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**SPECIFICATION FOR PORTABLE FIRE
EXTINGUISHERS — HALON 1211 TYPE**

(Incorporating Amendment Nos. 1, 2 & 3)

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Price Group 4

*Indian Standard*SPECIFICATION FOR PORTABLE FIRE
EXTINGUISHERS — HALON 1211 TYPE

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Indian Standard

SPECIFICATION FOR PORTABLE FIRE EXTINGUISHERS — HALON 1211 TYPE

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 28 September 1984, after the draft finalized by the Fire Fighting Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Halon 1211 type fire extinguishers are intended to be used in all cases of replacement for existing CTC type fire extinguishers, the use of which has been prohibited. Such type of fire extinguishers are suitable for fire fighting in confined space for all types of classes B and C fires (see IS : 2190-1979*). The Halon 1211, being non-conductive, can also be used safely on electrical fires and is suitable alternative to CO₂ or dry powder extinguishers. Manufacture, possession and use of any gas when contained in cylinder in compressed or liquified state is regulated under the Gas Cylinder Rules 1981, of the Government of India.

0.3 This edition 1.3 incorporates Amendment No. 1 (September 1988), Amendment No. 2 (May 1989) and Amendment No. 3 (October 1993). Side bar indicates modification of the text as the result of incorporation of the amendments.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS : 2-1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard lays down the requirements regarding, material, shape, construction, anti-corrosive treatment and performance test of portable fire extinguishers of Halon 1211 type.

2. CAPACITY

2.1 The water capacity of the container when filled to the specified level shall be maximum 6.5 litres. This standard covers the capacities of 1.25, 2.5, 4, 5 and 6.5 kg.

*Code of practice for selection, installation and maintenance of portable first-aid fire extinguishers (*second revision*).

†Rules for rounding off numerical values (*revised*).

3. PRINCIPLE

3.1 The extinguisher shall be designed to operate in the following ways:

- a) *1.25 kg Capacity* — Inverted type having piercing type of valve. By inverting the extinguisher and striking the knob of the piercing mechanism against hard surface, the content shall be expelled in a continuous discharge (sealing disc being replaced at the time of recharging). The extinguisher shall be held in inverted position during the operation.
- b) *All Capacities* — Upright type fitted with squeeze grip valves. By holding the extinguishers upright, removing the lock pin from the valve handle and pressing down the spring loaded spindle by pressing downwards the operation handle thereby controlled discharging the contents.

4 MATERIAL

4.1 The material for construction of various components are given in Table 1.

5 CONTENTS

5.1 Halon 1211 shall conform to IS : 11070-1984*. The quantity shall be at temperature of $27 \pm 5^\circ\text{C}$:

a) *For 1.25 kg capacity*

$1.25 \text{ kg } \begin{matrix} +50 \text{ g} \\ -0 \text{ g} \end{matrix}$ and shall be charged to a pressure of $9.5 \text{ kgf/cm}^2 \pm 0.5 \text{ kgf/cm}^2$.

b) *For 2.5 kg capacity*

$2.5 \text{ kg } \begin{matrix} +50 \text{ g} \\ -0 \text{ g} \end{matrix}$ and shall be charged to a pressure of $10.5 \text{ kgf/cm}^2 \pm 0.5 \text{ kgf/cm}^2$.

c) *For 4 kg capacity*

$4 \text{ kg } \begin{matrix} +50 \text{ g} \\ -0 \text{ g} \end{matrix}$ and shall be charged to a pressure of $10.5 \text{ kgf/cm}^2 \pm 0.5 \text{ kgf/cm}^2$.

d) *For 5 or 6.5 kg capacity*

$5 \text{ or } 6.5 \text{ kg } \begin{matrix} +50 \text{ g} \\ -0 \text{ g} \end{matrix}$ and shall be charged to a pressure of $10.5 \text{ kgf/cm}^2 \pm 0.5 \text{ kgf/cm}^2$.

5.11 The extinguishers shall be pressurized using dry nitrogen (see IS : 1747-1972†).

*Specification for bromochlorodifluoromethane (Halon 1211).

†Specification for nitrogen (*first revision*).

