Guideline to building simulations with MicroShade® in IDA ICE

This is a guideline to indoor climate and daylight simulations with MircoShade® 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 version 4.9.9 or later allows for climate based daylight calculations.

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.com

Simulation of MicroShade® in IDA ICE

About MicroShade®
MicroShade® is a highly effective shading product consisting of an almost invisible film combining UV and IR coatings with a structured micro-lamella. 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 course of the day due to the different positions of the sun morning, noon and evening

For façade applications[1] MicroShade® is commonly combined with either a low energy coating or an extra low energy coating. An extra low energy coating provides a stronger shading, whilst a low energy coating allows more daylight inside.
For roof applications an extra low energy coating is typically used, and for even stronger shading it is possible to combine MicroShade® with a hard coated solar control coating (SCH) on the front glass. For more information on selection of MicroShade® type please see our selection guidelines on www.microshade.com
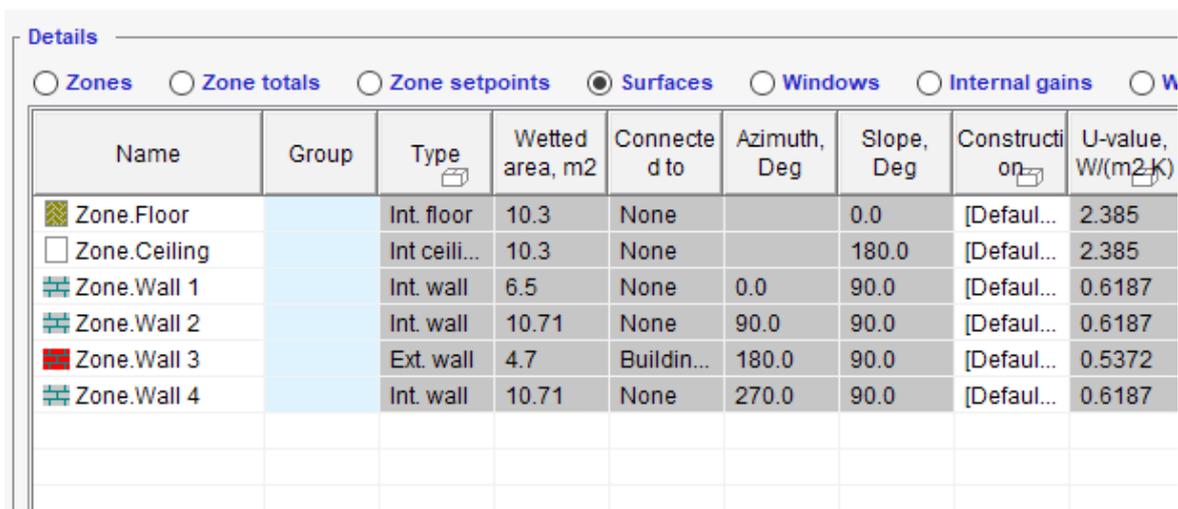
About IDA ICE
IDA ICE comes in two different versions: standard and expert. This guideline can be used by both versions. MicroShade® is implemented in version 4.8 of IDA ICE and it is therefore not possible to include MicroShade® in earlier versions of IDA ICE. EQUA also provides a "light" version of 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.

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[1] Facade application means glazing mounted in a near vertical position.

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.

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).

3. 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.
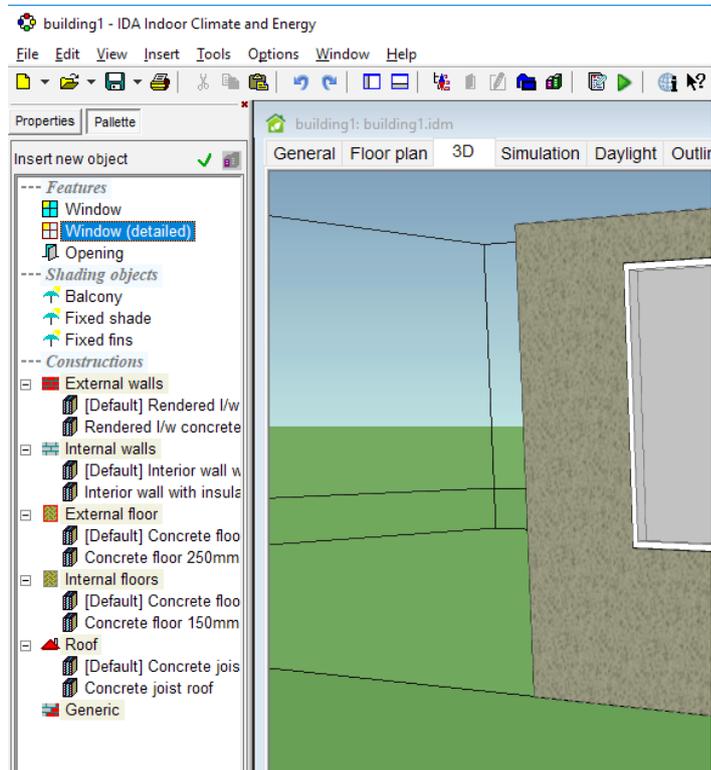

Figure 2: Add a detailed window to the model, by dragging it from the "Palette" menu.

