Glazing System Solar/Luminous/Thermal Property Test Report

Report number: OTM2306037

Client: **Nanoproof Solutions**

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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: Glazing system solar / luminous / thermal property testing of a single glazing glass sample.

The glass sample was delivered by the client and received by OTM on 26/06/2023 and was tested on 28/06/2023.

Approved signatory: Dr. Chen Fangzhi

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Date of test: 28/06/2023

Date of report: 30/06/2023

Test method description

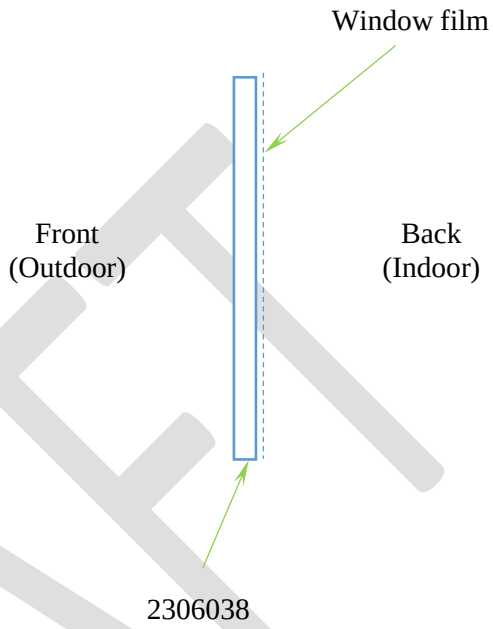
Methods	• ANSI/NFRC 100-2020 Procedure for determining fenestration product U-factors • ANSI/NFRC 200-2020 Procedure for determining fenestration product solar heat gain coefficient and visible transmittance at normal incidence • NFRC 300-2020 Test method for determining the solar optical properties of glazing materials and systems • NFRC 301-2020 Standard test method for emittance of glazing products
Instruments	• PerkinElmer Lambda 950 UV/VIS/NIR spectrophotometer, with 150 mm integrating sphere • PerkinElmer Spectrum Two FTIR spectrometer
Environmental conditions	• Temperature: 24 ± 2 °C • Relative humidity: 45 ± 15%
Calculation software	• Optics 6.0 • Window 7.7.10.0 • IGDB@OTM V1.1.3 (in-house software for IGDB format data generation)
Estimated uncertainties	• ±0.006 for solar energy and visible light transmittance/reflectance • ±0.14 W/(m^{2}K) for U-value • ±0.009 for SHGC • ±0.010 for shading coefficient • The uncertainties were estimated at a level of confidence of approximately 95%, with a coverage factor k = 2 • The estimated uncertainties do not include uncertainties caused by sample-to-sample variations and sample non-uniformities
Notes	• To convert the results from decimals to percentages, multiply the decimals by 100%. Example: visible light transmittance/reflectance of 0.123 is equal to 12.3%.

	• The UV transmittance was calculated according to ISO 9050:2003. UV transmittance is out of the scope of SAC accreditation. • The UV rejection (UVR) was calculated as 1 – UV transmittance. UVR is out of the scope of SAC accreditation. • The light to solar gain (LSG) ratio was calculated as the ratio of the visible light transmittance to the solar heat gain coefficient. LSG ratio is out of the scope of SAC accreditation.

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 sample description 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.

Glazing system description

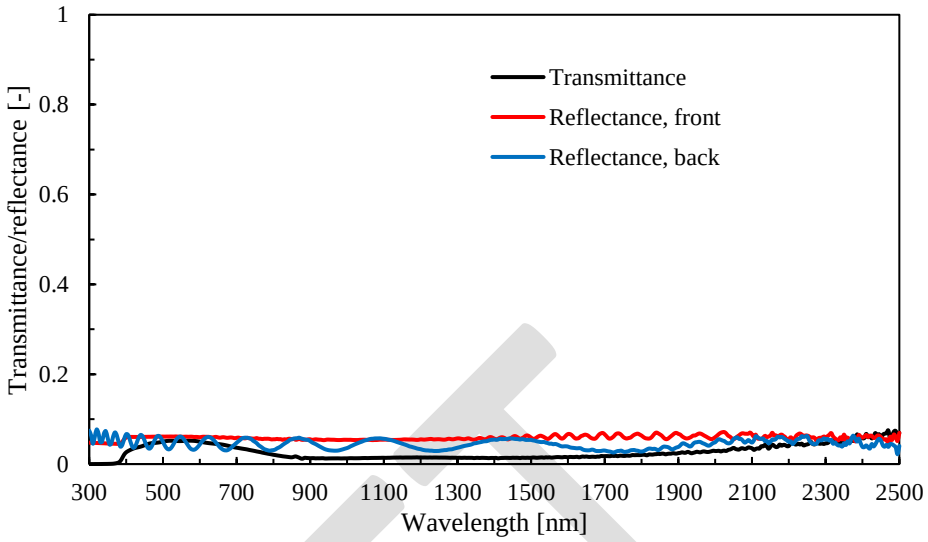
System schematics:	• Nanoproof Solar Films - Alpha Series 
Glazing system test results	Refer to pages 5 – 7

Glazing system test results

Sample ID	2306038
Sample description	Nanoproof Solar Films - Alpha Series
Dimension	5.9 mm × 10 cm × 10 cm
Test results	

Solar energy transmittance	0.029
Solar energy reflectance, front	0.058
Solar energy reflectance, back	0.045
Visible light transmittance	0.050
Visible light reflectance, front	0.061
Visible light reflectance, back	0.047
Emissivity, front	0.845
Emissivity, back	0.897
Solar heat gain coefficient	0.329
Shading coefficient	0.379
Summer condition U-value	5.42 W/(m^2K)
Winter condition U-value	5.98 W/(m^2K)
UV transmittance#	0.001
UV rejection (UVR)#	0.999
Light to solar gain (LSG) ratio#	0.153

Note: results marked with "#" are out of the scope of SAC accreditation.

Curves	
Photos	 Front side