TABLE 1 MATERIALS OF CONSTRUCTION OF VARIOUS COMPONENTS
(Clause 4.1)

SL No.	COMPONENT	MATERIAL	CONFORMING TO RELEVANT INDIAN STANDARD	
i)	Body	Steel	Grade D or DD of IS : 513-1986 ¹ or IS : 6240-1976 ²	
ii)	Neck ring	Steel	Any grade of IS : 226-1975 ³ or Any grade of IS : 1875-1978 ⁴ or Any grade of IS : 7283-1974 ⁵ or Any grade of IS : 9550-1980 ⁶ Grade LTB-2 of IS : 318-1957 ⁷	
iii)	a) Valve body b) Nozzle	Leaded tin bronze Extruded brass section	Grade I of IS : 291-1977 ⁸ or Type I of IS : 319-1974 ⁹	
iv)	Spring	Steel (plated)	IS : 4454 (Part 1)-1981 ¹⁰	
v)	Piercer/spindle	Steel	IS : 6528-1972 ¹¹	
vi)	Siphon tube	Brass copper	Alloy No. 2 of IS : 407-1981 ¹² or IS : 1545-1982 ¹³	
vii)	a) Sealing nuts b) Pierce disc c) Discharge fitting	Extruded brass section	Grade I of IS : 291-1977 ⁸ or Type I of IS : 319-1974 ⁹	
viii)	Washer		Rubber	IS : 937-1981 ¹⁴
ix)	Sealing disc		Copper	IS : 1972-1977 ¹⁵
	1 Specification for cold-rolled low carbon steel sheets (<i>third revision</i>).			
	2 Specification for hot-rolled steel plate (up to 6 mm) sheets and strip for the manufacture of low pressure gas cylinders (<i>first revision</i>).			
	3 Specification for structural steel (standard quality) (<i>fifth revision</i>).			
	4 Specification for carbon steel billets, blooms, slabs and bars for forgings (<i>fourth revision</i>).			
	5 Specification for hot rolled bars for production of bright bars.			
	6 Specification for bright bars.			
	7 Specification for leaded tin bronze ingots and casting (<i>second revision</i>).			
	8 Specification for naval brass rods and sections (suitable for machining and forging) (<i>second revision</i>).			
	9 Specification for free-cutting brass bars, rods and sections (<i>third revision</i>).			
	10 Specification for patented and cold-drawn steel wires — Unalloyed (<i>second revision</i>).			
	11 Specification for stainless steel wire.			
	12 Specification for brass tubes for general purposes (<i>third revision</i>).			
	13 Specification for solid-drawn copper alloy tubes for condensers, and heat and heat exchangers (<i>second revision</i>).			
	14 Specification for washers for water fittings for fire fighting purposes (<i>revised</i>).			
	15 Specification for copper plate, sheet and strip for industrial purposes (<i>first revision</i>).			

6. SHAPE

6.1 The shape of the body shall be cylindrical and filling ratio shall not be more than 0.75 by volume.

7. CONSTRUCTION

7.1 The cylinder shall be of seamless or welded construction having cold or hot drawn cylindrical portion with hemi-spherical ellipsoidal or tori-spherical ends welded to it or two halves cold or hot drawn and circumferential welded together. The end of dished part shall be having hemi-spherical, semi-ellipsoidal or tori-spherical shape and the end shall have cylindrical skirt or parallel portion of minimum length 10 mm or three times the shell thickness whichever is greater.

The welding shall be done by an electric arc welding process and shall conform to IS : 2825-1969* and, if radiographed, to IS : 817-1966†. There shall not be any longitudinal seam in the cylinder and number of circumferential seams shall not exceed two. The thickness of the shell and ends shall be calculated as in 7.1.1 and shall not be less than 1.4 mm. The neck-ring shall be welded with the body of the cylinder and shall be threaded to suit the type of valve hose.

7.1.1 The minimum thickness is calculated from the following formulae:

a) For cylindrical portion

$$t = \frac{ph D_o}{200 \times 0.8 J R_e + ph} = \frac{ph D_1}{200 \times 0.8 J R_e - ph}$$

b) For tori-spherical part or end

$$t = \frac{ph D_o}{200 \times 0.8 J R_e + ph} \times \frac{KZ}{5}$$

c) For semi-ellipsoidal part end

$$t = \frac{ph D_o}{200 \times 0.8 J R_e + ph} \times \frac{K (0.65 + 0.1 K)}{4}$$

where

t = calculated minimum wall thickness of cylindrical shell in mm from bursting point of view;

ph = test pressure above atmosphere (kgf/cm²);

D₁ = inner diameter in mm;

D_o = outer diameter in mm;

J = weld joint factor (0.9);

*Code for unfired pressure vessels.

†Code of practice for use of metal arc welders (revised).

R_e = yield strength in kgf/mm² (given in relevant Indian Standards);

H = depth of dishing in mm;

K = ratio D_0/H ;

r = Kunckle radius in mm ($r \geq 0.1$);

R = dishing radius in mm ($R \leq D_0$); and

$$Z = \left\{ \begin{array}{l} \frac{20}{H} \frac{r}{r+3} \\ \frac{20}{R} \frac{r}{r+1} \end{array} \right\}$$

7.2 The screw threads for attachment of valve shall be in accordance with Class A of IS : 2643 (Part 1)-1975*. The neck-ring shall be secured to the body by welding or pressing (where welding shall be at least 20 mm away from the circumferential wall of the cylinder).

