Test Report T13600-01-1 Issue 2
EN 166:2001
Kunshan Daiyo Industries Co., Ltd.
8533V Goggles
19 June 2019

ACCREDITED
Test Laboratory
Certificate: 1722.01

Approved by:

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Prepared by:

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Issued to: Kunshan Daiyo Industries Co., Ltd.
#1188 Hong Qiao Rd
Kunshan Jiangsu, 215300
PR China

Date: 19 June 2019
Report: T13600-01-1
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Objective:

Contract testing to EN 166:2001, "Personal Eye Protection - Specifications".

| Clause(s): 6 Design and manufacturing requirements
-excluding 6.2 Materials
7.1 Basic requirements
7.2.1.2 Protection against optical radiation, Ultraviolet filters (EN 170:2002)
7.2.2 Protection against high-speed particles – Medium energy impact (B)

Samples:

8533V Goggles

Ocular Variant	Quantity	Sample ID
Clear	30	0A

Date(s) submitted: 30 May 2019

Procedures:

Testing protocols in accord with good laboratory practice were employed unless otherwise specified, for all tests. All tests were conducted in a standard laboratory atmosphere unless otherwise specified.

Testing procedures were followed as specified within:

EN 167:2001 "Personal eye-protection - Optical test methods"
EN 168:2001 "Personal eye-protection - Non-optical test methods"

Samples were randomly selected from the quantity provided and tested in the as-received condition unless otherwise stated.

When applicable, samples were assessed on medium headform (64mm PD).

Variation in luminous transmittance- P1 and P2, the actual variation is compared to the requirement. If the actual variation does not meet the requirement, then the corrected variation is used. The corrected variation is calculated from the difference between the theoretical and actual variation. The theoretical values are determined by applying Beer-Lambert's Law to the known thickness variation of the lens.

Note: | = Indicates that a revision was made to previous Test Report.

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Assessment summary:

Date(s) tested: 04 through 07 June 2019

EN 166:2001 Requirements	Compliant	Non-Compliant
6 Design and manufacturing requirements		
6.1 General construction	X	
6.2 Materials	Not assessed	
6.3 Headbands	X	
7 Basic, particular and optional requirements		
7.1 Basic requirements		
7.1.1 Field of vision	X	
7.1.2 Optical requirements		
7.1.2.1 Spherical, astigmatic, and prismatic refractive powers	Optical Class 1	
7.1.2.2 Transmittance		
7.1.2.2.1 Oculars without filtering action	Not applicable	
7.1.2.2.2 Oculars with filtering action	See 7.2.1	
7.1.2.2.3 Variations in transmittance	X	
7.1.2.3 Diffusion of light	X	
7.1.3 Quality of material and surface	X	
7.1.4 Robustness		
7.1.4.1 Minimum robustness	Not applicable	
7.1.4.2 Increased robustness	X	
7.1.5 Resistance to Ageing		
7.1.5.1 Stability at elevated temperatures	X	
7.1.5.2 Resistance to ultraviolet radiation (oculars only)	X	
7.1.6 Resistance to corrosion	Not applicable	
7.1.7 Resistance to ignition	X	
7.2 Particular requirements (Optional)		
7.2.1 Protection against optical radiation		
7.2.1.2 Ultraviolet filters (EN170)	X	
Frame/Housing	***See Note 1***	
7.2.2 Protection against high speed particles (B)	X	
7.2.8 Lateral Protection	X	
7.3 Optional requirements	None claimed	

Samples as assessed meet the requirements of EN166:2001 and as a result of this assessment the following markings are suggested:

Ocular Variant	Filter Type	Filter Scale	Ocular Marking	Frame Marking[1]
Clear	Ultraviolet	2C-1.2 or 2-1.2	CE ‘filter scale’ ‘mfg’ 1 B	CE ‘mfg’ EN 166 B

[1]Frame/Housing does not provide protection against optical radiation.

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Results:

6.1 General construction; Result: Pass
Samples were assessed and found to be free from projections, sharp edges or other defects that are likely to cause discomfort or injury.

