



**PRODUCT MANUAL FOR
AUTOMATIC SPRINKLER HEADS FOR FIRE
PROTECTION SERVICE
ACCORDING TO IS 9972 : 2002**

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 9972: 2002
	Title	:	AUTOMATIC SPRINKLER HEADS FOR FIRE PROTECTION SERVICE
	No. of Amendments	:	Nil
2.	Sampling Guidelines:		
a)	Raw material	:	NA
b)	Grouping guidelines	:	Automatic sprinkler head of each Model identification as per manufacturers catalogue, which defines design, size, distribution type and mounting position, shall be tested to include that particular variety in the scope of the licence. Whenever there is any significant alteration in shape, materials or method of manufacture, additional shall be tested.
c)	Sample Size	:	Automatic sprinkler head - 60 Nos + 50 Glass bulbs for ageing test
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	:	Please refer ANNEX – C
6.	Scope of the Licence :		
	“Licence is granted to use Standard Mark as per IS 9972: 2002 with the following scope:		
	Name of the product	AUTOMATIC SPRINKLER HEADS FOR FIRE PROTECTION SERVICE	
	Variety	Model identification as per manufacturers catalogue which defines design, size, distribution type and mounting position.	

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	General requirements (Clause 5) Examination of sprinklers (Clause 6.1)	- Vernier Caliper - Micrometer - Sphere of 8 mm + 0.010 mm - Thread Gauges as per IS 2643
2	Leak resistance test (Clause 6.2)	- Hydrostatic test equipment with variable pressure rating arrangement and with pressure gauge - Stop watch
3	Functional test (Clause 6.3)	- Test oven pressurized with water as per clause 6.3.1 and Fig. 1 of IS 9972 : 2002 - Thermometer or temperature recorder - Stop watch
4	Release temperature test (Operating temperature) (Clause 6.4)	- Distilled water - Refined vegetable oil - Liquid bath with temperature controller and controlled rate of heating arrangement
5	Heat exposure test (For glass bulb sprinklers) (Clause 6.5)	- Liquid bath with temperature-controlled arrangement - Stop watch - Distilled water - Refined vegetable oil - Test oven pressurized with water as per clause 6.3.1 and Fig. 1 of IS 9972 : 2002 - Thermometer or temperature recorder
6	High ambient temperature (Ageing) test for all Sprinklers (Clause 6.6)	- Temperature controlled air oven
7	Thermal shock test (For glass bulb sprinklers) (Clause 6.7)	- Liquid bath- temperature controlled - Stop watch - Temperature controlled water bath - Stop watch
8	Strength and heat sensitive element test (Clause 6.8)	- Test rig for loading bulb with arrangement for applying force at rate of 250 ± 10 N/s - Test rig for loading fusible heat responsive element under controlled temperature condition of $20 \text{ }^\circ\text{C} \pm 3 \text{ }^\circ\text{C}$
9	Service load measurement (Clause 6.9)	- Test rig with arrangement for hydrostatic test pressure arrangement and pressure gauge - Linear gauge - Loading arrangement at rate of loading as 1500 N/min