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 or extra lowE on side 3 (and 5 if triple).
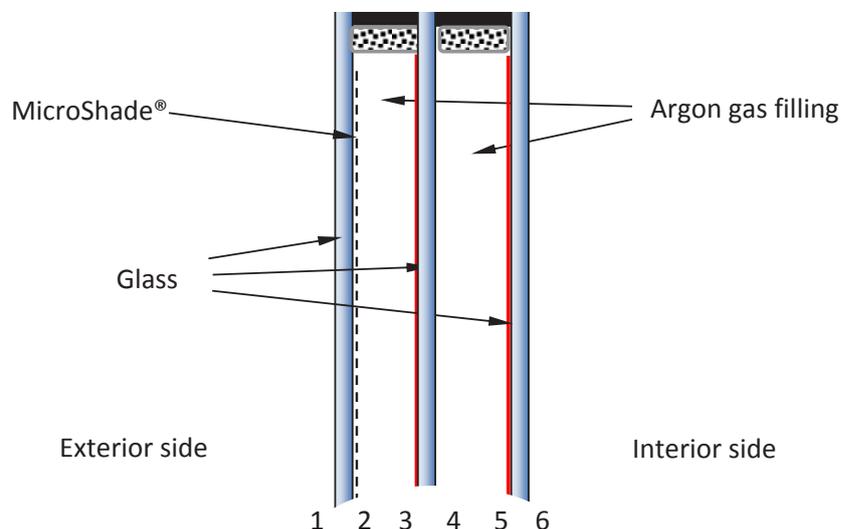

Figure 3: A glazing composition of a 3-layer LowE window with MicroShade®.
The numbers indicate the indexing of the glazing surfaces.

Important: It is not possible to combine MicroShade® with solar control coatings. MicroShade can only be combined with lowE and extra lowE coatings. Typical lowE and extra lowE coatings are e.g. "SSG PLANITHERM XN" or "SSG PLANITHERM ONE" found in the glass database.

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®. Thus it is important, to select a non-coasted float glass as the first, exterior, glass e.g. "SSG PLANICLEAR 6mm (Saint-Gobain)". 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.
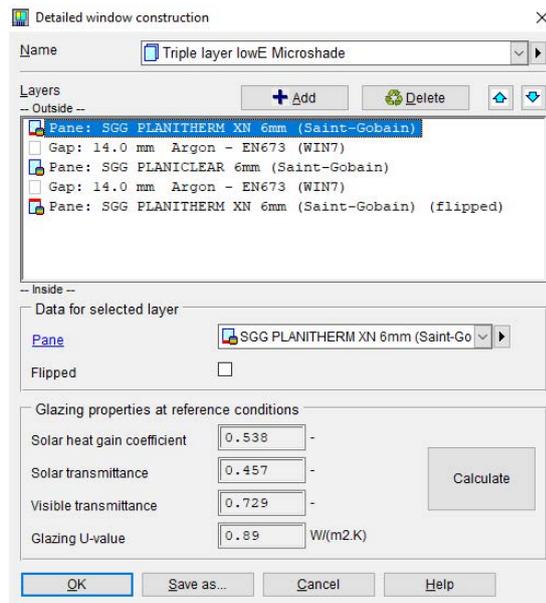

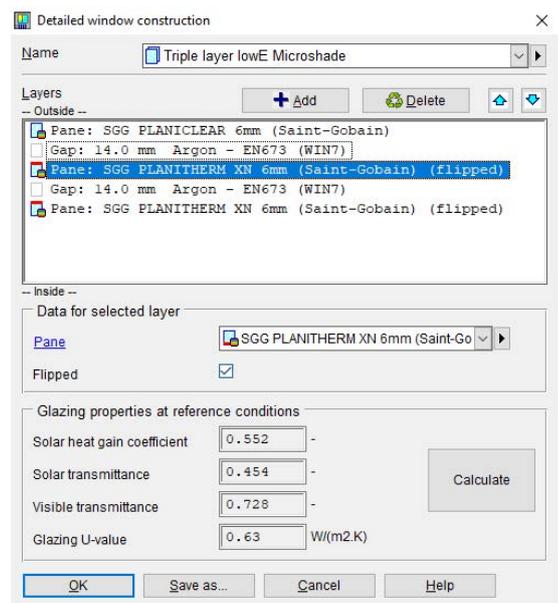Figure 4: **Incorrect** position of the LowE coatings.   Figure 5: **Correct** position of the LowE coatings

