

**DEPARTMENT OF PERSONAL PROTECTIVE EQUIPMENT
LABORATORY OF EYE AND FACE PROTECTORS**

TEST REPORT

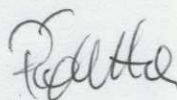
Contract to perform testing No.: 1026/PB-COV/2020/NO

Subject of the contract: Face shield tests

Ordering Party: DARMAR Mariola Libera
ul. Dekoracyjna 12A, 65-155 Zielona Góra

Date of issuing the test report: 27.08.2020

Main performer: Krzysztof Płachta



Authorized by: Grzegorz Owczarek



Approved by:

**HEAD OF TESTING AND
CALIBRATION LABORATORIES
DIVISION**


Karolina Burza, MA

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Test report contain results of tests within the scope of accreditation and non-accredited tests results.
The results outside the scope of accreditation are marked with (*).

TESTS OF FACE SHIELD

1. Subject of tests

Face shield - helmet type: Best Cover Face Shield 01 - 15 samples.

2. The date of obtain the samples to test

09.07.2020 r.

Sample registration number: 99/2020.

3. The date of performance of the test

21.08.2020 r.

4. The statement

- 4.1. The results in this report are linked only to tested samples.
- 4.2. The test results are applicable exclusively to the tested samples. None of the fragments of the report may be reproduced separately from the integral text without obtaining prior written consent from CIOP-PIB.
- 4.3. This test report includes 8 pages.

5. Identification of the methods used

Tests included in the scope of accreditation.

- Linear dimensions (vertical centerline depth) according to the methodology of EN 166:2001;
- Quality of material and surface according to the methodology of EN 167:2001;
- Spherical refractive power according to the methodology of EN 167:2001;
- Astigmatic refractive power according to the methodology of EN 167:2001;
- Difference in prismatic refractive power according to the methodology of EN 167:2001;
- Diffusion of light according to the methodology of EN 167:2001;
- Luminous transmittance, UV spectra transmittance according to the methodology of EN 167:2001;
- Resistance to UV radiation according to the methodology of EN 167:2001 and EN 168:2001;
- Stability at an elevated temperature according to the methodology of EN 168:2001;
- Resistance to ignition according to the methodology of EN 168:2001;
- Increased robustness according to the methodology of EN 168:2001;
- Protection against high speed particles according to the methodology of EN 168:2001.

Tests excluded in the scope of accreditation.

- Field of vision according to the methodology of EN 167:2001;
- Protection against liquid splashes according to the methodology of EN 168:2001.

6. Place of testing

Eye and Face Protection Laboratory.
CIOP-PIB, ul. Wierzbowa 48, 90-133 Łódź.

7. Tests results

The test results are presented on pages 3 to 8 of this report.

Linear dimensions (vertical centerline depth)

Sample No.	Specification	Requirements according to EN 166:2001	Assessment of conformity to the standard
	Depth of the vertical center line of the shield [mm] ¹⁾		
1	180	The visor shall have a field of view of a minimum vertical centerline depth of 150 mm.	Fulfill requirements of EN 166:2001, p. 7.2.4.
2	180		
3	180		
Measurement uncertainty			
The uncertainty of a single measurement: 0.06 cm		Expanded uncertainty taking into account dispersion of the results: 0,18 cm.	
The statement of compliance of the measurement results was formulated on the basis of the decision-making principle provided in the normative document EN 167: 2001, Annex B.			

¹⁾Measurements of the depth of the vertical center line were made taking into account the real field of view for cover mounted in the luminaire provided by the manufacturer.

