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उत्पाद मैन्युअल
यांत्रिक फोम बनाने के लिए फोम सांद्रण अग्निशमन
के लिए आई एस 4989 : 2018 के अनुसार

PRODUCT MANUAL FOR
FOAM CONCENTRATE FOR PRODUCING MECHANICAL
FOAM FOR FIRE FIGHTING ACCORDING TO IS 4989 : 2018

विभिन्न उत्पादों के लिए भारतीय मानक ब्यूरो) अनुरूपता मूल्यांकन (विनियम, 2018 की योजना -I के तहत प्रमाणन के संचालन में एकरूपता और पारदर्शिता के लिए इस उत्पाद मैनुअल का उपयोग सभी क्षेत्रीय / शाखा कार्यालयों और लाइसेंसधारियों द्वारा संदर्भ सामग्री के रूप में किया जाएगा। दस्तावेज़ का उपयोग बीआईएस प्रमाणन प्राप्त करने के इच्छुक संभावित आवेदकों द्वारा भी किया जा सकता है।

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure uniformity 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.

1.	मानक संख्या **IS No.**	:	IS 4989 : 2018
	शीर्षक **Title**	:	Foam Concentrate for Producing Mechanical Foam for Fire Fighting
	संशोधनों की संख्या **No. of amendments**	:	1
2.	नमूना दिशानिर्देश **Sampling Guidelines**		
a)	कच्चा माल **Raw material**	:	Nil Note: This section indicates the requirements for raw material (if specified in the IS) for which compliance is to be established during Grant of Licence/Change in Scope of Licence/ Factory Surveillance
b)	समूहीकरण दिशानिर्देश **Grouping Guidelines**	:	Please refer to Annex-A
c)	नमूने का परिमाण **Sample Quantity**	:	15 litres Note: This section indicates the quantity of the sample of the product and/or the raw material (if applicable), required to be sent to the laboratory for testing, for the purpose of Grant of Licence/Change in Scope of Licence/ Factory Surveillance (incase of market surveillance, effort may be made to procure therequired quantity of product sample, as far as possible since raw material sample may not be available in market)

d)	**परीक्षण अनुरोध में घोषित किए जाने वाले पैरामीटर** **Parameters to be Declared in Test Request**		- Same as the scope of licence - Viscosity (in case of foam of class AR) - Pour point (in case its below 0°C)
3.	**परीक्षण उपकरणों की सूची** **List of Test Equipment**	:	Please refer to Annex-B
4.	**निरीक्षण और परीक्षण की स्कीम** **Scheme of Inspection and Testing**	:	Please refer to Annex-C
5.	**एक दिन में संभावित परीक्षण** **Possible tests in a day**		
	(i)Visual examination (Clause 4.2, Table 1), (ii) pH and specific gravity (original) (Clause 4.2, Table 1), (iii) Pour point (Clause 4.2, Table 1), (iv) Sludge content (Clause 4.2, Table1), (v) Surface tension (Clause 4.2, Table 1) Note: This section is for the guidance of BIS Certification Officers/Technical Auditors of BIS Authorized Outside Surveillance Agencies (OSAs) during factory inspection to provide readyreference regarding the tests which can be witnessed during the inspection in the factory by the officer/auditor.		
6.	**लाइसेंस का दायरा /Scope of the Licence:**		
	"Licence is granted to use Standard Mark as per IS 4989:2018 with the following scope:		
	Name of the product	Name of the product	
	Class and Type of foam concentrate		

ANNEX-A
Grouping Guidelines

1. IS 4989: 2018 covers Foam Concentrates for Producing Mechanical Foam for Fire Fighting which are classified as under:

a) Suitable for top application:

Class	Type	Fuel for fire performance	Class of fire
AFFF	1,3 and 6	Non-polar	Class A and Class B
PF	3,6	Non-polar	Class A and Class B
FP	3,6	Non-polar	Class A and Class B
FFFP	3,6	Non-polar	Class A and Class B
SF	0.1 to 6	-	Class A
AR-AFFF	3/3 and 3/6	Both non-polar and polar	Class A and Class B
AR-FFFP	3/3 and 3/6	Both non-polar and polar	Class A and Class B
AR-FP	3/3 and 3/6	Both non-polar and polar	Class A and Class B

b) For base injection system for storage tanks, a special requirement can be put separately by users.

