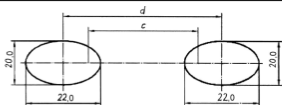


TEST REPORT BS EN 166 Eye and face protection - Sunglasses and related eyewear Part 1: Sunglasses for general use	
Report Reference No.....	20ZCTS0331211SP
Tested by (+ signature)	King
Approved by (+ signature)	Kevin
Date of issue	April 01, 2020
Testing Laboratory.....	Shenzhen ZCT Technology Co.,Ltd
Address.....	3/F, Building 5, Hongsheng Industrial Zone, Bao'an Road, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China
Testing procedure.....	CE
Applicant's name.....	Dongguan Ruizhuo Plastic Industrial Co., Ltd
Address.....	Lijiangwei Industrial Zone, Xiaohu Village, Daojiao Town, Dongguan City, Guangdong Province, China
Manufacturer's name	Dongguan Ruizhuo Plastic Industrial Co., Ltd
Address.....	Lijiangwei Industrial Zone, Xiaohu Village, Daojiao Town, Dongguan City, Guangdong Province, China
Factory's name.....	Dongguan Ruizhuo Plastic Industrial Co., Ltd
Address.....	Lijiangwei Industrial Zone, Xiaohu Village, Daojiao Town, Dongguan City, Guangdong Province, China
Test specification:	
Standard	<input checked="" type="checkbox"/> EN 166:2004
Test procedure	CE
Non-standard test method.....	N/A
Test Report Form No.	EN 166
TRF Originator.....	SBD
Master TRF.....	Dated 2013-05
Test item description.....	Face shield
Trade Mark	/
Model/Type reference.....	RZ-001、RZ-002
Ratings	-

Copy of marking plate:	
Face shield Model: RZ-001 Dongguan Ruizhuo Plastic Industrial Co., Ltd Lijiangwei Industrial Zone, Xiaohu Village, Daojiao Town, Dongguan City, Guangdong Province, China Made in China.	No marking
Summary of testing:	
This test report complies with BS EN 166:2004	
Test Report Content	
This test report consists of:	
Main report	
Annex I: Photo Documentation, 1 page(s).	

Test case verdicts:	
Test case does not apply to the test object ...:	N/A
Test object does meet the requirement	Pass (P)
Test object does not meet the requirement ...:	Fail (F)
Testing:	
Date of receipt of test item	March 20, 2020
Date(s) of performance of test	March 23, 2020 to April 01, 2020
General remarks:	
The test results presented in this report relate only to the item(s) tested.	
This report shall not be reproduced, except in full, without the written approval of the testing laboratory.	
"(see remark #)" refers to a remark appended to the report.	
"(see Annex #)" refers to an annex appended to the report.	
"(see appended table)" refers to a table in the Test Report.	
Throughout this report a comma (point) is used as the decimal separator.	

BS EN 166			
Clause	Requirement – Test	Result	Verdict
5	Designation of filters		-
	The transmittance characteristics of a filter are represented by a scale number.		P
	The scale number is a combination of the code number and the shade number of the filter, joined together by a dash.		P
	The scale number for welding filters does not include a code number, it comprises the shade number only.		P
6	Design and manufacturing requirements		-
6.1	General construction		-
	Eye-protectors shall be free from projections, sharp edges or other defects which are likely to cause discomfort or injury during use		P
			-
	Figure 1 — Definition of the field of vision		-
6.2	Materials		-
	No parts of the eye-protector which are in contact with the wearer shall be made of materials which are known to cause any skin irritation.		P
6.3	Headbands		-
	Headbands, when used as the principal means of retention, shall be at least 10 mm wide over any portion which may come into contact with the wearer's head. Headbands shall be adjustable or self-adjusting.		P
7	Basic, particular and optional requirements		-
	All eye-protectors shall meet the basic requirements given in 7.1.		P
	Furthermore, according to their intended use, eye-protectors shall, if appropriate, meet one or		P

