TECHNICKÝ A SKÚŠOBNÝ ÚSTAV STAVEBNÝ, n. o.
BUILDING TESTING AND RESEARCH INSTITUTE, Slovak Republic
Studená 3, 821 04 Bratislava

Calculation report
No. 40090491-1

Product: PVC-U window system veratec

Producer: ASAŞPEN PVC Kapı ve Pencere Sistemleri A.Ş., Akyazı İlçesi Küçücek Beldesi İstiklal Mah. ADAPAZARI, Turkey

Factory: ASAŞPEN PVC Kapı ve Pencere Sistemleri A.Ş., Akyazı İlçesi Küçücek Beldesi İstiklal Mah. ADAPAZARI, Turkey

1 Characteristics and methods of assessment

1.1 Thermal transmittance: EN ISO 10077-1: 2006 Thermal performance of windows, doors and shutters. Calculation of thermal transmittance. Part 1: General (ISO 10077-1:2006)
EN ISO 10077-2: 2003 Thermal performance of windows, doors and shutters. Calculation of thermal transmittance. Part 2: Numerical method for frames (ISO 10077-2:2003)

1.2 Acoustic performance: EN 14351-1: 2006 Windows and doors. Product standard, performance characteristics. Part 1: Windows and external pedestrian doorsets without resistance to fire and/or smoke leakage characteristics
EN 12758: 2005 Glass in building. Glazing and airborne sound insulation. Product descriptions and determination of properties

2 Calculation of thermal transmittance U_w

2.1 Calculation of thermal transmittance of profiles U_f as input data for U_w:

2.1.1 Input data:

The thermal transmittance of profile combinations (see Annex) was carried out by software programme Winlso2D Professional 5.0 in accordance to EN ISO 10077-2.

Edge conditions:

Outdoor:		
Temperature Θ_e:	0,00	°C
External surface resistance R_{se}:	0,040	m²K/W
Indoor:		
Temperature Θ_i:	20,00	°C
Internal surface resistance R_{si1}:	0,130	m²K/W
Internal surface resistance R_{si2}:	0,200	m²K/W

Osvedčovacie miesto OM 04, člen EOTA
Notifikovaná osoba 1301
Autorizovaná osoba SK04
Autorizovaná osoba SKTC-105
Úsek preukazovania zhody
Studená 3, 821 04 Bratislava

Pobočka Bratislava
Studená 3, 821 04 Bratislava
Pobočka Nové Mesto n/Váhom
Trenčianska 1872/12, 915 05 Nové Mesto n/Váhom
Pobočka Nitra
Braneckého 2, 949 01 Nitra
Pobočka Zvolen
Jesenského 15, 960 01 Zvolen

Pobočka Žilina
A. Rudnaya 90, 010 00 Žilina
Pobočka Košice
Krmanova 5, 040 01 Košice
Pobočka Prešov
Budovateľská 53, 080 01 Prešov
Pobočka Tatranská Štrba
Štefánikova 24, 059 41 Tatranská Štrba

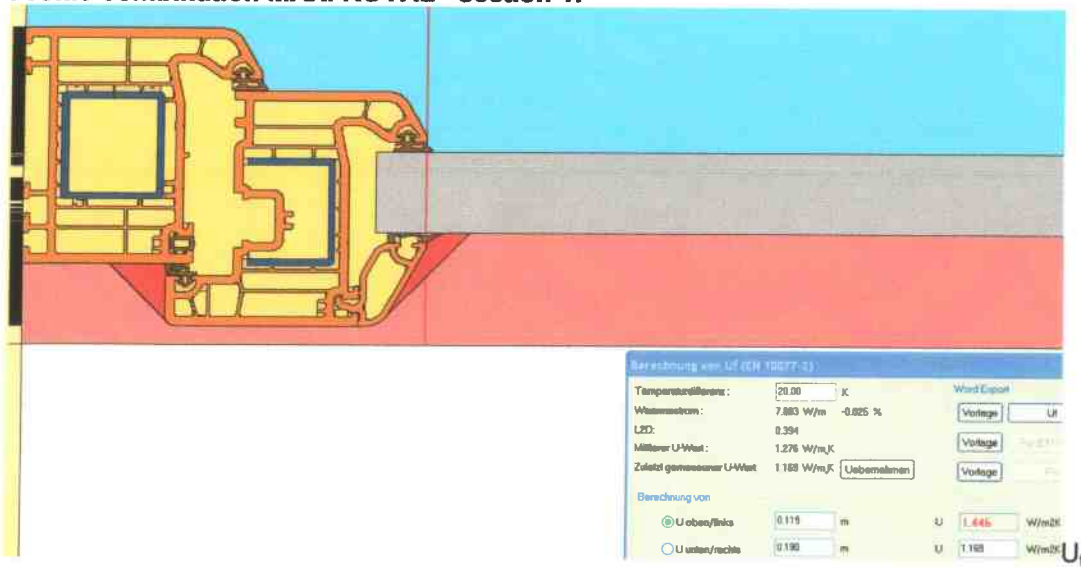
Materials and key:

Material	R (m.K/W)	T (°C)
Outdoor air 0,04, 0 °C, 80 %	0,040	0,000
Indoor air R_{si1}, 20°C, 50%	0,130	20,000
Indoor air with higher resistance R_{si2}, 20 °C, 50 %	0,200	20,000
Non ventilated air hole, EN ISO 10077-2		
Non ventilated air hole <=2mm, EN ISO 10077-2		
Low ventilated air hole, LBH EN ISO 10077-2		

