

PRÜFSTELLE TEXTIL



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DIN EN ISO/IEC 17025 akkreditierte Prüfstelle.
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enthaltene Prüfverfahren sind mit einem * gekennzeichnet.



Von der Federation Internationale de L'Automobile (FIA) Paris zugelassene Stelle zur Prüfung von hitze-
und flammresistenter Schutzkleidung für Auto-Rennfahrer gemäß Standard FIA 8856-2000

UNTERSUCHUNGSBERICHT | TESTREPORT

Order number STFI: 20181490.1

Report date: 20 June 2018
Person responsible: Reinhardt

Orderer: DELIUS GmbH
Angelika Schmidt-Koch
Goldstr.16-18
33602 Bielefeld

Test order:

Date: 13 June 2018
Order received: 14 June 2018
Material received: 14 June 2018

Material to analyse:

1 samples sun protective material

signed by client	code for order processing
Sample 29443-1551 „Sisto Dimout“	P1490_18_1

The sampling was supplied by the client. The test department is not informed about the sampling procedure.

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
- (4) Spectral values in the radiation range 300nm – 2500nm

* 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/Visible/NIR spectrophotometer Lambda 900, 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 window system (marked by the client). During the measurement an circular area with a diameter of 25 mm (integrating sphere port) is covered by the sample.

Test results:
(1) Light range
UV-range

Code	light transmission degree	light remission degree	light absorption coefficient	UV-transmission degree
P1490_18	$\tau_{v,n-h}$	$\rho_{v,n-h}$	α_v	τ_{uv}
1	0,0000	0,6607	0,3393	0,0000

(2) Global radiation range

Code	solar transmission degree	solar remission degree	solar absorption coefficient
P1490_18	$\tau_{e,n-h}$	$\rho_{e,n-h}$	α_e
1	0,0013	0,6260	0,3727

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

	Single glazing		Double glazing with air interspace		Double glazing with low emission degree and argon interspace		Triple glazing with low emission degree and argon interspace	
Code	$U_g=5,8 \text{ W/(m}^2\text{K)}$ $g=0,85$		$U_g=2,9 \text{ W/(m}^2\text{K)}$ $g=0,76$		$U_g=1,2 \text{ W/(m}^2\text{K)}$ $g=0,59$		$U_g=0,8 \text{ W/(m}^2\text{K)}$ $g=0,55$	
P1490_18	g_{tot}	F_c	g_{tot}	F_c	g_{tot}	F_c	g_{tot}	F_c
1	0,35	0,41	0,37	0,49	0,36	0,62	0,36	0,65

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). Therefore it is necessary to measure reflection to the not the radiation exposed side and 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; spectrograms are kept in the test department.

(4) Spectral values

Sample code: P1490_18_1

λ in nm	T in %	R in %	A in %
300	0,0000	5,6198	94,3802
310	0,0950	6,5228	93,3821
320	0,0889	7,5943	92,3168
330	0,0618	8,0676	91,8705
340	0,0421	9,7884	90,1695
350	0,0238	14,1928	85,7834
360	0,0003	24,5524	75,4474
370	0,0381	43,0198	56,9421
380	0,0441	56,2053	43,7505
390	0,0399	61,4587	38,5014
400	0,0379	62,7493	37,2128
410	0,0322	62,8284	37,1394
420	0,0262	61,7675	38,2063
430	0,0257	61,4031	38,5711
440	0,0371	61,0218	38,9411
450	0,0490	59,6826	40,2685
460	0,0066	62,5591	37,4343
470	0,0000	65,4389	34,5611
480	0,0068	66,2175	33,7757
490	0,0782	66,2997	33,6222
500	0,0660	66,3507	33,5833
510	0,0083	66,0043	33,9874
520	0,0002	65,5234	34,4764
530	0,0016	65,6169	34,3815
540	0,0021	65,8013	34,1967
550	0,0203	65,6759	34,3038
560	0,0418	65,4171	34,5411
570	0,0305	65,8768	34,0926
580	0,0281	66,5895	33,3824
590	0,0286	67,1324	32,8390
600	0,0307	67,1656	32,8037
610	0,0270	67,0453	32,9277
620	0,0318	66,9621	33,0061
630	0,0275	66,7823	33,1902
640	0,0253	66,6898	33,2848

λ in nm	T in %	R in %	A in %
650	0,0318	66,7180	33,2502
660	0,0389	66,8330	33,1281
670	0,0585	67,2126	32,7289
680	0,0808	67,2698	32,6494
690	0,0859	67,2343	32,6798
700	0,0862	67,1423	32,7715
710	0,0878	67,0615	32,8507
720	0,0931	66,9517	32,9552
730	0,0987	66,6681	33,2332
740	0,0966	66,5065	33,3970
750	0,0976	66,5096	33,3927
760	0,1078	66,4261	33,4661
770	0,1012	66,3901	33,5087
780	0,1038	66,2984	33,5978
790	0,1337	65,9641	33,9022
800	0,1391	65,9816	33,8793
850	0,1058	65,4533	34,4409
900	0,4181	65,3255	34,2564
950	0,3519	64,6229	35,0252
1000	0,4516	64,3069	35,2415
1100	0,0000	63,4785	36,5215
1200	0,2712	62,7772	36,9516
1300	1,0829	62,3848	36,5323
1400	0,3131	61,5733	38,1136
1500	0,7542	61,8843	37,3615
1600	0,0000	60,9112	39,0888
1700	0,2912	58,4958	41,2130
1800	0,4810	59,7105	39,8084
1900	0,0000	57,8879	42,1121
2000	0,5327	60,0540	39,4134
2100	0,1046	57,2640	42,6314
2200	0,4989	56,7908	42,7103
2300	0,0000	47,4580	52,5420
2400	0,0102	47,5467	52,4431
2500	0,0000	46,8640	53,1360

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

The testing period is defined as timeframe between receipt of samples and issue date of test report.

The test results are referring to the submitted samples. These test report is not allowed to copy in parts.



Dipl.-Ing. Marian Hierhammer
head of test department



Patrick Reinhardt, M.Sc.
field responsible collaborator

stfi
geprüft