BSEN 166			
Clause	Requirement – Test	Result	Verdict
	more of the particular requirements given in 7.2.		
	Optional requirements related to additional properties of eye-protectors are given in 7.3.		P
7.1	Basic requirements		-
7.1.1	Field of vision		-
	The size of the field of vision is defined in conjunction with the appropriate head-form described in clause 17 of EN 168:2001.		P
	Eye-protectors shall exhibit a minimum field of vision defined by the two ellipses in Figure 1 when placed and centered at a distance of 25 mm from the surface of the eyes of the appropriate head-form.		P
	The horizontal axis shall be parallel to and 0,7 mm below the height of the line connecting the centres of the two eyes.		P
	The horizontal length of the ellipses shall be of 22,0 mm, the vertical width of the ellipses shall be 20,0 mm.		P
	The centre distance of the two ellipses shall be $d = c + 6$ mm, where c is the pupillary distance.		P
	The pupillary distance is 64 mm for the medium head-form and 54 mm for the small head-form, if not specified differently by the manufacture.		P
	The test shall be carried out in accordance with clause 18 of EN 168:2001.		P
7.1.2	Optical requirements		-
7.1.2.1	Spherical, astigmatic and prismatic refractive powers		-
	The refractive powers of oculars shall be measured by the reference methods specified in clause 3 of EN 167:2001.		P
	This clause refers also to an optional method for use in specific circumstances; the details of this method are given in annex A of EN 167:2001.		P
7.1.2.1.1	Unmounted oculars covering one eye		-
	The refractive power characteristics of unmounted		P

BS EN 166			
Clause	Requirement – Test	Result	Verdict
	oculars covering one eye shall be measured by the method specified in 3.1 of EN 167:2001 (non-corrective oculars), and by the methods specified in EN ISO 8980-3 (corrective oculars).		
	The permissible tolerances for oculars without corrective effect are given in Table 2.		P
	The permissible deviations for the vertex powers of oculars with corrective effect are specified in EN ISO 8980-1 and EN ISO 8980-2. Oculars that comply with EN ISO 8980-1 and EN ISO 8980-2 shall be categorised as class 1.		P
	For class 2, the deviations in vertex refractions may be 0,06 m ⁻¹ higher than for class 1.		P
7.1.2.1.2	Mounted oculars and unmounted oculars covering both eyes		-
	The refractive power characteristics of mounted oculars or unmounted oculars covering both eyes shall be measured by the method specified in 3.2 of EN 167:2001 at the visual centre of the ocular.		P
	The permissible tolerances for oculars without corrective effect are given in Table 3.		P
	The permissible deviations for vertex powers of oculars with corrective effect are as defined in 7.1.2.1.1.		P
	Deviations that would correspond to class 3 shall not be permitted.		P
	NOTE The difference in prismatic refractive power specified for an eye-protector depends not only on the prismatic refractive power of each ocular, but also on the position of the optical axis of the ocular in relation to the axis of vision, and therefore the shape of the frame.		P
	It is therefore necessary to use replacement oculars for which the difference in prismatic power remains within the permissible tolerance limits for the frame in question.		P
7.1.2.1.3	Cover plates		-
	The refractive powers of cover plates shall comply with the tolerances for optical class 1 given in		P

BS EN 166			
Clause	Requirement – Test	Result	Verdict
	Tables 2 and 3.		
7.1.2.2	Transmittance		-
7.1.2.2.1	Oculars without filtering action		-
	Oculars intended to protect the eyes against mechanical or chemical hazards only, and cover plates, shall have a luminous transmittance greater than 74,4 % when measured as given in clause 6 of EN 167:2001 (based on CIEsource A (2856 K)).		P
7.1.2.2.2	Oculars with filtering action (filters) and housings for oculars with filtering action.		-
	The transmittance of oculars with filtering action shall meet the requirements given in the specific standards relating to the various types of ocular (see 7.2.1).		P
	Goggles and face-shields which claim to provide protection against optical radiation shall provide at least the same level of protection against optical radiation as given by a filter of any scale number declared usable with the eyeprotector by the manufacturer or supplier. Testing shall be in accordance with clause 6 of EN 167:2001.		P
7.1.2.2.3	Variations in transmittance (Oculars without filtering action are exempt from this requirement)		-
7.1.2.2.3.1	Oculars without corrective effect		-
	Variations in luminous transmittance shall be measured in accordance with clause 7 of EN 167:2001.		P
	The relative variations of the luminous transmittance around the visual centre(s) P ₁ (and P ₂) shall not exceed the values of Table 4.		P
	The relative difference in luminous transmittance P ₃ between left and right eye shall not exceed the values of Table 4 or 20 % whichever is greater.		P
7.1.2.2.3.2	Oculars with corrective effect (prescription oculars)		-

