

Guideline to building simulations with MicroShade® in IDA ICE

This is a guideline to indoor climate and daylight simulations with MicroShade® in IDA ICE v. 4.8 or later. IDA ICE is a building simulation software developed and licensed by EQUA Simulation A/B. IDA ICE is used for designing and simulating buildings and calculates the annual energy consumption and indoor climate of a building. IDA ICE also has a daylight calculation tool based on Radiance and daylight factor calculations can be performed with IDA ICE.

This guideline shows how to use MicroShade® in IDA ICE for simulation of indoor climate, energy consumption and daylight. For further questions regarding IDA ICE simulations, please contact EQUA on their support page www.equa.se/en/contact/contact-us. For questions regarding MicroShade®, please contact us on support@microshade.dk

Simulation of MicroShade® in IDA ICE

About MicroShade®

MicroShade® is a highly effective shading product containing microscopic shading lamellas. The shading efficiency depends on the incidence angle of the sun on the lamellas. When the sun is high in the sky during the summer, MicroShade® provides the strongest shading and during winter when the sun is low more heat is allowed into the building. Similarly, the shading efficiency also varies during the day due to the different positions of the sun morning, noon and evening. For façade applications two MicroShade® product types are commonly used – the MicroShade® MS-A and MS-D. Aesthetically, these are similar, only the MS-D provides a stronger shading whilst the MS-A allows more daylight inside. For roof applications, MS-RS and MS-RW are typically used. MS-RS is recommended in pitches up to 30°, and MS-RW is recommended for pitches between 30° and 60°. For more information on selection of MicroShade® type please see our selection guidelines on www.microshade.dk/download-loads-software.

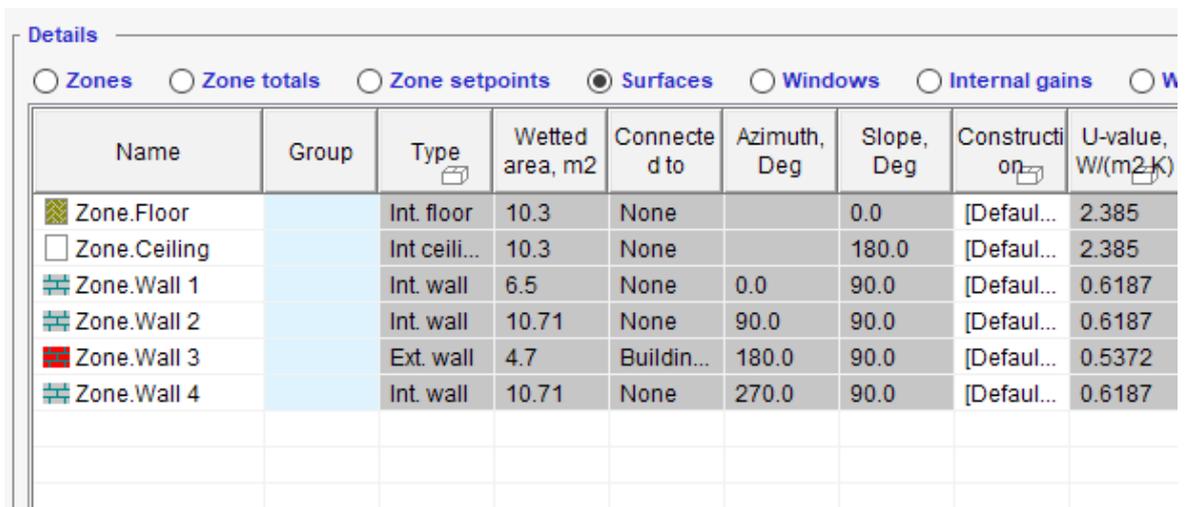
About IDA ICE

IDA ICE comes in two different versions: standard and expert. This guideline can be used by both versions. MicroShade® is implemented in version 4.8 of IDA ICE and it is therefore not possible to include MicroShade® in earlier versions of IDA ICE. EQUA also provides a "light" version of IDA ICE, called ESBO light, which also includes MicroShade®. The focus of this guideline is exclusively on how to use MicroShade® in IDA ICE and is therefore not a general guide on how to use IDA ICE. For an in-depth tutorial of IDA ICE, please contact EQUA.

