Customer:

Dow Silicones Belgium SPRL
Rue Jules Bordet, Parc Industriel Zone C
7180 Seneffe
Belgium

Project/Customer:

DOWSIL 3364

Content:

- $U_{m/t}$ simulation of profiles in accordance to EN ISO 12631
- U_g calculation of insulating glass in accordance to EN 673
- Ψ_g simulation of IG edge spacer bars in accordance to EN ISO 12631
- U_{cw} calculation of façades in accordance to EN ISO 12631
- Simulation of isothermal lines and surface temperatures

Object:

- Profiles: representative façade profiles according to ift guideline WA-22/2:2016-08 and Schüco façade profile FW50+SG
- Glass: representative triple insulating glass unit according to ift guideline WA-22/2:2016-08
- Glass edge:
  - Standard stainless steel spacer
  - Saint-Gobain Glass Solutions Swisspacer Ultimate
- Secondary sealant material:
  - polysulfide/polyurethane: 0.40 W/mK
  - standard silicone: 0.35 W/mK
  - DOWSIL 3364: 0.19 W/mK

Assumptions/Advices:

- The following results are only valid for the shown geometries and material characteristics. The geometries are based on drawing provided by the customer.
- Profile cavities have been treated with the Radiosity method in accordance to EN ISO 10077-2:2018.

Normative references:

- EN ISO 10077-2:2018-01, Thermal performance of windows, doors and shutters - Calculation of thermal transmittance - Part 2: Numerical method for frames
- EN ISO 12631:2018-01, Thermal performance of curtain walling - Calculation of thermal transmittance
- EN ISO 10211:2018-03, Thermal bridges in building construction – Heat flows and surface temperatures
- EN 673:2011-04, Glass in building – Determination of thermal transmittance (U value) – Calculation method
- ift guideline WA-22/2:2016-08, Thermally improved spacers, Part 3 – Determination of representative Ψ values for profile sections of windows
- EN ISO 6946:2018-03, Building components and building elements – Thermal resistance and thermal transmittance – Calculation method
- EN ISO 10456:2010-05, Building materials and products – hygrothermal properties – tabulated values and procedure for determining declared and designed thermal values

Materials:

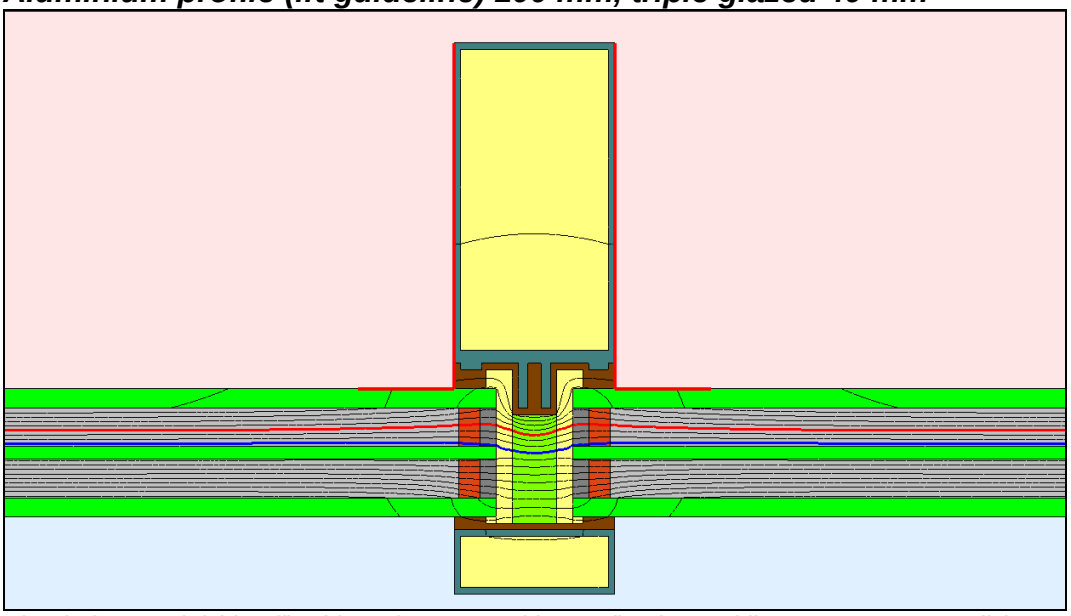
	Boundary conditions	R_s (m^2K/W)	θ (°C)	10077-2 conform
	external air	0.040	0.0	X
	internal air (standard at window and facade)	0.13	20.0	X
	internal air (reduced radiation and convection)	0.20	20.0	X
	Generally	R_s (m^2K/W)	θ (°C)	10077-2 conform
	unventilated cavity	acc. to EN ISO 10077-2		
	unventilated cavity <= 2 mm			
	slightly ventilated cavity to external and internal air			
	adiabat	∞		X
	Materials	λ (W/mK)		10456 conform
	aluminium coated	160		X
	PVC hard	0.17		X
	EPDM gasket	0.25		X
	insulation foam in façade profiles (ift-guideline)	0.025		-
	insulation foam in façade profiles (FW50+SG)	0.040		-
	float glass	1.0		X
	gas in IG cavity	acc. to EN ISO 673		
	stainless steel spacer 7.0 mm, two box model	0.61		X
	Saint-Gobain Glass Solutions Swisspacer Ultimate 6.5 mm, two box model	0.14		X
	polysulfide/polyurethane	0.40		X
	standard silicone	0.35		X
	DOWSIL 3364	**0.19		-

For thermal simulations designed values of thermal conductivity must be used. The tabulated values are designed values unless there are marked as different.
Values marked with " ** " are designed values taken from customers declaration. Certificates are available from the customer.