6.3 Headbands; Result: Pass
Headband is adjustable and has a width greater than 10mm.

7.1.1 Field of view; Result: Pass
Samples assessed and a 22mm(W) x 20mm(H) ellipse could be described in full for each eye (64mm pupil distance)

7.1.2.1 Refractive powers

Spherical and astigmatic powers

Sample ID	Left Ocular		Right Ocular		Optical Class Met
	Spherical Power (m^{-1})	Astigmatic Power (m^{-1})	Spherical Power (m^{-1})	Astigmatic Power (m^{-1})	
0A-1	-0.008	0.02	0.000	0.01	1
0A-2	-0.012	0.02	-0.003	0.02	1
0A-3	0.000	0.01	-0.007	0.01	1
Requirement Optical Class 1: Optical Class 2: Optical Class 3:	 +/- 0.06 +/- 0.12 + 0.12 /- 0.25	 ≤ 0.06 ≤ 0.12 ≤ 0.25	 +/- 0.06 +/- 0.12 + 0.12 /- 0.25	 ≤ 0.06 ≤ 0.12 ≤ 0.25	

Difference in prismatic refractive power

Sample ID	Vertical Imbalance (cm/m)	Horizontal Imbalance (cm/m)	Optical Class Met
0A-1	<0.03	0.06 Base In	1
0A-2	<0.03	0.04 Base In	1
0A-3	<0.03	0.05 Base In	1
Requirement Optical Class 1: Optical Class 2: Optical Class 3:	 ≤ 0.25 ≤ 0.25 ≤ 0.25	 ≤ 0.75 Base Out, ≤ 0.25 Base In ≤ 1.00 Base Out, ≤ 0.25 Base In ≤ 1.00 Base Out, ≤ 0.25 Base In	

7.1.2.2.3 Variations in transmittance *[filtering]*

Sample ID:	0A-4		0A-5		0A-6		Requirement
Ocular:	Left	Right	Left	Right	Left	Right	
Maximum %T:	90.6	89.2	89.2	89.2	89.2	89.2	
Center %T:	89.5	89.1	89.1	89.2	89.2	89.0	
Minimum %T:	88.9	89.0	89.0	88.9	89.0	88.9	
Actual P1 & P2:	1.23	0.11	0.11	0.34	0.22	0.22	± 5%
P3:	0.45		0.11		0.22		± 20%
Pass/Fail:	Pass						

7.1.2.3 Diffusion of light

Sample ID	cd/(m^2·lx)	Pass	Fail
0A-4	0.12	X	
0A-5	0.10	X	
0A-6	0.13	X	
Requirement:	≤ 0.75		

7.1.3 Quality of material and surface; Result: Pass

Samples assessed shall be free from any significant defects likely to impair vision in use, such as bubbles, scratches, inclusions, dull spots, pitting, mould marks, scouring, grains, pocking, scaling and undulation.

7.1.4.2 Increased robustness - Complete eye-protectors

Sample ID	Location	Conditioning	Velocity (m/s)	Pass	Fail
0A-7	Left Frontal (1)	55°C	5.1m/s 22mm 43g Drop Ball 1.3m	X	
0A-8				X	
0A-9	Right Frontal (2)			X	
0A-10				X	
0A-11	Left Lateral (3)			X	
0A-12	Right Lateral (4)			X	
0A-13	Left Frontal (1)	-5°C		X	
0A-14				X	
0A-15	Right Frontal (2)			X	
0A-16				X	
0A-17	Left Lateral (3)			X	
0A-18	Right Lateral (4)			X	

7.1.5.1 Stability at elevated temperatures; Result: Pass

Samples assessed had no visible deformation.

7.1.5.2 Resistance to ultraviolet radiation - Transmittance

Sample ID	Before (%)	After (%)	Relative Change (%)	Pass	Fail
0A-4R	84.1	89.0	-0.112	X	
0A-5L	84.1	89.0	-0.112	X	
0A-6R	84.1	88.9	-0.225	X	
Requirement:			±5		

7.1.5.2 Resistance to ultraviolet radiation - Diffusion of Light

Sample ID	cd/(m^2·lx)	Pass	Fail
0A-4R	0.17	X	
0A-5L	0.13	X	
0A-6R	0.18	X	
Requirement:	≤ 0.75		

