Fraunhofer ISE

Report **TLSF-2607-046**

Characterisation of polymer films according to ASTM E 903-20 for RHODETEC GmbH

For
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The results in this report refer to the tested sample. Fraunhofer ISE did not have any influence on the selection of samples.

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Freiburg, 31 July 2026

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1 Sample description

The test samples used for this report are shown in the following list.
Samples of two different polymer films were supplied by RHODETEC GmbH and delivered on 13th January 2025 to Fraunhofer ISE.

Table 1 Sample descriptions.

Fraunhofer ISE ID	Descriptions as confirmed by RHODETEC GmbH	Thickness (mm)	Dimensions (mm)
TLSF6095	Shade Film SiGr01	0.075	238 mm x 210 mm
TLSF6096	Shade Film SiGr02	0.075	238 mm x 210 mm

2 Description of methods

TestLab Solar Façades is accredited for thermal-optical testing of windows, façades and other products according to DIN EN ISO/IEC 17025:2018. The initial accreditation was in 2006. The accreditation encompasses the determination by measurement and calculation of the g value, transmittance, reflectance and U value. The flexible accreditation also includes procedures developed at Fraunhofer ISE which go beyond the state of the art as documented in standards.

The DAkkS registration number for the accreditation is **D-PL-11140-03-00**.

2.1 Description of spectral transmittance and reflectance measurements in the solar spectral range

The spectral normal-hemispherical transmittance and the spectral near-normal-hemispherical reflectance of the samples were measured in the range from 280 nm to 2500 nm using a Perkin-Elmer Lambda-900 spectrometer and a 220 mm integrating sphere coated with sintered PTFE.
The reference used for the reflectance measurements with the Lambda-900 spectrometer is a mirror reflectance standard that is traceable to reflectance standards calibrated externally by RI.SE, the Swedish national metrological institute (calibration certificate number: 105105-2P02127-K03rev1 of 2020-04-06).
For normal-diffuse measurements, the relevant "gloss trap" is removed, allowing the normal-normal component to leave the sphere undetected.
The angle of incidence was 0° for the transmittance measurements and 8° for the reflectance measurements.

2.2 Calculation of the light and solar energy characteristics

The light and solar energy properties were calculated by weighting the measured near-normal hemispherical reflectance spectrum over the solar spectral range with the hemispherical (global) solar spectral irradiance distribution according to ASTM G 173-23, Table 2, and integrating the result in accordance with ASTM E 903-20.

A computer program developed and validated at Fraunhofer ISE was used to calculate the solar reflectance for hemispherical solar radiation in accordance with ASTM G 173-23.

3 Results

The measurements were carried out between 16.01.2025 and 30.01.2025.

3.1 Calculated technical values for measured samples according to ASTM E 903-20

The technical values calculated according to ASTM E 903-20 from the normal-hemispherical spectra for the samples are presented in Table 2.

Table 2 Summary of normal-hemispherical transmittance values and near-normal-hemispherical reflectance values according to ASTM E 903-20 for the samples described in Table 1.
The uncertainty for reflectance is ±0.02. These uncertainty values do not take the uncertainty of the wavelength calibration into account. With these spectral distributions, we do not expect that the measurement uncertainty would be significantly larger if the wavelength calibration were taken into account.
τ = transmittance with light incident on the labelled surface, ρ= reflectance with light incident on the labelled surface, ρ' = reflectance with light incident on the unlabelled surface, e = (solar) energy, nh = normal-hemispherical.
The values are given to three decimal places to identify small differences or trends.

Fraunhofer ISE ID	Sample	$\tau_{e,nh}$ [-]	$\rho_{e,nh}$ [-]	$\rho'_{e,nh}$ [-]
TLSF6095	Shade Film SiGr01	0.008	0.318	0.827
TLSF6096	Shade Film SiGr02	0.020	0.301	0.727

