TEST LABORATORY

stfi

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The test laboratory is accredited in compliance with DIN EN ISO/IEC 17025 by the Deutsche Akkreditierungs- stelle GmbH. The accreditation is also valid for products of Regulation EU 2016/425. Test methods not included in the scope of accreditation are marked by a *.

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Deutsche
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D-PL-11239-01-00

TEST REPORT

Order no. STFI:	**P2021 1274.1**
Order no. applicant:	none
Report date:	8th June 2021
Testing officer:	Reinhardt
Applicant:	Zimmer+Rhode GmbH
	Oda Nimmer
	Zimmermühlenweg 14-18
	61440 Oberursel
Testing application:	
of:	31th May 2021
order receipt on:	31th May 2021
sample receipt on:	1th June 2021

Material to analyse:

signed by client	code for order processing
Samplel: 10842 Moonlight FR Material: 100% PES FR, Coating 100% PES FR	P1274_21_1

Sampling was carried out by the applicant; the testing laboratory has no information on this.

Analysis content:

(1) Remission and transmission in the visible light range in accordance with DIN EN 410: 2011-04 (DIN EN 14500: 2008-08)

(2) Remission and transmission in the global radiation range in accordance with DIN EN 410: 2011-04 (DIN EN 14500: 2008-08)

(3)* Calculation of the total energy permeability degree g_{tot} of a window system with sun protective material, following DIN EN ISO 52022-1: 2018-01 and approximate calculation of the reduce factor F_c following DIN EN 14501: 2006-02

* Standards for calculation and assessment are not allowed for accreditation

Conditions and equipment for optical tests:

test parameter	symbol	range of radiation
light transmission degree	$\tau_{v,n-h}$	380...780 nm (standard light D65)
light remission degree	$\rho_{v,n-h}$	380...780 nm (standard light D65)
light absorption coefficient	α_v	380...780 nm
UV - transmission degree	τ_{UV}	280...380 nm (UV-radiation)
solar transmission degree	$\tau_{e,n-h}$	280...2500 nm (global radiation)
solar remission degree	$\rho_{e,n-h}$	280...2500 nm (global radiation)
solar absorption coefficient	α_e	280...2500 nm

Equipment: UV-VIS-NIR double beam spectrophotometer, company PERKIN - ELMER Corp., USA; 150 mm integrating sphere; irradiation perpendicular to the integrating sphere opening; 8° slope of the sample area to the light incidence axis for remission measurements

For each material sample of the client three samples in the format (55 x 75) mm are taken, one in the machine direction, one in the crossmachine direction and one diagonally. The irradiation takes place, if not otherwise noted, on the material side which is faced to the window system (marked by the client).

Test results:

(1) Light range   **UV-range**

Code	light transmission degree	light remission degree	light absorption coefficient	UV-transmission degree [1]
P1274_21	$\tau_{v,n-h}$	$\rho_{v,n-h}$	α_v	τ_{UV}
1	0,0000	0,5467	0,4533	0,0000

[1] In textile samples which were finished with an optical brightener the measured values of the UV-transmission degree could be defective (higher) under the use of the above described measuring method.

(2) Global radiation range

Code	solar transmission degree	solar remission degree	solar absorption coefficient
P1274_21	$\tau_{e,n-h}$	$\rho_{e,n-h}$	α_e
1	0,0010	0,5510	0,4480

(3)* Total energy permeability degree g_{tot} and reduce factor F_c

Code	Single glazing U_g=5,8 W/(m²K) g=0,85		Double glazing with air interspace U_g=2,9 W/(m²K) g=0,76		Double glazing with low emission degree and argon interspace U_g=1,2 W/(m²K) g=0,59		Triple glazing with low emission degree and argon interspace U_g=0,8 W/(m²K) g=0,55	
P1274_21	g_{tot}	F_c	g_{tot}	F_c	g_{tot}	F_c	g_{tot}	F_c
1	0,39	0,46	0,41	0,54	0,39	0,66	0,38	0,69

Code	Reference glass D - DIN EN 14501: 2006-02	
	Reflective double glazing with a low emissivity soft coating U_g=1,1 W/(m²K) g=0,32	
P1274_21	g_{tot}	F_c
1	0,26	0,81

Mounting assumptions:
- sun protective material inside and closed
- aerated interspace to the glazing

The mathematical model in DIN EN ISO 52022-1: 2018-01 (simplified method) for calculation of g_{tot} is appropriated to a coarse compare of sun protection materials. The model is only valid for the following boundary requirements:

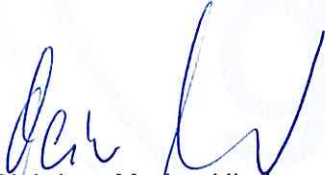- $0 \leq \tau_{e,n-h} \leq 0,5$
- $0,1 \leq \rho_{e,n-h} \leq 0,8$

If the above mentioned boundary requirements are not fulfilled, the calculation of F_c from g_{tot} and g is not guaranteed either. The calculation is recommended in accordance with DIN EN ISO 52022-3: 2018-01 (detailed calculation method). There fore it is necessary to measure the reflection of the sample side which is not directly exposed by the sun radiation and the sample thickness at least in addition to the data of this order. In case of known conditions to be used at a building it is unalterable.

The results are mean values from three measurements.

Further information on the test methods and results are available at the testing laboratory and can be provided to the applicant upon request.

The test results refer to the delivered specimen. This test report shall not be published in parts. The testing period is defined as timeframe between receipt of the sample and issue date of test report.

Unless otherwise agreed, all materials we received within this order will be kept for a maximum time of 6 months. Materials which are not stored because of technical or safety reasons are excluded from that.

Dipl.-Ing. Marian Hierhammer
Head of testing department

Patrick Reinhardt, M.Sc.
Responsible testing officer