2. Considering the above, following grouping guidelines is developed for GoL/CSoL:

- One sample from each Class of Foam Concentrate of lowest Type (for eg., 1 from 1, 3 and 6 or 3/3 from 3/3 and 3/6 or 0.1 from 0.1 to 6) shall be tested for all requirements to cover all Types of Foam Concentrates of that particular Class of Foam Concentrate in the scope of licence.

- Foam Concentrates intended for base injection system for storage tanks shall be tested separately to cover that variety in the scope of licence.

3. The firm shall declare the varieties (i.e. Class and Type) of Foam Concentrate they intend to cover in the licence. The scope of the Licence may be restricted based on the Manufacturing and Testing capabilities of the Manufacturer.

4. During the operation of the licence, BO shall ensure that all the varieties covered in the Licence are tested in rotation to the extent possible.

ANNEX-B

List of Test Equipment

(INDICATIVE LIST, FOR GUIDANCE ONLY)

Sr. No.	Tests used in with Clause Reference	Test Equipment
1	Visual examination (Clause 4.2, Table 1)	a) Glass beaker with stirrer b) Conditioning chamber for maintain 27 ± 5° C
2	Freezing and thawing (Clause 4.2, Table 1)	a) Freezing chamber (as per Cl A-3.1(a)) b) Polyethylene Tube (as per Cl A-3.1(b)) c) Measuring Cylinder (as per Cl A-3.1(c))
3	pH – Original and ageing (Clause 4.2, Table 1)	a) Standard pH electrometer with glass electrodes b) Conditioning chamber for maintaining temperature of 60° C c) Deep freezer to maintain temperature 0 ° C and -20 ° C
4	Specific gravity – Original and ageing (Clause 4.2, Table 1)	a) Hydrometer or specific gravity bottle b) Conditioning chamber for maintaining temperature of 60° C c) Deep freezer to maintain temperature 0 ° C and -20 ° C
5	Miscibility with distilled water, (Clause 4.2, Table 1)	a) Distilled water b) Synthetic sea water c) Glassware like beakers, stoppered graduated measuring cylinders etc.
6	Viscosity (Clause 4.2, Table 1)	a) Viscometer (size 150 of Table 1 of IS 1206 (Part 3)), or b) Digital viscometer (with suitable spindle type and speed as declared by the manufacturer)
7	Pour point (Clause 4.2, Table 1)	a) Apparatus for pour point test as per clause E-1 and Fig. 1 of IS 4989:2018
8	Sludge content (Clause 4.2, Table 1)	a) Electric oven/Water Bath with thermostat capable of maintaining at least 80 ° C b) Centrifuge with 2000 rpm capacity c) Graduated glass centrifuge tube of 50/100 ml. d) Desiccator with suitable drying agent e) Weighing balance.
9	Surface tension (Clause 4.2, Table 1)	a) Distilled water, Cyclohexane with min 99% purity (AR Grade) b) Du Nouy precision tensiometer c) Platinum ring of 4 or 6 cm circumference d) Glass container of 6 cm diameter e) Alcohol lamp
10	Spreading coefficient (Clause 4.2, Table 1)	
11	For maintaining ambient temperature during various tests	a) Air Conditioner

12	Expansion at 27 ± 5° C (Clause 4.2, Table 2)	a) Collecting vessel of 1600 ± 100 ml, equipped with bottom discharge facility as per Fig 5 of IS 4989: 2018 b) Measuring cylinder of 100 ml with 5 ml L.C c) Foam collector of stainless steel/Aluminium/ Brass/Plastic as per Fig 6 of IS 4989: 2018 d) Foam making nozzles as per Fig 2 & 3 of IS 4989: 2018 e) Foam solution vessel connected to the nozzle. f) Stopwatch
13	25 percent drainage time at 27 ± 5° C (Clause 4.2, Table 2)	
14	Fire test on hydrocarbon fires (non-polar) (Clause 4.2, Table 2)	a) Circular steel tray with total base area of 4.52 m^2, depth 200 ± 10 mm, thickness minimum 2.5 mm b) Adjustable stand to hold the nozzle c) Stopwatch d) Commercial heptanes with specifications as per Cl 8.1 of IS 4989:2018 e) Torch to ignite *n*-heptane f) Steel Burn back pot with 1.5 mm nominal thickness, 300 ± 10 mm diameter and 250 ± 10 mm depth g) Potable water and synthetic sea water h) Anemometer
15	Fire test on polar solvent fire (Clause 4.2, Table 2)	a) Circular steel tray with total base area of 1.73 m^2, depth 150 ± 10 mm, thickness minimum 2.5 mm b) Adjustable stand to hold the nozzle c) Stopwatch d) Commercial grade isopropyl alcohol with 98 % purity e) Torch
		f) Steel Burn back pot with 1.5 mm nominal thickness, 300 ± 10 mm diameter and 250 ± 10 mm depth g) Potable water and synthetic sea water h) Adjustable back board of 1000 mm width and height designed to be fixed and removed with the fire tray i) Anemometer
16	Foam Generating equipment (Clause 4.2, Annex- H)	a) Foam making nozzle as per per clause H-1 of IS 4989: 2018 b) Arrangement for generating foam as per clause H-2 of IS 4989: 2018 c) Foam generation equipment as per clause H-4 and Fig 4 of IS 4989: 2018
17	Fire test for synthetic foam (Clause 4.2, Annex-N)	a) 9 litre certified 2A water extinguisher b) 3A wood crib construction as per table 6 of IS 15683 c) Ignition pan d) Wood crib testing arrangement as per fig 2 of IS 15683

