ECO CERTIFICAZIONI S.P.A.
NOTIFIED TESTING LABORATORY
Nr. 0714 FOR DIRECTIVE 89/106/EEC

TEST REPORT

Nr.714C9110511 May 13, 2011

UNI EN 14351-1
WINDOWS AND DOORS

Manufacturer: METAL SA Aluminium Industry Sximatari – Viotia, Greece

Address: Area Patima Sximatari –Viotia 32009 Greece
Phone number: (0030) 22620 58212 _ 58756_ 58757
Fax number: (0030) 22620 58755
e-mail: metal3@hol.gr

Test Sample: TWO WINGS ONE SIDE TILT & TURN - COMPASS THERMO 500

Testing date: April 6, 2011

Type of test

- Air Permeability in accordance with UNI EN 1026:2001 with test result expressed in accordance with UNI EN 12207:2000;
- Water tightness in accordance with UNI EN 1027:2001 with test result expressed in accordance with UNI EN 12208:2000;
- Resistance to wind load in accordance with UNI EN 12211:2001 with result expressed in accordance with UNI EN 12210:2000;

TESTS RESULT LIST	
Air Permeability:	Class 3
Water tightness:	Class 9A
Resistance to wind load:	Class C2

The results are strictly connected with the sample submitted to the tests.

Technical Inspector Eco Certificazioni S.p.A
Gian Marco Babini

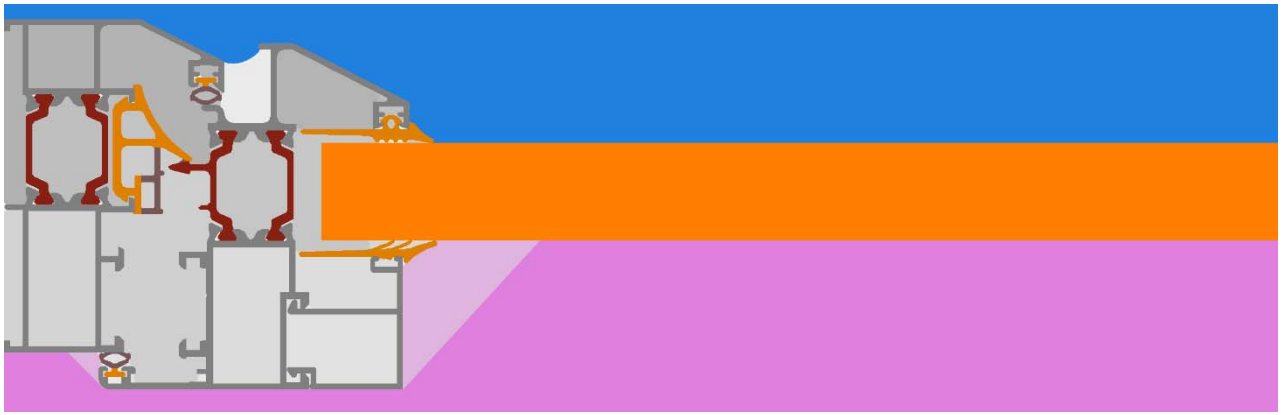
Technical Manager Eco Certificazioni S.p.A.
Eng. Gian Luca Laghi