Material	λ (W/m.K)
Aluminium (Si-Leg.) 160	160,000
Steel 50	50,000
U-PVC	0,170
EPDM	0,250
Calibration panel	0,035

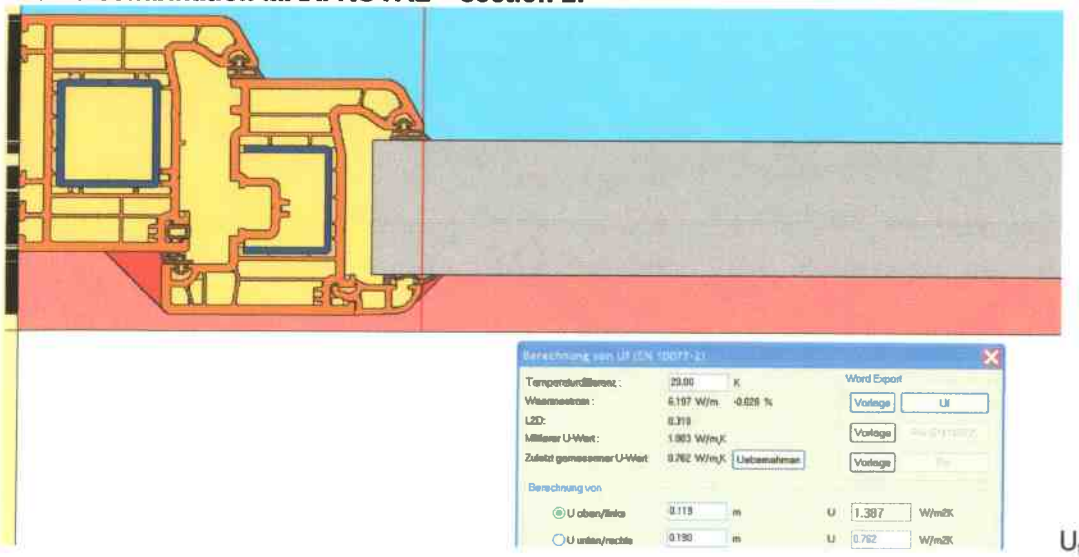
2.1.2 Calculation of profile combinations:

Profile combination MAXI ROYAL - section 1:



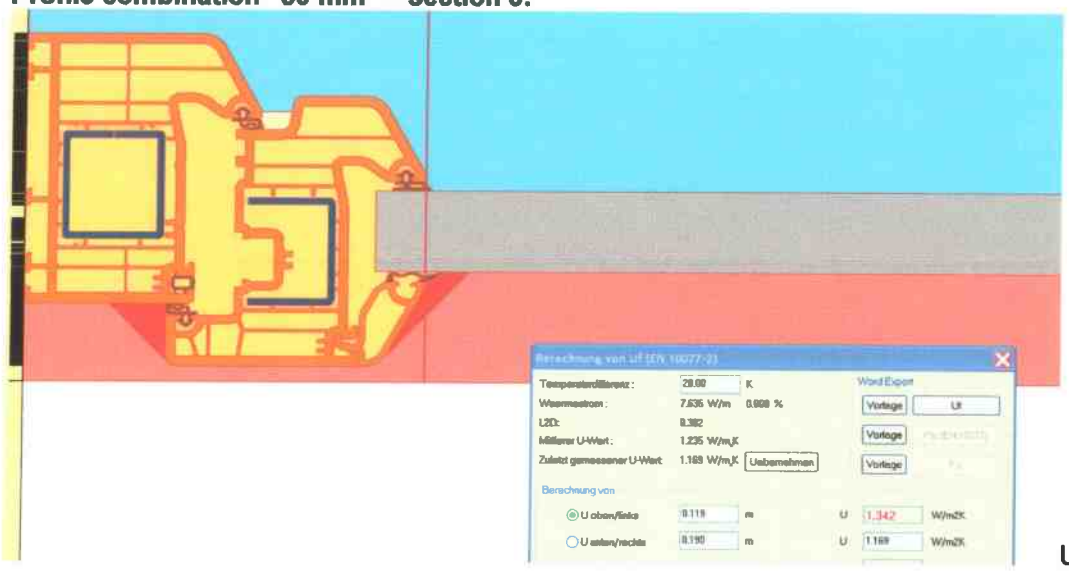
U_{f1} = 1,45 W/m²K

Profile combination MAXI ROYAL – section 2:



