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IS 15220 (2002): Specification for Halogenated hydrocarbons
- halon 1211 and halon 1301 - fire extinguishing media -
[CED 22: Fire Fighting]



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“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक

हैलोजनकृत हाइड्रोकार्बन — हैलोन 1211 और
हैलोन 1301 अग्निशमन माध्यम — विशिष्टि

Indian Standard

HALOGENATED HYDROCARBONS — HALON 1211
AND HALON 1301 — FIRE EXTINGUISHING
MEDIA — SPECIFICATION

ICS 13.220.10

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

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Fire Fighting Sectional Committee had been approved by the Civil Engineering Division Council.

Halons are halogenated hydrocarbons used as a fire extinguishing media. Halon 1211 is colourless, faintly sweet smelling and Halon 1301 is odourless, electrically non-conductive gas. This media is effective where an electrically non-conductive medium is essential or desirable. Some of the important type of hazards this media can protect include gaseous and liquid flammable material, electrical hazards and combustible material such as paper wood and textiles.

Halons (Halogenated hydrocarbons) which exhibit exceptional fire fighting and explosion prevention/suppression characteristics have been found to possess high ozone depleting potential. They come under Group II of Appendix A of the Montreal Protocol, the international environment treaty for phasing out ozone depleting substances, which came into force on 1 January 1989. For developing countries like India, the total phase out of halons is to be achieved by 1 January 2010 as per the Montreal Protocol. India has ratified Montreal Protocol Treaty in 1992 and obligated to phase out use of ozone depleting substances including halons. Government of India has notified phase out of halons in the fire protection sector with effect from 1 January 2001 except for essential use. Meanwhile, the practical implication of the phasing out of the halons will cover, by and large, the following aspects:

- a) Production of halons in India to be stopped w.e.f. 1 January 2001.
- b) Availability of halons will be restricted.
- c) Discharge of halons for testing/training, etc, shall not be permitted.
- d) All efforts shall be made for avoiding/minimizing halons emissions at various levels such as production, fire equipment manufacture, user, service and maintenance.
- e) Halons shall be restricted for 'essential uses' only, for protection of critical fire explosion risk areas which would otherwise result in serious impairment of an essential service to society, or pose an unacceptable threat to life, the environment, or national security and all other appropriate fire protection measures have been taken.
- f) Instead of halon, use of suitable alternative extinguishing media/methods shall be resorted to.
- g) Non-standard halon extinguishers, like aerosol type, shall not be permitted.

Detailed instructions issued by the Government of India from time to time for implementation of the country programme for the phasing out of ozone depleting substances (ODS) shall have to be complied with.

The composition of the Committee responsible for the formulation of this standard is given at Annex A.

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 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

HALOGENATED HYDROCARBONS — HALON 1211 AND HALON 1301 — FIRE EXTINGUISHING MEDIA — SPECIFICATION

1 SCOPE

This standard specifies requirements for the following halogenated hydrocarbons for use as fire extinguishing media:

- a) Halon 1211 [bromochlorodifluoromethane (CF_2ClBr)]; and
- b) Halon 1301 [bromotrifluoromethane (CF_3Br)].

2 REFERENCES

The Indian Standards listed below contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

| IS No. | Title |
|-------------------------|--|
| 3196 (Part 2) : 1992 | Welded low carbon steel cylinder exceeding 5 litre water capacity for low pressure liquefiable gases: Part 2 Cylinders for liquefiable gases other than LPG — Specification (<i>fourth revision</i>) |
| 5610 : 1993 | Specification for chlorofluoro hydrocarbons of the methane and ethane series (<i>second revision</i>) |
| 7285 : 1988 | Specification for seamless steel cylinders for permanent and high pressure liquefiable gases (<i>second revision</i>) |

3 DEFINITION

For the purpose of this standard, the following definition shall apply.

3.1 Halon — A halogenated hydrocarbon used as a fire extinguishing medium.

NOTE — The word 'halon' is followed by a number, usually of four digits, giving, in turn, the number of carbon, fluorine, chlorine and bromine atoms. Terminal zeros are omitted. Thus Halon 1211 is bromochlorodifluoromethane (CF_2ClBr) and Halon 1301 is bromotrifluoromethane (CF_3Br).

4 REQUIREMENTS

4.1 Halons 1211 and 1301 shall comply with the requirements of Table 1, when tested by the appropriate method of test specified in 5.

Table 1 Requirements
(Clause 4.1)

| Sl No. | Property | Requirements | |
|--------|--|--------------|-------------|
| | | Halon 1211 | Halon 1301 |
| i) | Purity, percent (mol/mol), <i>Min</i> | 99.0 | 99.6 |
| ii) | Acidity, ppm by mass, <i>Max</i> | 3.0 | 3.0 |
| iii) | Water content, ppm by mass, <i>Max</i> | 20 | 10 |
| iv) | Non-volatile residue, percent (<i>m/m</i>), <i>Max</i> | 0.01 | 0.01 |
| v) | Halogen ion | Passes test | Passes test |
| vi) | Suspended matter or sediment | Non-visible | Non-visible |