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", and select "load from database". In the newly opened window, double click on the desired MicroShade® to include it in your model.
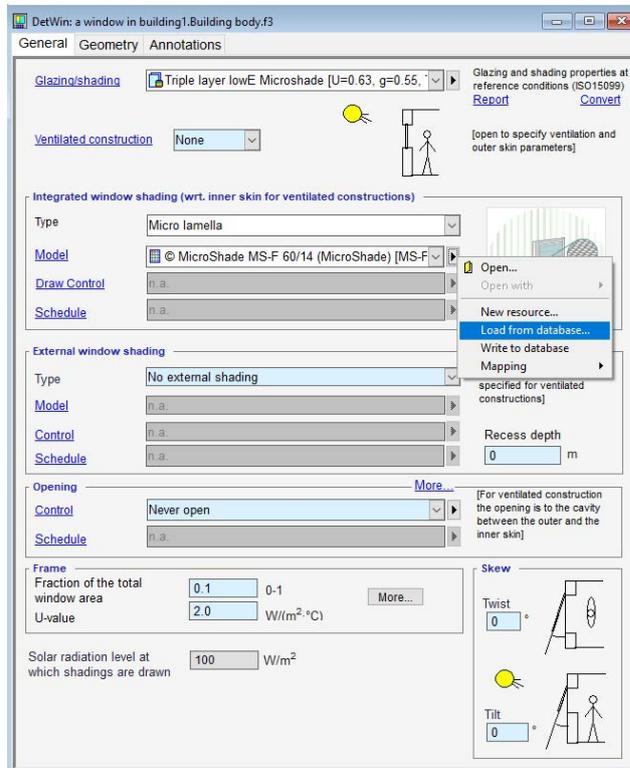

Figure 6: Choose "Micro lamella" from shading type list and select "load from database" under model, choose the desired MicroShade®

Rotation of MicroShade®
A rotation of MicroShade® can be done to optimize the g-value. For vertical facades MicroShade® are never rotated, while MicroShade® in roof windows can be rotated depending on the orientation and tilt of roof. Rotation should be considered for orientations between northeast (45˚) and northwest (315˚) for roof windows at tilts between 25˚ and 70˚. The rotation angle is always 90˚. Please contact MicroShade® **support@microshade.com** to confirm if rotation is beneficial.

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 in version 4.9 or later can do a whole year simulation based on climate data. Previous versions can only calculate the daylight factor and the illuminance level at one point in time. The two latter daylight measures are very simple and do not give information about the varying daylight conditions that users will experience. It is therefore recommended to use the climate based calculation. In Europe it is recommended to use the spatial daylight autonomy as described in EN 17037.

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 three kinds of simulations available in v. 4.9.9 IDA ICE: Daylight factor, illuminance and whole year illuminance. It is recommended to use the whole year illumination. Setup up the simulation by choosing type of simulation. Date and time has to be specified for the first two types.

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 fugure 7. You can then change the reflectance or other parameters 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.
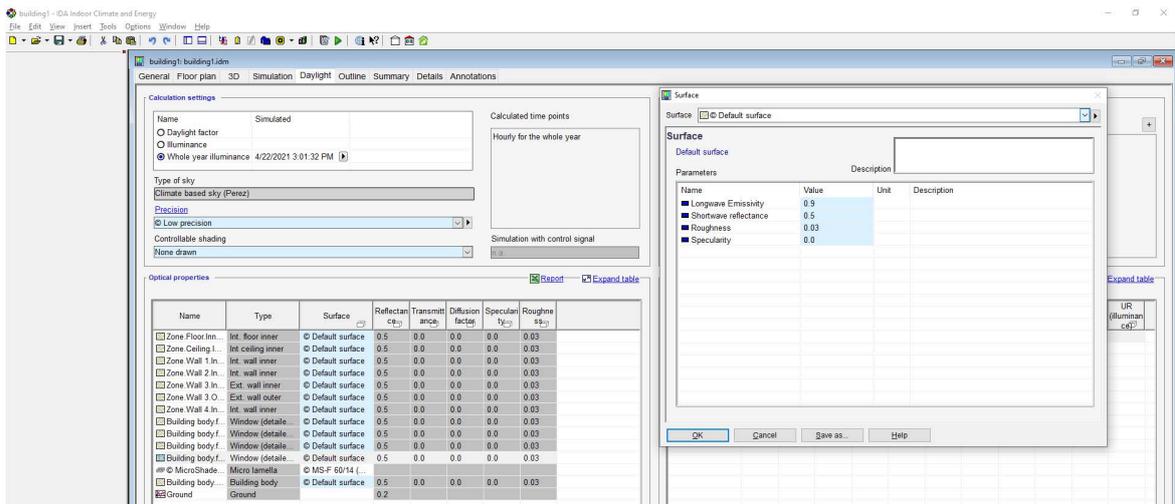

Figure 7: The "Daylight menu. Reflectances of the surfaces can be edited, by double clicking on the appropriate surfaces in the "Optical properties" menu in the bottom left corner.