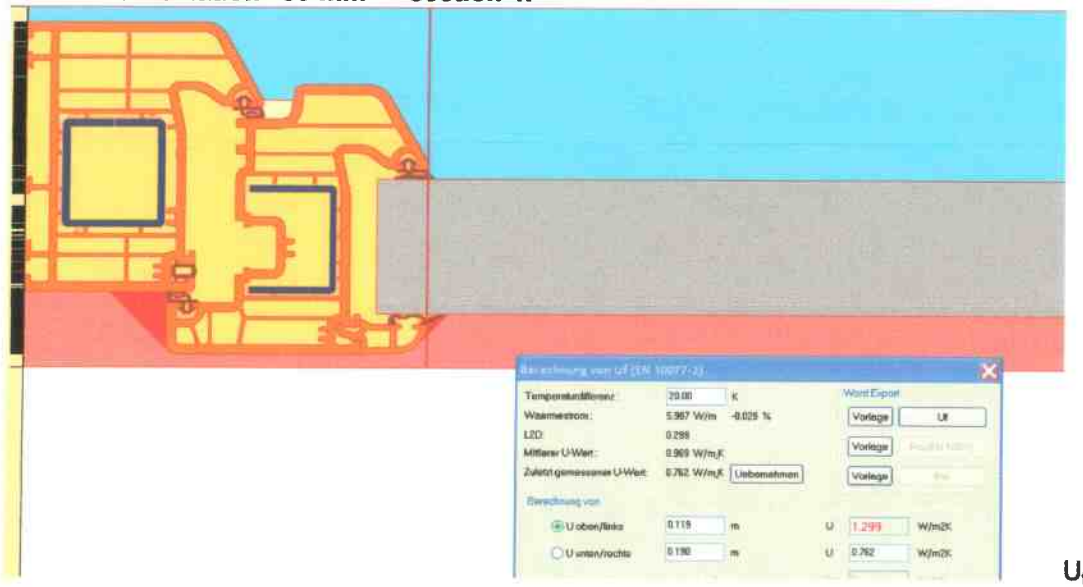
U_{f2} = 1,39 W/m²K

Profile combination "80 mm" – section 3:



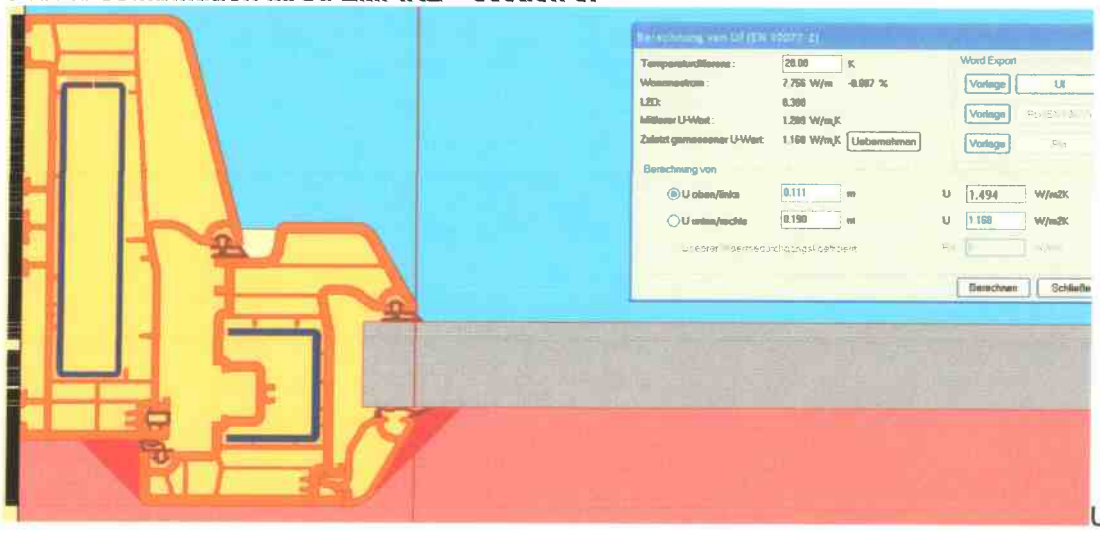
U_{f3} = 1,34 W/m²K

Profile combination "80 mm" – section 4:



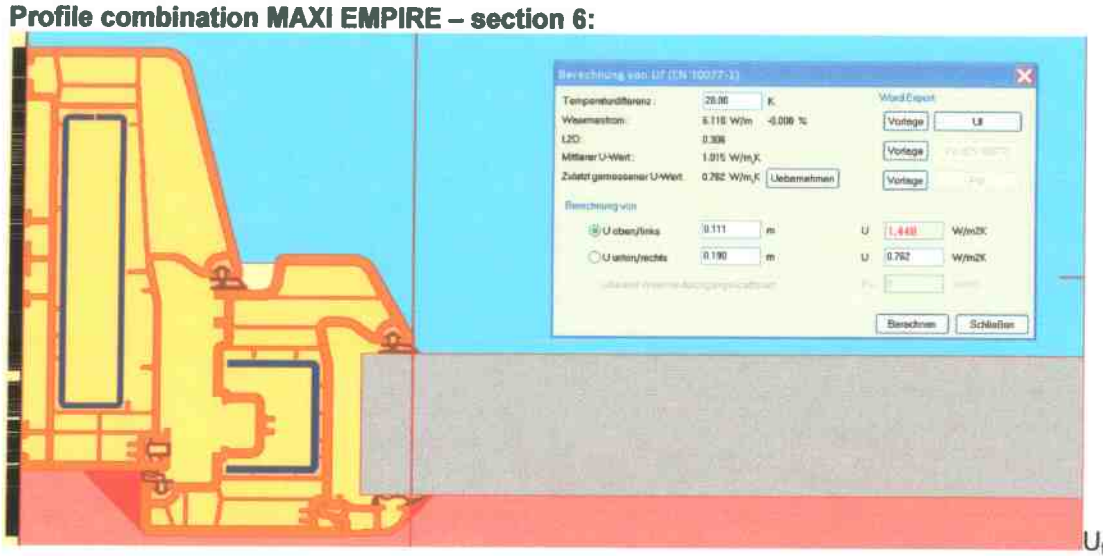
U_{f4} = 1,30 W/m²K

Profile combination MAXI EMPIRE – section 5:



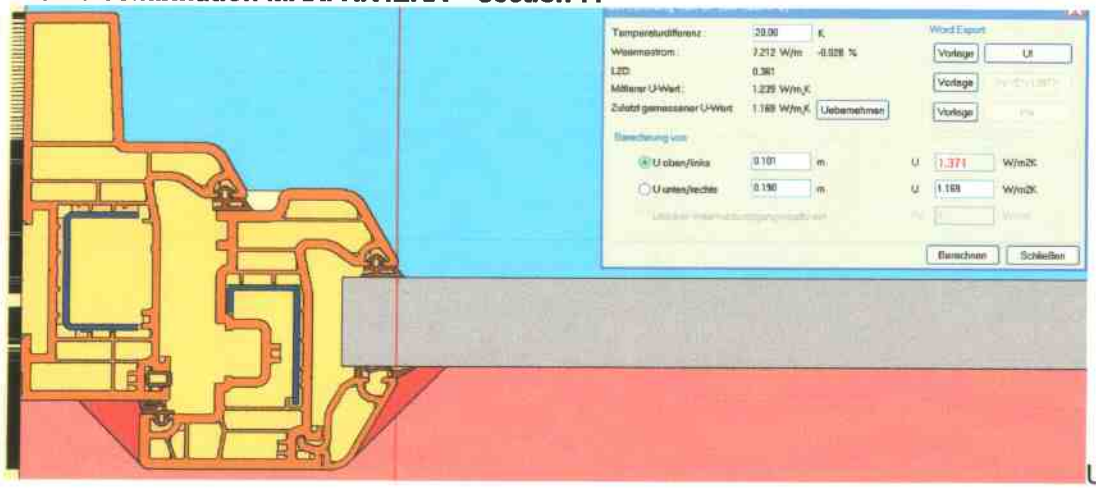
U_{f5} = 1,49 W/m²K

Profile combination MAXI EMPIRE – section 6:



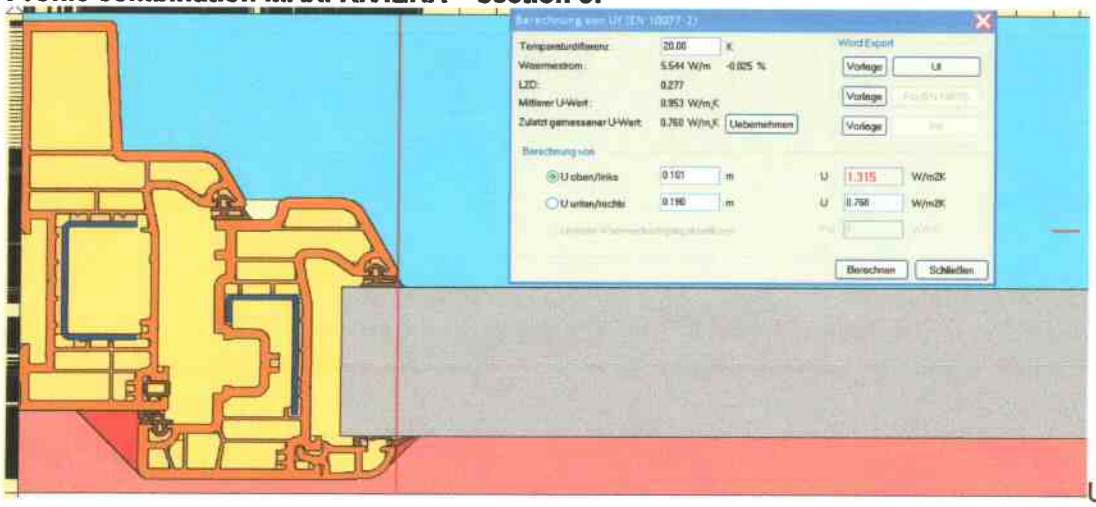
U_{f6} = 1,45 W/m²K

Profile combination MAXI RIVIERA – section 7:



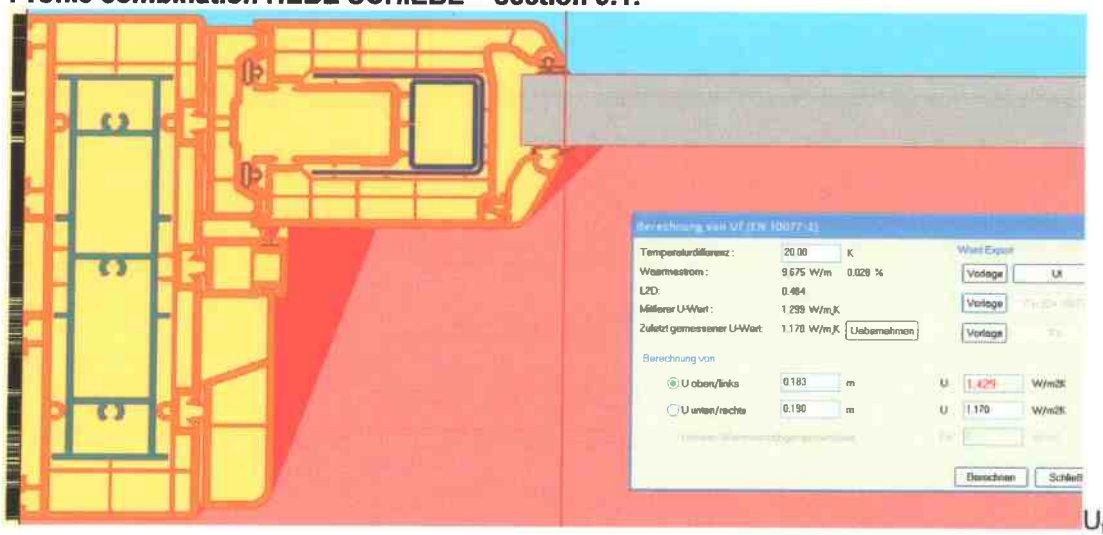
U_{f7} = 1,37 W/m²K

Profile combination MAXI RIVIERA – section 8:



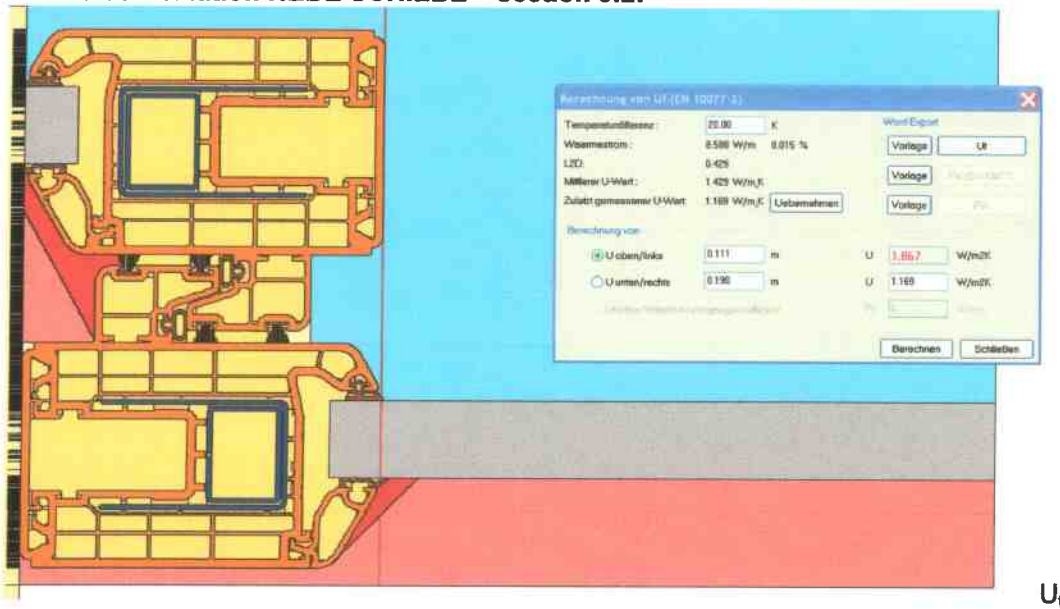
U_{f8} = 1,31 W/m²K

Profile combination HEBE SCHIEBE – section 9.1:



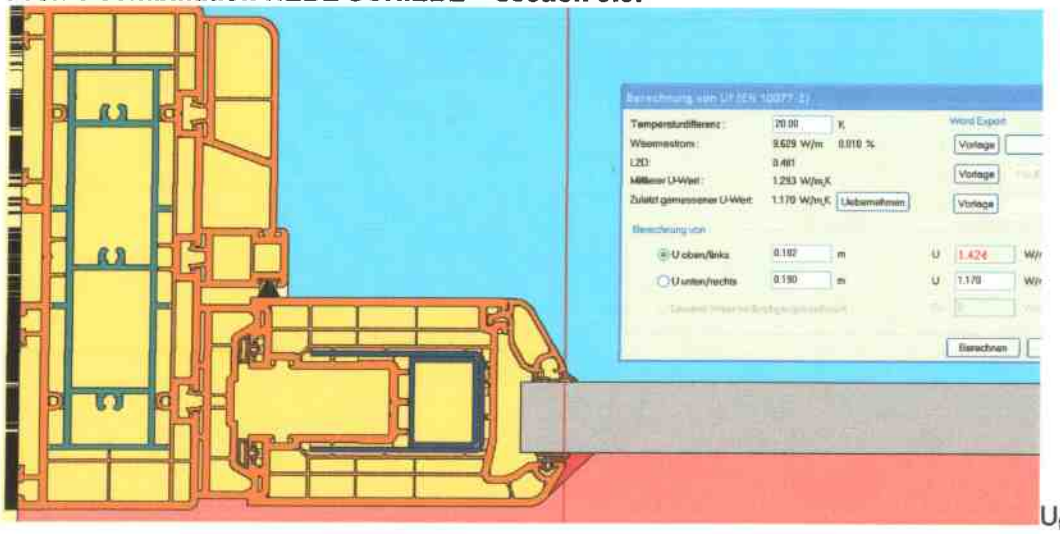
U_{f91} = 1,43 W/m²K

Profile combination HEBE SCHIEBE – section 9.2:



