

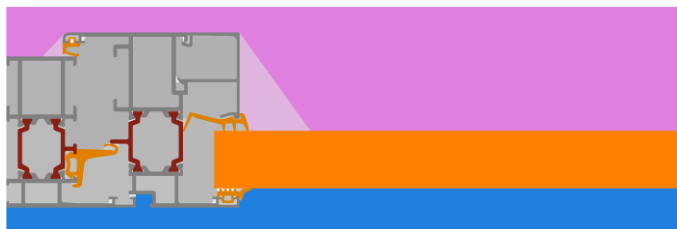


## Introduction

This document collects several examples of window frame configurations in BISCO.

### 1. Aluminium frame 1:

[alu\\_1\\_frame\\_panel.bsc](#)



The file [alu\\_1\\_frame\\_panel.dxf](#) was used to create the data. The DXF file contains layer names such as "aluminium", "EPDM", .... After opening the DXF file in BISCO, the DXF file is converted to a BMP file either using BiscoDxf.exe or using directly Bisco.exe. In this last case a layer file ([alu\\_1\\_frame\\_panel.lay](#)) containing the colour index and fill mode for each layer is required. In BISCO the "EN 10077 preparation" function (menu Bitmap) is used to adjust the data according to EN ISO 10077. Before using this function, the EN 10077 settings should be checked.

Alternatively, [alu\\_1\\_frame\\_panel.bsc](#) can be directly obtained from the DXF file [alu\\_1\\_frame\\_panel\\_prepared.dxf](#). In this file the 3 first digits of the layer name correspond to the Physibel Colour Database index<sup>1</sup> and the 5<sup>th</sup> digit corresponds to the required fill mode (1 = fill contour, 2 = flood fill), for example "008\_1\_aluminium". The DXF file is directly opened in BISCO without the need of a .LAY file. Then the "EN 10077 preparation" function (menu Bitmap) is used. Another possibility is to perform a batch calculation for the DXF file. This will cause the bitmap conversion, the EN 10077 preparation, the calculation and output in 1 step.

The full tutorial on calculating  $U_f$  and  $\Psi$  of this frame can be found in the Knowledge Base document: '[Thermal transmittance of a window profile according to EN ISO 10077-2](#)' and '[Linear thermal transmittance of a glazing spacer according to EN ISO 10077-2](#)'.

### 2. Central wood frame

[central\\_wood\\_frame\\_panel.bsc](#)

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<sup>1</sup> More information: Knowledge Base document: '[A12 - Material and boundary conditions: EN 10077-2, EN ISO 6946, EN ISO 10456, ISO 15099 and NFRC \(Colour database\)](#)'



The file [central\\_wood\\_frame\\_panel.dxf](#) was used to create the data. The DXF file uses indexed layer names as in the previous example.

[central\\_wood\\_frame\\_glazed.bsc](#).



The insulation panel in the previous data was replaced by a double glazing (bitmap [glazing\\_spacer\\_4\\_15\\_4\\_inox1.bmp](#)) using the Bisco "import bitmap" function or within the BiscoBmp environment (menu Bitmap-> Edit Using BiscoBmp). For the glazing cavity an equivalent thermal conductivity was used in order to obtain a glazing thermal transmittance  $U_g = 1.1 \text{ W/m}^2\text{K}$ .

In order to derive the linear thermal transmittance  $\psi_g$  of the glazing edge

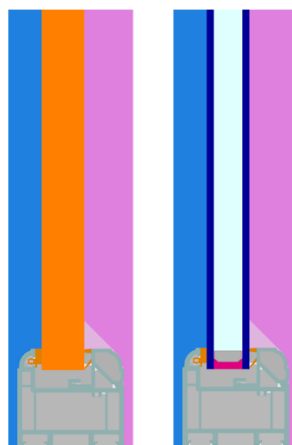
- The thermal transmittance of the frame  $U_f = 1.419 \text{ W/m}^2\text{K}$  (obtained by using the previous Bisco data) is entered as an "enforced U-value" in the Border U-values Window (using the left border by lack of a central position).
- The appropriate parameters are specified in the Derived Thermal Properties dialogue box.

