CERTOTTICA

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TEST REPORT

Client:	BOLLE' PROTECTION
Address:	95 rue Louis Guérin - 69 100 VILLEURBANNE FRANCE
Article:	Spectacle
Model:	RANGER smoke lens
Job no.:	C101041
Report no.:	103993
Receiving Date:	26/10/2010
Date of Test Begin:	12/11/2010
Date of Test End:	18/11/2010
Issuing Date:	19/11/2010
Standard Applied:	EN 166:2001 - Personal eye-protection - Specifications

Note 1: This Test Report is valid exclusively for the specimens utilized for tests and any modification shall be solely performed with the issuing of a new test report.
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Note 3: The Test Report in digital format and the relevant attached file of the digital signatures are official documents. The validity of this Test Report can be checked at **http://www.certottica.org**.
Note 4: The tests were performed on specimens that sampled the customer.

Optical Tests

Quality of material and surface

Clause 7.1.3

Requirements

Except for a marginal area 5 mm wide, oculars shall be free from any significant defects likely to impair vision in use.

Outcomes

Sample	Defects	Test
103993 15dx	—	Pass
103993 15sx	—	Pass
103993 16dx	—	Pass
103993 16sx	—	Pass
103993 17dx	—	Pass
103993 17sx	—	Pass

Diffusion of light

Clause 7.1.2.3

Requirements

The measurement of the reduced luminance factor is performed following the method stated in the EN167 Clause 4.2.1 (basic method). The reduced luminance factor shall be not superior than 1 $cd\,m^{-2}\,lx^{-1}$ for welding filters, 0.75 $cd\,m^{-2}\,lx^{-1}$ for oculars used in eye-protectors against high speed particles, 0.5 $cd\,m^{-2}\,lx^{-1}$ for all other oculars.

Outcomes

Sample	ℓ^* ($cd\,m^{-2}\,lx^{-1}$)	Test
103993 4dx	0.05	Pass
103993 4sx	0.06	Pass
103993 5dx	0.05	Pass
103993 5sx	0.06	Pass
103993 6dx	0.04	Pass
103993 6sx	0.05	Pass

Trasmittance

Clause 7.1.2.2

Oculars with filtering action (filters) and housings for oculars with filtering action

Clauses 7.1.2.2.2, 7.2.1

Requirements

The trasmittance requirements for filtering oculars are specified in the EN 169 - *Welding filters*, EN 170 - *Ultraviolet filters*, EN 171 - *Infrared filters*, EN 172 - *Sunglare filters for industrial use* and EN 379, *Welding filters with switchable luminous transmittance*.

Goggles and face-shields mounting filtering oculars shall provide al least the same level of protection as given by the oculars.

Permissible transmittance and scale numbers

EN172 - Clause 4

Measurement Method of the Spectral Transmittance

The spectral transmittance is measured at least from 280 to 780 nm and at no more than from 280 to 2000 nm, always with the step of 1 nm through a spectrophotometer using a spectral band width not superior to 2 nm in the ultraviolet and in the visible and not over 20 nm in the infrared.

Sample Labeling and Measurement Point

The sample labeling and the measurement points are explained as following.
The measurement point on a filter is the standard's reference point if not otherwise specified. The reference point is the visual point or the geometric point if the first is unknown.
The spectral transmittance measurement points are labeled by meean a serie of strings.
The strings *sx* e *dx* identified the left and the right oculars reference point respectively.
The mounted gradient filters generally are measured in the reference point and in the points at the most 15 mm up and below the reference point and along the two parallels to the line through the right and the left reference points of the protective equipment.
In the case of unmounted singular filter the measurement are performed along the gradient direction.
The two measurement points apart the reference point are labeled *s* and *c*.
Photochromic filters can to be measured at different conditions of temperature, T (unit Celsius degree), and illumination, L (unit lux), and the labeling is perfomed with a suffix.

Luminous Transmittance

EN172 - Clause 4.1

Requirements

The superior and inferior limits of Tv relative to a filter shade number are showed in the Tables 1 and 2 of the standard.