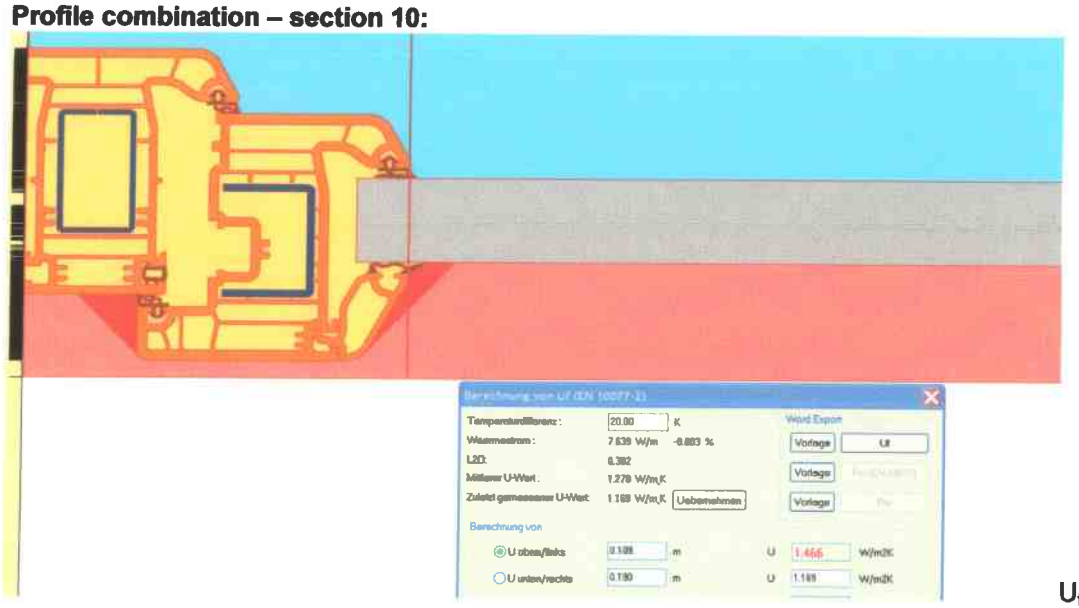
U_{f92} = 1,87 W/m²K

Profile combination HEBE SCHIEBE – section 9.3:



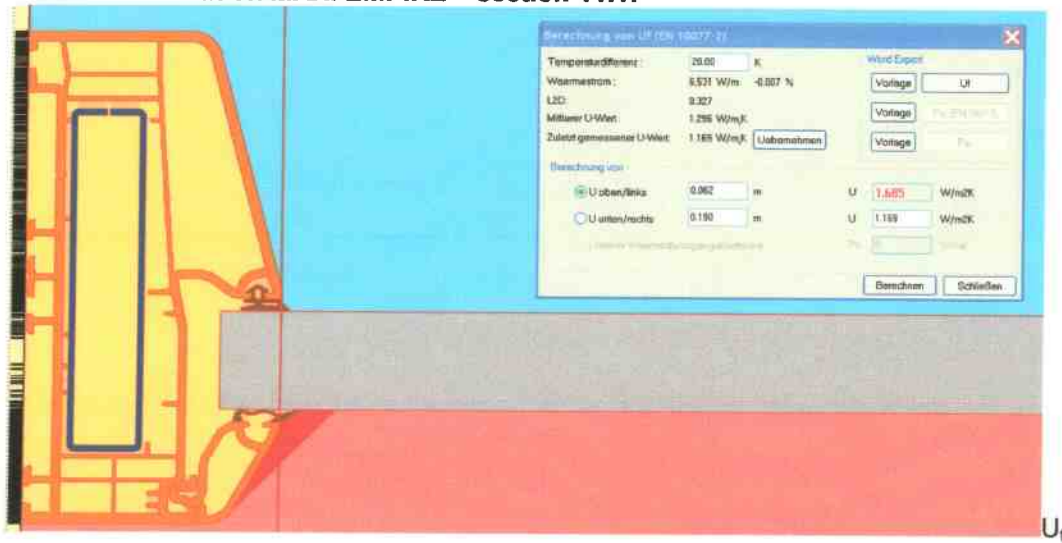
U_{f93} = 1,42 W/m²K

Profile combination – section 10:



U_{f10} = 1,47 W/m²K

Profile combination MAXI EMPIRE – section 11.1:

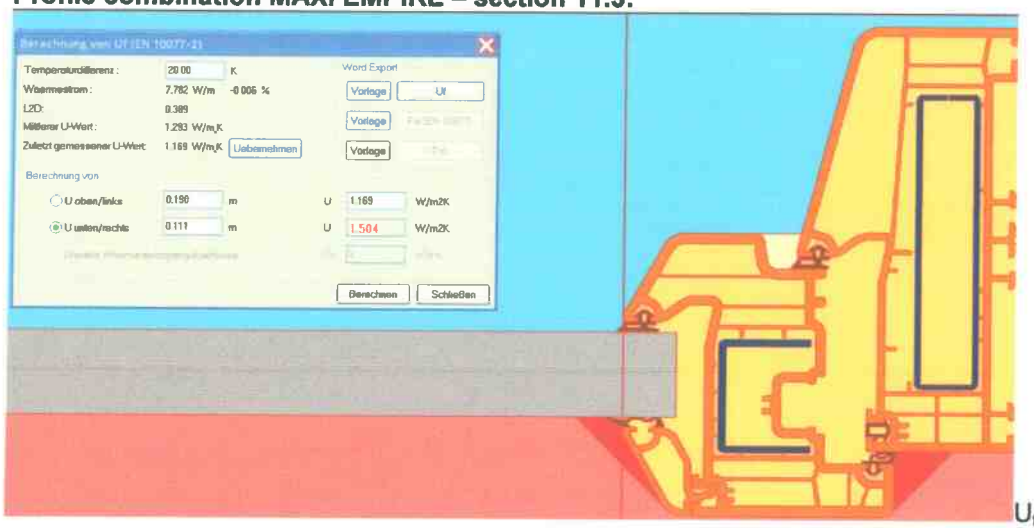


U_{f11} = 1,68 W/m²K

Profile combination MAXI EMPIRE – section 11.2:

