

# TEST LABORATORY



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The test laboratory is accredited in compliance with DIN EN ISO/IEC 17025 by the Deutsche Akkreditierungsstelle 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 \*.



## TEST REPORT

**Order no. STFI:**

**P2025 0230**

Order no. applicant:

none

Report date:

11<sup>th</sup> February 2025

Testing officer:

Reinhardt

**Applicant:**

Aktiebolaget Ludvig Svensson  
Mrs. Caroline Hultberg  
Bangatan 8  
51182 KINNA  
SWEDEN

**Testing application:**

of:

4<sup>th</sup> February 2025

order receipt on:

4<sup>th</sup> February 2025

sample receipt on:

6<sup>th</sup> February 2025

## Material to analyse:

signed by client		code for order processing
Dual Reflect	colour: 8100	P0230_25_1
Dual Reflect	colour: 5511	P0230_25_2
Dual Reflect	colour: 6621	P0230_25_3

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

## Analysis content:

- (1) Measurement of the remission and transmission in the visible light range in accordance with DIN EN 14500: 2021-09
- (2) Measurement of the remission and transmission in the global radiation range in accordance with DIN EN 14500: 2021-09
- (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  $F_c$
- (4) Measurement of the direct und diffuse transmission in the visible light range in accordance with DIN EN 14500: 2021-09
- (5)\* Classification of glare control in accordance with DIN EN 14501: 2021-09 (p.20; paragraph 6.3; table 7)
- (6)\* Classification of privacy night in accordance with DIN EN 14501: 2021-09 (p.21; paragraph 6.4; table 8)
- (7)\* Classification of the visual contact with the outside in accordance with DIN EN 14501: 2021-09 (p.22; paragraph 6.5; table 9)
- (8)\* Classification of the daylight utilisation in accordance with DIN EN 14501: 2021-09 (p.22; paragraph 6.6; table 10) on the basis of the diffuse/hemispherical light transmission degree  $\tau_{v,dif-h}$ , approximately calculated after equation 32 in DIN EN 14500: 2021-09

\* Standards for calculation and assessment are not allowed for accreditation

## Conditions:

### 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	$\alpha_v$	(380 – 780) nm (standard light D65)
UV - transmission degree	$\tau_{UV}$	(280 – 380) nm
solar transmission degree	$\tau_{e,n-h}$	(300 – 2500) nm
solar remission degree	$\rho_{e,n-h}$	(300 – 2500) nm
solar absorption coefficient	$\alpha_e$	(300 – 2500) nm
normal/normal light transmission degree	$\tau_{v,n-n}$	(380 – 780) nm (standard light D65)
normal/diffuse light transmission degree	$\tau_{v,n-dif}$	(380 – 780) nm (standard light D65)

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 cross machine direction and one diagonally. The irradiation takes place, if not otherwise noted, on the material side which is faced to the solar radiation in usage (face side marked by client, back side which is facing to the window tested). The results at least are mean values of three measurements.

### Description of classification for visual comfort:

Description of classification for glare control, privacy night, visual contact with the outside and the daylight utilisation is given in DIN EN 14501: 2021-09 (p.16; paragraph 6.1, table 5).

Influence on visual comfort					
class	0	1	2	3	4
	very small effect	small effect	moderate effect	high effect	very high effect

## Test results:

### (1) Light range and UV-range

Code	light transmission degree	light remission degree	light absorption coefficient	UV-transmission degree <sup>1)</sup>
P0230_25	$\tau_{v,n-h}$	$\rho_{v,n-h}$	$\alpha_v$	$\tau_{UV}$
1	0,166	0,764	0,070	0,128
2	0,144	0,755	0,101	0,105
3	0,140	0,758	0,102	0,092

<sup>1)</sup> For textile products that have fluorescence effects (e.g. due to the finishing with optical brighteners) the measured result of the UV-transmission degree using the measurement method described above can be incorrect (increased).

### (2) Global radiation range

Code	solar transmission degree	solar remission degree	solar absorption coefficient
P0230_25	$\tau_{e,n-h}$	$\rho_{e,n-h}$	$\alpha_e$
1	0,172	0,758	0,070
2	0,160	0,753	0,087
3	0,156	0,756	0,088

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

#### Usage as internal sun protection material

	Single glazing		Double glazing with air filling		Double glazing with argon filling and low-e coating	
Code	$U_g = 5,8 \text{ W/(m}^2\text{K)}$ $g = 0,85$		$U_g = 2,9 \text{ W/(m}^2\text{K)}$ $g = 0,76$		$U_g = 1,2 \text{ W/(m}^2\text{K)}$ $g = 0,59$	
P0230_25	$g_{tot}$	$F_c$	$g_{tot}$	$F_c$	$g_{tot}$	$F_c$
1	0,29	0,34	0,32	0,42	0,32	0,55
2	0,29	0,35	0,32	0,42	0,33	0,55
3	0,29	0,34	0,32	0,42	0,32	0,55

	Solar controlled double glazing with argon filling and low-e coating		Triple glazing with argon filling and low-e coating	
Code	$U_g = 1,1 \text{ W/(m}^2\text{K)}$ $g = 0,32$		$U_g = 0,8 \text{ W/(m}^2\text{K)}$ $g = 0,55$	
P0230_25	$g_{tot}$	$F_c$	$g_{tot}$	$F_c$
1	0,24	0,75	0,32	0,58
2	0,24	0,76	0,32	0,58
3	0,24	0,75	0,32	0,58

### Mounting assumptions:

- sun protective material inside and closed
- aerated air 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 for 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.

### (4) Diffuse and normal transmission degree

Code	normal/hemispherical light transmission degree	normal/diffuse light transmission degree	normal/normal light transmission degree
P0230_25	$\tau_{v,n-h}$	$\tau_{v,n-dif}$	$\tau_{v,n-n}$
1	0,166	0,165	0,001
2	0,144	0,144	0,000
3	0,140	0,140	0,000

### (5-8)\* Classification


Code	glare control	privacy night	sight contact with the outside
P0230_25			
1	2	2	0
2	3	3	0
3	2	2	1

Code	diffuse/hemispherical light transmission degree	daylight utilisation
P0230_25	$\tau_{v,dif-h}$	
1	0,148	2
2	0,129	2
3	0,125	2


Further information on the test procedures or results are available at the accredited testing laboratory and can be provided to the client upon request.

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

All materials received in connection with this order will be stored for a maximum period of six months unless agreed otherwise. Exempted from this practice are materials which will not be stored due to technical or safety-related reasons.



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field responsible collaborator