BS EN 166			
Clause	Requirement – Test	Result	Verdict
	The requirements of 7.1.2.2.3.1 shall also apply to prescription oculars, with the provision that variations in luminous transmittance which are due to thickness variations inherent in the design of the ocular are not taken into account, providing the luminous transmittance at no point deviates by more than a factor of 2,68 (one shade number) from its value at the visual centre.		P
	The IR and UV transmittance shall meet the requirements of the specified shade number at every point on the ocular.		P
7.1.2.3	Diffusion of light		-
	The diffusion of light shall be measured in accordance with one of the reference methods specified in clause 4 of EN 167:2001.		P
	The maximum value of the reduced luminance factor shall be:		P
	$100 \frac{\text{cd}}{\text{m}^2 \cdot \text{lx}}$ for welding filters;		P
	$0,75 \frac{\text{cd}}{\text{m}^2 \cdot \text{lx}}$ for oculars used in eye-protectors against high speed particles		P
	$0,50 \frac{\text{cd}}{\text{m}^2 \cdot \text{lx}}$ for all other oculars		P
7.1.3	Quality of material and surface		-
	Except for a marginal area 5 mm wide, oculars 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.		P
	The assessment shall be carried out in accordance with the method specified in clause 5 of EN 167:2001.		P
7.1.4	Robustness		-
7.1.4.1	Minimum robustness		-
	This requirement relates only to cover plates and		P

BS EN 166			
Clause	Requirement – Test	Result	Verdict
	oculars with filtering effect and need not be assessed if these items are intended to meet the requirements for increased robustness or resistance to high speed particles, in which case the requirements of 7.1.4.2 or 7.2.2 shall be met.		
	The requirement for minimum robustness is satisfied if the ocular withstands the application of a 22 mm nominal diameter steel ball with a force of (100 ± 2) N, when tested in accordance with clause 4 of EN 168:2001.		P
	On so testing the following defects shall not occur:		P
	a) ocular fracture : an ocular shall be considered to have fractured if it cracks through its entire thickness into two or more pieces, or if more than 5 mg of the ocular material becomes detached from the surface away from the one in contact with the ball, or if the ball passes through the ocular;		P
	b) ocular deformation : an ocular shall be considered to have been deformed if a mark appears on the white paper on the opposite side to the one on which the force is applied.		P
7.1.4.2	Increased robustness		-
7.1.4.2.1	Unmounted oculars		-
	The oculars shall withstand the impact of a 22 mm nominal diameter steel ball, of 43 g minimum mass, striking the ocular at a speed of approximately 5,1 m/s, when tested in accordance with 3.1 of EN 168:2001.		P
	On so testing the following defects shall not occur:		P
	a) ocular fracture : an ocular shall be considered to have fractured if it cracks through its entire thickness into two or more pieces, or if more than 5 mg of the ocular material becomes detached from the surface away from the one struck by the ball, or if the ball passes through the ocular;		P
	b) ocular deformation : an ocular shall be considered to have been deformed if a mark		P

BS EN 166			
Clause	Requirement – Test	Result	Verdict
	appears on the white paper on the opposite side to that struck by the ball.		
7.1.4.2.2	Complete eye-protectors and frames		-
	The complete eye-protector or frame shall withstand the lateral and frontal impacts of a steel ball striking at a specified speed.		P
	The diameter of the steel ball and the corresponding impact speed are given in Table 5.		P
	The test shall be in accordance with the method specified in 3.2 of EN 168:2001.		P
	If a spectacle is claimed to have lateral protection it shall not be possible for the ball to strike the lateral impact points without first striking the lateral protection.		P
	On so testing the following defects shall not occur:		P
	a) ocular fracture : an ocular shall be considered to have fractured if it cracks through its entire thickness into two or more pieces, or if more than 5 mg of the ocular material becomes detached from the surface away from the one struck by the ball, or if the ball passes through the ocular;		P
	b) ocular deformation : an ocular shall be considered to have been deformed if a mark appears on the white paper on the opposite side to that struck by the ball;		P
	c) ocular housing or frame fracture : an ocular housing or frame shall be considered to have failed if it separates into two or more pieces, or if it is no longer capable of holding an ocular in position, or if an unbroken ocular detaches from the frame, or if the ball passes through the housing or frame;		P
	d) lateral protection failure : the lateral protection shall be considered to have failed if it fractures through its entire thickness into two or more separate pieces, or if one or more particles become detached from the surface remote from the impact point, or if it allows the ball to penetrate		P