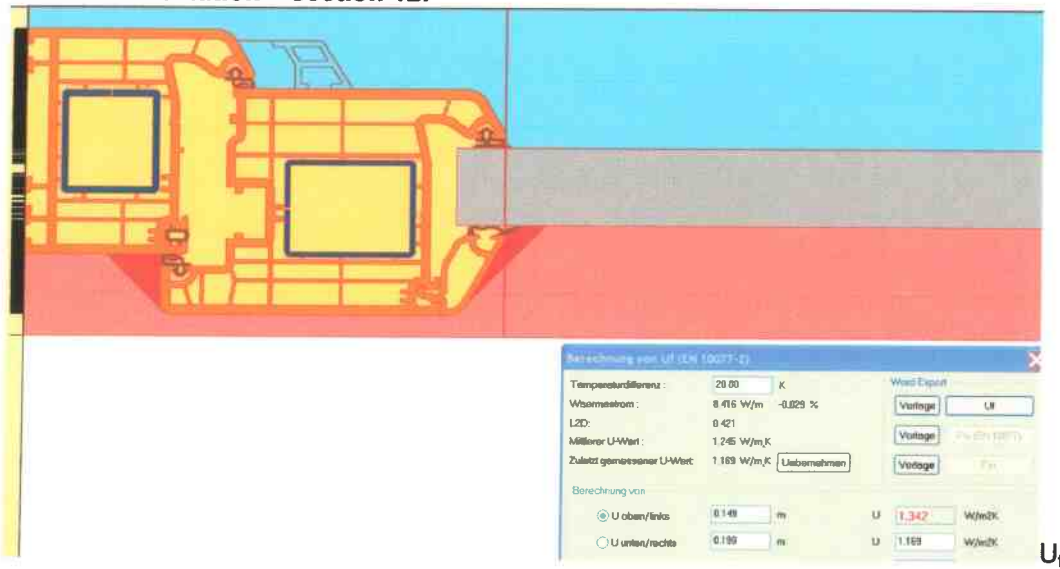
U_{f112} = 1,66 W/m²K

Profile combination MAXI EMPIRE – section 11.3:



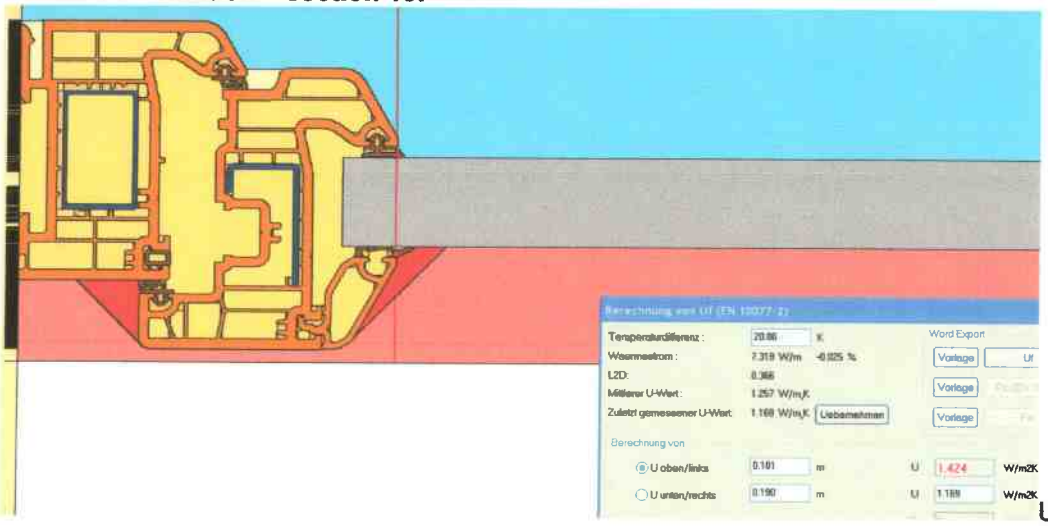
U_{f113} = 1,50 W/m²K

Profile combination – section 12:



U_{f12} = 1,34 W/m²K

Profile combination – section 13:



U_{f13} = 1,42 W/m²K

2.2 Other input data:

Glazing*: IGU (4-16-4) mm with argon filling with U_g = 1,1 W/(m^2K)
IGU (6-14-4-12-4) mm with krypton filling with U_g = 0,5 W/(m^2K)
Ψ_g *: according to EN ISO 10077-1, table E.1, IGU and argon filling - 0,06 W/(m^2K)
A_g, A_f, l_g: dimensions taken from drawings and calculated
* - values required by window producer

2.3 Elements: (see separate file No. 40090491-2)

3 Determination of sound insulation index:

3.1 Element 1
Input data:

Type of opening: turn-and-tilt
Overall area: up to 2,7 m^2
Glazing: air filled IGU (4-16-4) mm with R_w [C ; C_{tr}] = 29 [-1;-4] dB – tabulated value EN 12758
Weather stripping: inner and outer gasket – required 1 gasket - fulfilled
Air permeability of window: class 4 – required class 3 minimally - fulfilled

Determination

IGU R_w	29 [-1;-4] dB
Window R_w	32 dB
IGU R_w + C_{tr}	25 dB
Window R_w + C_{tr}	27 dB
C	-1 dB
C_{tr}	-5 dB
R_w [C ; C_{tr}]	**32 [-1;-5] dB**

Note:
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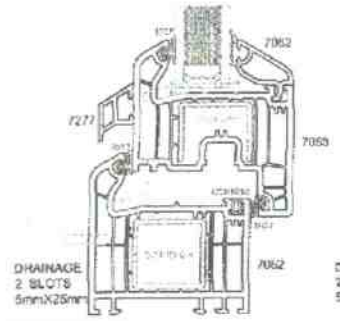
Represented by Director of Branch Nitra: Ing. Ladislav Lósy

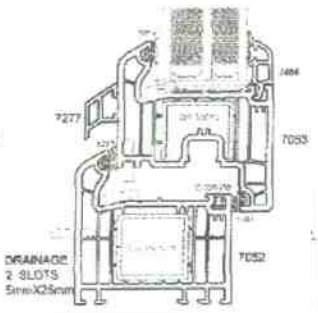
Technický a skúšobný ústav stavebný, n. o. TSUS Notifikovaná osoba 1301 -4-