7.3 The valve shall be screwed for fixing to the neck-ring for not less than 12 mm effective thread length with parallel threads conforming to IS : 2643 (Part 1)-1975*.

7.4 Valve Mechanism

7.4.1 A spring-loaded piercing device shall be provided in the valve for piercing the seal of disc fitted inside the neck-ring. The piercing end shall be designed so as to ensure a clear opening in the disc seal when the piercer is operated. The safety clip shall be provided for prevention of accidents in operation of piercing mechanism and discharging the contents.

7.4.2 In case of squeeze grip valve assembly, a spring-loaded, pressure sealed sliding spindle shall be provided in such a way that it is operated by manual depression by means of a cantilever hinged grip lever. The spindle shall be so designed, that the extinguisher can be regulated by means of pressing and releasing the squeeze grip handle. A safety pin shall be provided for prevention of accidents which shall be fitted on cantilever hinged grip lever through valve body.

7.4.3 The length of the piercer/spindle shall be sufficient to pierce/operate the extinguisher by piercing/pressing the piercer.

7.5 Discharge Fittings

7.5.1 Nozzle— The discharge nozzle shall be screwed to valve body/hose or it can be an integral part of valve body. The design of the

*Specification for dimensions for pipe threads for fastening purposes: Part 1 Basic profile and dimensions.

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nozzle and area of the orifice shall be such that it satisfies the performance requirement given in **10.5**.

7.5.2 For 'uprightly' designed extinguisher, a siphon tube shall be fitted to the bottom end of the valve.

7.5.3 Hose — It shall be required for 4.5 and 6.5 kg capacity and shall be either rubber or braided hose having bursting pressure of not less than 5 MN/m^2 (50 kgf/cm^2). It shall have a nominal bore of 10 mm and length of not less than 300 mm.

7.6 Pressure Gauge — Pressure gauge shall be fitted to the extinguisher (except for inverted type) to indicate its internal pressure. The gauge shall be marked suitably with normal pressure at which the extinguisher shall be charged and also indicate when it is wholly or partially released.

8. ANTI-CORROSIVE TREATMENT

8.1 On all internal and external surfaces of the body, anti-corrosive treatment shall be applied. The anti-corrosive treatment is of the following types. The thickness of the coating shall be measured by any of the methods given in IS : 3203-1982*.

- a) Lead tin alloy (tin not less than 10 percent) shall be applied by hot dipping process or by electrical process, thickness not less than 0.012 mm.
- b) Copper coating by suitable process, thickness not less than 0.005 mm.

9. PAINTING

9.1 Each extinguisher shall be painted fire red conforming to shade No. 536 of IS : 5-1978†. The paint shall conform to IS : 2932-1974‡.

9.2 The picture showing the operation of the extinguisher in the correct manner shall be provided on the body of the extinguisher.

9.3 The extinguisher shall be marked with letters B and C indicating their suitability for the respective classes of fires laid down in IS : 2190-1979§. All the letters B and C shall be of 2.5 cm size printed in black colour centrally contained in a square of 4 cm size and circle of 2 cm radius respectively. The square and circle shall be coloured green conforming to shade No. 284 of IS : 5-1978†. The paint shall conform to IS : 2932-1974‡.

*Method of testing local thickness of electroplated coatings (*first revision*).

†Specification for colours for ready mixed paints and enamels (*third revision*).

‡Specification for enamel, synthetic, exterior (a) under coating, (b) finishing (*first revision*).

§Code of practice for selection, installation and maintenance of portable first-aid fire appliances (*second revision*).

10. TEST REQUIREMENT

10.1 Hydrostatic Test — The extinguishers having 1.25 kg capacity shall be capable of withstanding the internal hydraulic pressure of 2.5 MN/m^2 (25 kgf/cm^2) for a period of 30 seconds without leakage or visible distortion. For higher capacities, it should be tested at 3 MN/m^2 (30 kgf/cm^2) for a period of 30 seconds without leakage or visible distortion. This test shall be carried out before the extinguishers are painted and after heat treatment.

10.2 Leakage Test — The fire extinguisher after being covered by inverted glass-transparent jar shall be dipped in suitable water tank filled with water, the level of which is sufficiently higher than the height of fire extinguisher for 24 hours. There shall not be any collection of even a single bubble on the inside top of the inverted glass after a lapse of 24 hours. The air bubble collected in first 6 hours shall be neglected.

NOTE 1 — The size of water tank will depend on lot size to be tested at a time. The fire extinguishers shall be arranged in rows having two grids having square opening the top one being about 8 cm below the top of fire extinguishers.

