# PRÜFSTELLE TEXTIL

**ilac-MRA** (( **DAkkS**
Deutsche
Akkreditierungsstelle
D-PL-11239-01-00

**SÄCHSISCHES
TEXTIL
FORSCHUNGS
INSTITUT e.V.**

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 I TESTREPORT

**Order number STFI:**      **20180960.3**

Report date:      2018-04-17
Person responsible:      Reinhardt

**Orderer:**      Vescom B.V.
Sint Jozefstraat 20
5753 AV Deurne
NETHERLAND

**Test order:**

Date:      2018-04-10
Order received:      2018-04-12
Material received:      2018-04-12

**Material to analyse:**

1 samples sun protective material

| signed by client | colour | code for order processing |
|---|---|---|
| Bedra + print | 8061 | P0960_18_4 |

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)*    Calculation of the total energy permeability degree $g_{tot}$ and the direct solar transmittance $\tau_{e,tot}$ of a window system with sun protective material, following DIN EN ISO 52022-1: 2018-01 and approximate calculation of the reduce factor $F_c$ and the secondary heat transfer factor $q_{i,tot}$ following DIN EN 14501: 2006-02 (only for reference glazing C of DIN EN 14501: 2006-02)

(5)    Direct und diffuse transmission measurement in the visible light range in accordance with DIN EN 410: 2011-04 (DIN EN 14500: 2008-08)

(6)*    Classification of glare control in accordance with DIN EN 14501: 2006-02 (p.15; paragraph 6.3; table 8)

(7)*    Classification of privacy night in accordance with DIN EN 14501: 2006-02 (p.16; paragraph 6.4; table 9)

(8)*    Classification of the visual contact with the outside in accordance with DIN EN 14501: 2006-02 (p.17; paragraph 6.5; table 10)

(9)*    Classification of the daylight utilisation in accordance with DIN EN 14501: 2006-02 (p.18; paragraph 6.6; table 11) on the basis of the rotational symmetric diffuse/hemispherical light transmission degree $\tau_{v,dif-h}$, approximately calculated after equation 18 in DIN EN 14500: 2008-08

(10)    Measurement of the protective properties against ultraviolet solar radiation in accordance with DIN EN 13758 -1: 2007-03

\* 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 | $\alpha_v$ | 380...780 nm |
| UV - transmission degree | $\tau_{UV}$ | 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 | $\alpha_e$ | 280...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/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.

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: 2006-02 (p.13; 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 |

## Conditions for UV - transmission tests:

Equipment: Labsphere Ultraviolet Transmittance Analyzer UV-2000F

The samples were tested under normal climate conditions (20°C, 65% r. H.) without elongation.

The UV-transmission was measured in a wavelength range from (280 – 400) nm, whereas the UV-A range extends from (315 – 400) nm and the UV-B range from (280 – 315) nm. The solar spectrum of Albuquerque was used to calculate the UPF-rating.

## Test results:

### (1) Light range

<div style="text-align:right"><b>UV-range</b></div>

| Code | light transmission degree | light remission degree | light absorption coefficient | UV-transmission degree |
|---|---|---|---|---|
| P0960_18 | $\tau_{v,n-h}$ | $\rho_{v,n-h}$ | $\alpha_v$ | $\tau_{UV}$ |
| 4 | 0,0010 | 0,6337 | 0,3653 | 0,0000 |

### (2) Global radiation range

| Code | solar transmission degree | solar remission degree | solar absorption coefficient |
|---|---|---|---|
| P0960_18 | $\tau_{e,n-h}$ | $\rho_{e,n-h}$ | $\alpha_e$ |
| 4 | 0,0033 | 0,5853 | 0,4114 |

### (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 | |
|---|---|---|---|---|---|---|---|---|
| | $g_{tot}$ | $F_c$ | $g_{tot}$ | $F_c$ | $g_{tot}$ | $F_c$ | $g_{tot}$ | $F_c$ |
| P0960_18 | | | | | | | | |
| 4 | 0,37 | 0,44 | 0,39 | 0,52 | 0,38 | 0,64 | 0,37 | 0,67 |

| Code | Reference glass - DIN EN 13363-1: 2007-09 | | | |
|---|---|---|---|---|
| | Triple glazing $U_g$=2,0 W/(m²K) g=0,65 | | Double glazing with thermal protective covering $U_g$=1,6 W/(m²K) g=0,70 | |
| | $g_t$ | $F_c$ | $g_t$ | $F_c$ |
| P0960_18 | | | | |
| 4 | 0,39 | 0,59 | 0,40 | 0,57 |

### (4)* Total energy permeability degree $g_{tot}$, direct solar transmittance $\tau_{e,tot}$, reduce factor $F_c$ and secondary heat transfer factor $q_{i,tot}$

| Code | Double glazing with low emission degree (C) | | | |
|---|---|---|---|---|
| | $U_g$=1,2 W/(m²K) g=0,59 | | $\tau_e$ =0,49 $\rho'_e$ =0,27 | |
| | $g_{tot}$ | $F_c$ | $\tau_{e,tot}$ | $q_{i,tot}$ |
| P0960_18 | | | | |
| 4 | 0,38 | 0,64 | 0,00 | 0,37 |

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 $g_{tot}$ and $\tau_{e,tot}$ 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 $g$ and the calculation of $q_{i,tot}$ from $g_{tot}$ and $\tau_{e,tot}$ 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.

### (5) Diffuse und normal transmission in the visible light range

| Code | normal/hemispherical light transmission degree | normal/diffuse light transmission degree | normal/normal light transmission degree |
|---|---|---|---|
| P0960_18 | $\tau_{v,n-h}$ | $\tau_{v,n-dif}$ | $\tau_{v,n-n}$ |
| 4 | 0,0010 | 0,0007 | 0,0003 |

### (6-8)* Classification

| Code | glare control | privacy night | sight contact with the outside |
|---|---|---|---|
| P0960_18 | | | |
| 4 | 3 | 2 | 2 |

### (9)* Classification of the daylight utilisation

| Code | diffuse/hemispherical light transmission degree | daylight utilisation |
|---|---|---|
| P0960_18 | $\tau_{v,dif-h}$ | |
| 4 | 0,0008 | 0 |

The results are mean values from three measurements; spectrograms are kept in the test department.

**(10) Solar UV protective properties**

| Code STFI | UPF | | Transmission (UV-A) in % | | Transmission (UV-B) in % | | UPF-Rating |
|---|---|---|---|---|---|---|---|
| P0960_18 | Mean | STD | Mean | STD | Mean | STD | |
| 4 | 2000,00 | 0,00 | 0,05 | 0,00 | 0,05 | 0,00 | 50+ |

The results are mean values from 10 measurements.

This UPF rating is for the fabric and does not address the amount of protection which is afforded by the design of the article. Manipulations involved in garment manufacture such as stretching and sewing may lower the UPF-value of the material.

The protection offered by this item may be lessened,
- at points where the fabric is in close contact with the skin such as across the shoulders
- if the fabric is stretched or wet
- with time, due to effects of normal wear

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.

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