It should be emphasized that the derived  $\psi$  value in the text output =  $2 \times \psi_g$ . More information on this topic can be found in the Knowledge Base document: '[B9 – Calculation of the linear thermal transmittance of a glazing spacer according to EN ISO 10077-2](#)'.

### 3. PVC frame

[pvc\\_frame\\_vert\\_panel.bsc](#)

[pvc\\_frame\\_vert\\_glazed.bsc](#)



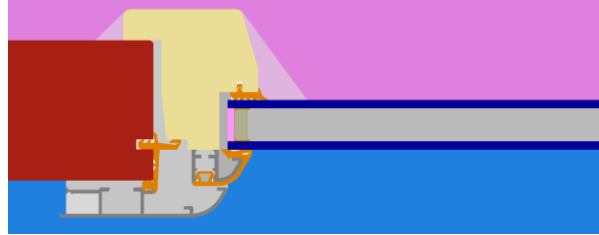
The data were created from the DXF files [pvc\\_frame\\_vert\\_panel.dxf](#) and [pvc\\_frame\\_vert\\_glazed.dxf](#) that use indexed layer names.

In order to derive the linear thermal transmittance  $\psi_g$  of the glazing edge:

- The thermal transmittance of the frame  $U_f = 1.425 \text{ W/m}^2\text{K}$  (obtained by using the data with the panel) is entered as an “enforced U-value” in the Border U-values Window.
- The appropriate parameters are specified in the Derived Thermal Properties dialogue box.

#### 4. Wood Aluminium Frame

[wood\\_alu\\_glazed.bsc](#)



#### 5. PVC frame

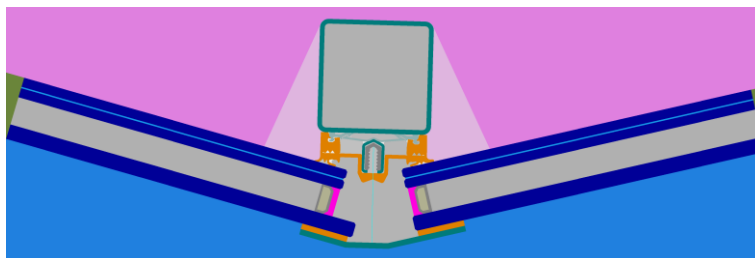
[pvc\\_frame\\_panel.bsc](#)

[pvc\\_frame\\_glazed.bsc](#)



#### 6. Steel frame sloped

[steel\\_frame\\_sloped.bsc](#)



Data highlights:

- adiabatic colour left & right

- Screw 2D method (equivalent thickness)<sup>2</sup>
- U-value of glazing calculated in window Distances
- Node linear thermal transmittance<sup>3</sup>.

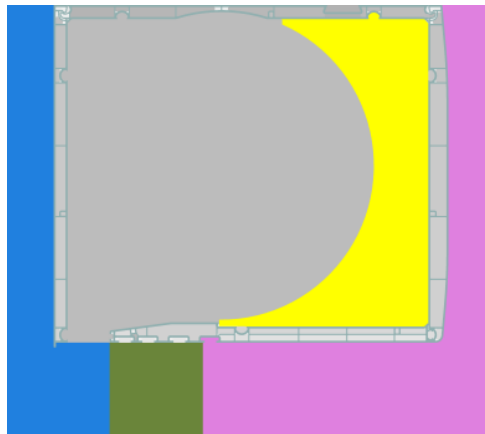
## 7. Aluminium frame 3

[alu\\_3\\_frame\\_panel.bsc](#)



## 8. Shutter box

[shutter\\_box.bsc](#)



## 9. Corner

[corner\\_ex.bsc](#)

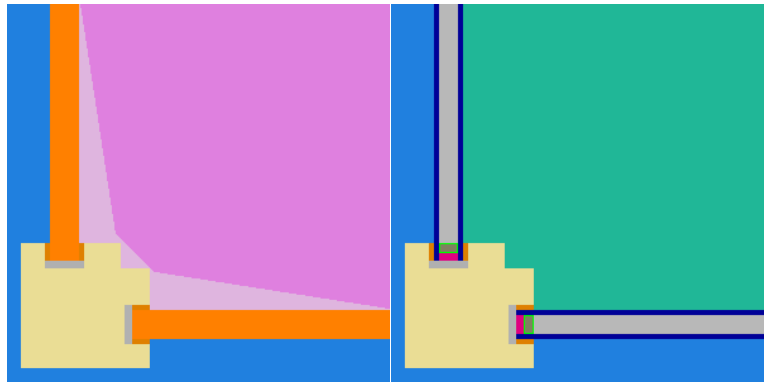
[corner\\_glazed.bsc](#)