3. The next step is to add the measuring plane(s) to the calculation. The easiest way to do this, is to add the zones that should be calculated, and define the height above the floor, distance from the wall and the space between the calculation points. We recommend to use relevant and valid standards such as EN 17037 to specify these.
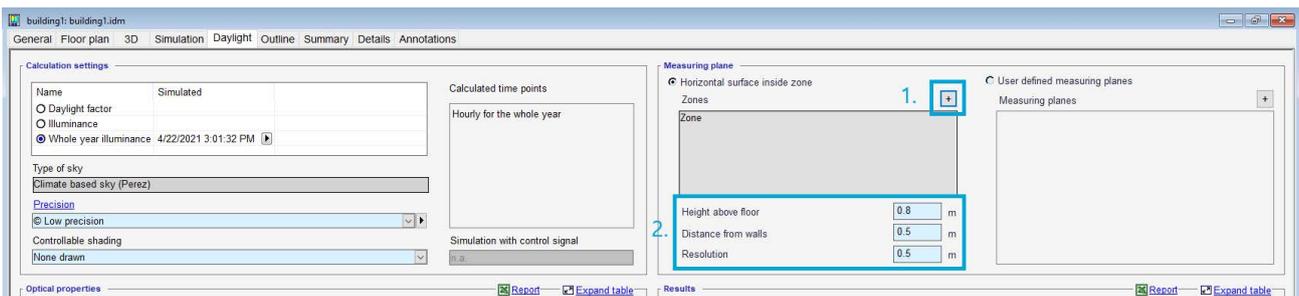

Figure 8: Steps to ad calculation plane based on zones. 1. Click the "+" symbol and select the zones you want to calculate. 2. Define Height above floor, distance from wall and Resolution.

4. Under "precision" select the desired precision. **We always recommend to only use results obtained using high precision**. However since these calculations can take several hours the functionality of the model can be assessed by running a calculation with low precision.

5. Click "Run" in the lower left corner and wait. When the calculation has finished, the results can be explored in the results menu in the tab. Please note that in order to find the results of the "Whole year illuminance" calculation, you will have to double click on the zone in the results tab, a new window will then open and calculated metrics can be assessed. Alternatively the results can be assessed by clicking on the arrow next to the calculation you have chosen in the upper left corner. Here you can get a report and a simulation of your results.
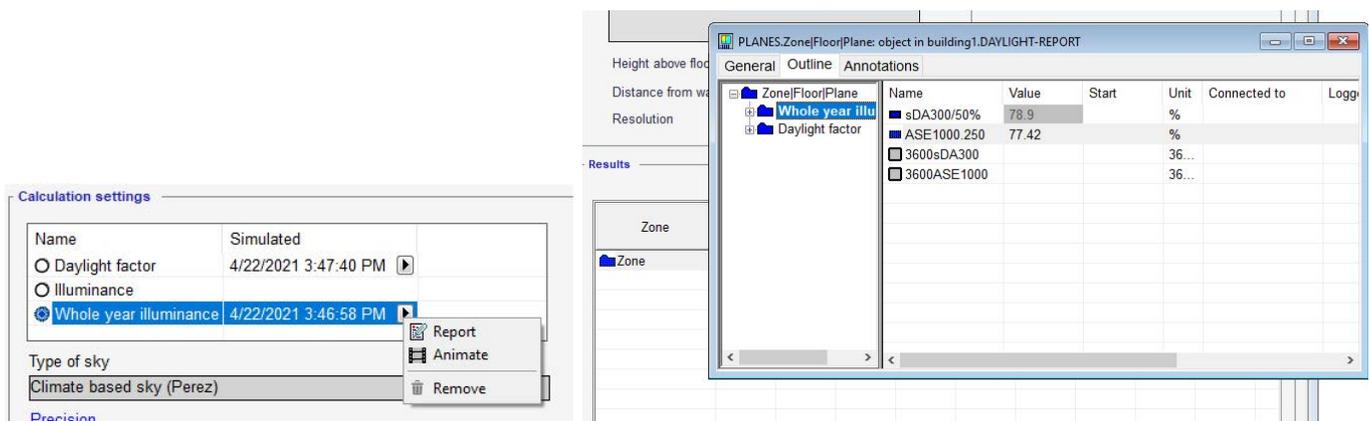

Figure 9: Extract your results as a report or explore the results as an animation through the menu in the upper left corner

Figure 10: The results can also be found in the results menu. Note "Whole year illuminance" results only can be found in this menu by double clicking on the zone in the table. Results from the other calculations will be shown in the table.

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