Setting up a simulation in IDA ICE with MicroShade®

Getting started

1. Open IDA ICE and create a new project or open an existing project. You can also import an IFC file from BIM software. Set up the location, climate, global parameters and HVAC systems under the "General" tab like you normally would.
2. Under the "Floor plan" tab, make sure that the façade walls are connected to the building face. If a wall is lying on top or close to the building face, it will be treated as part of the building face. To check if a wall is a part of the building face or treated as an inner wall, you can do either of the following:
 - a. See the "General" tab > "Details" > "Surfaces". This will show a list of all the surfaces in the model. If a wall is red, it is treated as part of the building face.



Details								
<input type="radio"/> Zones <input type="radio"/> Zone totals <input type="radio"/> Zone setpoints <input checked="" type="radio"/> Surfaces <input type="radio"/> Windows <input type="radio"/> Internal gains <input type="radio"/> W								
Name	Group	Type	Wetted area, m2	Connecte d to	Azimuth, Deg	Slope, Deg	Constructi on	U-value, W/(m2·K)
 Zone.Floor		Int. floor	10.3	None		0.0	[Defaul...	2.385
 Zone.Ceiling		Int. ceili...	10.3	None		180.0	[Defaul...	2.385
 Zone.Wall 1		Int. wall	6.5	None	0.0	90.0	[Defaul...	0.6187
 Zone.Wall 2		Int. wall	10.71	None	90.0	90.0	[Defaul...	0.6187
 Zone.Wall 3		Ext. wall	4.7	Buildin...	180.0	90.0	[Defaul...	0.5372
 Zone.Wall 4		Int. wall	10.71	None	270.0	90.0	[Defaul...	0.6187

Figure 1: The "Surfaces" menu. If a surface is red, it is treated as part of the building face.

- b. Check the 3D model. If a wall has texture, it's part of the building face. If its white, its defined as an inner wall and treated as adiabatic (this can be changed, by double clicking the wall).

- To implement MicroShade® in a window, the window needs to be "detailed". The standard window will not do. Go to the "3D" tab. On the left-hand side, a properties menu is shown. Select "Palette" instead of "Properties" in the top of the menu. A list of different features that can be added to the model is now shown. Pull the "Window (detailed)" feature and place it on your model, where the window needs to be. Alternatively, double click the wall and open the wall sub-menu by right clicking on the wall and select "New object..." and select "Detailed window". Do this for all the windows, that needs to have MicroShade® implemented.

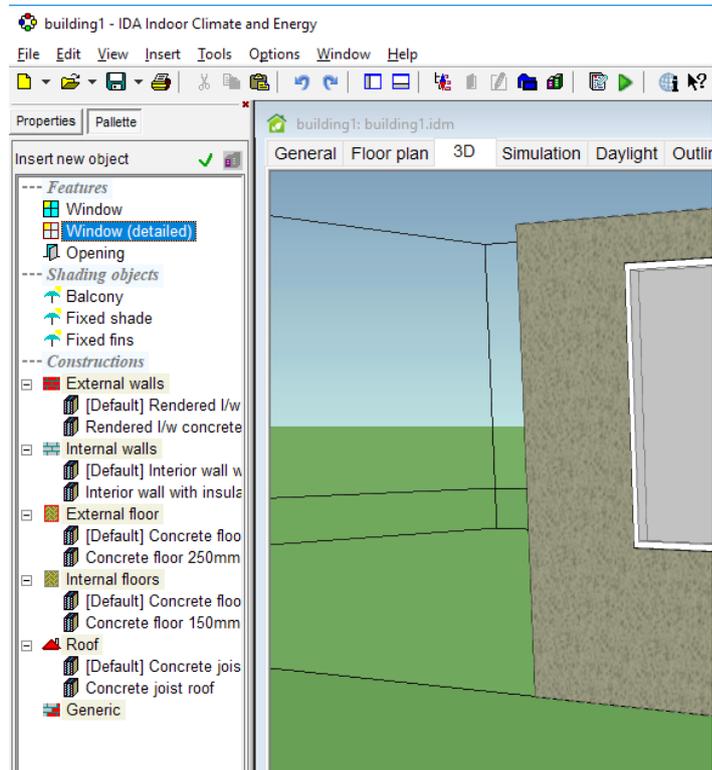


Figure 2: Add a detailed window to the model, by dragging it from the "Palette" menu.

