



**PRODUCT MANUAL FOR
Eye Protectors
According to IS 5983:1980**

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure coherence of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification/licence/certificate.

1.	Product	:	IS 5983:1980
	Title	:	Specification for Eye Protectors
	No. of Amendments	:	1
2.	Sampling Guidelines:		
a)	Raw material	:	Please refer Annex-A
b)	Grouping guidelines	:	For eye protectors with filtering action, any one shade number may be tested to cover all shade numbers in the particular filter category.
c)	Sample Size	:	10 oculars/5 pairs of oculars + 5 assembled eye-protectors
3.	List of Test Equipment	:	Please refer ANNEX –B
4.	Scheme of Inspection and Testing	:	Please refer ANNEX –C
5.	Possible tests in a day :	:	Since testing facility is not available in any BIS/BIS recognized lab, complete testing has to be carried out in the Factory for certification and during surveillance. 3 days inspection (with gap days in between) required for complete testing (~total 5 days)
6.	Scope of the Licence :		
	“Licence is granted to use Standard Mark as per IS 5983:1980 with the following scope:		
	Name of the product	Eye Protectors	
	Type	Eye-protectors : Safety Goggles/Safety Spectacles/Safety Clip-ons/Eyes, face and hand shields, and Wire Mesh Screens Oculars : Mineral Oculars (Glass)/Organic Oculars (Plastic) /Laminated Oculars	
	Use of eye-protector	General Purpose/High velocity impact/Molten metal and Hot solids/Splashes/Dust/Gases and Vapours/Filtering action/Combination	
	Designation of Filters (for eye-protectors with filtering action)	Welding/UV/IF/Daylight Filters	

ANNEX A
Raw Materials

Except for spectacles, all materials which are likely to be exposed to radiation during use and which come in contact with the operator shall have a thermal conductivity of less than $0.2 \text{ W.m}^{-1}\text{K}^{-1}$.
¹.Certificate/material Data sheet from supplier shall be obtained.

ANNEX B
List of Test Equipment

Major test equipment required to test as per the Indian Standard

Sr. No.	Test Equipment	Tests used in with Clause Reference
1	Measuring scale/tape, and other precision measuring instruments such as Vernier Calipers and Micrometer/Screw Gauge/Dial-calipers etc.	Dimensions of Oculars (Cl 5.1.1) Dimension of head band (4.2)
	Heat flow meter or similar equipment for testing thermal conductivity	Thermal conductivity (4.5)
2	<p>For testing Unmounted Oculars (3.1 of IS 7524 (Part 2))</p> <p>Apparatus comprising of:</p> <ul style="list-style-type: none"> - Telescope - having a magnification between 7.5 and 20 (recommended magnification 15) with an aperture of 15 to 20 mm and an adjustable eye-piece fitted with a graticule, - Adjustable light source with condenser - Target - consisting of a black plate with the cut-out pattern shown in Fig. 1 of Cl 3.1.1.3 of IS 7524 (Part 2) - Interference Filter - for wavelength 555 ± 10 nm and a half- band width of approximately 50 nm. - Standard lenses -with refractive powers of $\pm 0.6 \text{ m}^{-1}$ & $\pm 0.12 \text{ m}^{-1}$ and $\pm 0.25 \text{ m}^{-1}$ (tolerance $\pm 0.01 \text{ m}^{-1}$). <p>For testing Mounted Oculars (3.2 of IS 7524 (Part 2))</p> <p>Apparatus as per Method A comprising: Standard Support made of metal or other rigid material, Telescopes - Two in number, similar to that presented in 3.1.1.1 of IS 7524 (part 2) and fitted with diaphragms 6 mm in diameter, Double target - as shown in Fig. 3 of IS 7524 (part 2), Standard lenses - same as in 3.1.1.5 of IS 7524 (part 2), preferably two sets</p> <p style="text-align: center;">OR</p> <p>Apparatus as per Method B comprising: Filament lamp - one, of 6V, 5A rating, Green Filter, 40V viewfinder, Plano-convex lenses - two in number; lens 1 having focal length 600 mm; diameter 95 mm, and lens 2 with focal length 1190 mm, diameter 100 mm, Diaphragm - pierced with two 5 mm diameter holes, the centres of which are 66 mm apart; for allowing two parallel beams of light to pass through and</p>	Optical requirements of oculars (Cl 5.1.2)