Quality of material and surface

Feature examined	Sample no					Requirements according to EN 166:2001	Assessment of conformity to the standard
	1	2	3	4	5		
Bubbles	No	No	No	No	No	Except for a marginal area 5 mm wide oculars shall be free from any significant defects likely to impair vision.	Fulfill requirements of EN 166:2001 p. 7.1.3.
Scratches	No	No	No	No	No		
Inclusions	No	No	No	No	No		
Dull spots	No	No	No	No	No		
Pitting	No	No	No	No	No		
Mould marks	No	No	No	No	No		
Scouring	No	No	No	No	No		
Grains	No	No	No	No	No		
Pocking	No	No	No	No	No		
Scaling	No	No	No	No	No		
Undulation	No	No	No	No	No		
Measurement uncertainty							
Not applicable - organoleptic evaluation							

Spherical refractive Power

Sample No.	Spherical refractive power [m ⁻¹]		Spherical power [m ⁻¹]	Requirements according to EN 166:2001	Assessment of conformity to the standard
	Horizontal belts	Vertical belts			
1	0,00	0,00	0,00	For optical class 1: Less then ±0,06 [m ⁻¹].	Fulfill requirements of EN 166:2001 p.7.1.2.1 for optical class 1.
2	0,00	0,00	0,00		
3	0,00	0,00	0,00		
The average value of the spherical optical power of the sample			0,00		
Measurement uncertainty					
The uncertainty of a single measurement: 0,01 m ⁻¹ .			Expanded uncertainty taking into account dispersion of the results: 0,02 m ⁻¹ .		
The statement of compliance of the measurement results was formulated on the basis of the decision-making principle provided in the normative document EN 167: 2001, Annex B.					

Astigmatic refractive power

Astigmatic refractive power					
Sample No.	Astigmatic refractive power [m ⁻¹]		Astigmatic power [m ⁻¹]	Requirements according to EN 166:2001	Assessment of conformity to the standard
	Horizontal belts	Vertical belts			
1	0,00	0,00	0,00	For optical class 1: Less then 0,06 [m ⁻¹]	Fulfill requirements of EN 166:2001 p.7.1.2.1 for optical class 1.
2	0,00	0,00	0,00		
3	0,00	0,00	0,00		
The average value of the spherical optical power of the sample			0,00		
Measurement uncertainty					
The uncertainty of a single measurement: 0,01 m ⁻¹ .			Expanded uncertainty taking into account dispersion of the results: 0,02 m ⁻¹ .		
The statement of compliance of the measurement results was formulated on the basis of the decision-making principle provided in the normative document EN 167: 2001, Annex B.					

Difference in prismatic refractive power

Specification		Sample No.			Requirements according to EN 166:2001	Assessment of conformity to the standard
		4	5	6		
Prismatic power	Base in	No	No	No	For optical class 1: Less then 0,75 [cm/m] (base out, horizontal).	Fulfill requirements of EN 166:2001 p.7.1.2.1.
	Base out	Yes	Yes	Yes		
Difference in prismatic refractive power [cm/m]	Horizontal	0,20	0,20	0,20		
	Vertical	0,00	0,00	0,00		
Measurement uncertainty						
The uncertainty of a single measurement: 0,01 cm/m.		Expanded uncertainty taking into account dispersion of the results: 0,02 cm/m.				
The statement of compliance of the measurement results was formulated on the basis of the decision-making principle provided in the normative document EN 167: 2001. Annex B.						

Diffusion of light

Sample No	Reduced luminance factor [cd/(m ² x lx)]	Requirements according to EN 166:2001	Assessment of conformity to the standard
6	0,24	For optical class 1: Less then $0,75 \frac{\text{cd}}{\text{m}^2 \cdot \text{lx}}$	Fulfill requirements of EN 166:2001 p. 7.1.2.3.
7	0,23		
8	0,24		
Measurement uncertainty			
The uncertainty of a single measurement: 0,01 cd/(m ² ·lx).		Expanded uncertainty taking into account dispersion of the results: 0,02 cd/(m ² ·lx).	
The statement of compliance of the measurement results was formulated on the basis of the decision-making principle provided in the normative document EN 167: 2001, Annex B.			

Luminous transmittance

Luminous transmittance			
Sample No.	Luminous transmittance [%]	Requirements according to EN 166:2001	Assessment of conformity to the standard
6	90,11	Oculars intended to protect the eyes against mechanical or chemical hazards only, and cover plates, shall have a luminous transmittance greater than 74,4 %.	Fulfill requirements of EN 166:2001, p. 7.1.2.2.1.
7	89,87		
8	89,90		
Measurement uncertainty			
The uncertainty of a single measurement: 0,01 %.		Expanded uncertainty taking into account dispersion of the results: 0,11 %.	
The statement of compliance of the measurement results was formulated on the basis of the decision-making principle provided in the normative document EN 167: 2001, Annex B.			