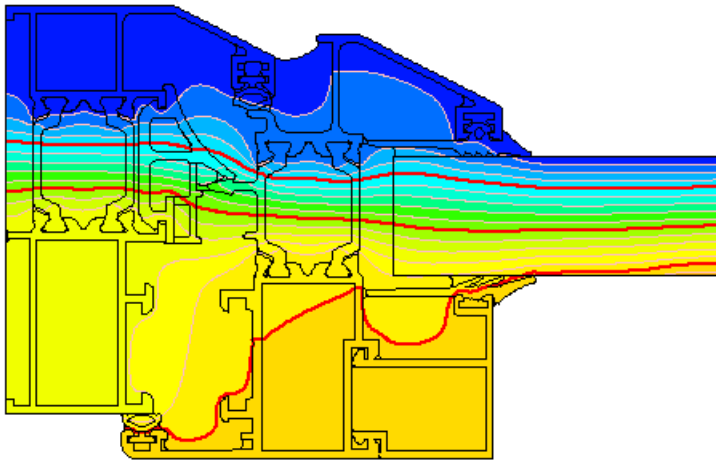
TECHNOFORM **BAUTEC**

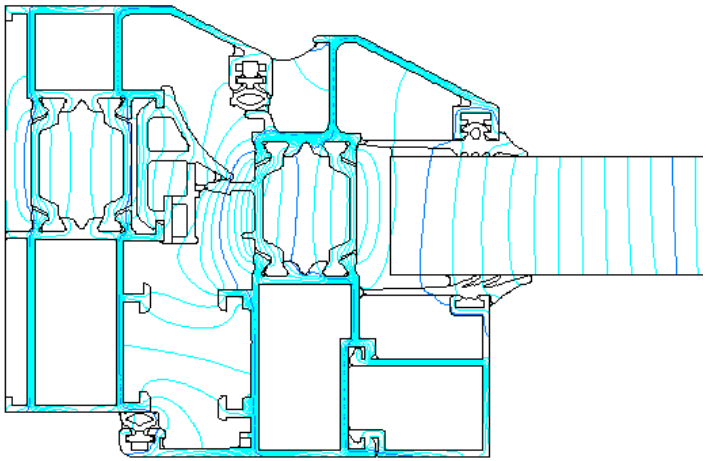
Thermal perfomances analysis

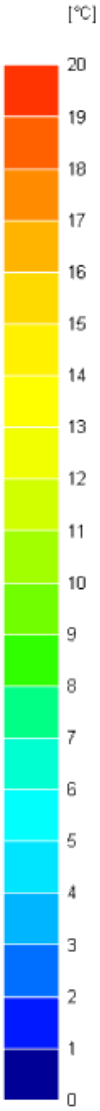
TC18-0008_001
Actual system (235100, 251800)

$U_f = 2{,}475\ W/m^2K$









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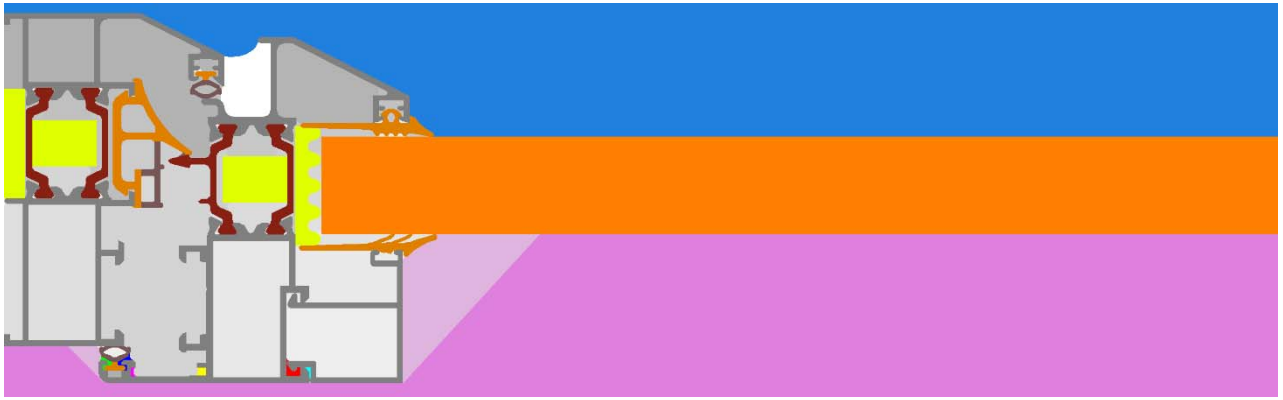
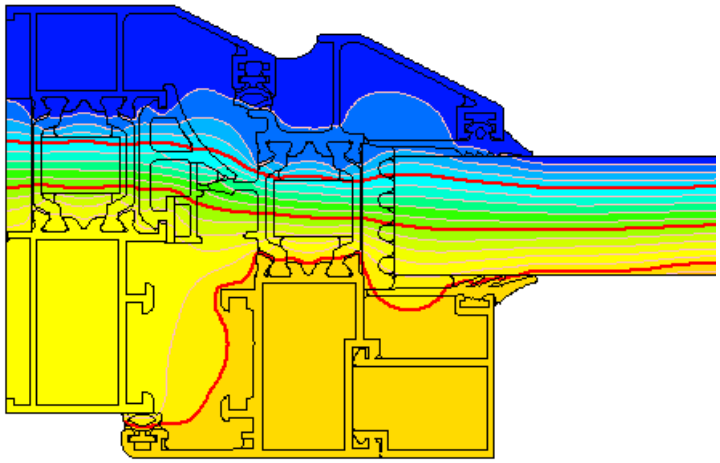
TECHNOFORM **BAUTEC**

