ✓	EN 10077-2: ✓	

Standardsprosse	Fast karm med standardrude	Skydedør med standardrude	
Ψ Linjetab / Bredde mm / Ψ Linjetab / L5	1230 mm / L6 — V6 V5 — L3 / 1480 mm	2500 mm / L31 L32 / V30 V31 V32 / L32 L34 / 2180 mm C€	

EN 10077-1: ☐	EN 10077-1: ☐	EN 10077-1: ☐	☐
EN 10077-2: ✓	EN 10077-2: ☐	EN 10077-2: ☐	

Inwido		29294769	
Firmanavn		Tlf.	
Fabriksvej 4	9640	Farsø	
Adresse	Postnr.	By	
09.03.2016	Charlotte Boeriis	*Charlotte Brun.*	
Dato	Navn/Underskrift		

* Ug-værdi skal skrives med 2 decimaler
EN 10077-1 = Forenklet beregningsmetode – EN 10077-2 = Avanceret beregningsmetode
Vedlæg alle relevante tegninger samt datablade på ruder, afstandsprofiler og pladedør, tegninger mærkes iht. skitserne.

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Appendix 2 – Customer information on window system
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Calculation SommerGlobal

Project 2015_02_09   Position 02

Layer composition (outside to inside)

Number	BE	Denomination	mm
1		EUROFLOAT	4,00
2		90% Argon	16,00
3	3	Silverstar E *	
4		EUROFLOAT	4,00
* Userdefined			24,00

Rw (C;Ctr) dB = npd

Nr. 1   2   3
BE   3
20,9°C
20,0°C
7,1°C
5,0°C

Transmission, Reflexion, Absorbtion

ρ_v = 0,1296 (Light reflection factor outside) T_{UV}=0,3051 (ultraviolet transmittance)

ρ'_v = 0,1300 (Light reflection factor inside) T_v =0,8194 (Light transmission factor)

ρ_e = 0,1838 (direct radiation reflection factor) T_e =0,6448 (direct radiation transmission factor)

α_e 1 = 0,0804; 2 = 0,0910 (direct radiation absorption factor)

R_a = 97,96   (general color rendering index

EN 410

SC   = 0,8342   (Shading Coefficient, g/0,87) q_i =0,0809 (secondary heat inside)

b-Faktor =   0,91   (VDI 2078, g/0,80)   g   =0,7258 (Total energy transmission

EN 673   Installation angle = 90°   vertikal U_g =1,168 W/m²K (Heat transfer coefficient)

EN 13363-2 T_e= 5,00 °C T_i=20,00 °C E_s = 300,00 W/m²   System   = 1,50 m

g_{th} =0,0468   (Thermal radiation factor) $h_{c,e}$=   18 W/m²K $h_{c,i}$ =   3,6 W/m²K

g_c =0,0354   (Convection factor) q_i =0,0822   (secondary heat inside)

g_v =0,0000   (Ventilation   g =0,7270   (Total energy transmission

Benutzerdefinierte Materialien werden verwendet.
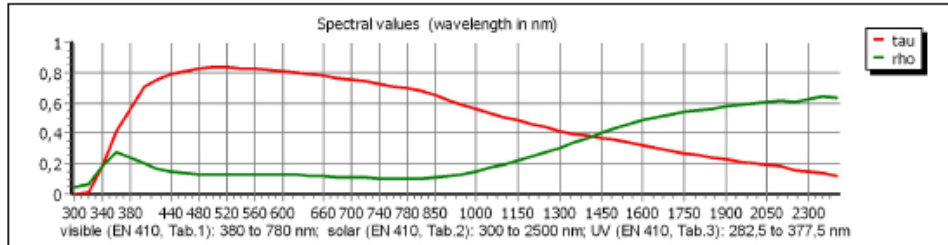
Spectral values (wavelength in nm)
— tau
— rho

300 340 380   440 480 520 560 600   660 700 740 780 850 1000 1150 1300 1450 1600 1750 1900 2050 2300
visible (EN 410, Tab.1): 380 to 780 nm; solar (EN 410, Tab.2): 300 to 2500 nm; UV (EN 410, Tab.3): 282,5 to 377,5 nm

ift-certified lt. validation report no. 410 42167 (status as of 11/2009)
Registered for: PRESS GLASS SA - PRESS GLASS SA   ADMIN 2015-02-09 - 08:53:13
SommerGlobal 6.1025   Copyright Sommer Informatik GmbH, Rosenheim   1 / 1