Outcomes

The measument values of Tv, expressed in percent, and the relative test are:

Sample	Tv (%)	Test
103993 4sx	12.1	Pass
103993 4dx	13.0	Pass
103993 5sx	11.6	Pass
103993 5dx	12.7	Pass
103993 6sx	11.6	Pass
103993 6dx	12.5	Pass

Ultraviolet and Visible Spectral Transmittance

EN172 - Clause 4.1

Requirements

The superior values of the spectral transmittance , $T(\lambda)$, from 280 to 315 nm, here named Tmax280_315, and of the transmittance , $T(\lambda)$, from 315 to 350 nm, here named Tmax315_350, must be conform to the requirements in the Tabb. 1 and 2 of the standard.
The mean value of $T(\lambda)$ from 315 to 380 nm, here named Tmean315_380, must be conform to the requirements in the Tabb. 1 and 2 of the standard.
The minimum value of $T(\lambda)$ from 500 to 650 nm, here named Tmin500_600, must be not inferior to 1/5 ot the T_V.

Outcomes

Measurement values and the result of the tests are:

Sample	Tmax280_315 (Tv)	Test	Tmax315_350 (Tv)	Test	Tmean315_380 (Tv)	Test
103993 4sx	0.00	Pass	0.00	Pass	0.00	Pass
103993 4dx	0.00	Pass	0.00	Pass	0.00	Pass
103993 5sx	0.00	Pass	0.00	Pass	0.00	Pass
103993 5dx	0.00	Pass	0.00	Pass	0.00	Pass
103993 6sx	0.00	Pass	0.00	Pass	0.00	Pass
103993 6dx	0.00	Pass	0.00	Pass	0.00	Pass

Recognition of signal lights

EN172 - Clause 4.2

Requirements

Nota: these specifications are applicable to filters with shade number from 1 to 3,1.
The Q-factor of the semaphoric signals red, yellow, green and blue, here named respectively Qred, Qyellow, Qgreen e Qblue, must be not inferior to 4/5.

Outcomes

The measurements values of Qred, Qyellow, Qgreen e Qblue and the results of the tests are:

Sample	Qred	Test	Qyellow	Test	Qgreen	Test	Qblue	Test
103993 4sx	0.98	Pass	0.91	Pass	1.06	Pass	1.21	Pass
103993 4dx	1.00	Pass	0.92	Pass	1.06	Pass	1.21	Pass
103993 5sx	0.97	Pass	0.91	Pass	1.07	Pass	1.21	Pass
103993 5dx	0.98	Pass	0.92	Pass	1.06	Pass	1.21	Pass
103993 6sx	0.97	Pass	0.91	Pass	1.07	Pass	1.21	Pass
103993 6dx	0.98	Pass	0.91	Pass	1.06	Pass	1.21	Pass

Spectral transmittance

EN172 - Clause 4.2

Requirements

Note: these specifications are applicable to filters with shade number from 1 to 3,1.
The minimun value of the spectral transmission factor in the wavelength interval from 500 to 650 nm, here named Tmin500_650, shall not be inferior to 0.2 Tv for filters declared appropriate for driving and use on the road.

Outcomes

The minimun value measured of the spectral transmittance from 500 to 650 nm, is:

Sample	Tmin500_650 (Tv)	Test
103993 4sx	0.74	Pass
103993 4dx	0.75	Pass
103993 5sx	0.74	Pass
103993 5dx	0.75	Pass
103993 6sx	0.74	Pass
103993 6dx	0.74	Pass

On road use: day Yes ; night NO .

Scale Number

EN166 Clause 5

Requirements

The scale numbers are defined by Table 1 of the EN166.

Outcomes

The filter scale number determined is:

Sample	Scale Number
103993 4sx	5 - 3,1
103993 4dx	5 - 3,1
103993 5sx	5 - 3,1
103993 5dx	5 - 3,1
103993 6sx	5 - 3,1
103993 6dx	5 - 3,1

Variations in transmittance (Oculars without filtering action are exempt from this requirement)

Clause 7.1.2.2.3

Oculars without corrective effect

Clause 7.1.2.2.3.1

Requirements

The relative variation of the luminous transmittance around the visual centre(s) P_1 (and P_2) shall not exceed the values stated in Table 4 of the standard.