BS EN 166			
Clause	Requirement – Test	Result	Verdict
	completely, or if it partially or totally detaches from the eye-protector, or if its component parts become separated.		
7.1.5	Resistance to ageing		-
	NOTE Cover plates and glass oculars are exempt from these tests. The exemption does not apply to coated or laminated glass.		P
7.1.5.1	Stability at an elevated temperature		-
	Assembled eye-protectors shall show no apparent deformation when tested by the method specified in clause 5 of EN 168:2001.		P
7.1.5.2	Resistance to ultraviolet radiation (oculars only)		-
	Oculars shall be subjected to the test for resistance to ultraviolet radiation in accordance with the method specified in clause 6 of EN 168:2001.		P
	At the end of the test, oculars shall meet the following requirements.		P
	a) The relative change of luminous transmittance shall not be greater than the values specified in Table 6.		P
	If for welding filters the relative change of the luminous transmittance is larger than the values specified in Table 6 but the actual value of luminous transmittance remains within the range specified by its shade number, a second irradiation is performed in accordance with clause 6 of EN 168:2001 on the same sample.		P
	The relative change of luminous transmittance due to the second irradiation shall not be greater than the values specified in Table 6 and the actual value of luminous transmittance shall remain within the range specified by its shade number;		P
	b) The value of the reduced luminance factor shall not exceed the permissible limits given in 7.1.2.3.		P
7.1.6	Resistance to corrosion		-
	After having undergone the test for resistance to		P

BS EN 166			
Clause	Requirement – Test	Result	Verdict
	corrosion specified in clause 8 of EN 168:2001, all metal parts of the eye-protector shall display smooth surfaces, free from corrosion, when they are examined by a trained observer.		
7.1.7	Resistance to ignition		-
	Eye-protectors shall be tested in accordance with the method specified in clause 7 of EN 168:2001 and shall be considered to be satisfactory if no part of the eye-protector ignites or continues to glow after removal of the steel rod.		P
7.2	Particular requirements		P
7.2.1	Protection against optical radiation		N
7.2.1.1	Welding filters – see EN 169.		N
7.2.1.2	Ultraviolet filters – see EN 170.		N
7.2.1.3	Infrared filters – see EN 171.		N
7.2.1.4	Sunglare filters for industrial use – see EN 172.		N
7.2.1.5	Welding Filters with switchable luminous transmittance - see EN 379.		-
7.2.2	Protection against high-speed particles		-
	Eye-protectors intended to provide protection against high-speed particles shall withstand the impact of a 6 mm nominal diameter steel ball of 0,86 g minimum mass, striking the oculars and the lateral protection at one of the speeds given in Table 7.		P
	Eye-protectors for protection against high-speed particles shall also meet the requirements for increased robustness given in 7.1.4.2.		P
	The test shall be in accordance with the method specified in clause 9 of EN 168:2001.		P
	It shall not be possible for the ball to strike the lateral impact point without first striking the lateral protection.		P
	On so testing the following defects shall not occur:		P
	a) ocular fracture : an ocular shall be considered to have fractured if it cracks through its entire thickness into two or more pieces, or if more than 5		P