10	Strength of frame test (Clause 6.10)	<ul style="list-style-type: none"> - Loading arrangement at rate of loading as 1500 N/min - Stop watch - Vernier caliper/ other suitable equipment
11	Deflector strength test (Clause 6.11)	<ul style="list-style-type: none"> - Force loading arrangement as per clause 6.11 with rate of loading 30 N/s - Arrangement for supply of water under pressure
12	Water flow test (Clause 6.12)	<ul style="list-style-type: none"> - Testing arrangement as per Fig 2 of IS 9972 : 2002 with pressure gauge and arrangement for measurement of flow of water - Arrangement for maintaining temperature during the test.
13	Water distribution test (Clause 6.13)	<ul style="list-style-type: none"> - Equal sized pans – 100 Nos - Arrangement for maintain temperature of 20 ± 15 °C during the test - Test room of suitable sizes (based on type of sprinkler) - Piping arrangement for installation of sprinklers - Steel scale - Measuring cylinders - Flow meter
14	Water hammer test (Clause 6.14)	<ul style="list-style-type: none"> - Arrangement for pressuring sprinkler head in cyclic manner with pressure gauge (small motor operated piston pump that produce a rapid rise in discharge pressure at the rate of 60 cycles/min) and counter for measurement of number of cycles
15	Vibration test (Clause 6.15)	<ul style="list-style-type: none"> - Arrangement for subjecting sprinkler to vibration of 1 mm amplitude and 18 to 37 Hz frequency.
16	Calibration test (Clause 6.16)	<ul style="list-style-type: none"> - Arrangement for testing flow rate at various pressure - Flow meter - Test arrangement as per clause 6.16 and Fig 10 of IS 9972 : 2002
17	Corrosion Test, Cl 6.17	<ul style="list-style-type: none"> - Distilled water - Nitric acid - Stop watch - Mercurous nitrate - Sodium thiosulphate - Vessel of 10 ltr or other suitable size with lid with heating arrangement through the bas and cooling coils along the side walls with thermostat. - Sulphuric acid - Thermometer - Hygrometer

18	Stress corrosion cracking test, (Clause 6.18)	<ul style="list-style-type: none"> - Moist ammonia air - Glass chamber with cover - Thermometer - Microscope of magnification 25 X - Flask of 500 ml with thermometer and wet condenser - Magnesium chloride - De-ionized water
19	Determination of time constant (Clause 6.19)	<ul style="list-style-type: none"> - Wind tunnel as per Fig 11 of IS 9972 : 2002 - Arrangement for maintaining temperature in tunnel to 20 °C - Arrangement for pressuring the sprinklers
20	Response test for ceiling, flush, recessed and concealed sprinklers (Clause 6.20)	<ul style="list-style-type: none"> - Room of suitable size - Heat source - Thermal sensors or thermometer - Temperature controlled cabinet - Cylindrical mass - Scale
21	Determination of automatic sprinkler head sensitivity (Clause 7)	<ul style="list-style-type: none"> - Frames as per fig. 16A and 16 B of IS 9972 : 2002 - Wind Tunnel as per Fig 11 of IS 9972 : 2002 - Plunge test tunnel as per Fig 15 and Table 10 of IS 9972 : 2002

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 9972 : 2002.

4. CONTROL UNIT – All sprinkler heads of same type/class and size manufactured in a day from same consignment of raw material 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		
CI No	Requirement	Test Method			No. of Sample	Frequency	Remarks
		Clause	Reference				
5	General requirements						
5.1	Orifice Size	5.1.1, 5.1.2, 5.1.3, Table 1	IS 9972 IS 2643	R	Two	Each control unit	Dry and Flush sprinklers may have larger thread sizes than specified in Table 1
5.2	Nominal release temperature and colour coding a) Glass bulb b) Fusible elements	5.2.1, 5.2.2, Table 2, Table 3	IS 9972	R	Each sprinkler head	Each control unit	
6	Performance tests						
6.1	Examination of sprinklers	6.1	IS 9972	R	Two	Each control unit	Routine Test
6.2	Leak Resistance Test						
	i) Leakage Test	6.2.1	IS 9972	R	Ten	Each control unit	
	ii) 30 day leakage	6.2.2.	IS 9972	R	Two	Each control unit	
6.3	Functional Test	6.3, 6.3.1 to 6.3.6 Table 4, Annex- A	IS 9972	R	24	Each control unit	

