



**PRODUCT MANUAL FOR
NON-METAL HELMET FOR
FIREMEN AND CIVIL DEFENCE PERSONNEL
ACCORDING TO IS 2745: 1983**

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 2745: 1983
	Title	:	Non-metal Helmet for Firemen and Civil Defence Personnel
	No. of Amendments	:	3
2.	Sampling Guidelines:		
a)	Raw material	:	Material - Clause 3 of IS 2745: 1983
b)	Grouping guidelines	:	Each variety of Helmet shall be tested to cover that variety in the licence.
c)	Sample Size	:	Helmets - 10 Nos for all tests
3.	List of Test Equipment	:	Please refer ANNEX – A
4.	Scheme of Inspection and Testing	:	Please refer ANNEX – B
5.	Possible tests in a day:		
	(i) Sizes (clause 4)		
	(ii) Construction (Clause 5)		
	(iii) Workmanship and finish (Clause 6)		
	(iv) Mass (Clause 7)		
	(v) Shock absorption test (Clause 9.1)		
	(vi) Penetration resistance (Clause 9.2)		
	(vii) Strength of Retention System (Clause 9.3)		
	(viii) Flame resistance (Clause 9.6)		
6.	Scope of the Licence:		
	“Licence is granted to use Standard Mark as per IS 2745: 1983 with the following scope:		
	Name of the product	Non-metal Helmet for Firemen and Civil Defence Personnel	
	Size (mm)		
	Type	With or without Visor	

ANNEX A**List of Test Equipment***Major test equipment required to test as per the Indian Standard*

Sl No.	Tests used in with Clause Reference	Test Equipment
1.	Sizes (Clause 4)	- Head form or Fixed plug gauge / expanding gauge
2.	Construction (Clause 5)	- Vernier calliper - Steel scale - Plug gauge - Outside micrometre - Load 120 N and Rod of diameter more than 10 mm - Head Forms of required sizes
3	Visor (Clause 5.3.5)	a) Impact Resistance - Test apparatus - Air conditioner - Steel spherical ball b) Penetration Resistance - Test apparatus - Pointed project with 50 gm weight c) Flammability - Burner - Bare copper wire 0.71 mm - Protractor - Stop watch d) Spherical and cylindrical error and Prismatic error - Standard lenses - Telescope - Adjustable light source with condenser e) Diffuse transmittance and Light Transmission - Haze meter - Integrating sphere f) Mass - Weighing balance with weights
4.	Mass (Clause 7)	- Weighing balance
5.	Shock Absorption Resistance (Clause 9.1)	- Wooden head form as per IS 7692 - Striker weighing $5_{-0}^{+0.1}$ kg - Striking face: 180 X 180 mm - Apparatus for measuring force/ Load Shell (Clause A-1.2 of IS 2745: 1983) - Concrete Block to support the gauge and Head Form - Hot air Oven - Deep Freezer - Water flow arrangement litre/mim

6.	Penetration Resistance (Clause 9.2)	<ul style="list-style-type: none"> - Arrangement for Penetration Resistance Test - Steel Plate 300 mm square and 6 mm thick. - Plumb bob of 3 kg \pm 0.005 kg mass with minimum height 40 mm & included angle 60 ° \pm 0.5 ° and max tip radius 0.5 mm - Measuring Tape - Micrometer
7.	Strength Retention System (Clause 9.3)	<ul style="list-style-type: none"> - Arrangement for Strength retention System (As per clause C-1.1 of IS 2745: 1983) - Arrangement for application of load at prescribed rate as per clause C-1.2 of IS 2745: 1983)
8.	Electrical Resistance (Clause 9.4)	<ul style="list-style-type: none"> - High Voltage tester - Voltmeter - Milli Ammeter - Air Conditioner - Water bath with temperature control
9.	Water Absorption (Clause 9.5)	<ul style="list-style-type: none"> - Weighing balance - Water bath with temperature control - Air conditioner
10.	Flammability resistance (Clause 9.6)	<ul style="list-style-type: none"> - Arrangement for Flammability Resistance Test - Copper Wire 0.71 mm diameter - Barthel Burner - Reservoir, Absolute Alcohol (Ethanol) - Stop watch

The above list is indicative only and may not be treated as exhaustive.

ANNEX B

Scheme of Inspection and Testing

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. LABELLING AND MARKING – As per the requirements of IS 2745: 1983.

3.1 In addition, if visor is provided with the helmet, it shall be marked with manufacturer's name or trade mark, year of manufacture and identification in code or otherwise for traceability.

3.2 Each visor shall also be tagged with a printed card having the following information:

a) To maintain a good field of vision, formation of scratches and accumulation of dirt on the visor screen shall be avoided.

b) No organic solvents or materials containing organic solvents such as metal polish, wax and polish shall be used to clean the visor screen.

c) A soft cloth shall be used to wipe the visor for removing dust, dirt etc.

4. CONTROL UNIT – All helmets of the same size manufactured from same material in one day shall constitute a 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

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Methods			No. of Sample	Frequency	Remarks
		Clause	Reference				
3.1	Shell	3.1	IS 2745	-	One	Each consignment	Further testing is not required if consignment received with test certificate
3.2	Protective Padding	3.2	IS 2745	-	One	Each consignment	
3.3	Retention System	3.3	IS 2745	-	One	Each consignment	
3.4	Neck Protector	3.4	IS 2745	-	One	Each consignment	
4	Sizes	4	IS 2745	R	Ten	Each control unit	In case of failure all helmets in the control unit shall be tested.
5	Construction (except visor)	5.1 to 5.3	IS 2745	R	Ten	Each control unit	
5.3.5	Visor (If provided)	4.6	IS 2745 IS 9973	R	One sample for each shape and size	Each lot	No further testing is required if accompanied with the test certificate or ISI marked. However, for non-ISI visors, random sample counter check may be carried out once in a month.
6	Workmanship and finish	6.1, 6.2	IS 2745	-	Each helmet	-	-
7	Mass	7.1	IS 2745	R	Ten	Each control unit	-

9	Performance Requirements						
9.1	Shock absorption resistance	9.1 and Appendix- A	IS 2745	R	Three	Once a Week	#
9.2	Penetration resistance	9.2 and Appendix- B	IS 2745	R	One	Once a Week	-
9.3	Strength of Retention System	9.3 and Appendix- C	IS 2745	R	One	Once a Week	-
9.4	Electrical Resistance	9.4 and Appendix- D	IS 2745	R	One	Once a Week	-
9.5	Water Absorption	9.5 and Appendix-E	IS 2745	R	One	Once a Week	-
9.6	Flammability resistance	9.6 and Appendix- F	IS 2745	R	One	Once a Week	-

In case of failure of any sample, twice the number of samples from the same lot shall be tested. The lot shall be accepted only if retested samples pass.

Note-1: Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empanelled by the Bureau.

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 for approval by BO Head.