NOTE 2 — To ensure this requirement pneumatic leakage test may be conducted during in-process control.

10.3 Drop Test — This test shall be conducted at a temperature of $27 \pm 5^\circ\text{C}$. The extinguisher shall be filled with water to 90 percent by volume and pressurized to its charged pressure (*see 5.1*). The extinguisher complete with fittings shall be dropped from a height of 3 m to a concrete surface. Two drops shall be made for each extinguisher, first with cylinder axis horizontal and the second with cylindrical axis vertical with its head up. There shall be no leakage from the body permitting the loss of pressure after the test. The leakage shall be observed by immersing the extinguisher in water.

10.4 In case of ultimate failure test, mechanical failure shall not occur at a pressure of less than 4 MN/m^2 (40 kgf/cm^2).

10.5 The design and construction of extinguishers shall be such that when it is filled to the specified mass as determined by the difference of full mass in charged condition marked on the plate and then discharged at a temperature of $27 \pm 5^\circ\text{C}$ in its normal working position; it shall be capable of discharging not less than 95 percent of the liquid contents. The contents shall be expelled in the form of a

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continuous discharge, which shall comply with the following requirements :

<i>Capacity of Extinguisher</i>	<i>Minimum Period for Which Throw of Jet will be Maintained</i>	<i>Maximum Period to Discharge 95 percent of Contents</i>	<i>Range of Throw of Jet (Not Less Than)</i>
kg	s	s	m
1.25	8	14	2
2.5	8	16	2
4	10	20	3
5	12	24	4
6.5	14	28	4

The test shall be carried out so that the stream is discharged in horizontal direction in still air conditions.

11. MARKING

11.1 Each extinguisher shall be clearly and permanently marked in accordance with the requirements laid down as under:

- Manufacturer's name and trade-mark;
- Method of operation in prominent letters;
- The words Halon 1211 in prominent letters;
- The capacity and charged pressure and whether radiographed;
- The words 'Send for re-charging immediately after use';
- Year of manufacture;
- Test pressure and capacity in kg;
- The tare and full weight (partly as gas and partly as liquid); and
- The words 'WARNING : Ventilate the area after use'.

11.2 BIS Certification Marking

The product may also be marked with Standard Mark.

11.2.1 The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

12. SAMPLING AND CRITERIA FOR CONFORMITY

12.1 The details of sampling and criteria for conformity is given in Appendix A.

APPENDIX A

(Clause 12.1)

SAMPLING AND CRITERIA FOR CONFORMITY

A-0. GENERAL

A-0.1 The risk involved in failure of a fire extinguisher to work when needed is extremely large. Fire extinguishers, therefore, ought to have a high degree of reliability of performance during the entire specified period of its service. It can be achieved only through adequate design and control of quality of all raw materials, component parts and fittings followed by process control in all stages of manufacture and assembly.

A-1. SAMPLING

A-1.1 All portable fire extinguishers of the same type, shape, design and capacity produced by the same manufacturer from similar materials under almost identical conditions of manufacture shall be grouped together to constitute a lot.

A-1.2 Each lot shall be considered individually for the purpose of evaluation of quality in accordance with this specification.

A-1.2.1 The number of samples for testing to be taken at random from a lot and the criteria for conformity shall be as given in **A-1.2.2**.

A-1.2.2 From each lot a number of samples as indicated below shall be selected at random.

<i>Number of Items in the Lot</i>	<i>Sample Size</i>
Up to 25	3
26 ,, 50	5
51 ,, 100	8
101 and up to 200	8 percent

A-1.2.3 They shall be examined visually as far as possible in respect of requirements specified in **2** to **7**, **9** and **11** in respect of hydraulic pressure test (*see 10.1*), leakage test (*see 10.2*) and anti-corrosion treatment (*see 8*).

A-1.2.4 All the samples tested shall pass all these tests for the lot to be declared to conform to these requirements.

A-1.2.5 One sample shall then be examined for each of the properties drop test (*see 10.3*), and performance test (*see 10.5*).

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A-1.2.6 In respect of bursting pressure (*see 10.4*), the manufacturer shall produce a test certificate with the lot to the effect that these tests had been performed and had been found satisfactory in respect of the type of fire extinguishers presented in the lot. Alternatively, one sample shall be tested and the sample shall pass the test for the lot to be considered to conform to this requirement.

A-1.2.7 In the absence of a test certificate from a manufacturer about conformity of various components (*see 4*) and the quality of charge (*see 5*) to the requirement of this specification, from a sample fire extinguisher one item each of all the component parts and fittings shall be taken separately and examined individually in respect of the relevant requirements laid down in this specification. The sample shall also meet the requirements regarding the quality of charge (*see 5*).

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