Glazing build up with MicroShade®

To implement MicroShade® in a window, you need to make sure that the coatings of the glazing are placed on the correct surfaces in the glazing. MicroShade® is implemented on the first pane of the glazing, on the interior surface referenced to as surface "2" in Fig. 3. A MicroShade® glazing should always have lowE on side 3 (and 5 if triple).

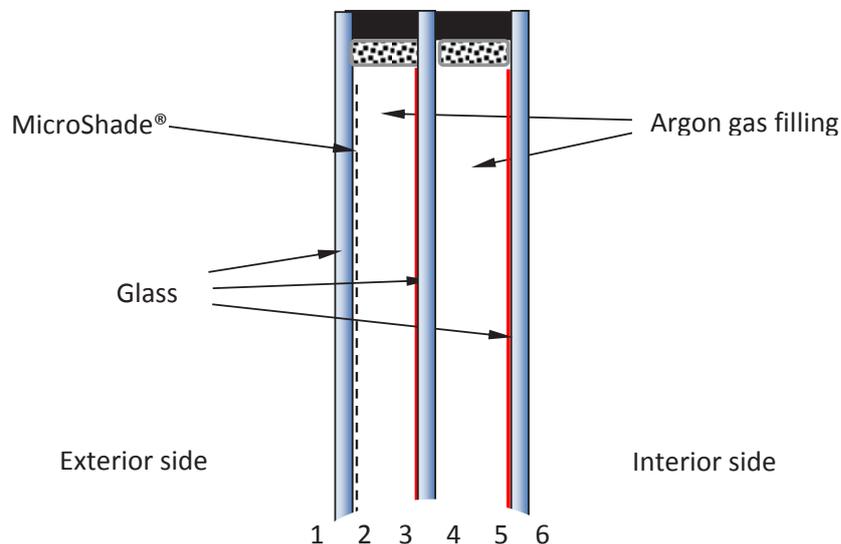


Figure 3: A glazing composition of a 3-layer LowE window with MicroShade®. The numbers indicate the indexing of the glazing surfaces.

1. If a low energy coating is found on surface "2", an incorrect U-value for the glazing will be used in IDA ICE, when using MicroShade®. To check that the coatings are placed in the correct positions, go to the 3D model. Double click the wall and then double click on the window and "Glazing/shading". A submenu will open with options and parameters for the window. Alternatively, this submenu can be accessed through the "General" tab: Under "Details", choose "Windows" and double click on the window in which you want to add MicroShade®. Click on "Glazing/shading".
2. A submenu will open with a graphic layout of the window composition. The red surfaces are the surfaces with coatings. Move the coated glasses to the correct positions, by using the blue arrows and check the "Flipped" checkbox.

Please notice, that changing the composition of the glazing, also makes small changes to the variables values of the glazing. Check to see if the values of variables is correct, by clicking "Glazing and shading properties at reference conditions (ISO15099)".

3. MicroShade® recommends that simulations in IDA ICE are performed with spectral panes as opposed to regular panes, which only shows simplified glazing data. Spectral panes are based on data from the full spectrum light, which gives a more precise simulation. These are found by clicking "load database." Spectral panes are indicated by a small "rainbow" icon on the pane icon. 

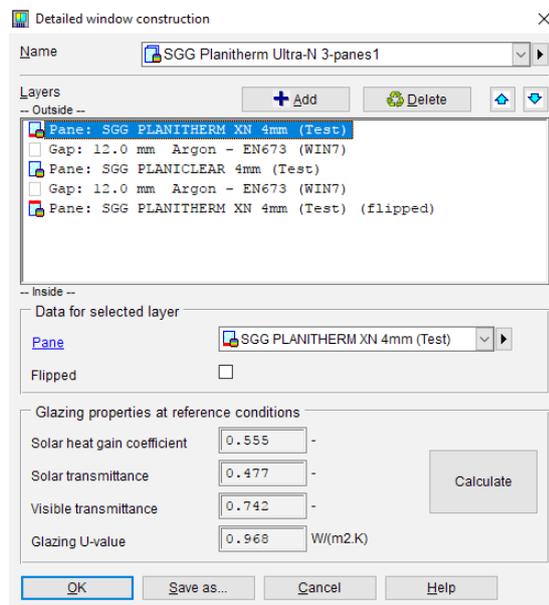


Figure 4: Incorrect position of the LowE coatings.