Resistance to UV radiation – diffusion of light

Resistance to UV radiation – diffusion of light			
Sample No	Relative change of reduce luminance factor after UV exposure [%]	Requirements according to EN 166:2001	Assessment of conformity to the standard
6	0,37	For optical class 1: Less then $0,75 \frac{\text{cd}}{\text{m}^2 \cdot \text{lx}}$	Fulfill requirements of EN 166:2001 p. 7.1.5.2.
7	0,36		
8	0,34		
Measurement uncertainty			
The uncertainty of a single measurement: 0,01 cd/(m ² ·lx).		Expanded uncertainty taking into account dispersion of the results: 0,02 cd/(m ² ·lx).	
The statement of compliance of the measurement results was formulated on the basis of the decision-making principle provided in the normative document EN 167: 2001, Annex B and EN 168: 2001, Annex A.			

Resistance to UV radiation

Sample No	Luminous transmittance before UV exposure [%]	Luminous transmittance after UV exposure [%]	Relative change of luminous transmittance [%]
6	90,11	89,65	0,51
7	89,87	89,35	0,58
8	89,90	89,44	0,51
Requirements according to EN 166:2001		Relative change of luminous transmittance less then $\pm 5\%$ for a light transmission factor of 100% to 17.8%.	
Assessment of conformity to the standard		Fulfill requirements of EN 166:2001 p. 7.1.5.2.	
Measurement uncertainty			
The uncertainty of a single measurement: 0,01 %.		Expanded uncertainty taking into account dispersion of the results: 0,02 %.	
The statement of compliance of the measurement results was formulated on the basis of the decision-making principle provided in the normative document EN 167: 2001, Annex B. EN 168: 2001, Annex A.			

Stability at an elevated temperature

Feature examined	Sample No			Requirements according to EN 166:2001	Assessment of conformity to the standard
	6	7	8		
Visible deformation	No	No	No	No visible deformation.	Fulfill requirements of EN 166:2001 p. 7.1.5.1.
Measurement uncertainty					
Not applicable - organoleptic evaluation.					

Increased robustness

Defects specification	Sample No. ¹⁾								Requirements according to EN 166:2001	Assessment of conformity to the standard
	1,2	3,4	5,6	7,8	9	10	11	12		
Ocular fracture	No	No	No	No	No	No	No	No	No defects: ocular fracture, ocular deformation, ocular housing fracture.	Fulfill requirements of EN 166:2001, p. 7.1.4.2.
Lens deformation	No	No	No	No	No	No	No	No		
Ocular housing fracture	No	No	No	No	No	No	No	No		
Lateral protection failure	No	No	No	No	No	No	No	No		
Measurement uncertainty										
Not applicable - organoleptic evaluation.										

¹⁾Samples:

- 1, 2 – front impact in the left eye, the sample conditioned at $(55 \pm 2)^\circ\text{C}$
- 3, 4 – front impact in the left eye, the sample conditioned at a temperature $(-5 \pm 2)^\circ\text{C}$
- 5, 6 – front impact in the right eye, the sample conditioned at $(55 \pm 2)^\circ\text{C}$
- 7, 8 – front impact in the of the right eye, the sample conditioned at a temperature $(-5 \pm 2)^\circ\text{C}$
- 9 – lateral impact in the left eye, the sample conditioned at $(55 \pm 2)^\circ\text{C}$
- 10 – lateral impact of the left eye", the sample conditioned at a temperature $(-5 \pm 2)^\circ\text{C}$
- 11 – lateral impact of the right eye," the sample conditioned at $(55 \pm 2)^\circ\text{C}$
- 12 – lateral impact of the right eye," the sample conditioned at a temperature $(-5 \pm 2)^\circ\text{C}$