		e) Plain water f) Wetting agent solution (as per manufacturer's declaration) g) Cylindrical basket, h) perforated sheet steel, ginned cotton i) fibre insulation board, weighing balance

ANNEX C
SCHEME OF INSPECTION AND TESTING

1. QUALITY ASSURANCE PLAN

1.1 It is expected that manufacturers (licensees/applicants) will implement a Quality Assurance Plan i.e. a plan of regular testing and in-process controls, designed to ensure that the product bearing theStandard Mark conforms to all requirements of the Indian Standard.

1.2 The manufacturers shall define a Quality Assurance Plan defining the control unit (i.e. lot/batch etc.) and the levels of control (i.e. the frequency and number of samples for conducting the differenttests as per the Indian Standard) and submit the same to BIS Branch Office for information. The manufacturer shall comply with the same and maintain test records in accordance with para 2.4.

1.3 **RECOMMENDED LEVELS OF CONTROL/CONTROL UNIT**:

1.3.1 For the guidance of manufacturers, the recommended definition of control unit: Foam concentrate of same Class & type produced as a batch per charge shall constitute a control unit.

1.3.2 For the guidance of manufacturers in preparing the Quality Assurance Plan, recommendedlevels of control are given in **Table 1**.

1.3.3 The manufacturer shall ensure inspection and testing as per the Quality Assurance Plan submitted by them on the whole production of the factory which is covered by this plan. Alternatively,the manufacturer has the option of adherence to the quality plan as per levels of control recommended in column 3 of Table 1.

1.4 However, all manufacturers shall ensure compliance of their products to all the requirementsof the Indian Standard.

2 **ENSURING COMPLIANCE THROUGH TESTING-** It is expected that manufacturers (licensees/applicants) will establish a suitably equipped and staffed in house laboratory (In-house testing facility) for testing at least those parameters of the Indian Standard which require routine testing for ensuring quality of the product. This includes in-process controls as may be defined and put in place by the manufacturer and testing parameters/requirements which can only be performed in the factory.

2.3 For the guidance of manufacturers, Table 1 giving the recommended levels of control is givenbelow. Column 2 of Table 1 indicates routine tests where test equipment is required in house as "R" or other tests which can be subcontracted as "S". Subcontracting is permitted to BIS recognized/empanelled laboratory or any other laboratory having valid NABL accreditation as perIS/ISO/IEC 17025.

2.4 For MSME manufacturers, the requirement of maintaining a laboratory/in-house testingfacility for routine tests (indicated as "R" in Column 2 of Table 1) is also optional.

2.4.2 MSME manufacturers may utilize common cluster based facilities as per guidelines for the utilization of cluster based test facilities by MSMEs or the provisions of Sharing of testing facilitiesor get testing done from BIS recognized/empaneled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025.

2.5 **Large Scale manufacturers shall maintain an in-house laboratory equipped at least withtest facilities for routine tests (indicated as "R" in Column 2 of Table 1)**, where different testsgiven in the specification shall be carried out in accordance with the method given in the specification**.** They shall also implement a calibration plan for the in-house test equipment.