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Bundsnit L9 / Bottom section cut L9

Firmanavn / Company Name:
Inwido

Produktsystem / Product system:
Træ-Alu B / Wood-Alu B

Tætningsliste / Gasket:
Trelleborg

Indv glasisætningsbånd / Inside glazing tape:
4x10 EPDM foam

Alu glasliste indbygget i profil med EPDM/EPDM-foam
Alu glazing bead built in profile with EPDM-foam

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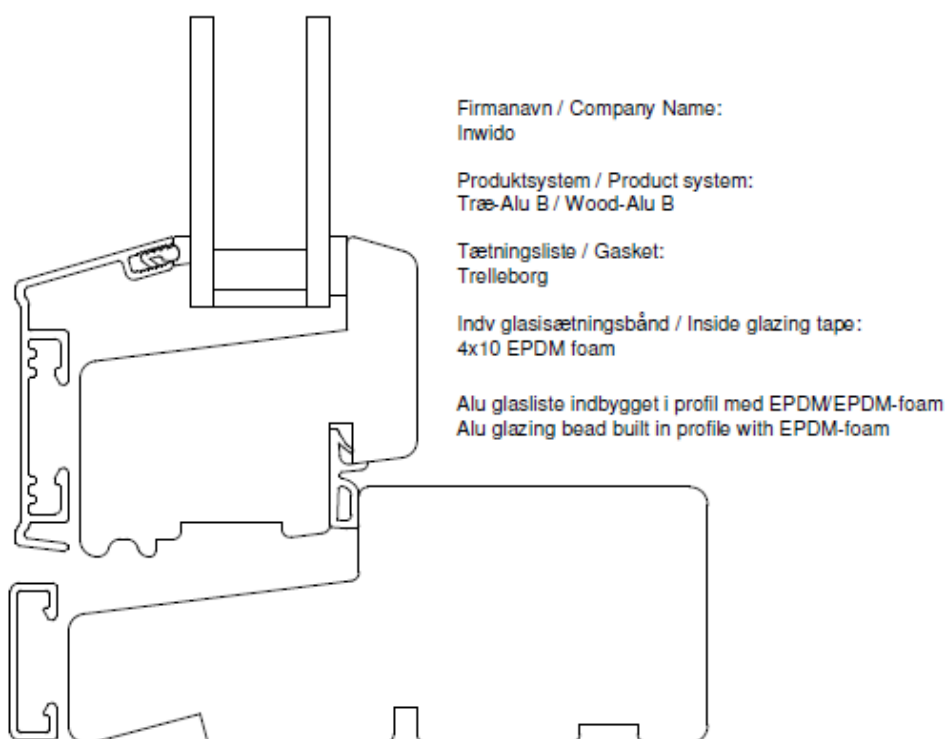
Topsnit L1 / Top section cut L1
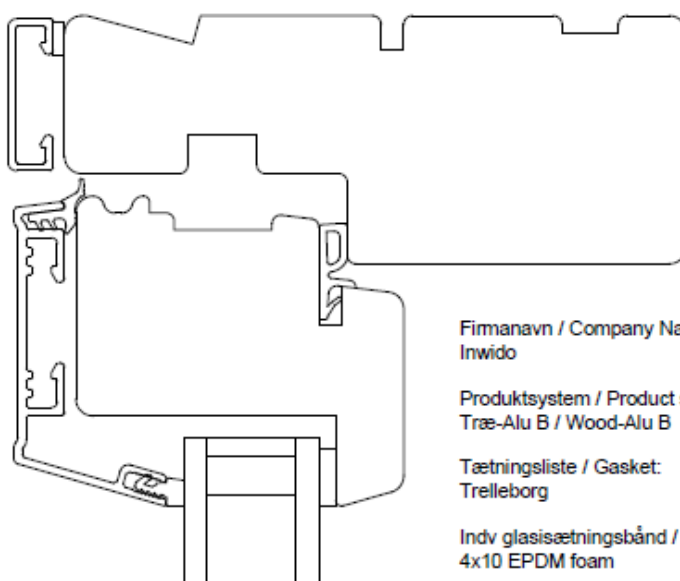
Firmanavn / Company Name:
Inwido