BS EN 166			
Clause	Requirement – Test	Result	Verdict
	mg of the ocular material becomes detached from the surface away from the one struck by the ball, or if the ball passes through the ocular;		
	b) ocular deformation : an ocular shall be considered to have been deformed if a mark appears on the white paper on the opposite side to that struck by the ball;		P
	c) ocular housing or frame failure : an ocular housing or frame shall be considered to have failed if it separates into two or more pieces, or if it is no longer capable of holding an ocular in position, or if an unbroken ocular detaches from the frame, or if the ball passes through the housing or frame;		P
	d) lateral protection failure : the lateral protection shall be considered to have failed if it fractures through its entire thickness into two or more separate pieces, or if one or more particles becomes detached from the surface remote from the impact point, or if it allows the ball to penetrate completely, or if it partially or totally detaches from the eye-protector, or if its component parts become separated.		P
	NOTE Eye-protectors offering protection against high-speed particles must provide lateral protection (see 7.2.8).		P
7.2.3	Protection against molten metals and hot solids		-
	Eye-protectors intended to provide protection against molten metals and hot solids shall be considered to be satisfactory if:		P
	a) the eye-protector is either a goggle or a face-shield;		P
	b) the viewing area of oculars for face-shields has a minimum vertical centre-line depth of 150 mm when mounted in the appropriate housing;		P
	c) face-shields cover the eye-region rectangle of the appropriate head-form as assessed in		P

BS EN 166			
Clause	Requirement – Test	Result	Verdict
	accordance with 10.2 of EN 168:2001;		
	d) the eye-protector satisfies the requirements for one of the three impact energy categories given in 7.2.2;		P
	e) when tested and assessed in accordance with 10.1 of EN 168:2001 they prevent the adherence of molten metal to the portion of the eye-protector which affords protection to the eye-region rectangle ABCD shown in Figure 11 of EN 168:2001;		P
	f) complete penetration of oculars for goggles, and all types of frames, housings, browguards, etc. does not occur within 7 s when tested as described in clause 11 of EN 168:2001;		P
	g) complete penetration of oculars for face-shields does not occur within 5 s when tested as described in clause 11 of EN 168:2001.		P
7.2.4	Protection against droplets and splashes of liquids		-
	Eye-protectors for use against droplets (goggles) and splashes of liquids (face-shields) shall be tested in accordance with the methods specified in clause 12 of EN 168:2001.		P
	The results shall be considered to be satisfactory if:		P
	a) no pink or crimson colouration appears in the ocular regions defined by the two circles when assessing goggles for protection against droplets. No account shall be taken of any such colouration up to a distance of 6 mm inside the edges of the eye-protector;		P
	b) face-shields cover the eye-region rectangle of the appropriate head-form as described in 10.2.2.2 of EN 168:2001 as assessed in accordance with 10.2 of EN 168:2001.		P
	Additionally, face-shields for protection against splashes of liquids shall have a viewing area with a		P

BS EN 166			
Clause	Requirement – Test	Result	Verdict
	minimum vertical centre-line depth of 150 mm when mounted in the appropriate housing.		
7.2.5	Protection against large dust particles		-
	Eye-protectors for use against large dust particles shall be tested in accordance with the method specified in clause 13 of EN 168:2001.		P
	The result shall be considered to be satisfactory if the reflectance after the test is not less than 80 % of its value before the test.		P
7.2.6	Protection against gases and fine dust particles		-
	Eye-protectors for use against gases and fine dust particles shall be tested in accordance with the method specified in clause 14 of EN 168:2001.		P
	They shall be regarded as satisfactory if no pink or crimson coloration appears in the area covered by the eye-protector.		P
	No account shall be taken of any such coloration up to a distance of 6 mm inside the edges of the eye-protector.		P
7.2.7	Protection against short circuit electric arc		-
	Eye-protectors for protection against short circuit electric arc shall be face-shields only. They shall have no exposed metal parts and all external edges of the protector shall be radiussed, chamfered or otherwise treated to eliminate sharp edges.		P
	Oculars shall have a minimum thickness of 1,4 mm and a scale number of 2-1,2 or 3-1,2.		P
	Face-shields shall satisfy the requirements for area of coverage defined in clause 6.2.4 (b) and shall have a viewing area with a minimum vertical centre line depth of 150 mm when mounted in the appropriate housing.		P
	NOTE The specification of a minimum ocular thickness of 1,4 mm was derived from a series of tests in Germany on a range of materials, including polycarbonate,		P