	a Screen	
3	Suitable arrangement for measuring diffusion of light as per Fig. 7 of Cl. 4 of IS 7524 (Part 2) comprising of: light source, spherical mirrors, concave mirrors, diaphragms, achromatic lenses, filters and a photomultiplier	Diffusion of light in oculars (CI 5.1.1.3)
4	Suitable setup of apparatus for test of Quality of material and surface as illustrated in Fig 8 of Cl 5 of IS 7524 (Part 2) comprising of: Adjustable opaque dull black mask, lamp (light source), dull background and achromatic lenses	Quality of material and surface of oculars (CI 5.1.1.5)
5	<p>Apparatus as per Cl 4.1 of IS 7524 (Part 1) comprising of:</p> <ul style="list-style-type: none"> - An immediate support for the ocular, which shall be a steel or rigid plastics cylinder with an internal diameter of 25 ± 0.4 mm and an outside diameter of 32 mm. The cylinder shall be inserted into, or be an integral part of a steel base. - A seating ring shall be firmly attached to the top of the cylinder to provide cushioning to the ocular. The seating ring shall have a thickness of 3 mm and the same inside and outside diameters as the support tube. The seating material shall have a hardness of 40 ± 5 IRHD. The combined mass of the support assembly shall be at least 12 kg. - A load ring weighing 250 g shall be provided for being placed upon the ocular. This ring shall have an inside diameter the same as the support tube, and any convenient outside diameter. A seating of the same dimensions and hardness as in (b) shall be firmly affixed at the bottom surface of the load ring. - A device allowing a 22-mm diameter steel ball of about 44 g mass to drop, from rest, from a height of 1.27 to 1.30 m on to the specified area of the ocular of the eye protector. - Arrangement for maintaining the temperature of the room at $23 \pm 3^\circ\text{C}$ 	Robustness of Construction of unmounted oculars (CI 5.1.1.6 (a))
6	<p>Apparatus as per Cl 4.2 of IS 7524 (Part 1) comprising of:</p> <ul style="list-style-type: none"> - Arrangement for heating eye-protectors to $55 \pm 2^\circ\text{C}$ and cooling them to $-20 \pm 2^\circ\text{C}$ and maintaining these temperatures for at least 4 hours. - Head-form - made of a suitable material having a hardness of 50 to 60 IRHD. The essential dimensions and contours shall conform to those given in Fig.1 of Cl 4.2 of IS 7524 (Part 1) - A device allowing a 22 mm diameter steel ball of about 44 g mass to drop from rest, from a height of 1.27 to 1.30 m on to the specified area of the oculars of the eye-protector. 	Robustness of Construction of mounted oculars (CI 5.1.1.6 (b))

7	Suitable apparatus comprising of quartz envelop high pressure xenon lamp of 450 W	Stability in presence of ultra-violet radiation (CI 5.1.1.7)
8	Air-Oven - capable of maintaining a temperature of $55 \pm 2^{\circ}\text{C}$.	Stability at elevated temperatures for eye-protector assembly (CI 5.1.2.1)
9	Sodium Chloride Solution - 10 percent (m/m) in water Hot plate, laboratory glassware, thermometer	Resistance to corrosion for eye-protector assembly (CI 5.1.2.2)
10	Disinfectant solution, for example, 0.1 percent (v/v) solution of dodecyl-dilamine ethyl (amino-ethyl) glycine hydrochloride or cleaning solution recommended by manufacturer	Suitability for disinfection for eye-protector assembly (CI 5.1.2.3)
11	Apparatus for determination of transmittance as per Method A of IS 7524 (Part 2) comprising of: Spectrophotometer and light sources Method B: Light source, detector, microammeter and optical bench	Transmittance (CI 5.2.1.1)
12	Flame resistance test apparatus as per CI 8.1 of IS 7524 (Part 1) comprising of - Gas welding rod - made of steel, 300 mm long and 6 mm in diameter, with flat end faces - Heat source - for heating the gas welding rod to a temperature of $650 \pm 10^{\circ}\text{C}$	Flame resistance for industrial eye-protectors (CI 5.2.2.1 (a))
13	Air-oven - having a capacity not less than 10 times the volume of the sample eye-protector and capable of being heated to a temperature of $200 \pm 5^{\circ}\text{C}$	Flame resistance for eye-protectors used by professionals solely for the attenuation of daylight (CI 5.2.2.1 (b))
14	Resistance to high speed particles test apparatus as per CI 9 of IS 7524 (Part 1) comprising of - Head-Form - made of cast aluminium. The dimensions and contours shall conform to those given in Fig. 2 as per CI 9 of IS 7524 (Part 1). - Propulsion Equipment - The equipment shall be capable of imparting to a 6-mm diameter steel ball known velocities up to 190 m/s. (The equipment specifications shall be as given in CI 9.1.2 of IS 7524 (Part 1) - High accuracy timing device	Protection against high velocity particles (CI 5.2.2.2)
15	i. Apparatus for test of non adherence to molten metal as per CI 10 and Fig 3 of IS 7524 (Part 1) comprising of - Spring loaded piston fitted with an ejector head dished in the centre to accommodate the molten metal - A fixed platform with a central opening large enough to permit the charge of molten metal to go through it	Protection against molten metal and hot solids (CI 5.2.2.3)