Produktsystem / Product system:
Træ-Alu B / Wood-Alu B

Tætningsliste / Gasket:
Trelleborg

Indv glasisætningsbånd / Inside glazing tape:
4x10 EPDM foam

Alu glasliste indbygget i profil med EPDM/EPDM-foam
Alu glazing bead built in profile with EPDM-foam

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Sidesnit V1-V9 / Side section cut V1-V9

Firmanavn / Company Name:
Inwido

Produktsystem / Product system:
Træ-Alu B / Wood-Alu B

Tætningsliste / Gasket:
Trelleborg

Indv glasisætningsbånd / Inside glazing tape:
4x10 EPDM foam

Alu glasliste indbygget i profil med EPDM/EPDM-foam
Alu glazing bead built in profile with EPDM-foam

DANISH TECHNOLOGICAL INSTITUTE

Bundsnit L22 / Bottom section cut L22

Firmanavn / Company Name:
Inwido

Produktsystem / Product system:
Træ-Alu B / Wood-Alu B

Tætningsliste / Gasket:
Trelleborg

Indv glasisætningsbånd / Inside glazing tape:
4x10 EPDM foam

Alu glasliste indbygget i profil med EPDM/EPDM-foam
Alu glazing bead built in profile with EPDM-foam

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Appendix 2 – Customer information on window system
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Topsnit L20 / Top section cut L20
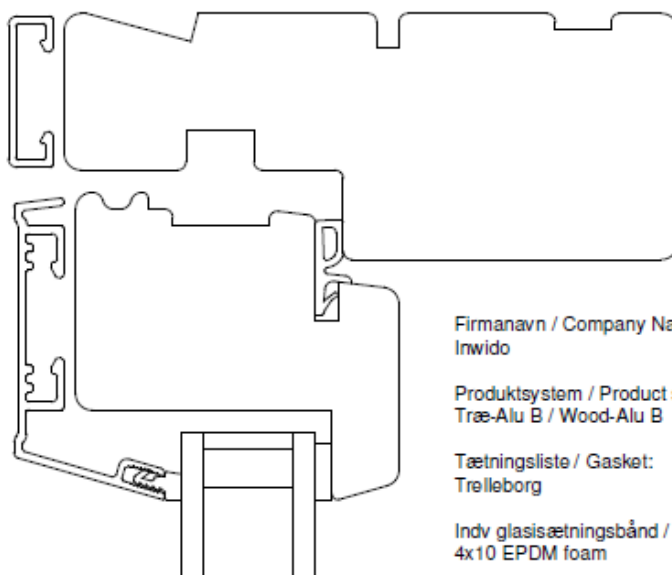

Firmanavn / Company Name:
Inwido

Produktsystem / Product system:
Træ-Alu B / Wood-Alu B

Tætningsliste / Gasket:
Trelleborg

Indv glasisætningsbånd / Inside glazing tape:
4x10 EPDM foam

Alu glasliste indbygget i profil med EPDM/EPDM-foam
Alu glazing bead built in profile with EPDM-foam