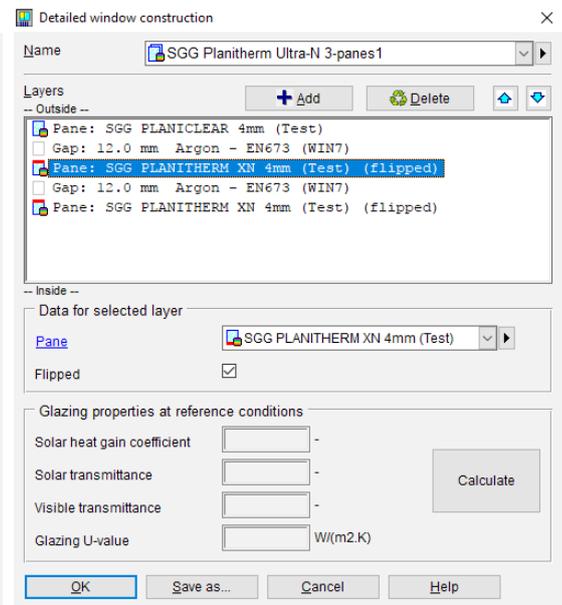


Figure 5: Correct position of the LowE coatings

4. If the window type/name is already in use, you will have to make a copy. IDA ICE will automatically ask you to do this when you press "OK".

5. You can choose MicroShade® as the shading option in the window submenu, by clicking on "Integrated window shading". Many different options for shading will be shown. Choose "Micro lamellas". Under "Type", choose the desired MicroShade® type.

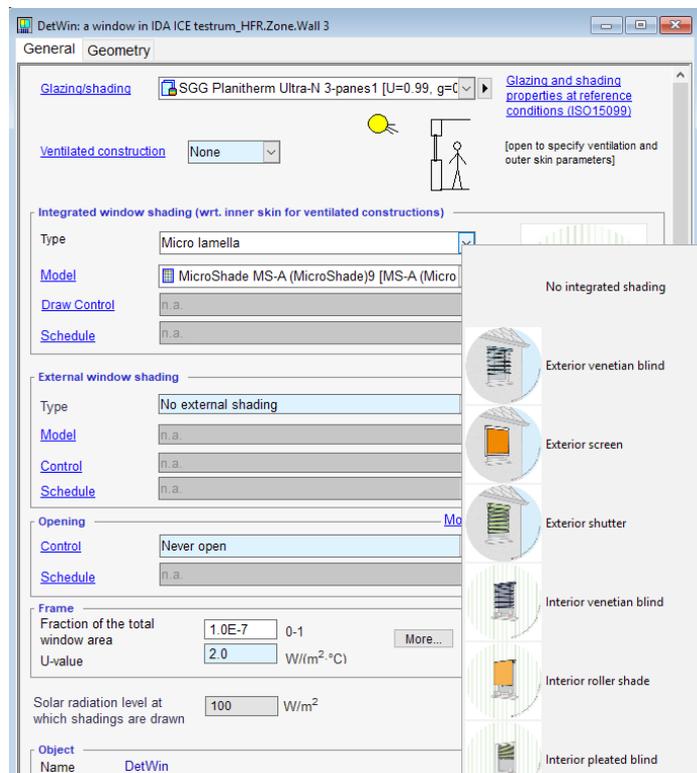


Figure 6: Choose "Micro lamella" from shading type list and then choose the desired MicroShade® type.

Different types of MicroShade® are available for selection:

- MS-A (Used in south facing facades)
- MS-D (Used in east and west facing facades)
- MS-RS (Used in roofs with inclination <30°)
- MS-RW (Used in roofs with inclination between 30° and 80°)
 - MS-RW 90° - MS-RW rotated 90°
 - MS-RW 180° - MS-RW rotated 180°
 - MS-RW 270° - MS-RW rotated 270°

A rotation of MicroShade® is normally done to optimize the g-value. For vertical facades MicroShade® is never rotated, while MicroShade® in roof windows can be rotated depending on the orientation and inclination of the roof. Rotation should be considered for MS-RW for orientations between northeast (45°) and northwest (315°) for all roof windows. Please contact MicroShade A/S at support@microshade.dk in these cases to get the right rotation angle.

For more information on which MicroShade® type to choose for your project, please see the selection guidelines on www.microshade.dk/downloads-software, or contact us at support@microshade.dk

MicroShade® has now been added to the window. Complete this guideline for all the windows in the IDA ICE model, where you wish to implement MicroShade®.