	<p>ii. Apparatus for test of resistance to penetration of hot solids as per CI 11 of IS 7524 (Part 1) comprising of</p> <ul style="list-style-type: none"> - Metal cylinder shaped to hold the test material and to take a funnel of heat-insulating material shaped to centre a steel ball, 6.5 mm in diameter, on the the test specimen - Furnace capable of heating this metal cylinder up to a temperature of up to 1030 ±20°C. 	
16	<p>Apparatus for test of proof against chemical splashes as per CI 12 of IS 7524 (Part 1) comprising of</p> <ul style="list-style-type: none"> - Head-Form - Same as prescribed in 9.1.1 of IS 7524 (Part 1) - Hand Atomizer - capable of producing fine droplets (not mist). - Test Paper - White blotting paper 180 x 100 mm approximately, dipped in a 0.1 M solution of sodium carbonate; to be placed over the lint - Detecting Solution - Prepared by dissolving 5 g of phenolphthalein in 500 ml of methanol and adding 500 ml of distilled water, to obtain 1 litre. 	Protection Against Chemical Splashes (CI 5.2.2.4)
17	<p>Apparatus for test of protection against dust as per CI 13 of IS 7524 (Part 1) comprising of</p> <ul style="list-style-type: none"> - Dust Chamber - illustrated in Fig. 5 of IS 7524 (Part 1) and as per specifications detailed in CI 13.1.1 of IS 7524 (Part 1) - Test Dust – 1000 g of pulverized coal having grain size distribution as per CI 13.1.2 of IS 7524 (Part 1) - IS Sieves – For measuring grain size of test dust - Head-Form - Same as prescribed in 9.1.1 of IS 7524 (Part 1) - Photoelectric Reflectometer 	Protection Against dust (CI 5.2.2.5)
18	<p>Apparatus for test of protection against gas as per CI 14 of IS 7524 (Part 1) comprising of</p> <ul style="list-style-type: none"> - Head-Form - Same as in 9.1.1 - Gas Chamber as per specifications given in CI 14.1.2 of IS 7524 (Part 1) - Gas supply (Ammonia Gas) - Test Paper - White blotting paper 180 x 100 mm, free from sulphur compounds and dipped in 1 percent (m/m) solution of mercurous nitrate so that it is damp at the time of the test - Mercurous Nitrate Solution - 1 percent (m/m). Prepare by dissolving 1 g of mercurous nitrate in 100 ml of distilled water containing 1 ml of concentrated nitric acid 	Protection against gases and vapours (CI 5.2.2.6)

The list above is indicative in nature and may not be taken as exhaustive

ANNEXURE-C

**SCHEME OF INSPECTION AND TESTING for
Eye-Protectors**

According to IS 5983:1980

1. LABORATORY - A laboratory shall be maintained which shall be suitably equipped (as per the requirement given in column 2 of Table 1) and staffed, where different tests given in the specification shall be carried out in accordance with the methods given in the specification.

1.1 The manufacturer shall prepare a calibration plan for the test equipment.

2. TEST RECORDS –The manufacturer shall maintain test records for the tests carried out to establish conformity.

3. PACKING AND MARKING– The Standard Mark as given in the schedule of the licence shall be indelibly marked on each Eye-protector and their packaging along with the other marking details as required by the standard. Packing and Marking shall be done as per the provisions of the Indian Standard. The following shall be marked in addition –

a) The BIS licence number

b) The phrase 'Please see www.bis.gov.in for BIS certification details'. *

**In case of space constraints, (b) may be marked only on the package*

4. CONTROL UNIT – For the purpose of this scheme, eye protectors of the same Design, Model, Type, Use and Designation of Filter and of same material manufactured from the same consignment of raw material in a day shall constitute one control unit.

5. LEVELS OF CONTROL - The tests as indicated in column 1 of Table 1 and the levels of control in column 3 of Table 1, shall be carried out on the whole production of the factory which is covered by this plan and appropriate records maintained in accordance with paragraph 2 above.

5.1 All the production which conforms to the Indian Standard and covered by the licence should be marked with Standard Mark.