ANNEX 1: Profile combination details
ANNEX 2: Element sketches (delivered by producer as Model 1 to 13)

ANNEX 1 **Profile combination details**



section 1



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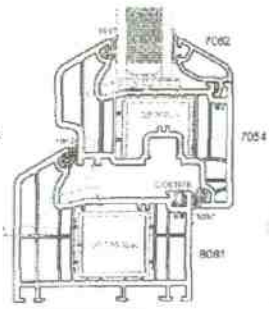

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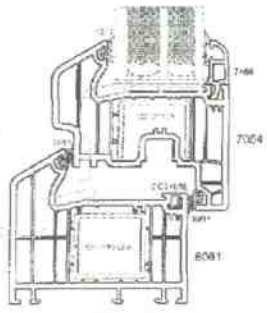
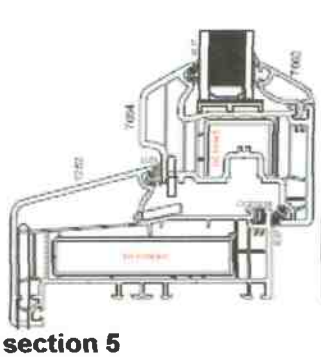
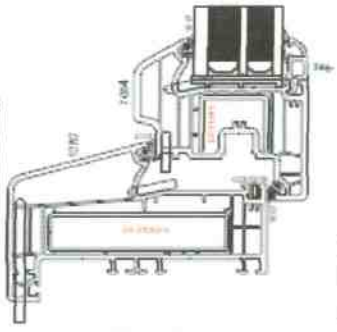


section 4



section 5



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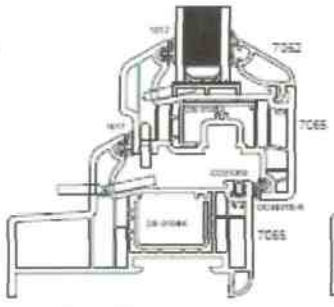

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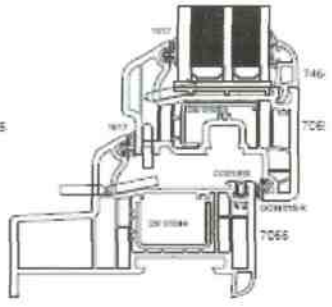

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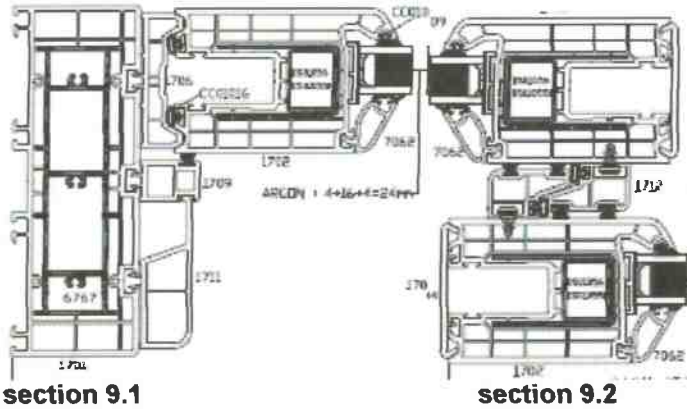
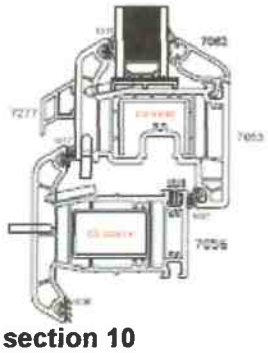


section 9.1

section 9.2

section 9.3



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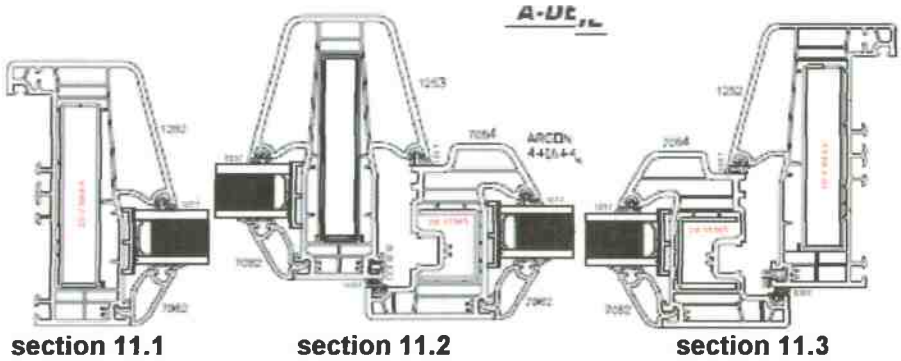
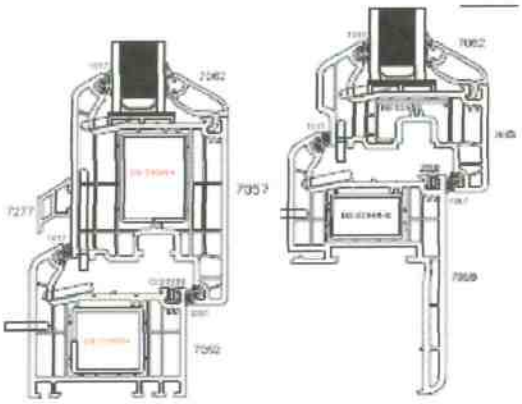


section 11.1

section 11.2

section 11.3



section 12 **section 13**