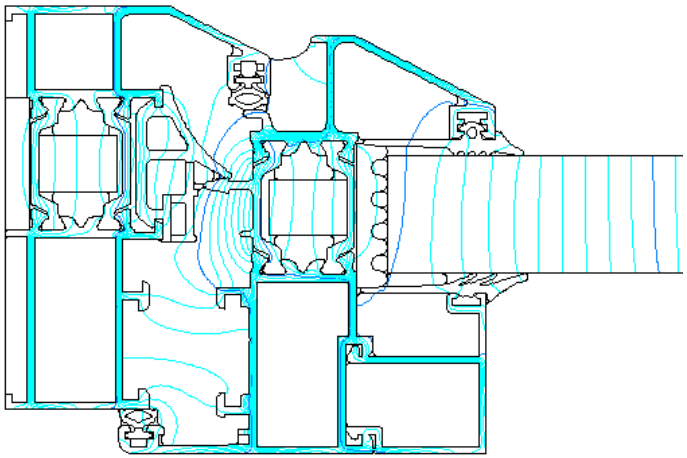
Thermal perfomances analysis

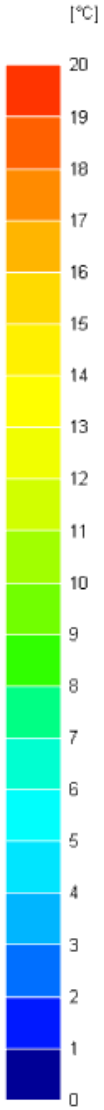
TC18-0008_001 + foam
Actual system (235100, 251800) + foam

$U_f = 2{,}326\ W/m^2K$









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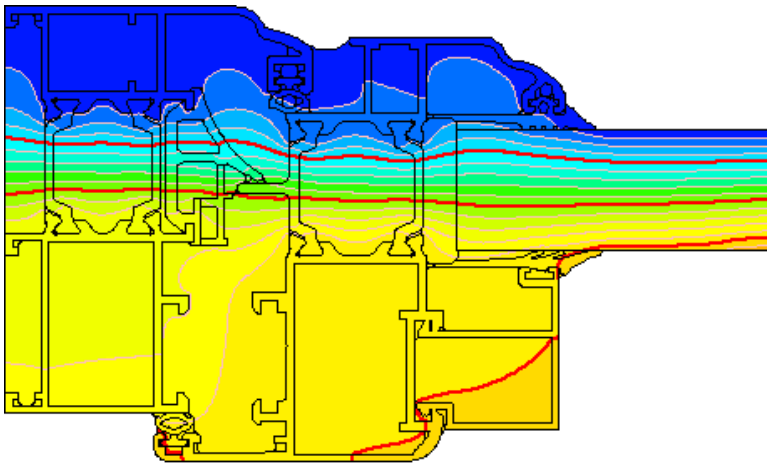
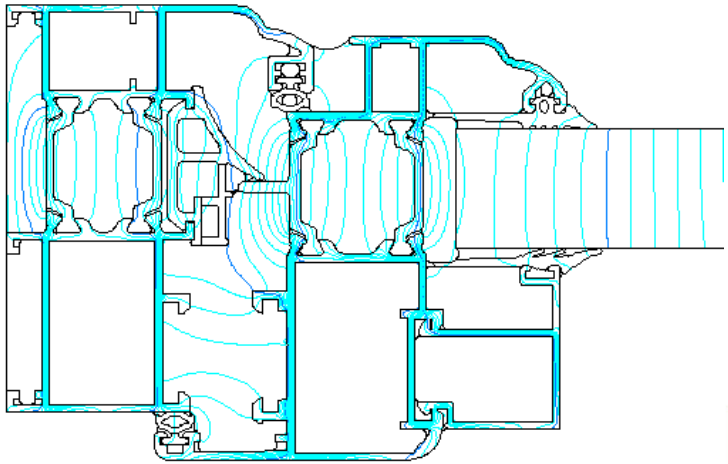
TECHNOFORM **BAUTEC**