EN ISO 10077-2 is only applicable for frames for which the glazing lies in the same line with the frame. EN ISO 10077-2 does not anticipate for corner frames. In such case the definition of a) width of the frame and b) zones with reduced surface coefficient are open for interpretation. Using the external width of the frame ([corner\\_ex.bsc](#)) results in an artificial low  $U_f$ -value. Therefore it is suggested to apply the node linear thermal transmittance  $\psi_n$  with detailed radiation at the interior side. This will

<sup>2</sup> More information on this topic in Physibel Knowledge Base document '[B2 – 3D & 2D simulation of fixings - validation of EN 12631:2017 Annex E](#)'.

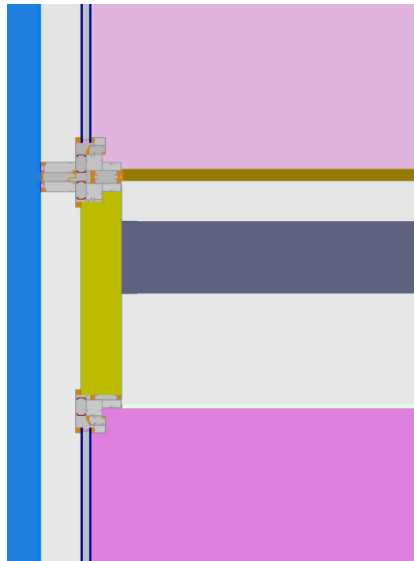
<sup>3</sup> More information on this topic in Physibel Knowledge Base document '[B8 - Glazed facades: derived thermal properties](#)'.

include directly the thermal transmittance of the frame + glass spacer ([corner\\_glazed.bsc](#)). More information on this topic can be found in the Physibel Knowledge Base document '[B8 - Glazed facades: Derived thermal properties.](#)'



## 10. Double skin façade

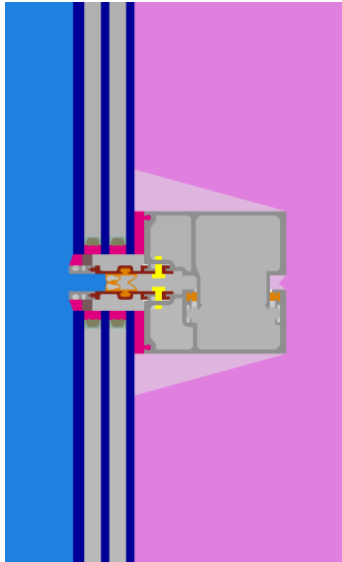
[facade\\_floor.bsc](#)



The file [facade\\_floor.bsc](#) is used to determine the  $U_{TJ}$  of a (double skin) curtain wall in line with EN 12631. The air cavity between the two glazing panes (10cm) is modelled by the type BC\_FREE.

## 11. Curtain wall

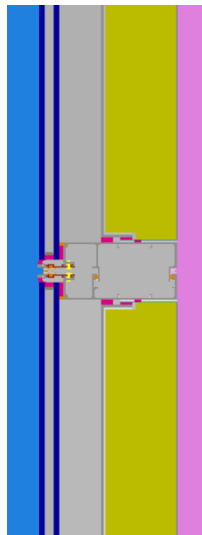
[Curtainwall.bsc](#)



According to EN ISO 12631, the thermal transmittance of the thermal joint can be expressed by either  $U_{TJ} = 3.559 \text{ W/m}^2\text{K}$  or  $\psi_{TJ} = 0.293 \text{ W/(m.K)}$ .

## 12. Spandrel panel

[Spandrel.bsc](#)



According to EN ISO 12631, the thermal transmittance of the thermal joint accounts for the effect of the glazing edge is  $U_{TJ} = 6.205 \text{ W/m}^2\text{K}$  and  $\psi_{TJ} = 0.610 \text{ W/(m.K)}$ .