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Sidesnit V20-V24 / Side section cut V20-V24
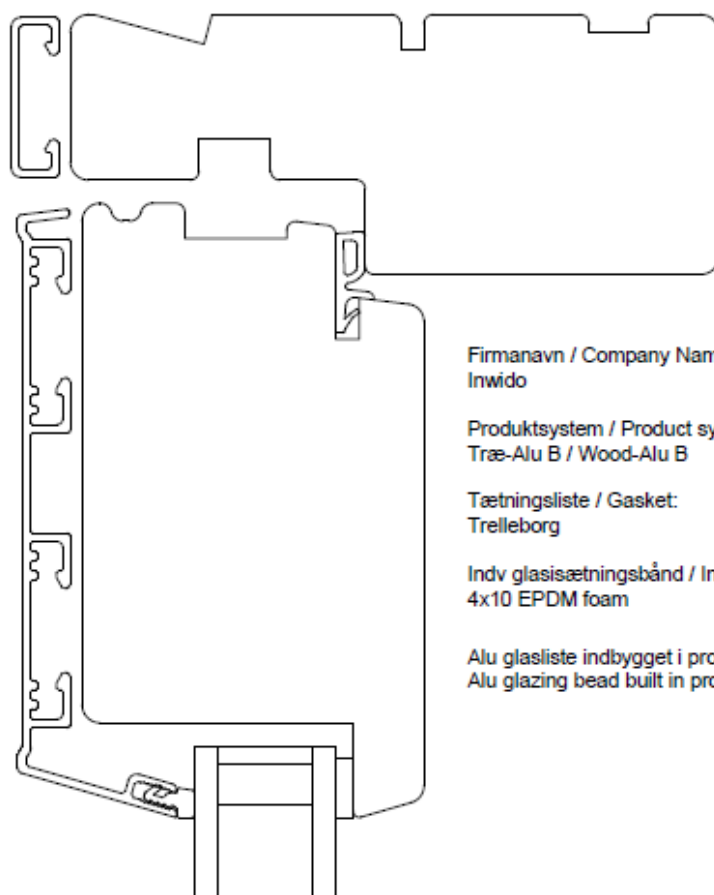
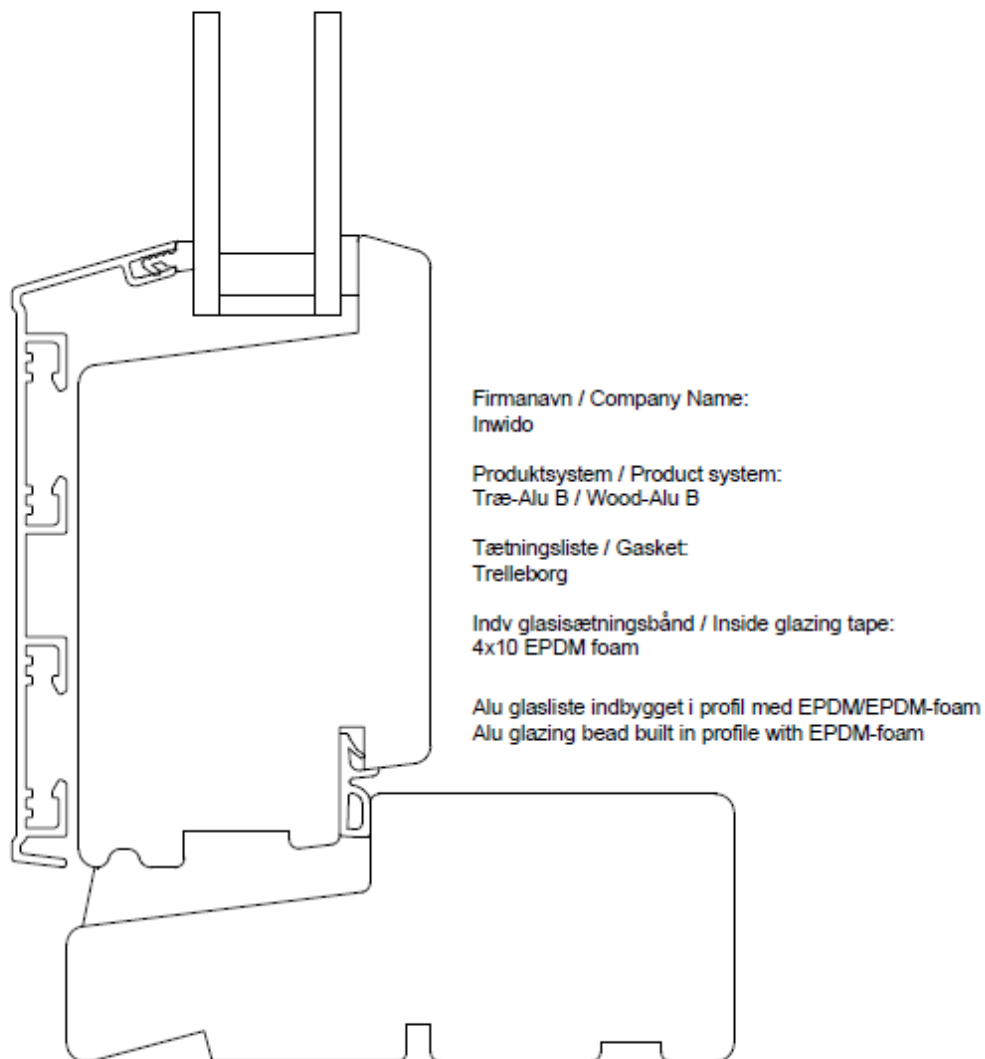Firmanavn / Company Name:
Inwido