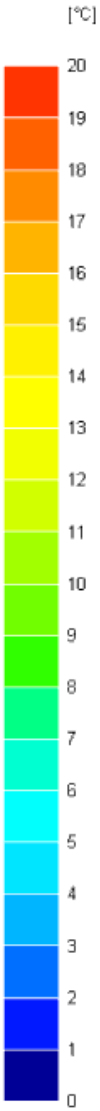
Thermal perfomances analysis

TC18-0008_002
Actual system (235100, 964300)

$U_f = 2{,}493\ W/m^2K$







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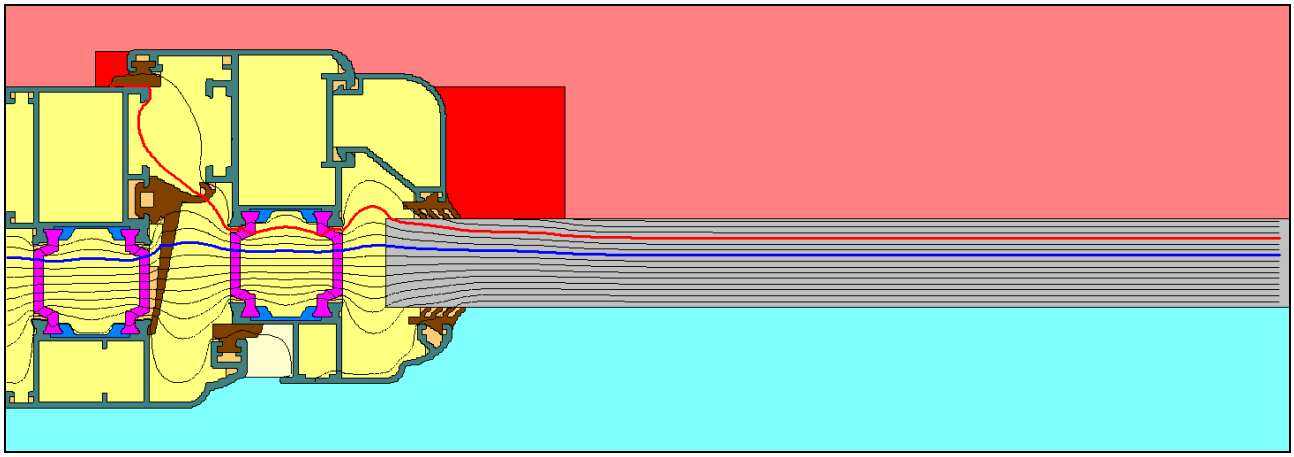
Customer:	**Technoform BAUTEC Greece, Metal Greece**
Date:	01.03.2010
Simulation Software:	WinIso2D 6.03
Object:	**thermally broken aluminium window profile THERMO 500**
Aluminium coating:	uncoated between thermal breaks (ε=0,3)
File:	…\metal_thermo500.f2d

