

Validation of g-value and optical transmission of MicroShade® MS-RS

The thermal and optical characteristics of MicroShade® MS-RS have been validated by the Fraunhofer Institute for Solar Energy Systems in Freiburg, Germany. The results are presented in the reports *TAG3-UA-1209-E03 Testing of the g-value of two glazing products with integrated MicroShade® layer* and *TAG3-HRW-1304-E08 Angle-dependent light and solar transmittance measurements on three MicroShade® samples*. The key thermal and optical results from the reports are shown below.

g-value

The validation of the g-value was performed on a triple-glazed unit with MicroShade® MS-RS consisting of (from outside to inside):

4 mm ESG float glass + MicroShade® MS-RS - 18 mm argon-filled cavity - 4 mm float glass N33 (position 3) - 18 mm argon-filled cavity - 4 mm float glass N33 (position 5)

The table below shows the measured angle dependant g-values (total solar energy transmittance) for the triple-glazed unit with MicroShade® MS-RS and the corresponding calculated values using MicroShade MSpec (MicroShade Performance Calculator) simulation program.

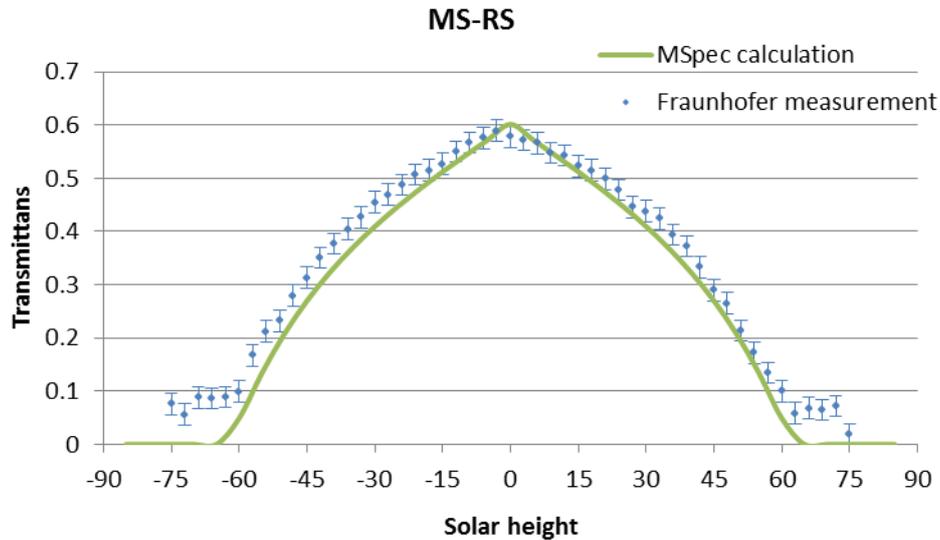
Solar height	g-value measurements Fraunhofer ISE	g-value MSpec MicroShade
0°	0.29 ± 0.03	0.35 ± 0.02
45°	0.15 ± 0.03	0.16 ± 0.02
60°	0.07 ± 0.02	0.03 ± 0.02

The g-values calculated with MicroShade MSpec are within the measurement range except at a solar height of 0°.

Optical transmission

The validation of the optical transmission was performed on a MicroShade® MS-RS strip alone.

The figure below show the measured transmission through the MicroShade® MS-RS strip and the transmission calculated with MicroShade MSpec. The figure shows the varying transmittance of MicroShade® MS-RS with solar height. Since MS-RS is symmetric for varying solar height and azimuth the curves for solar height is also valid for the azimuth direction.



As clearly indicated by the above figures, there is excellent agreement between the measured and calculated values.

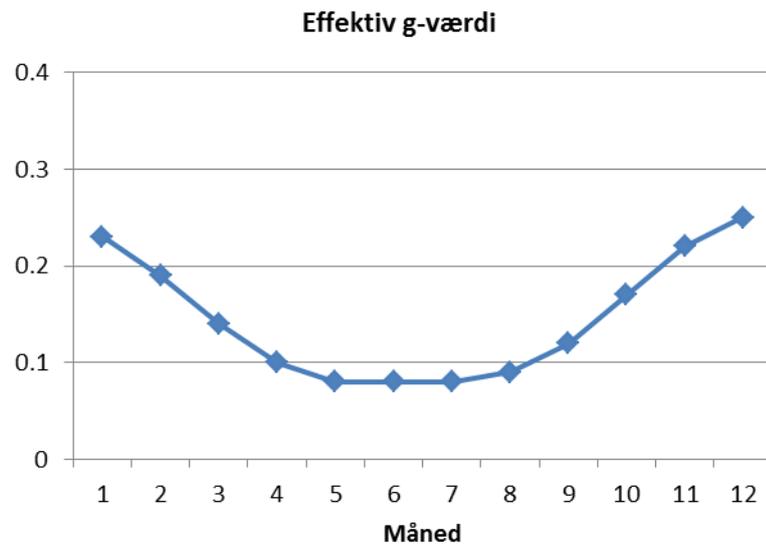
Effective g-value

The g-value is normally quoted for the perpendicular solar radiation on the window pane, also called **g₀-value**.

MicroShade® is a progressive sun protection product in which the angle of the solar radiation determines the shading effect. Thus the g-value of MicroShade® varies according to the altitude and position of the sun and cannot be described with just a single number (g₀-value). Instead, the **effective g-value**, which reflects the actual solar radiation through the window pane, is measured over a specified period of time. The effective g-value depends on the angle of the solar radiation, i.e. the position of the sun and is calculated on the basis of weather data.

In the table and graph below, the effective monthly g-values for a south facing façade in Würzburg (Germany) are shown as an example. The values are calculated with MSPEC and use the verified data above.

Month	Effective g-value
Jan	0.23
Feb	0.19
Mar	0.14
Apr	0.10
May	0.08
Jun	0.08
Jul	0.08
Aug	0.09
Sep	0.12
Oct	0.17
Nov	0.22
Dec	0.25



A calculation of the effective g-value for a specific façade or roof location and orientation can be made by contacting MicroShade A/S at support@microshade.dk.