Produktsystem / Product system:
Træ-Alu B / Wood-Alu B

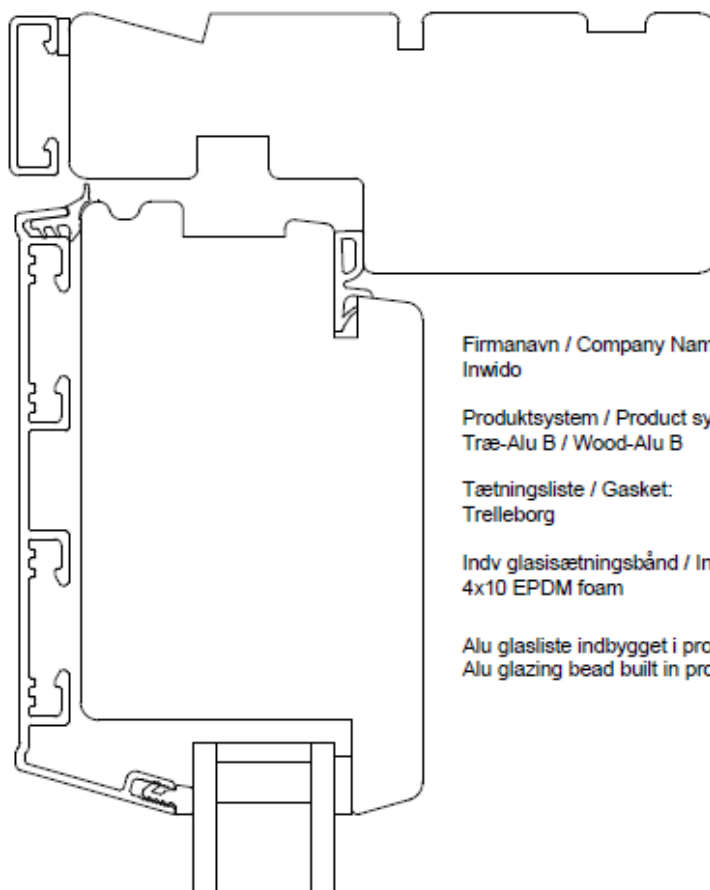Tætningsliste / Gasket:
Trelleborg

Indv glasisætningsbånd / Inside glazing tape:
4x10 EPDM foam

Alu glasliste indbygget i profil med EPDM/EPDM-foam
Alu glazing bead built in profile with EPDM-foam