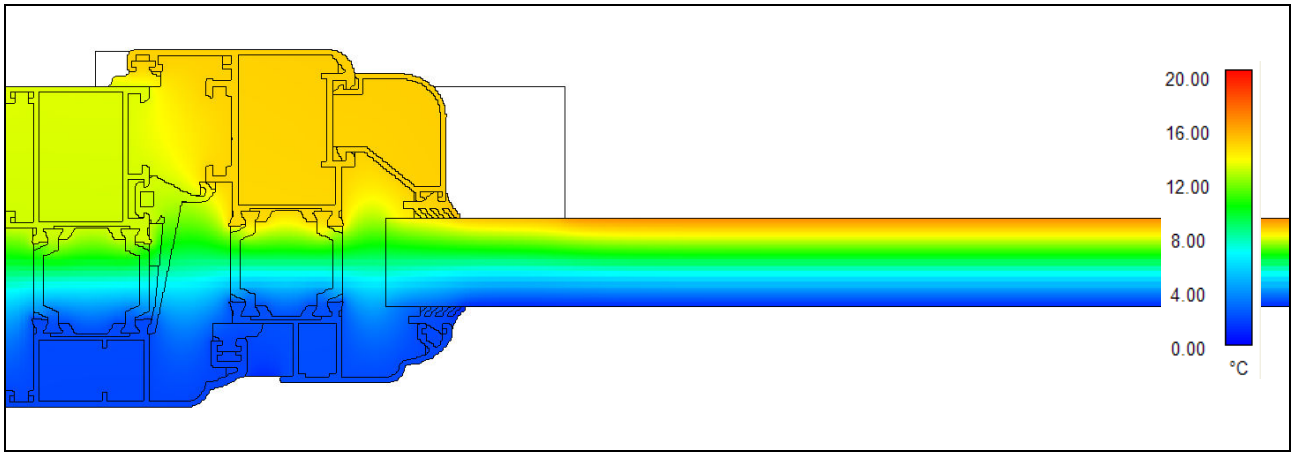
Calculation of the thermal transmission coefficient U_f of frame sections according to EN ISO 10077-2:2003-12

Simulation model:

Calibrating panel: Thickness: 20 mm; depth in frame: 15 mm
Dimensions of entire simulation model (width x height): 291,25 x 101,10 mm
Number of elements in simulation model: X-direction: 436; Y-direction: 294



Isothermal lines



Temperatures

Boundary conditions according to EN ISO 10077-2:2003-12:

External:

Temperature Θ_e:	0,00	°C
Surface resistance R_{se}:	0,040	m²K/W

Internal:

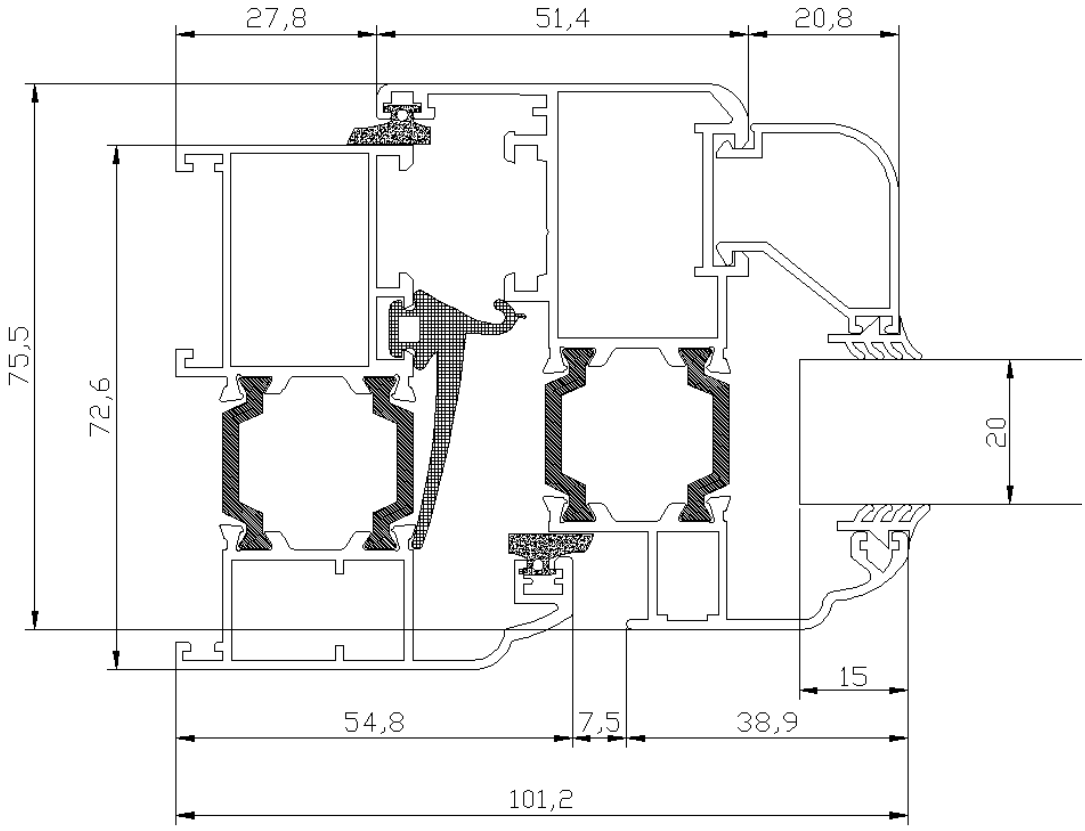
Temperature Θ_i:	20,00	°C
Surface resistance standard R_{si}:	0,130	m²K/W
Surface resistance reduced radiation/convection R_{si}:	0,200	m²K/W

Results according to EN ISO 10077-2:2003-12:

Temperature difference dT:	20,00	K
Total heat flow Q:	10,887	W/m
2D thermal conductance L^{2D}:	0,544	W/mK
Length of the calibrating panel:	190,00	mm
Thermal transmission coefficient of the calibrating panel:	1,349	W/m²K

Projected width of the frame section: ***101,30 mm***

Thermal transmission coefficient of the frame section: ***U_f = 2,8 W/m²K***
(2,843 W/m²K)



Drawing (Source: Muskita)

Materials:

	Boundary conditions	R_s (m²K/W)	θ (°C)	10077 / 13947 conform
	external air	0,040	0,000	X
	internal air (standard)	0,130	20,000	X
	internal air (reduced radiation and convection)	0,200	20,000	X
	unventilated cavity	acc. to EN ISO 10077-2		X
	unventilated cavity <= 2 mm	acc. to EN ISO 10077-2		X
	slightly ventilated cavity	acc. to EN ISO 10077-2		X
	calibrating panel	0,035		X
	adiabat	∞		X
	Materials	**λ (W/mK)**		**10077 / 13947 conform**
	aluminium coated	160,000		X
	aluminium uncoated ε = 0,3	160,000		X
	polyamide 6.6 25% GF	0,300		X
	EPDM gasket	0,250		X

The materials and boundary conditions marked with (X) accord to EN ISO 10077-2:2003-12.

Isothermal lines:
0 °C - 20 °C in 1 °C-steps
Red: 13 °C
Blue: 10 °C (Dew point at 20 °C/50%)

Normative references:

- *EN ISO 10077-2:2003-12, Thermal performance of windows, doors and shutters - Calculation of thermal transmittance - Part 2: Numerical method for frames*
- *prEN ISO 10077-2:2010/2011, Thermal performance of windows, doors and shutters - Calculation of thermal transmittance - Part 2: Numerical method for frames*
- *EN 13947:2007-07, Thermal performance of curtain walling - Calculation of thermal transmittance*
- *EN ISO 10211:2008-04, Thermal bridges in building construction – Heat flows and surface temperatures*

BAUWERK
Building physics consultancy
Rosenheim, 01.03.2010

Dipl.-Ing. (FH) Roland Steiner