BS EN 166			
Clause	Requirement – Test	Result	Verdict
	cellulose acetate and cellulose propionate. The distance of the material under test from the electric arc was a nominal 300 mm and the arc conditions were as follows :		
	Current = 12 kA max. ;		P
	Voltage = 380 – 400 V ;		P
	Frequency = 50 Hz nominal ;		P
	Duration = 1 s max.		P
7.2.8	Lateral Protection		-
	Eye-protectors claimed to provide lateral protection shall pass the lateral region coverage assessment detailed in clause 19 of EN 168:2001.		P
7.3	Optional requirements		-
	Optional requirements are specified for additional characteristics of eye-protectors which may be found to be beneficial to the user for operational reasons.		P
7.3.1	Resistance to surface damage by fine particles		-
	If oculars are described as resistant to surface damage by fine particles they shall have a reduced luminance factor of not more than		P
	$5 \frac{\text{cd}}{\text{m}^2 \cdot \text{lx}}$ following the test specified in clause 15 of EN 168:2001.		P
	NOTE This procedure does not assess resistance to abrasion.		P
7.3.2	Resistance to fogging of oculars		-
	If oculars are described as resistant to fogging they shall remain free from fogging for a minimum of 8 s when tested in accordance with clause 16 of EN 168:2001.		P
	NOTE This procedure does not assess resistance to fogging of the complete eye-protector.		P
7.3.3	Oculars with enhanced reflectance in the infrared		-
	Oculars which are claimed to have enhanced reflectance in the infrared shall have a mean		P

BS EN 166			
Clause	Requirement – Test	Result	Verdict
	spectral reflectance greater than 60 % within the wavelength range 780 nm to 2 000 nm when measured in accordance with clause 8 of EN 167:2001.		
7.3.4	Protection against high speed particles at extremes of temperature		-
	Eye-protectors intended to provide protection against high-speed particles at extremes of temperature shall withstand the impact of a 6 mm nominal diameter steel ball of 0,86 g minimum mass, striking the oculars and the lateral protection at one of the speeds given in Table 7.		P
	The impacts are carried out after the eye-protectors have been conditioned at extremes of temperature ((55 ± 2) °C and (-5 ± 2) °C) using the method specified in clause 9 of EN 168:2001.		P
	It shall not be possible for the ball to strike the lateral impact point without first striking the lateral protection		P
	On so testing the following defects shall not occur:		P
	a) ocular fracture : an ocular shall be considered to have fractured if it cracks through its entire thickness into two or more pieces, or if more than 5 mg of the ocular material becomes detached from the surface away from the one struck by the ball, or if the ball passes through the ocular;		P
	b) ocular deformation : an ocular shall be considered to have been deformed if a mark appears on the white paper on the opposite side to that struck by the ball;		P
	c) ocular housing or frame failure : an ocular housing or frame shall be considered to have failed if it separates into two or more pieces, or if it is no longer capable of holding an ocular in position, or if an unbroken ocular detaches from the frame, or if the ball passes through the housing or frame;		P
	d) lateral protection failure : the lateral protection shall be considered to have failed if it fractures through its entire thickness into two or more		P

BS EN 166			
Clause	Requirement – Test	Result	Verdict
	separate pieces, or if one or more particles becomes detached from the surface remote from the impact point, or if it allows the ball to penetrate completely, or if it partially or totally detaches from the eye-protector, or if its component parts become separated.		
	NOTE Eye-protectors offering protection against high speed particles at extremes of temperature must provide lateral protection (see 7.2.8).		P
8	Allocation of requirements, test schedules and application		-
8.1	Requirements and test methods		-
	The requirements and test methods for oculars and complete eye-protectors are specified in various European Standards (see clause 2).		P
	It is the object of this clause to allocate the individual requirements and test methods to the different types of eye-protector.		P
	Table 8 specifies those requirements and tests which apply to oculars.		P
	Table 9 specifies those requirements and tests which apply to frames and complete eye-protectors.		P
8.2	Test schedules for type examination		-
	The necessary number of samples for type examination and the required order of the individual tests to be carried out are shown in Table 10 (mounted and unmounted oculars) and Table 11 (frames and complete eye-protectors).		P
8.3	Application of eye-protector types		-
	The application of eye-protector types to the various fields of use is shown in Table 12.		P

Type of equipment, model: Face shield, RZ-001

Details of: Model: RZ-001

View:

☒ general

☐ front

☐ rear

☐ right

☐ left

☐ top

☐ bottom



Details of: Model: RZ-001

View:

☒ general

☐ front

☐ rear

☐ right

☐ left

☐ top

☐ bottom