**DANISH
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Firmanavn:
Inwido

Produktsystem:
2 og 3-lags Træ/alu A og B

Tætningsliste:
Trelleborg

Indv glaslsætningsbånd:
4x10 EPDM foam

Udv glaslsætningsbånd:
Fyr/Alu glaslste ned EPDM/EPDM—foam

Pladedør A—B Udadgående bundsnit L29

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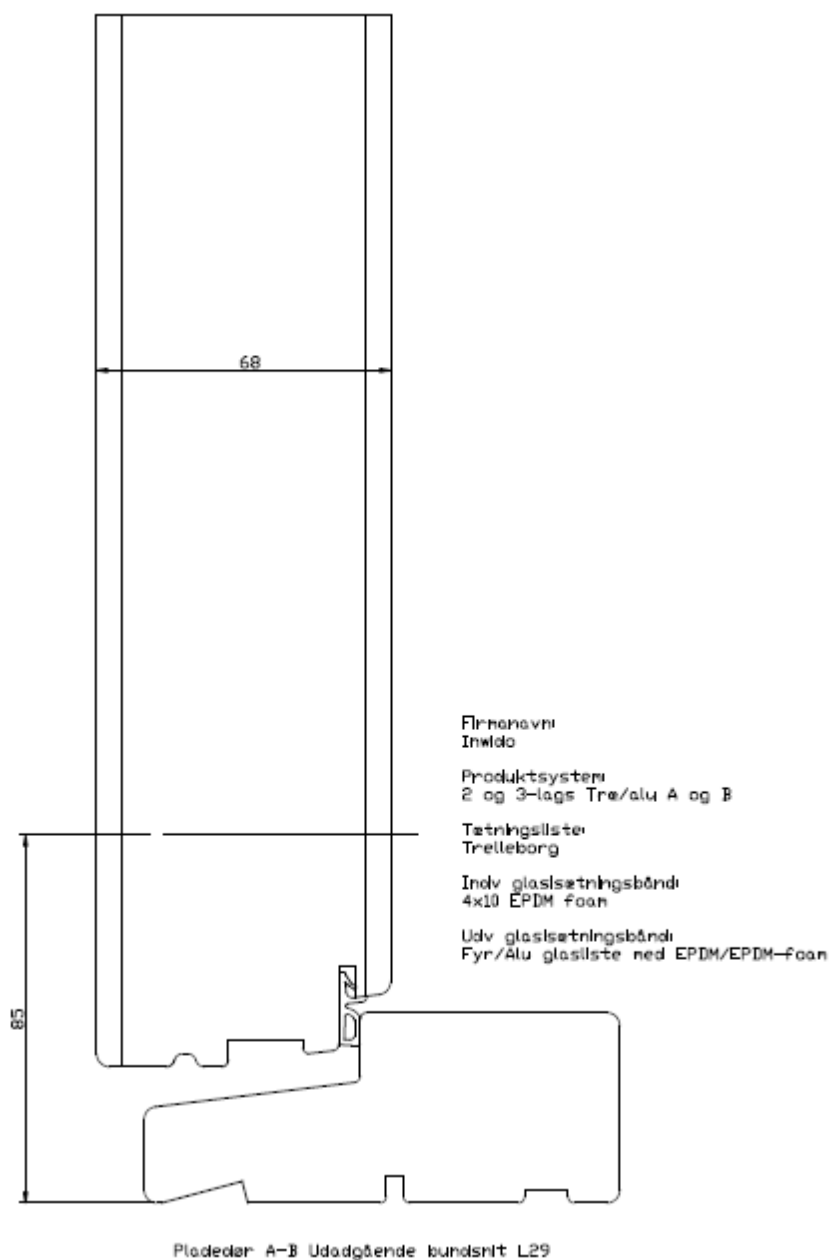
Plodedør A/B Topsnit L30