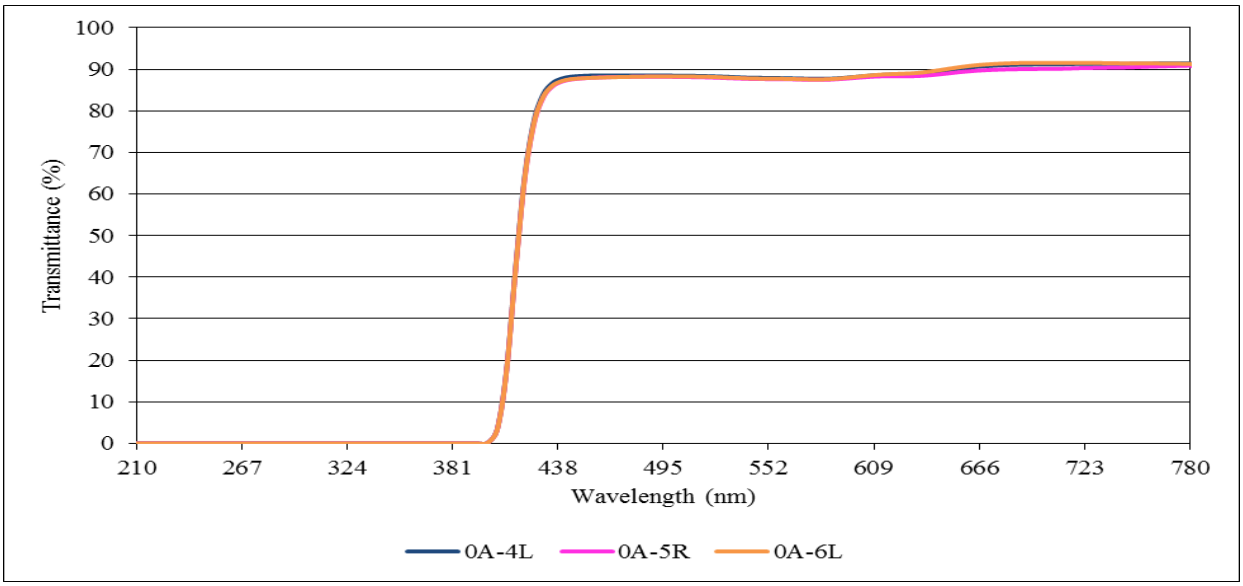
7.1.7 Resistance to ignition; Results: Pass

Components tested (Lens, Frame, Vent) shall not ignite or continue to glow once the rod is removed.

7.2.1.2 Protection against optical radiation - Ultraviolet filters (EN 170)

- Lens

Sample ID:	0A-4L	0A-5R	0A-6L	Requirement Scale Number 2-1.2 or 2C-1.2
Luminous (Tv) - ILLA (%)	88.2	87.9	88.2	74.4 to 100
313nm (%)	9.1E-5	8.6E-5	8.6E-5	≤ 0.0003
365nm (%)	8.0E-5	8.2E-5	8.1E-5	≤ 10
Max. 210 to 313nm (%)	1.4E-4	1.3E-4	1.4E-4	≤ 0.0003
Max. 313 to 365nm (%)	1.0E-4	1.0E-4	1.0E-4	≤ 10
Max. 365 to 405nm (%)	3.14	3.08	3.04	< Tv
Optional requirements for oculars with enhanced color recognition:				
Min. 500 to 650nm (%)	87.7	87.5	87.6	≥ 0.2 Tv
Attenuation Quotients:				
Red Signal	1.01	1.01	1.01	≥ 0.8
Yellow Signal	1.00	1.00	1.00	
Green Signal	1.00	1.00	1.00	
Blue Signal	1.00	1.00	1.00	
Scale number met	2-1.2 or 2C-1.2			



- Frame

Sample ID:	0A-4	Requirement Scale Number 2-1.2 or 2C-1.2
Luminous (Tv) - ILLA (%)	74.1	74.4 to 100
313nm (%)	***6.0E-3***	≤ 0.0003
365nm (%)	5.2E-3	≤ 10
Max. 210 to 313nm (%)	***6.0E-3***	≤ 0.0003
Max. 313 to 365nm (%)	6.0E-3	≤ 10
Max. 365 to 405nm (%)	66.7	< Tv
Scale number met	***None***	

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7.2.2 Protection against high-speed particles

Sample ID	Location	Velocity (m/s)	Pass	Fail
0A-19	Left Frontal (1)	122.9	X	
0A-20		121.9	X	
0A-21		122.0	X	
0A-22		121.9	X	
0A-23	Right Frontal (2)	121.9	X	
0A-24		122.0	X	
0A-25		121.8	X	
0A-26		121.9	X	
0A-27	Left Lateral (3)	121.8	X	
0A-28		121.9	X	
0A-29	Right Lateral (4)	121.8	X	
0A-30		121.9	X	

7.2.8 Lateral protection; Result: Pass

Samples prevent the tip of a 2mm rod from touching the lateral impact regions of the headform.

Sample photograph:



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