The relative difference in luminous transmittance, P_3, between left and right oculars shall not exceed the values stated in Table 4 of the standard or 20% whichever is greater.

Outcomes

Sample	P_1 (%)	Test	P_2 (%)	Test	P_3 (%)	Test
103993 4	2	Pass	5	Pass	7	Pass
103993 5	2	Pass	6	Pass	9	Pass
103993 6	2	Pass	5	Pass	7	Pass

Resistance to ultraviolet radiation (oculars only)

Clause 7.1.5.2

Requirements

The external surface of the filters is exposed to radiation of a 450W Xenon lamp. The exposure time is 50 hours, the distance between filter and lamp is 300 mm, and the test equipment operate at environment temperature of 23 ± 5 Celsius degrees.
The absolute value of the relative variation of Tv after radiation shall not be greater than the values specified in Table 6 of EN166.
Measurement value of ℓ^* after radiation shall be not higher than 1, 0.75, 0.5 $cd\,m^{-2}\,lx^{-1}$ respectivily for welding filters, ocular for protection against high-speed particles, for all other type of oculars.

Outcomes

Measurement values of Tv and ℓ^* after irradiation, the relative variation of Tv and the test results are:

Sample	Tv (%)	$\Delta Tv/Tv$ (%)	Test	ℓ^* ($cd\,m^{-2}\,lx^{-1}$)	Test
103993 4sx	12.0	-1	Pass	0.11	Pass
103993 4dx	12.9	-1	Pass	0.10	Pass
103993 5sx	11.6	0	Pass	0.07	Pass
103993 5dx	12.7	0	Pass	0.15	Pass
103993 5sx	11.5	-1	Pass	0.07	Pass
103993 5dx	12.6	1	Pass	0.13	Pass

Spherical, astigmatic and prismatic powers

Clause 7.1.2.1

Note: The refractive powers of cover plates (see Clause 7.1.2.1.3 of the standard) shall comply with the tolerances for optical class 1 given in Tables 2 and 3 of the standard. The test results in the case of the cover plates here reported are relative to the optical class 1 requirements.

Mounted oculars and umounted oculars covering both eyes

Clause 7.1.2.1.2

Requirements

Note: The refractive powers of cover plates shall comply with the tollerances for optical class 1 given in Tables 2 and 3 of the standard.

Outcomes

Sample	Sph. Refr. Pow. (D)	Test	Ast. Refr. Pow. (D)	Test
103993 1dx	-0.01	Pass	0.03	Pass
103993 1sx	-0.01	Pass	0.02	Pass
103993 2dx	-0.01	Pass	0.03	Pass
103993 2sx	-0.02	Pass	0.02	Pass
103993 3dx	0.00	Pass	0.03	Pass
103993 3sx	-0.02	Pass	0.01	Pass

Requirements

Note: The refractive powers of cover plates shall comply with the tollerances for optical class 1 given in Tables 2 and 3 of the standard.

Outcomes

Measurement values of the differences of the horizontal and vertical refractive prismatic powers, the base, the relative tests and the possible optical class, are:

Sample	Base	Horiz. Pris. Diff. (cm/m)	Test	Ver. Pris. Diff. (cm/m)	Test	Optical Class
103993 1	out	0.35	Pass	0.10	Pass	One
103993 2	out	0.30	Pass	0.15	Pass	One
103993 3	out	0.30	Pass	0.15	Pass	One

Stability at an elevated temperature

Clause 7.1.5.1

Requirements

The protective equipment conditioned at the temperature of 55 ± 5 Celsius degrees for 60 ± 5 minutes, after 60 minutes at the environment temperature shall show no apparent deformation.

Outcomes

The test has given the following results:

Sample	Deformations	Test
103993 1	—	Pass
103993 2	—	Pass
103993 3	—	Pass

Mechanical Tests

General construction

Clause 6.1

Requirements

Eye-protectors shall meet the general construction requirements consisting in being free from projections, sharp edges or other defects which can cause discomfort or injury during normal use.

