



PRODUCT MANUAL FOR PROTECTIVE HELMET FOR TWO WHEELER RIDERS ACCORDING TO IS 4151: 2015

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 4151 : 2015
	Title	:	Protective Helmet for Two Wheeler Riders
	No. of Amendments	:	2
2.	Sampling Guidelines:		
a)	Raw material	:	Materials - Clause 4 of IS 4151 : 2015
b)	Grouping guidelines	:	Helmet of each Model/Design, Type and Size shall be tested to cover that variety in the licence
c)	Sample Size	:	8 Helmets - 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 5)		
	(ii) Constructional requirement (Clause 6.1 to 6.6))		
	(iii) Peripheral vision (Clause 6.7)		
	(iv) Workmanship and Finish (Clause 6.8)		
	(v) Mass (Class 6.9)		
	(vi) Dynamic test of retention system (Clause 7.5)		
6.	Scope of the Licence :		
	“Licence is granted to use Standard Mark as per IS 4151 : 2015 with the following scope:		
	Name of the product	Protective Helmet for Two Wheeler Riders	
	Model/Design of helmet (Including reference to document submitted by licensee/applicant)	-	
	Type	- With or without lower face cover - With or without Visor	
	Size	--- mm	

ANNEX A
List of Test Equipment

Major test equipment required to test as per the Indian Standard

S. No.	Tests used in with Clause Reference	Test Equipment
1	Metal parts (Clause 4.5)	<ul style="list-style-type: none"> - Spray cabinet - Temperature controlling arrangement - Salt spray arrangement under pressure and with atomizer - Solution collection device
2	Visor (Clause 4.6)	<p><i>a) Impact Resistance</i></p> <ul style="list-style-type: none"> - Test apparatus - Air conditioner - Steel spherical ball <p><i>b) Penetration Resistance</i></p> <ul style="list-style-type: none"> - Test apparatus - Pointed project with 50 gm weight <p><i>c) Flammability</i></p> <ul style="list-style-type: none"> - Burner - Bare copper wire 0.71 mm - Protractor - Stop watch <p><i>d) Spherical and cylindrical error and Prismatic error</i></p> <ul style="list-style-type: none"> - Standard lenses - Telescope - Adjustable light source with condenser <p><i>e) Diffuse transmittance and Light Transmission</i></p> <ul style="list-style-type: none"> - Haze meter - Integrating sphere <p><i>f) Mass</i></p> <ul style="list-style-type: none"> - Weighing balance with weights
3	Sizes (Clause 5)	Head forms of various sizes as per Annex A of IS 4151
4	Shell (Clause 6.2)	<ul style="list-style-type: none"> - Vernier calliper / Steel scale - Radius gauges
5	Retention system (Clause 6.4)	<ul style="list-style-type: none"> - Vernier calliper - Load of 150 N \pm 5 N

6	Peripheral vision (Clause 6.7)	<ul style="list-style-type: none"> - Head forms of various sizes - Load of 50 N - Angle protractor or gauge to check the angle
7	Mass (Clause 6.9)	<ul style="list-style-type: none"> - Weighing balance
8	Impact absorption test (Clause 7.2)	<ul style="list-style-type: none"> - As per C-2 of IS 4151
9	Rigidity test (Clause 7.3)	<ul style="list-style-type: none"> - Loading arrangement on helmet with loads of 630 N and 30 N - Steel scale or Vernier calliper - Stop watch
10	<i>Test for projections and surface friction (Clause 7.4)</i>	
	Method A	<ul style="list-style-type: none"> - As per E-1.2 of IS 4151
	Method B	<ul style="list-style-type: none"> - As per E-2.2 of IS 4151
11	Dynamic test of retention system (Clause 7.5)	<ul style="list-style-type: none"> - Test apparatus - Headform with 15 ± 0.5 kg mass - Falling mass 10 ± 0.1 kg and height 750 ± 5 mm
12	Audibility test (Clause 7.6)	<ul style="list-style-type: none"> - As per G-1 of IS 4151
13	Retention (Detaching) test (Clause 7.7)	<ul style="list-style-type: none"> - Retention (Detaching) test apparatus - Headform - Falling mass of 10 ± 0.01 kg from height 0.50 ± 0.01 m height
14	Micro-slip test of the chin strap (Clause 7.8)	<ul style="list-style-type: none"> - Apparatus for testing slippage of the chin strap - Reciprocating clamp
15	Test for resistance to abrasion of the chin strap (Clause 7.9)	<ul style="list-style-type: none"> - Apparatus for testing abrasion of the chin strap
16	<i>Tests for retention system relying quick – release mechanisms (Clause 7.10)</i>	
	Inadvertent release by pressure (Clause 7.10.1)	Rigid sphere of 100 mm and load to exert pressure of 100 ± 5 N on helmet
	Ease of release (Clause 7.10.2)	<ul style="list-style-type: none"> - Force measuring equipment - Dynamometer - Vernier calliper
	Durability of Quick – release Mechanisms (Clause 7.10.3)	<ul style="list-style-type: none"> - Suitable test apparatus - Provision for applying force of 20 ± 1 N - Closed cabinet with spray arrangement and temperature control arrangement
17	<i>For conditioning of helmets (Clause 7.1.1)</i>	

