Material Solar Reflectance Index (SRI) Test Report

Report number: OTM2003003

Client:

Nipo International Pte Ltd

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Attention: Amanda Khoo

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View laboratory profile

The Optical & Thermal Testing Laboratory of OTM Solutions Pte Ltd is accredited to ISO/IEC 17025 under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme (SAC-SINGLAS, Certificate No: LA-2016-0610-G).

The results reported herein have been performed in accordance with the terms of accreditation under the Singapore Accreditation Council.

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Job description: Testing of solar reflectance index (SRI) of a sample.

The sample was delivered by the client and received by OTM on 27/02/2020 and was tested on 29/02/2020 & 01/03/2020.

Approved signatory: Dr. Chen Fangzhi

Laboratory Manager (Tel: +65 9187 7666; Email: chen.fz@otm.sg)

Date of test: 29/02/2020 & 01/03/2020

Date of report: 02/03/2020

Test method description

Methods:	• ASTM E903-12 Standard test method for solar absorptance, reflectance, and transmittance of materials using integrating spheres • ASTM C1371-15 Standard test method for determination of emittance of materials near room temperature using portable emissometers ○ With D&S Technical Note 11-2: Model AE1 emittance measurement using a port adaptor, Model AE-ADP • ASTM E1980-11 Standard practice for calculating solar reflectance index of horizontal and low-sloped opaque surfaces
Instruments	• PerkinElmer Lambda 950 UV/VIS/NIR spectrophotometer, with 150 mm integrating sphere • Reflectance reference material: Spectralon diffuse reference standard (serial number: 99AA03-0319-2095, calibrated on 07/05/2019) • Devices and Services emissometer with scaling digital voltmeter, model AE1 RD1
Environmental conditions	• Temperature: 24 ± 2 °C • Relative humidity: 45 ± 15%

Calculation software and method	• In-house software (SRI@OTM, V1.2.0) based on ASTM E1980 and E903
	  ○ Solar properties were calculated with the weighted ordinate method (Section 8.3 of ASTM E903)
	  ○ The AM1.5 direct normal solar spectral irradiance distribution defined in ASTM E891 was used as the weighting spectrum
	  ○ Surface temperatures were calculated by solving Eq. 1 of ASTM E1980 iteratively

Estimated uncertainties	• ±0.011 (±1.1%) for solar reflectance and absorptance • ±0.02 for emittance • ±1.7 for solar reflectance index (SRI) • The estimated uncertainties do not include uncertainties caused by sample-to-sample variations and sample non-uniformities

Notes	N/A

Disclaimer

- The test report shall not be reproduced except in full, without written approval of the laboratory.
- The sampling was not performed by the laboratory. The test results relate only to the sample received and tested.
- The client's reference information was declared by the client and it may affect the validity of the results.
- The test report is issued subject to the "Testing Service Terms and Conditions" annexed to OTM official quotation and on request from OTM.