The model is now ready for simulation of the indoor climate and energy consumption. Go to the "Simulation" tab and choose the desired simulation type. For daylight simulation, see the "Daylight simulation with MicroShade® in IDA ICE" section in this guideline.

Daylight simulations in IDA ICE

IDA ICE daylight module can only calculate the daylight factor or the illuminance level at one point in time. Both daylight measures are very simple and do not give information about the varying daylight conditions that users will experience. It is therefore not recommended only to use the daylight factor.

In order to assess the daylight conditions more realistically it is recommended to use either Useful Daylight Illuminance (UDI) or Daylight Autonomy (DA) as the evaluation parameter when simulating daylight conditions of a room or building. MicroShade® therefore recommends using software such as Radiance, DAYSIM or DIVA for in depth daylight simulations.

UDI describes how many hours, workhours or percentage of the year where the daylight levels are within the desired interval (usually 100-3000 lux). Lower illuminance levels requires artificial light and higher illuminance levels causes a large risk of overheating and glare. UDI is calculated based on weather data for every hour of a year.

DA describes how many hours, workhours or percentage of the year where the daylight levels are above a certain limit, usually 300 lux or 500 lux. DA is also calculated based on weather data for every hour of a year.

Daylight simulation with MicroShade® in IDA ICE

1. After MicroShade® has been successfully added in the windows, a daylight simulation can be performed from the "Daylight" tab. There are two kinds of simulations available in v. 4.8 IDA ICE: Daylight factor and illuminance. Setup up the simulation by choosing type of simulation, date and time.

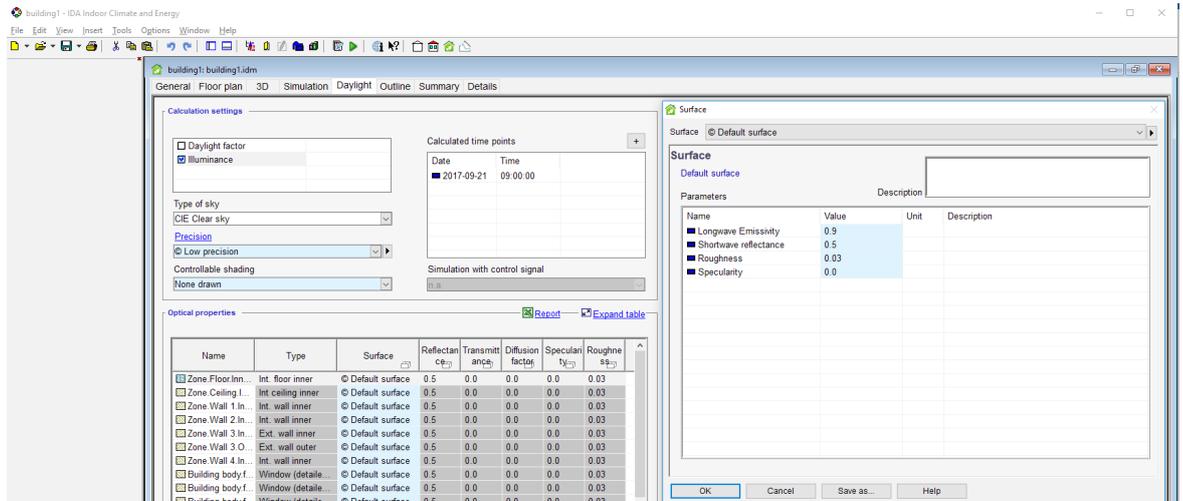


Figure 7: The "Daylight" menu. Reflectances of the surfaces can be edited, by double clicking on the appropriate surfaces in the "Optical properties" menu in the bottom left corner.

2. For the daylight simulation, it is also important to define correct reflectance's of the surfaces. This can be done, by double clicking the surface you want to edit in the "Optical properties" menu, see figure 7. You can then change the reflectance or other parameter for the surface. If the surface type is in use on other surfaces, you will have to make a copy of the surface, with changed values. IDA ICE will automatically ask you to do this.
3. When the reflectances of the surfaces have been defined, a simulation can be performed. The results are displayed in the menu in the bottom right corner of the "Daylight" tab. If more than one date and time has been simulated for the illuminance simulation, the different simulations can be viewed by clicking on the simulation dates above the results menu.