Protection against high speed particles with medium energy impact - impact speed of ball 45 m/s

Defects specification	Sample No. ¹⁾				Requirements according to EN 166:2001	Assessment of conformity to the standard
	1,2,3,4	5,6,7,8	9,10	11,12		
Lens fracture	No	No	No	No	No defects are occurred and it is not possible for the ball to strike directly the lateral impact points. Adequate side protection.	Fulfill requirements of EN 166:2001, p. 7.2.2.
Lens deformation	No	No	No	No		
ocular housing fracture	No	No	No	No		
Adequate side protection	Yes	Yes	Yes	Yes		
Measurement uncertainty						
Not applicable - organoleptic evaluation.						

¹⁾Samples:

1, 2, 3, 4 – front impact in the left eye, the sample conditioned at $(23 \pm 2)^\circ \text{C}$

5, 6, 7, 8 – front impact in the of the right eye, the sample conditioned at a temperature $(23 \pm 2)^\circ \text{C}$

9, 10 – lateral impact in the left eye, the sample conditioned at $(23 \pm 2)^\circ \text{C}$

11, 12 – lateral impact of the right eye, the sample conditioned at $(23 \pm 2)^\circ \text{C}$

Resistance to ignition

Feature examined	Sample No.			Requirements according to EN 166:2001	Assessment of conformity to the standard
	10	11	12		
No parts of eye protector ignites	No	No	No	During test no parts of eye protector igniter or continue to glow.	Fulfill requirements of EN 166:2001, p. 7.1.7.
No parts of eye protector continua to glow after removal of steel rod	No	No	No		
Measurement uncertainty					
Not applicable - organoleptic evaluation.					

Field of vision *

Specification	Sample No.			Requirements according to EN 166:2001	Assessment of conformity to the standard
	2	3	5		
Face shield provide a minimum field of vision	Yes	Yes	Yes	Eye protector exhibit a minimum field of vision defined by two ellipses (20 mm x 22 mm), when placed and centered at distance of 25 mm from the surface of the Eye of the head form.	Fulfill requirements of EN 166:2001, p. 7.1.1.
Measurement uncertainty					
Not applicable - organoleptic evaluation.					

Protection against liquid splashes *

Protection against liquid splashes			
Sample No.	Specification	Requirements according to EN 166:2001	Assessment of conformity to the standard
	The visor covers the rectangular eye area		
13	Yes	Face shields cover the rectangular eye area on the headform.	Fulfill requirements of EN 166:2001, p. 7.2.4.
14	Yes		
15	Yes		
Measurement uncertainty			
Not applicable - organoleptic evaluation.			

Opinion/interpretation*

That report also includes a range of selected parameters for eye and face protectors intended solely for healthcare personnel, including sanitary transport, services and others involved in efforts to control the SARS-CoV-2 virus and the COVID-19 disease it causes, and avoid the further spread of this virus and the disease it causes¹. The assessment of these parameters is positive.

The following information should be attached to the device intended solely for medical personnel:

- The device is intended only for healthcare personnel, including ambulance transport, services and other persons involved in efforts to control the SARS-CoV-2 virus and the COVID-19 disease it causes and avoid further spread of this virus and the disease it causes;
- The product may be used only in the period of increased epidemic risk
- and epidemics, but not longer than within 30 days from the end of the epidemic in connection with SARS-CoV-2 virus infections;
- Manufacturer's data (name, address).

Grzegorz Owczarek

.....
Name and surname of the person drawing up the opinion / interpretation

* Opinion / interpretation included in this report is not covered by accreditation.

End of the test report

¹ Uchwała Nr 33/2020 Rady Ministrów z dnia 20 marca 2020 r. w sprawie szczególnych rozwiązań w zakresie zaopatrzenia w środki ochrony indywidualnej, które są niezbędne do przeciwdziałania rozpowszechnianiu się wirusa SARS-CoV-2. (Resolution No. 33/2020 of the Council of Ministers of March 20, 2020 on special solutions for the supply of personal protective equipment, which are necessary to counteract the spread of SARS-CoV-2 virus.)