ilac-MRA ENAC ENSAYOS Nº 4/LE024

The calculations included in Annex 1 are not within the scope of the ENAC accreditation.

REPORT No. 083345

CUSTOMER	SMART SAVE ENERGY s.r.o.
APPLICANT	MIROSLAV LYSEK
ADDRESS	KAPROVA 42/14, PRAGUE 110 00 (CZECHIA)
PURPOSE	SRI INDEX IN ACCORDANCE WITH ASTM E1980-11
SAMPLE TESTED	WHITE COATING REF. «SMART reflex»
DATE OF RECEIPT	13.09.2024
TEST DATE	17.09.2024
DATE ISSUED	19.09.2024

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Susana Santamaría
Technical Consultant Industry – Lab Services

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CHARACTERISTICS OF THE SAMPLES

On 13th September 2024, TECNALIA received from the company Smart Save Energy s.r.o. four test specimens of coating applied by the Customer measuring 100 mm x 100 mm and referred to as:

«SMART reflex»

The annex 2 includes the technical data sheet for the product tested supplied by the customer.

CALCULATION REQUESTED

The calculation requested is the determination of the **SRI index** of the test specimen received in accordance with **ASTM E1980-11** «Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces».

Two tests must be done prior to the determination of the SRI index;

- Determination of the **solar reflectance** in accordance with **ASTM E903-12** «Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres».
- Determination of the **emissivity** in accordance with **ASTM C1371-15** «Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers».

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TESTS CARRIED OUT

SOLAR REFLECTANCE

The determination of the reflectance between 280 and 2,500 nm was carried out using a Perkin-Elmer Spectrometer Lambda 900 UV/VIS/NIR spectrophotometer with an integrating sphere of 150 mm in diameter and white standard.

The test was carried out under laboratory conditions at (23±2) ºC and a relative humidity of under 70%. The test specimens were conditioned for 24 hours under the laboratory conditions described above.

The method used has the following characteristics:

- Wavelength interval: 5 nm
- Scan speed: 284.6 nm/min
- Slit UV/VIS:1
- Detector gain NIR:4

Six measurements were taken on the test specimens received.

Based on each reflectance measure, solar reflectance was calculated using the selected ordinate method set out in Section 8.3.4.. Ordinates were selected from the values of direct normal solar irradiance specified in Table X2.3 of the ASTM E903-12 «50 Selected Ordinates for G173 Direct Normal Irradiance AM 1.5». The average of the solar reflectance values was calculated.

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EMISSIVITY

The measuring equipment used was an emissometer model AE manufactured by Device & Services Company for low and high emissivity.

The test was carried out under laboratory conditions at (23±2) ºC and a relative humidity of under 70%. The test specimens and test device (Emissometer Model AE) were conditioned for 24 hours under the laboratory conditions described above.

Emissivity values are determined by comparing the minimum standard value estimated at 0.04 using a silver and copper alloy disc and the maximum standard value estimated at 0.88 using a black disc close to perfect black with a value of 1, made of galvanized aluminium and coated with Teflon. The values of these materials of reference are described in technical note 78-2 provided by the Device & Services Company, which explains how these standard emissivity values have been reached.

Ten measurements were taken on the test specimens received and the average was calculated.

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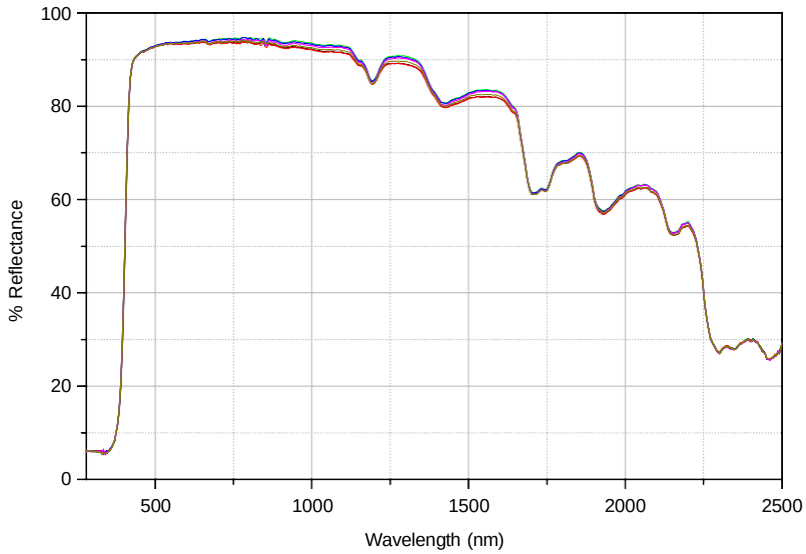
RESULTS

SOLAR REFLECTANCE

The following graph shows the data of the spectral reflectance of the test specimen.



The result of solar reflectance of the test specimen referenced as **«SMART reflex»** is:

Solar reflectance (%)	**86.0 ± 0.7**
Standard deviation	**0.3**

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EMISSIVITY

The results of emissivity are:

Measurement	1	2	3	4	5	6	7	8	9	10
Emissivity	0.84	0.82	0.83	0.83	0.84	0.83	0.84	0.84	0.84	0.84

Therefore, the mean emissivity value of the test specimen referenced as **«SMART reflex»** is:

Emissivity	**0.84 ± 0.04**

SRI

Using the solar reflectance and emissivity values obtained, the following **SRI index** values are obtained, in accordance with the ASTM E1980-11 Standard for different convection coefficients:

Convective coefficient	Wind	SRI
Low (5 W/m^{2}K)	**0-2 m/s**	**106.7 ± 1.2**
Medium (12 W/m^{2}K)	**2-6 m/s**	**107.0 ± 1.1**
High (30 W/m^{2}K)	**6-10 m/s**	**107.4 ± 1.0**

DECLARATION OF UNCERTAINTY

The expanded uncertainty of measurement has been obtained by multiplying the standard uncertainty by the coverage factor k=2 which, for a normal distribution, corresponds to a coverage probability of approximately 95%.

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ANNEX 1

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The ASTM E1980-11 Standard defines the **steady-state surface temperature** T_S as the temperature of the surface, in K, under the standard solar and ambient conditions. For the purpose of the surface temperature calculation the conditions are defined as a solar flux of 1,000 W/m^2, ambient air temperature of 310 Kelvin y sky temperature of 300 K.

The next table shows the surface temperature value in K for each convective coefficient:

Convective coefficient	T_s (K)
Low (5 W/m^{2}K)	318.4
Medium (12 W/m^{2}K)	315.3
High (30 W/m^{2}K)	312.4

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