6. REJECTIONS–Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act, 2016.

TABLE 1
LEVELS OF CONTROL

Test Details				Levels of Control			
Cl.	Requirement	Test Methods		Test equipment requirement R: required (or)S: Sub-contracting permitted	No. of Samples	Frequency	Remarks
		Clause	Reference				
4	Design and Manufacture						
4.0	General	4.0	IS 5983	S	5 (of each design or model)	Each Control Unit	See Note 4
4.1	Comfort to the wearer	4.1	-do-	S	-do-	-do-	-do-
4.2	Head band	4.2	-do-	S	-do-	-do-	-do-
4.3	Fittings	4.3	-do-	S	-do-	-do-	-do-
4.4	Ventilation	4.4	-do-	S	-do-	-do-	-do-
4.5	Thermal Conductivity	4.5	-do-	S	5 (of each design or model)	Each consignment	See Note 3
4.6	Composition of Oculars	4.6	-do-	S	5 (of each design or model)	Each consignment	-do-
5	Requirements						See Note 5
5.1	General requirements						
5.1.1	Oculars						
5.1.1.1	Dimensions	5.1.1.1	IS 5983	S	5 pairs (of each design or model)	Each Control Unit	See Note 4
5.1.1.2	Optical requirements						
a)	Unmounted oculars	3.1	IS 7524 (Part 2)	S	5 pairs (of each design or model)	Every month or whenever there is change in material	
b)	Mounted Oculars	3.2	-do-	S	-do-	-do-	
5.1.1.3	Diffusion of light	4	-do-	S	-do-	-do-	
5.1.1.4	Colour Recognition	5.1.1.4	IS 5983	S	-do-	-do-	

5.1.1.5	Quality of Material and Surface	5	IS 7524 (Part 2)	S	5 pairs (of each design or model)	Every 7 th control unit	
5.1.1.6	Robustness of Construction						
a)	Unmounted Oculars	4.1	IS 7524 (Part 1)	S	5 pairs (of each design or model)	Every 7 th Control Unit	
b)	Mounted Oculars	4.2	-do-	S	-do-	-do-	
5.1.1.7	Stability in presence of UV radiation	5.1.1.7	IS 5983	S	5 pairs (of each design or model)	Every 3 months	
5.1.2	Eye Protector Assembly	5.1.2	-do-	S	5 pairs (of each design or model)	Every 7 th Control Unit	
5.1.2.1	Stability at elevated temperature	3	IS 7524 (Part 1)	S	5 (of each design or model)	Every month	
5.1.2.2	Resistance to corrosion	6	-do-	S	-do-	-do-	
5.1.2.3	Suitability for disinfection	7	-do-	S	-do-	-do-	
5.2	Specific Requirements						
5.2.1	Oculars						
5.2.1.1	Transmittance	6	IS 7524 (Part 2)	S	5 pairs (of each design or model)	Every 7 th Control Unit	
5.2.2	Eye protector assembly						
5.2.2.1	Flame resistance						
a)	Industrial eye protectors	8.1	IS 7524 (Part 1)	S	5 (of each design or model)	Every month	
b)	Eye protectors used by professionals solely for the attenuation of daylight	8.2	-do-	S	-do-	-do-	
5.2.2.2	Protection against high velocity particles	9	-do-	S	-do-	-do-	
5.2.2.3	Protection against molten metals and hot solids	10 & 11	-do-	S	-do-	-do-	
5.2.2.4	Protection against chemical splashes	12	-do-	S	-do-	-do-	
5.2.2.5	Protection against dust	13	-do-	S	-do-	-do-	
5.2.2.6	Protection against gases and vapours	14	-do-	S	-do-	-do-	

Note 1: Whether test equipment is required or sub-contracting is permitted in column 2 shall be decided by the

Bureau and shall be mandatory. Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empaneled by the Bureau or to the laboratory of BIS licensee for this product whose licence scope includes the variety to be tested.

Note 2: Levels of control given in column 3 are only recommendatory in nature. The manufacturer may define the control unit/batch/lot and submit his own levels of control in column 3 with proper justification to BO head.

Note-3: Each consignment of material, used in manufacture of eye-protectors has to be accompanied with supplier's test certificate or test report issued by a third party laboratory recognized by the Bureau or Government laboratories empaneled by the Bureau indicating conformity to the requirements of the standard. No testing is required if the material is ISI marked.

Note-4: Design and Manufacture and dimensional/visual requirements shall be checked against a drawing incorporating material, design, and other relevant parameters for each design/model of eye-protector which shall be prepared & endorsed by both purchaser and manufacturer.

Note-5: Applicability of the above tests to various types of oculars and eye protectors shall be as per Table 4 and 5 of IS 5983:1980 – Schedule of Tests for Eye Protectors, respectively.