6.4	Release temperature test (Operating temperature)						
	Fusible element sprinklers and cover plates of concealed sprinklers	6.4.1	IS 9972	R	50 glass bulbs	Each consignment	
	Glass bulbs and Glass bulb sprinklers	6.4.2	IS 9972	R	50 glass bulbs	Each consignment	
6.5	Heat exposure (For Glass bulb sprinklers)	6.5, 6.5.1 to 6.5.6	IS 9972	R	Two	Each control unit	#
6.6	High ambient temperature (Ageing) test for all sprinklers	6.6, 6.6.1, 6.6.2	IS 9972	R	Eight	Each control unit	#
6.7	Thermal shock Test (For Glass bulb sprinklers)	6.7, 6.7.1	IS 9972	R	Two	Each control unit	#
6.8	Strength and heat sensitive element Test	6.8	IS 9972	R	Four	Each control unit	#
	Glass bulb sprinkler	6.8.1					
	Fusible element sprinkler	6.8.2					
6.9	Service Load Measurement	6.9	IS 9972	R	Four	Each control unit	#
6.10	Strength of frame Test	6.10	IS 9972	R	Four	Each control unit	-
6.11	Deflector strength test	6.11, 6.11.1 6.11.2	IS 9972	R	Two	Each control unit	#
6.12	Water flow test						
	Water flow test (Normal)	6.12.1	IS 9972	R	Four	Each control unit	-
	Water flow endurance test	6.12.2	IS 9972	R	Four	Each Control Unit	-

6.13	Water distribution test					Each Control Unit	Optional Test
	i) Conventional, spray and Dry sprinklers unit	6.13.1	IS 9972	S	Four		
	ii) Sidewall sprinklers (15mm)	6.13.2	IS 9972	S	Four		
	iii) Water distribution above and below the sprinkler unit deflector (Not applicable to sidewall sprinklers)	6.13.3	IS 9972	S	Two		
6.14	Water hammer test	6.14, 6.14.1 to 6.14.3	IS 9972	R	Three	Each Control Unit	#
6.15	Vibration test	6.15, 6.15.1 to 6.15.3	IS 9972	R	Three	Each Control Unit	#
6.16	Calibration test	6.16	IS 9972	S	Three	Each Control Unit	Optional Test
6.17	Corrosion test						
	i) Mercurous Nitrate stress corrosion test	6.17.1	IS 9972	R	Two	Each Control Unit	
	ii) Sulphur Dioxide corrosion test	6.17.2	IS 9972	R	Four	Each Control Unit	
6.18	Stress corrosion cracking test		IS 9972	R	Two	Each Control Unit	#
	i) For Sprinklers with brass parts. unit	6.18.1					
	ii) For Sprinklers with Stainless Steel parts	6.18.2					
6.19	Determination of time constant	6.19	IS 9972	R	Four	Each Control Unit	

6.20	Response test, for Ceiling, Flush, Recessed and Concealed sprinklers	6.20, 16.20.2	IS 9972	S	Ten	Each Control Unit	Optional Test
6.20.3	Impact Resistance Test	6.20.3	IS 9972	S	Three	Each Control Unit	Optional Test
7	Determination of Automatic Sprinkler Head Sensitivity	7.1 to 7.4	IS 9972	S	Ten	Each Control Unit	Optional Test

Note-1: If any sample fails in any requirement, all sprinklers in the control unit may be suitably corrected and twice the number of samples from the lot shall be tested for all requirements. The control unit shall be accepted on passing of retested samples.

Note- 2: Tests as per clause 6.5, 6.6, 6.7, 6.8, 6.9, 6.11, 6.14, 6.15 and 6.18 are categorised as type tests and shall be conducted on each variety i.e. model declared by the manufacturer once in a year.

Note-3: Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empanelled by the Bureau.

Note-4: 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.

ANNEX - C

Possible tests in a day:

- (i) Orifice sizes (clause 5.1)
- (ii) Nominal release temperature and colour coding (Clause 5.2)
- (iii) Examination of sprinkler (Clause 6.1)
- (iv) Leakage test (Clause 6.2.1)
- (v) Functional test (Clause 6.3)
- (vi) Release temperature test (Clause 6.4)
- (vii) Strength of frame test (Clause 6.10)
- (viii) Water flow Test (Normal) (Clause 6.12.1)