4.2 Physical properties of Halon 1211 and Halon 1301 are given in Table 2.

**Table 2 Physical Properties of
Halons 1211 and 1301**
(Clause 4.2)

| Sl No. | Property | Halon 1211 | Halon 1301 |
|--------|--|------------|------------|
| i) | Relative molecular mass | 165.38 | 148.93 |
| ii) | Boiling point at 1.013 bar ¹⁾ , °C | - 4.0 | - 57.8 |
| iii) | Freezing point, °C | - 160.5 | - 168.0 |
| iv) | Critical temperature, °C | 153.8 | 67.0 |
| v) | Critical pressure, bar | 42.06 | 39.6 |
| vi) | Critical volume, m ³ /kg | 0.001 41 | 0.001 34 |
| vii) | Critical density, kg/ m ³ | 713 | 745 |
| viii) | Vapour pressure | | |
| | a) At 20 °C, bar | 2.53 | 14.63 |
| | b) At 60 °C, bar | 7.20 | 34.58 |
| ix) | Liquid density at 20 °C, kg/m ³ | 1 830 | 1 575 |
| x) | Saturated vapour density at 20 °C, kg/m ³ | 17.4 | 115.6 |
| xi) | Specific volume of superheated vapour at 1.013 bar and 20 °C, m ³ /kg | 0.145 | 0.159 |

¹⁾ 1 bar = 10⁵ Pa

4.3 Electrical Conductivity

Halons 1211 and 1301 have a very low electrical conductivity. In many cases they can be used to extinguish fires involving live electrical equipment, but this, to a significant extent, may depend on the circumstances, particularly the method of discharge. In case of doubt, reference should be made to the

instructions on the fire extinguishing equipment to be used.

5 METHODS OF TEST

5.1 General

For all tests, the sample shall be taken from the liquid phase.

5.2 Purity

Determine the purity by gas-liquid in accordance with IS 5610.

5.3 Acidity

Determine the acidity by the method specified in IS 5610.

5.4 Water Content

Determine the water content by the method specified in IS 5610.

5.5 Non-volatile Residue

Determine the non-volatile residue by the method specified in IS 5610.

5.6 Halogen Ions

Mix 5 g of the sample with 5 ml of absolute methanol containing several drops of a saturated methanolic silver nitrate (AgNO_3) solution. The resulting solution shall exhibit no turbidity or precipitation of silver halide.

5.7 Suspended Matter or Sediment

Examine the liquid phase of the sample visually.

5.8 High Boiling Impurities

Determine the high boiling impurities by the method specified in IS 5610.

6 PACKING

6.1 Halon 1211 shall be packed in gas cylinder conforming to IS 3196 (Part 2). Material shall be filled to 75 percent (v/v) of filling ratio. However, due to high pressure liquefiable gas, Halon 1301 shall be filled in cylinder conforming to IS 7285.

7 MARKING

7.1 Each container shall be legibly and indelibly marked on the outside with the following information:

- a) Manufacturer's name and trade-mark, if any;
- b) Month and year of manufacture;
- c) Words 'Halon 1211' or 'Halon 1301' in prominent letters;
- d) Source, year of manufacture of the cylinder and its test pressure;
- e) Empty mass of the cylinder; and
- f) Filled mass of the cylinder.

7.1.1 Halon 1211 and Halon 1301, conforming to this standard may also be marked with BIS Standard Mark.

7.1.1.1 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 the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A*(Foreword)***COMMITTEE COMPOSITION****Fire Fighting Sectional Committee, CED 22***Organization*

Ministry of Home Affairs, New Delhi
 Airport Authority of India, New Delhi

 Andhra Pradesh Fire Services, Hyderabad
 Bhabha Atomic Research Centre, Mumbai
 Bombay Fire Brigade, Mumbai

 Central Building Research Institute, Roorkee

 Central Industrial Security Force, New Delhi

 Central Public Works Department, New Delhi
 Centre for Environment and Explosive Safety, Delhi

 Concord Arai Pvt Limited, Chennai
 Controllerate of Quality Assurance (Fire), Pune
 Defence Research and Development Organization, Delhi

 Delhi Fire Service, New Delhi

 Directorate General of Supplies and Disposals, Hyderabad

 Engineer-in-Chief's Branch, Army Headquarter, New Delhi

 Fire and Safety Appliances Company, Kolkata
 Home (Police Department), Hyderabad
 Home Department (Fire Service), Chennai

 In personal capacity (33/2965-A, Vennala High School, Vennala, Cochin)
 In personal capacity (29/25, Rajendra Nagar, New Delhi)
 Institution of Fire Engineers (India), New Delhi

 Kooverji Devshi & Co (P) Limited, Mumbai

 K. V. Fire Chemicals, Navi Mumbai
 Loss Prevention Association of India, Mumbai

 Mather and Platt (India) Limited, New Delhi
 MECON Limited, Ranchi

 Ministry of Home Affairs, New Delhi
 Newage Industries, Mumbai

 Northern Railway, New Delhi
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(Continued on page 4)

(Continued from page 3)

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BUREAU OF INDIAN STANDARDS

Headquarters :

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110 002
Telephones : 323 01 31, 323 33 75, 323 94 02

Telegrams : Manaksanstha
(Common to all offices)

Regional Offices :

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
NEW DELHI 110 002

Telephone

$$\begin{cases} 323 & 76 & 17 \\ 323 & 38 & 41 \end{cases}$$

Eastern : 1/14 C.I.T. Scheme VII M, V. I. P. Road, Kankurgachi
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$$\left\{ \begin{array}{l} 337\ 84\ 99, 337\ 85\ 61 \\ 337\ 86\ 26, 337\ 91\ 20 \end{array} \right.$$

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