Solvent conditioning (Clause 7.1.1.1)	<ul style="list-style-type: none"> - Cotton cloth - Octane - Toluene - Stop watch - Steel scale
Ambient temperature and hygrometry conditioning (Clause 7.1.1.2)	<ul style="list-style-type: none"> - Arrangement for maintaining temperature of 25 ± 5 ° C and humidity 65 ± 5 % - Stop watch
Heat conditioning (Clause 7.1.1.3)	<ul style="list-style-type: none"> - Arrangement for maintaining temperature of 50 ± 5 ° C - Stop watch
Low temperature conditioning (Clause 7.1.1.4)	<ul style="list-style-type: none"> - Arrangement for maintaining temperature of -20 ± 2 ° C - Stop watch
Ultraviolet –radiation conditioning and moisture conditioning (Clause 7.1.1.5)	<ul style="list-style-type: none"> - Xenon filled quartz lamp of 125 W with range 25 cm - Water spraying arrangement - Timer

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 equipments.

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

3. LABELLING AND MARKING – As per the requirement of IS 4151: 2015.

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 – Helmets of same Model/Design, Type and Size manufactured under similar conditions in a 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 Standards 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 Method			No. of Sample	Frequency	Remarks
		Clause	Reference				
4.1	Shell	4.1	IS 4151	–	–	Material shall conform to the requirements.	
4.2	Protective padding	4.2	IS 4151	–	–		
4.3	Comfort padding	4.3	IS 4151	–	–		
4.4	Retention system	4.4	IS 4151	–	–		
4.5	Metal Parts (Corrosion resistance)	4.5	IS 4151 IS 9844	S	Two samples for each component.	Each consignment	No further testing is required if accompanied with the test certificate. However, random sample counter check on each component may be carried out once in three months.
4.6 and 6.1.2	Visor (If provided)	4.6	IS 4151 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.
5	Sizes	5.1	IS 4151	R	Eight	Each control unit	In case of any failure, all helmets in the control unit shall be tested.
6	CONSTRUCTIONAL REQUIREMENTS						
6.1	General (Except visor)	6.1.1 , 6.1.2 6.1.3	IS 4151	R	Eight	Each control unit	In case of any failure, all helmets in the control unit shall be tested
6.2	Shell	6.2.1 to 6.2.7	IS 4151	R	Eight	Each control unit	

6.3	Protective padding	6.3	IS 4151	R	Eight	Each control unit	In case of any failure, all helmets in the control unit shall be tested
6.4	Retention system	6.4	IS 4151	R	Eight	Each control unit	–
6.5	Characteristics of material of helmet	6.5	IS 4151	R	Eight	Each control unit	–
6.6	Safety of wearer	6.6	IS 4151	R	Eight	Each control unit	–
6.7	Peripheral vision	6.7, Annex B	IS 4151	R	One sample for each shape and size from every 7 control units.		# Please see foot note.
6.8	Workmanship and finish	6.8	IS 4151	R	Each	–	–
6.9	Mass	6.9	IS 4151	R	Eight	Each control unit	In case of any failure, all the helmets in the control unit shall be tested.
7.2	Impact absorption test	7.1, 7.2, Annex C	IS 4151	S	Five samples for each shape and size	Once in three months	# Please see footnote.
7.3	Rigidity test	7.1, 7.3, Annex D	IS 4151	R	Two samples for each shape and size from every 30 control units		# Please see footnote.
7.4	Test for projections and surface friction	7.4, Annex E	IS 4151	R			# Please see footnote.
7.5	Dynamic test of retention system	7.5, Annex F	IS 4151	R	One	Each control unit	-
7.6	Audibility test	7.6, Annex G	IS 4151	S	One sample for each shape and size	Once in 6 month	# Please see footnote.

7.7	Retention (Detaching) test of helmet	7.1, 7.7, Annex H	IS 4151	R	One sample	Each control unit	–
7.8	Micro-slip test of the Chin strap	7.8, Annex J	IS 4151	S	One sample for each shape and size	Once in three month	# Please see footnote.
7.9	Test for resistance to abrasion of the Chin strap	7.9, Annex K	IS 4151	S	One sample for each shape and size	Once in three month	# Please see footnote.
7.10	Test for retention systems relying on quick release mechanisms	7.10	IS 4151	S	One sample for each shape and size	Once in three month	# Please see footnote.

In case of failure of sample in any of the requirements as per clauses 6.7, 7.2, 7.3, 7.4, 7.6, 7.8, 7.9 and 7.10, samples from two consecutive control units shall be tested for the requirement in which failure has occurred. The original frequency shall be restored only after samples from both control units are found meeting the requirement.

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

Note-2: The control unit and levels of control as decided by the Bureau are obligatory, to which the licensee shall comply with.