Outcomes

Specimen	Observations	Test
103993 1	—	Pass
103993 2	—	Pass
103993 3	—	Pass

Field of vision

Clause 7.1.1

Requirements

Eye-protectors shall have a field of vision including for each eye the field defined by a cone having its vertex in the pupil and such to form an ellipse with its section on the plane parallel to the two pupils and orthogonal to the horizontal sight axis. The ellipses have the following geometric features: horizontal axis 22 mm, vertical axis 20 mm. The horizontal axis shall be parallel to and 0.7 mm below the height of the line connecting the centres of the two eyes; horizontal displacement of 3 mm toward the external eye side, with respect to the horizontal sight axis.

Outcomes

The performed tests have given the following results:

Specimen	Observations	Test
103993 1	—	Pass
103993 2	—	Pass
103993 3	—	Pass

Robustness

Clause 7.1.4

Increased robustness

Clause 7.1.4.2

Complete eye-protectors and frames

Clause 7.1.4.2.2

Requirements

The eye protector shall be submitted to an impact of a 22 mm diameter steel ball, of 43 g minimum mass at a speed of 5.1 m/s. The impact occurs in correspondance to the visual centers and the eye-sides.
As a consequence of the test, the sample shall not present any ocular fractures or deformations, ocular housing fractures, frame fractures, lateral protection failure.
Before the test, samples are pre-conditioned for at least one hour at -5 or +55 Celsius degrees.
The possible impact points are the ocular centres and the lateral protection.
A new sample shall be used for each impact point.

Outcomes

The results of the test are:

Sample	Impact Point	Temperature (° C)	Observations	Test
103993 7	right frontal	+55	—	Pass
103993 8	left frontal	+55	—	Pass
103993 9	right side	+55	—	Pass
103993 10	left side	+55	—	Pass
103993 11	right frontal	+55	—	Pass
103993 12	left side	+55	—	Pass
103993 13	right frontal	-5	—	Pass
103993 14	left frontal	-5	—	Pass
103993 15	right side	-5	—	Pass
103993 16	left side	-5	—	Pass
103993 17	left frontal	-5	—	Pass
103993 18	right side	-5	—	Pass

Resistance to ignition

Clause 7.1.7

Requirements

The several external parts of the test sample except elastic headbands and textile edging, are put into direct contact for 5 ± 0.5 seconds with a steel bar risen to the temperature of 650 ± 20 Celsius degrees. During the test, a visual exam is performed to establish if the test sample ignite or continue to glow after the removal of the steel bar.

Outcomes

The visual exam has given the following results:

Sample	Observations	Test
103993 10	—	Pass
103993 11	—	Pass
103993 12	—	Pass

Lateral protection

Clause 7.2.8

Requirements

The eye-protector shall give lateral protection of the ocular region. The test consists to verify that the lateral and the frontal impact point of the headform are protected by the device to test, into an area of radius 10 mm.

Outcomes

The results of the test are:

Sample	Observations	Test
103993 1	—	Pass
103993 2	—	Pass
103993 3	—	Pass

Protection against high Speed particles at extremes of temperature

Clause 7.3.4

Requirements

If an increased impact resistance is required, the complete eye-protector shall withstand the impact of a 6 mm nominal diameter steel ball of 0.86 g minimum mass striking the ocular at one of the speeds 45, 120 or 190 m/s according to the robustness declared.
The impact are carried out after the protector have been conditioned at $+55 \pm 2$ and -5 ± 2 Celsius degrees, in correspondence to the visual centre and of the lateral protection.

Outcomes

The performed tests have given the following results:

Sample	Impact point	Temperature (° C)	Speed (m/s)	Defects	Test
103993 45	right frontal	+55	45.7	—	Pass
103993 46	left frontal	+55	46.1	—	Pass
103993 47	right side	+55	45.6	—	Pass
103993 48	left side	+55	45.8	—	Pass
103993 49	right frontal	+55	45.9	—	Pass
103993 50	left side	+55	46.1	—	Pass
103993 51	right frontal	-5	45.9	—	Pass
103993 52	left frontal	-5	45.7	—	Pass
103993 53	right side	-5	45.3	—	Pass
103993 54	left side	-5	46.0	—	Pass
103993 55	left frontal	-5	45.8	—	Pass
103993 56	right side	-5	45.5	—	Pass

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Figure 1: Specimen picture.