2.5.2 Alternatively, in lieu of an in-house laboratory, large scale manufacturers can also utilize theprovisions of Sharing of testing facilities as per the Guidelines for Grant of Licence available on BIS website www.bis.gov.in. (Under Conformity Assessment>Product Certification Process). Even for subcontracted tests, provisions for sharing of testing facilities can be utilized.

2.6 **TEST RECORDS**- The manufacturers maintaining an in-house laboratory or utilizing common cluster based facilities or shared test facilities shall maintain test records for the tests carried out to establish conformity. For the tests being subcontracted to BIS recognized/empanelled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025, test reports issued by the laboratories shall be available for inspection by BIS.

3 **PACKING AND MARKING** - The Standard Mark as given in the Schedule of the licence shall be legibly and indelibly marked on each container, provided always that the product so marked conforms to all requirements of the specification.

3.3 Marking shall be done as per Clause 7.1 of IS 4989:2018.

3.4 **Additional Marking requirements**: Each container shall also be marked with the following detail:

a) "For BIS certification details please visit www.bis.gov.in"

4 **REJECTION -** All the production which conforms to the Indian Standard and covered under the scope of this licence shall be marked with the Standard Mark. 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

(ONLY FOR GUIDANCE PURPOSE)

(1)				(2)	(3)		
Test Details				**Test equipment requirement R: required (or) S: Sub-contracting permitted**	**Levels of Control**		
Cl No	Requirement	**Test Method**			**No. of Sample**	**Frequency**	**Remarks**
		Clause	**Reference**				
4.1	General	4.1	IS 4989	R	All	-	-
4.2 Table 1	**Characteristics - Physical and Chemical requirement**						
i)	Visual examination	A-1 of Annex- A	IS 4989	-	Each control unit	-	-
ii)	Freezing and thawing	A-3 of Annex- A	IS 4989	R	Each type of foam concentrate	Once in three months	-
iii)	pH – Original	Annex- B	IS 4989	R	One	Each control unit	-
	pH – Ageing	Annex- B	IS 4989	R	Each type of foam concentrate	Once in a month	#
iv)	Specific gravity – Original	Annex- C	IS 4989	R	One	Each control unit	-
	Specific gravity – Ageing	Annex- C	IS 4989	R	Each type of foam concentrate	Once in a month	#
v)	Miscibility with distilled water	Annex- D	IS 4989	R	Each type of foam concentrate	Once in a week	-
vi)	Viscosity	Sl No (iv) of Table 2	IS 1206 (Part 3)	R	One	Each control unit	-
vii)	Pour point	Annex- E	IS 4989	R	One	Each control unit	-
viii)	Sludge content	Annex- F	IS 4989	R	Each type of foam concentrate	Once in a month	-
ix)	Surface tension	Annex- G	IS 4989	R	One	Each control unit	-

x)	Spreading coefficient	Annex- G	IS 4989	R	One	Each control unit	-
4.2 Table 2	**Characteristics – Fire performance**						
i)	Expansion at 27 ± 5 ° C	Annex- J	IS 4989	S	Each type of foam concentrate	Once in six months	-
ii)	25 percent drainage time at 27 ± 5 ° C	Annex- J	IS 4989	S	Each type of foam concentrate	Once in six months	-
iii)	Fire test on hydrocarbon fires (non- polar)	Annex- K, Clause 8.1	IS 4989				
	a) Fire control time	Annex- K	IS 4989	S	Each type of foam concentrate	Once in six months	-
	b) Fire extinction time	Annex- K	IS 4989	S	Each type of foam concentrate	Once in six months	-
	c) Seal ability / Film forming	Annex- K	IS 4989	S	Each type of foam concentrate	Once in six months	-
	d) Burn back	Annex- K	IS 4989	S	Each type of foam concentrate	Once in six months	-
iv)	Fire test on polar solvent fires (Polar)	Annex- M, Clause 8.2	IS 4989				
	a) Fire control time	Annex- M	IS 4989	S	Each type of foam concentrate	Once in six months	-
	b) Fire extinction time	Annex-M	IS 4989	S	Each type of foam concentrate	Once in six months	-
	c) Seal ability / Film forming	Annex- M	IS 4989	S	Each type of foam concentrate	Once in six months	-
	d) Burn back	Annex- M	IS 4989	S	Each type of foam concentrate	Once in six months	-
v)	Fire test for synthetic foam	Annex-N	IS 4989	S	Each type of foam concentrate	Once in six months	-

For type test with same formulation, cycle of conditioning as specified in A-2 shall be followed.