Firmanavn:
Inwido

Produktsystem:
2 og 3-lags Træ/alu A og B

Tætningsliste:
Trelleborg

Indv glaslsætningsbånd:
4x10 EPDM foam

Udv glaslsætningsbånd:
Fyr/Alu glasliste med EPDM/EPDM-foam

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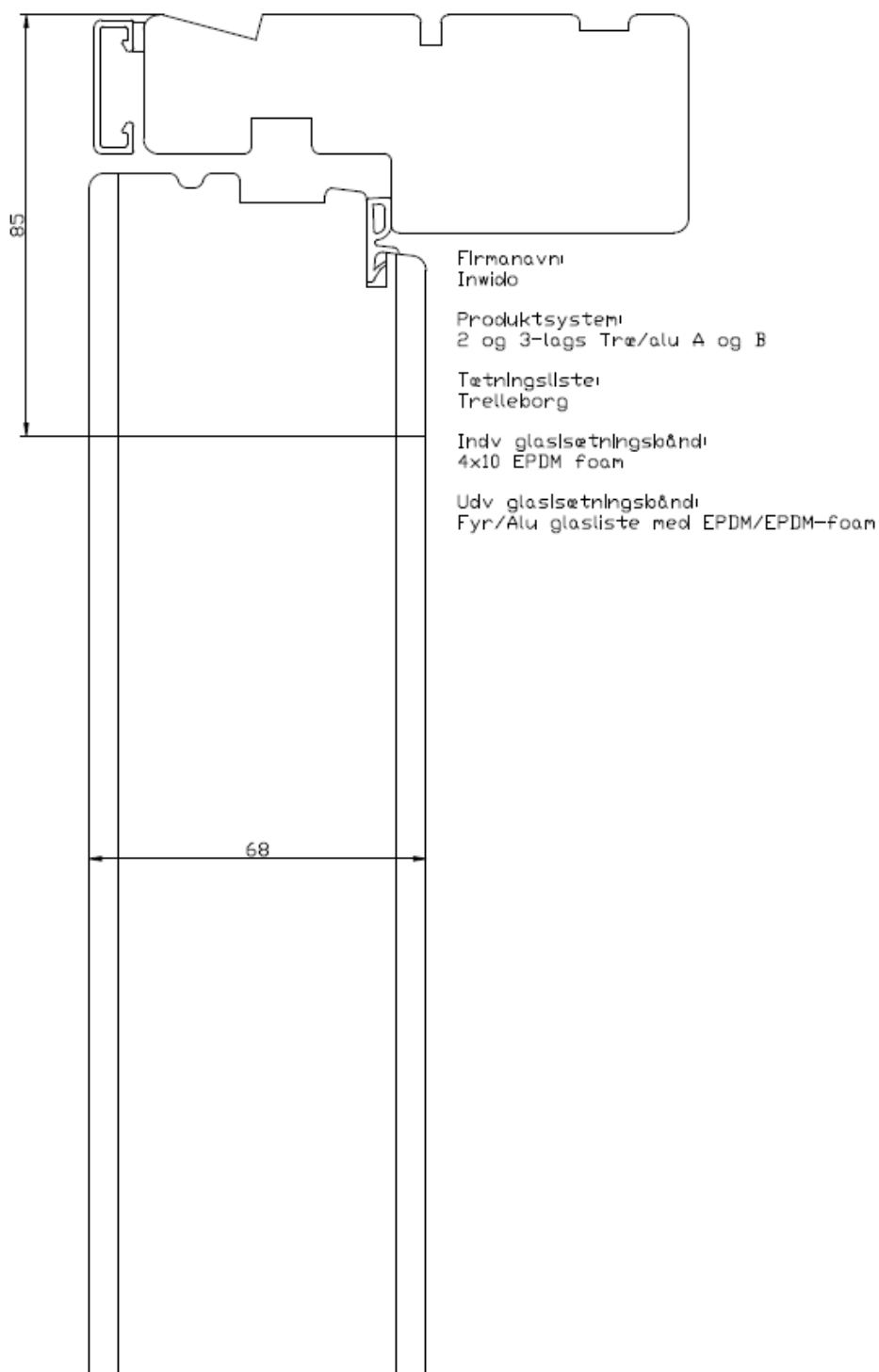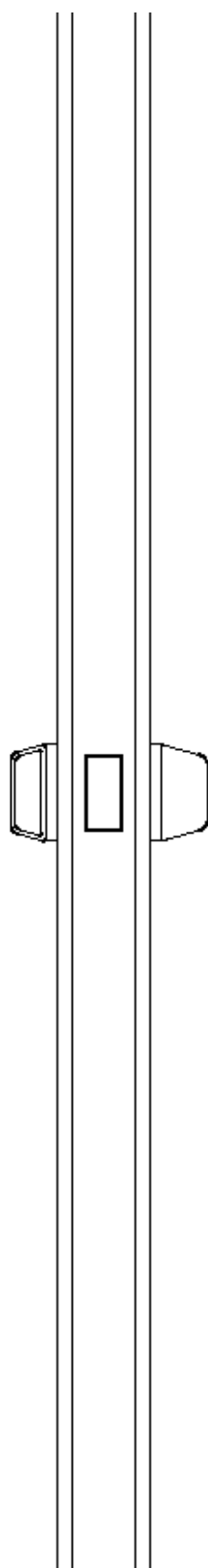
Firmanavn:

Inwido

Produktsystem:
Træ B samt Træ/Alu 2-lags B med B rude

Tætningsliste:
-
Indv. montagebånd
EPDM foam
Udv. montagebånd
EPDM foam

Snit L5

The general conditions pertaining to assignments accepted by Danish Technological Institute shall apply in full to the technical testing and calibration at Danish Technological Institute and to the completion of test reports and calibration certificates within the relevant field.

DTI vouches for that employees performing tests for use with harmonized standards under notification No. 1235, pursuant to EU Regulation 305/2011, Article 43, meet all the requirements of capability, integrity and impartiality. See next page.

Construction Product Regulation (CPR) – EU 305/2011 – Article 43:
Requirements for notified bodies.