3.2 Spectra of the samples

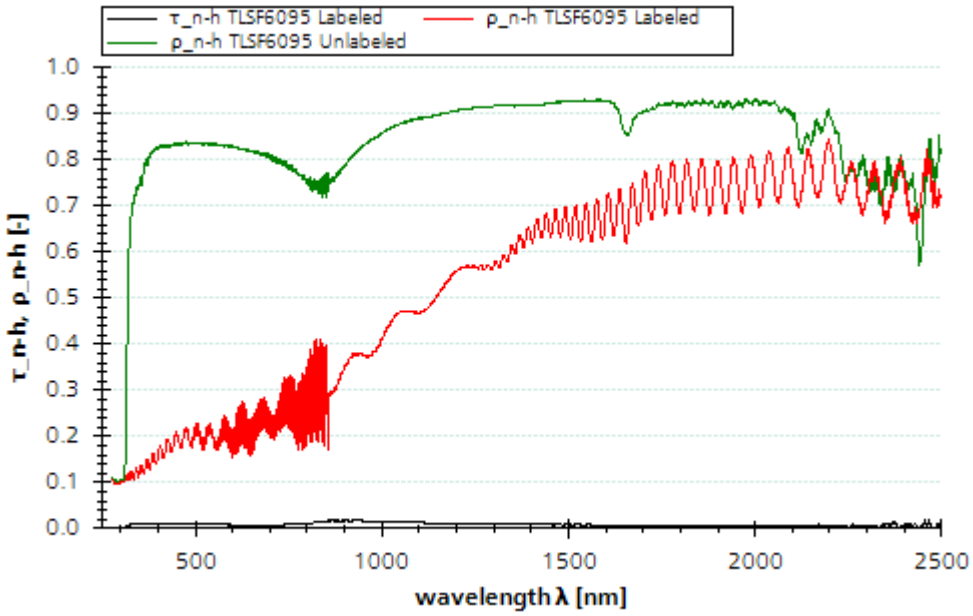

Figure 1 Normal-hemispherical (Tnh), and near-normal-hemispherical reflectance (Rnh) spectra for the sample TLSF6095 (Shade Film SiGr01).

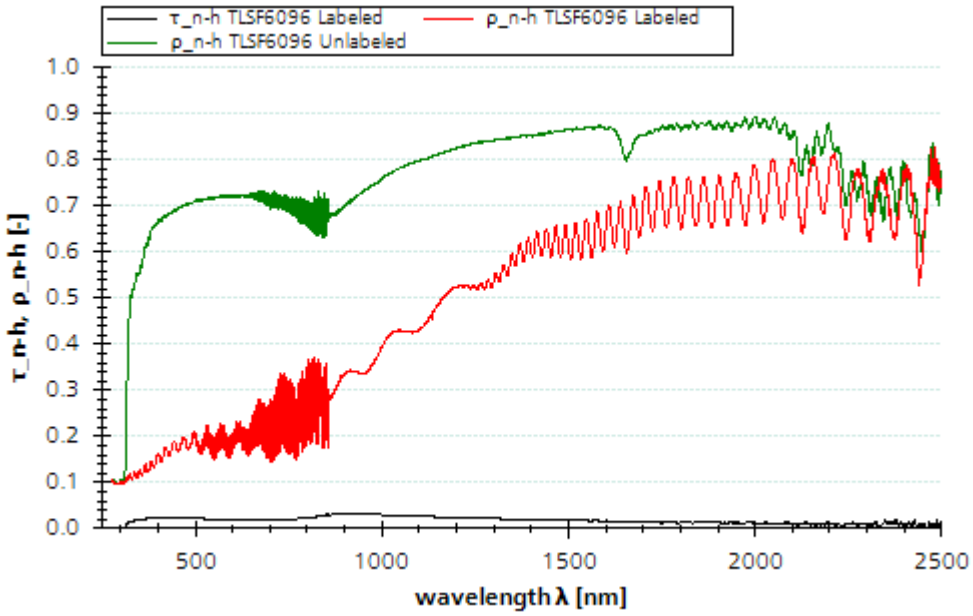

Figure 2 Normal-hemispherical (Tnh), and near-normal-hemispherical reflectance (Rnh) spectra for the sample TLSF6096 (Shade Film SiGr02).

4 References

ASTM E903-20 Standard Test Method for Solar Absorptance, Reflectance and Transmittance of Materials Using Integrating Spheres

ASTM G 173-23 Standard Tables for Reference Solar Spectral Irradiances: Direct Normal and Hemispherical on 37° Tilted Surface