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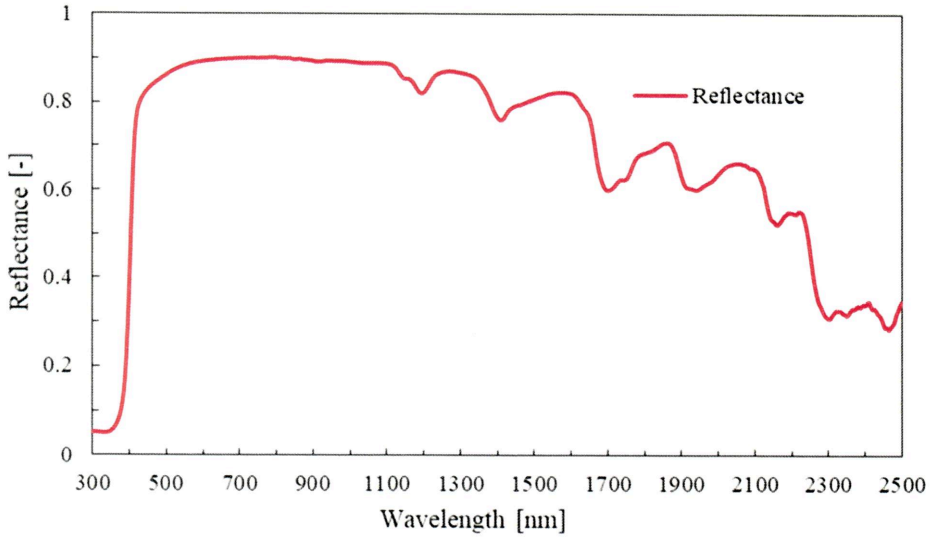
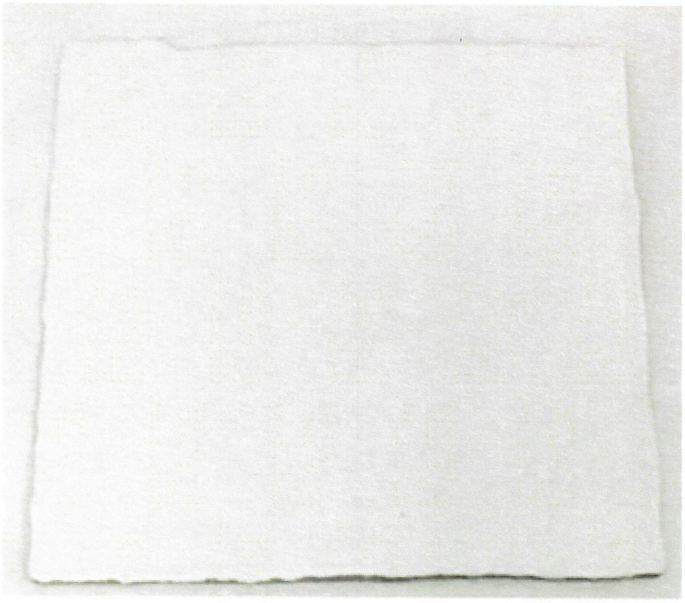
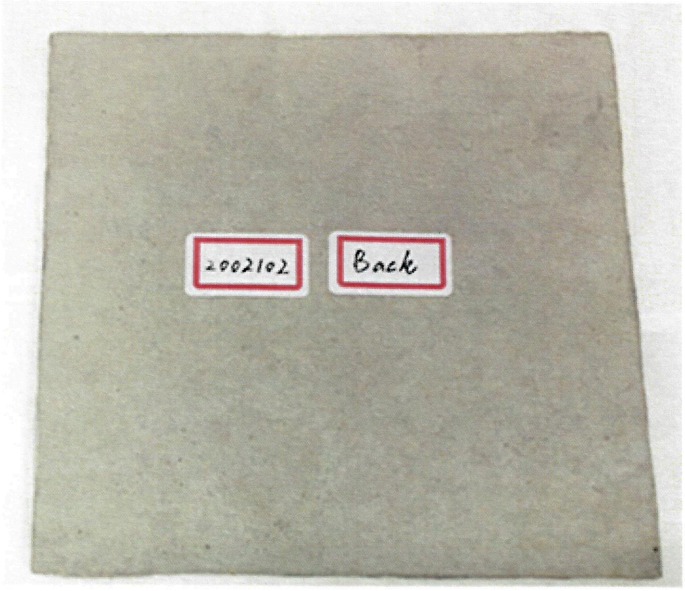
Sample ID	2002102
Client's reference	• Company : NIPO INTERNATIONAL PTE LTD • Product : ThermoShield "WP" – Colour WHITE
Dimension	4 mm × 11.5 cm × 11.5 cm
Test results	Emittance = 0.91 Solar reflectance = 0.829 (82.9%) Solar absorptance = 0.171 (17.1%)

Condition	Low-wind (0 – 2 m/s)	Medium-wind (2 – 6 m/s)	High-wind (6 – 10 m/s)
Black surface temperature, T_b, [K]	376.8	355.6	334.2
White surface temperature, T_w, [K]	322.4	317.8	313.9
Specimen surface temperature, T_s, [K]	319.8	316.1	313.1
Solar reflectance index, *SRI*, [-]	104.8	104.4	104.1

Spectral curve



Photos	 Front side (the side tested)  Back side