1. For the purposes of notification, a notified body shall meet the requirements set out in paragraphs 2 to 11.

2. A notified body shall be established under national law and have legal personality.

3. A notified body shall be a third-party body independent from the organisation or the construction product it assesses.

   A body belonging to a business association or professional federation representing undertakings involved in the design, manufacturing, provision, assembly, use or maintenance of construction products which it assesses, can on condition that its independence and the absence of any conflict of interest are demonstrated, be considered to be such a body.

4. A notified body, its top-level management and the personnel responsible for carrying out the third party tasks in the process of assessment and verification of constancy of performance shall not be the designer, manufacturer, supplier, installer, purchaser, owner, user or maintainer of the construction products which it assesses, nor the authorised representative of any of those parties. This shall not preclude the use of assessed products that are necessary for the operations of the notified body or the use of products for personal purposes.

   A notified body, its top-level management and the personnel responsible for carrying out the third party tasks in the process of assessment and verification of constancy of performance shall not become directly involved in the design, manufacture or construction, marketing, installation, use or maintenance of those construction products, nor represent the parties engaged in those activities. They shall not engage in any activity that may conflict with their independence of judgement and integrity related to the activities for which they have been notified. This shall, in particular, apply to consultancy services.

   A notified body shall ensure that activities of its subsidiaries or subcontractors do not affect the confidentiality, objectivity and impartiality of its assessment and/or verification activities.

5. A notified body and its personnel shall carry out the third party tasks in the process of assessment and verification of constancy of performance with the highest degree of professional integrity and requisite technical competence in the specific field and must be free from all pressures and inducements, particularly financial, which might influence their judgement or the results of their assessment and/or verification activities, especially from persons or groups of persons with an interest in the results of those activities.

6. A notified body shall be capable of carrying out all the third party tasks in the process of assessment and verification of constancy of performance assigned to it in accordance with Annex V in relation to which it has been notified, whether those tasks are carried out by the notified body itself or on its behalf and under its responsibility.

   At all times and for each system of assessment and verification of constancy of performance and for each kind or category of construction products, essential characteristics and tasks in relation to which it has been notified, the notified body shall have the following at its disposal:

   (a) the necessary personnel with technical knowledge and sufficient and appropriate experience to perform the third party tasks in the process of assessment and verification of constancy of performance;

   (b) the necessary description of procedures according to which the assessment of performance is carried out, ensuring the transparency and the ability of reproduction of these procedures; it shall have appropriate policies and procedures in place that distinguish between the tasks it carries out as a notified body and other activities;

   (c) the necessary procedures to perform its activities which take due account of the size of an undertaking, the sector in which it operates, its structure, the degree of complexity of the product technology in question and the mass or serial nature of the production process.

   A notified body shall have the means necessary to perform the technical and administrative tasks connected with the activities for which it is notified in an appropriate manner and shall have access to all necessary equipment or facilities.

7. The personnel responsible for carrying out the activities in relation to which the body has been notified, shall have the following:

   (a) sound technical and vocational training covering all the third party tasks in the process of assessment and verification of constancy of performance within the relevant scope for which the body has been notified;

   (b) satisfactory knowledge of the requirements of the assessments and verifications they carry out and adequate authority to carry out such operations;

   (c) appropriate knowledge and understanding of the applicable harmonised standards and of the relevant provisions of the Regulation;

   (d) the ability required to draw up the certificates, records and reports to demonstrate that the assessments and the verifications have been carried out.

8. The impartiality of the notified body, its top-level management and assessment personnel shall be guaranteed.

   The remuneration of the notified body's top-level management and assessment personnel shall not depend on the number of assessments carried out or on the results of such assessments.

9. A notified body shall take out liability insurance unless liability is assumed by the Member State in accordance with national law, or the Member State itself is directly responsible for the assessment and/or the verification performed.

10. The personnel of the notified body shall be bound to observe professional secrecy with regard to all information gained in carrying out its tasks under Annex V, except in relation to the competent administrative authorities of the Member State in which its activities are carried out. Proprietary rights shall be protected.

11. A notified body shall participate in, or ensure that its assessment personnel is informed of, the relevant standardisation activities and the activities of the notified body coordination group established under this Regulation and shall apply as general guidance the administrative decisions and documents produced as a work result of that group.