Isothermal lines:

0°C to 20°C in 1°C steps
Red: 13°C isothermal line (mould critical temperature at 20°C, 50%)
Blue: 10°C isothermal line (condensation critical temperature 20°C, 50%)

Aluminium profile (ift guideline) 100 mm, triple glazed 40 mm



Simulation model (detail) with Swisspacer Ultimate (isothermal lines at 0°C externally)

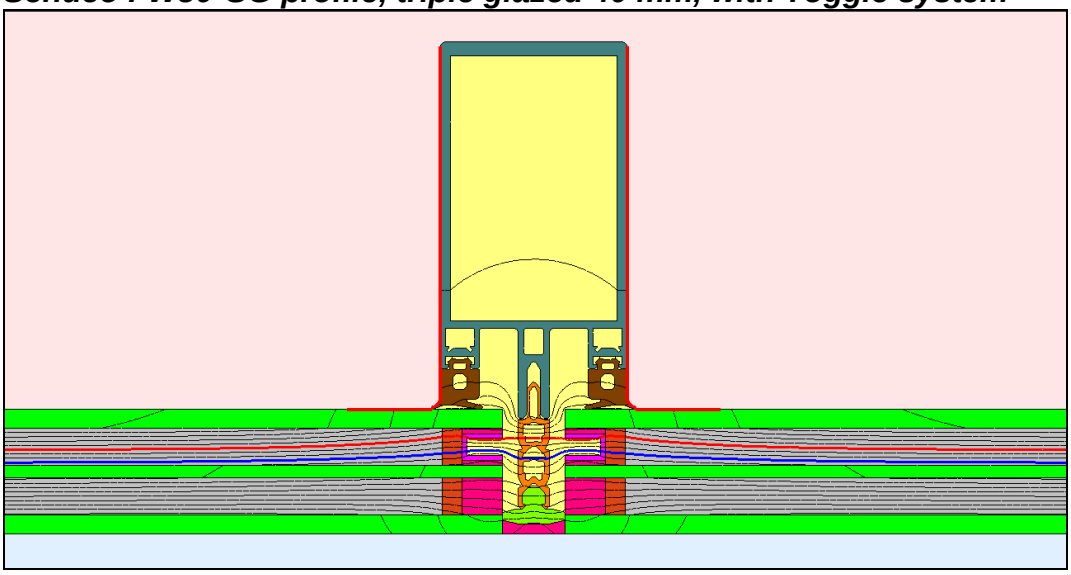
U_m	=	***1.1***	W/m²K
b_m	=	50.0	mm
U_g	=	***0.7***	W/m²K

	Stainless Steel			Swisspacer Ultimate		
	Ψ_g	$T_{min(0°/20°)}$**	U_{cw}*	Ψ_g	$T_{min(0°/20°)}$**	U_{cw}*
	[W/mK]	[°C]	[W/m²K]	[W/mK]	[°C]	[W/m²K]
3 mm PS/PU (0.40)	2x 0.094	14.7 / -20.4	1.002	2x 0.056	16.3 / -37.8	0.892
5 mm Silicone (0.35)	2x 0.092	14.8 / -21.2	0.996	2x 0.052	16.4 / -39.4	0.880
5 mm DOWSIL 3364 (0.19)	2x 0.085	15.0 / -22.8	0.976	2x 0.040	16.9 / -49.0	0.846

*not rounded U_{cw} for an element size 1.00 x 2.00 m, screws and other fixings not considered

**minimum surface temperature at the glass edge / lowest external temperature without internal condensation

Schüco FW50+SG profile, triple glazed 40 mm, with Toggle system



Simulation model (detail) with Swisspacer Ultimate (isothermal lines at 0°C externally)

U_m	=	***1.2***	W/m²K
b_m	=	60.0	mm
U_g	=	***0.7***	W/m²K

	Stainless Steel			Swisspacer Ultimate		
	Ψ_g	$T_{min(0°/20°)}$**	U_{cw}*	Ψ_g	$T_{min(0°/20°)}$**	U_{cw}*
	[W/mK]	[°C]	[W/m²K]	[W/mK]	[°C]	[W/m²K]
3 mm PS/PU (0.40)	n.d.					
13 mm Silicone (0.35)	2x 0.10	13.5 / -12.9	1.051	2x 0.069	15.2 / -24.6	0.966
13 mm DOWSIL 3364 (0.19)	2x 0.093	13.8 / -14.5	1.016	2x 0.058	15.6 / -28.6	0.915

*not rounded U_{cw} for an element size 1.00 x 2.00 m, screws and other fixings not considered

*U_{cw} value have been calculated with the assumption that the Toggle pocket is about 1/3 of the glass edge length

**minimum surface temperature at the glass edge / lowest external temperature without internal condensation

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