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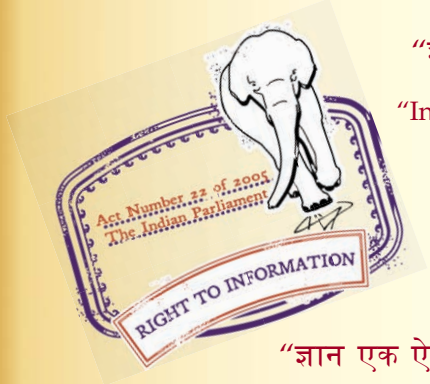
IS 15221 (2002, Reaffirmed 2007): Safe Handling and Transfer Procedures of Halon 1211 and Halon 1301 (Halogenated Hydrocarbons)--Fire Extinguishing Media--Code of Practice. ICS 13.220.10



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"Knowledge is such a treasure which cannot be stolen"

(Reaffirmed 2007)
IS 15221 : 2002

भारतीय मानक

हैलोन 1211 और हैलोन 1301 (हैलोजनकृत हाइड्रोकार्बन) — अग्निशमन माध्यम के सुरक्षित प्रहस्तन और अंतरण की कार्यविधि — रीति संहिता

Indian Standard

SAFE HANDLING AND TRANSFER PROCEDURES OF HALON 1211 AND HALON 1301 (HALOGENATED HYDROCARBONS) — FIRE EXTINGUISHING MEDIA — CODE OF PRACTICE

ICS 13.220.10

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

December 2002

Price Group 3

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.

These specifications are designed to establish that the medium in question has at least a minimum useful fire extinguishing capability and can therefore be reasonably used for fire extinguishing purposes.

This standard gives procedures for the transfer of Halon 1211 and Halon 1301 from one container to another. These procedures can be applied to the filling and emptying of halon fire extinguishers and the containers used in halon extinguishing systems, to the handling of halon shipping containers and to the recovery of halons from containers which are to be scrapped, cleaned, internally examined, etc.

These procedures are recommended as good practice to reduce unnecessary emission of these halons which may have a damaging effect on the atmosphere.

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 requirment 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

SAFE HANDLING AND TRANSFER PROCEDURES OF HALON 1211 AND HALON 1301 (HALOGENATED HYDROCARBONS) — FIRE EXTINGUISHING MEDIA — CODE OF PRACTICE

1 SCOPE

This standard recommends procedures to be used in the transfer of Halon 1211 and Halon 1301 from one container to another to reduce unnecessary emission of these halons to the atmosphere. It also provides recommendations and information relevant to the health and safety of persons engaged in such procedures.

2 REFERENCE

The standard listed below contains provisions which through reference in this text, constitutes provisions of this standard. At the time of publication, the edition indicated was 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 edition of the standard indicated below:

IS No.	*Title*
15220 : 2002	Specification for halogenated hydrocarbons — Halon 1211 and halon 1301 — Fire extinguishing media

3 DEFINITION

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

3.1 Halon

Halogenated hydrocarbon used as a fire extinguishing medium.

NOTES

1 The term 'halon(s)' is used to mean Halon 1211 and Halon 1301.

2 The word 'halon' is followed by a number, usually comprising four digits, which represents, in the order given, the number of carbon, fluorine, chlorine and bromine atoms. Where this number would terminate with one (or more) zero(s), such zeros are omitted. Thus, Halon 1211 is bromochlorodifluoromethane (CF_2ClBr) and Halon 1301 is bromotrifluoromethane (CF_3Br).

3 Halon 1211 is a colourless, faintly sweet-smelling gas. Halon 1301 is a colourless, odourless gas.

4 MATERIALS FOR USE IN CONTACT WITH HALON 1211 AND HALON 1301

4.1 Halon 1211 and Halon 1301 are stable and inert to most common construction materials. Manufacturers' test data should be consulted when selecting materials suitable for use in contact with halons.

5 AVOIDANCE OF MIXING AND/OR CONTAMINATION

5.1 Avoidance of Mixing

Halon 1211 and Halon 1301 are miscible in all proportions. Halons should not be mixed because this will unnecessarily complicate their subsequent recovery and reprocessing.

5.2 Avoidance of Contamination

Precautions should be taken to prevent the entry of oil, water and/or other foreign matter into halon containers.

NOTE — Excessive moisture in containers may lead to corrosion, either directly, or indirectly by causing hydrolysis of the halon.

6 PRESSURE HAZARD

6.1 General

Halons are shipped, stored and used in fire extinguishing equipment as liquefied gases under pressure. Appropriate precautions should be observed when filling and handling containers.

6.2 Pressure Control in Transfer Procedures

It is essential that nitrogen cylinders are fitted with a pressure-reducing valve to control the nitrogen pressure to not more than the working pressure of the halon containers in use at any particular time. The pressure-reducing valve should be fitted with a pressure gauge on the outlet side, and with a pressure-relief valve in the line to vent excess pressure if the pressure-reducing valve fails.

WARNING — Bursting discs are not suitable pressure-relief devices for this application because their operation will vent the total contents of the halon container.

7 TOXICITY HAZARD

7.1 Skin Contact Hazard

Direct contact with liquid halons can degrease the skin

and cause a strong chilling effect. Gloves and eye protection should be worn during transfer procedures.

7.2 Inhalation Hazard

7.2.1 *Natural (Undecomposed) Halons*

7.2.1.1 *Effects of exposures*

Tests on human volunteer subjects have shown that the maximum safe exposures are 7 to 10 percent (*v/v*) of Halon 1301 for 1 min and 4 to 5 percent (*v/v*) of Halon 1211 for 1 min.

After exposure for 1 min at these concentrations, any person may experience symptoms of dizziness and slight tingling of the fingers and toes. Exposures to concentrations less than these for several minutes would be unlikely to produce any significant effect, but prolonged exposure to concentrations greater than these is hazardous and should be avoided.

7.2.1.2 *Precautions*

Attention should be paid to checking for and sealing any leaks in the equipment. All transfer procedures should be carried out in well-ventilated areas. It is good practice to avoid all unnecessary exposure to halons and an occupational exposure limit of 1 000 ppm (8 h time-weighted average) should be applied.

7.2.1.3 *Treatment of affected persons*

Persons suffering from over exposure to halon vapour should immediately move, or be moved, to an area containing fresh air. In treating persons suffering from the effects of over exposure to halons, the use of epinephrine (adrenaline) and similar drugs should be avoided because they may produce cardiac arrhythmias including ventricular fibrillation.

7.2.2 *Decomposition Products*

7.2.2.1 *Formation of decomposition products*

On exposure to a flame or hot surface, halons pyrolyse into decomposition products usually identified as a halogen acids (that is, HF, HCl and HBr) and free halogens (for example, Cl_2 and Br_2). Halon decomposition products have a characteristic, sharp, acrid odour even in minute concentrations that are far below the concentrations considered to be immediately dangerous. The irritation produced by these products provides a built-in warning system and thus encourages people to evacuate the area.

7.2.2.2 *Precautions*

Radiant heaters, heaters with open flames and heaters with hot elements in contact with the air should not be used in areas in which halon transfer procedures are carried out. Other open flames and, in particular, smoking should be prohibited in these areas.

8 METHODS OF TRANSFER

8.1 General

Halon should be transferred from one container to another by one of the methods described in **8.2** and **8.3**.

8.2 Nitrogen Overpressurization Method

Use dry nitrogen to pressurize the vapour space in the supply container to dispense the contents. It is essential that the moisture content of the nitrogen should not exceed 0.006 percent (*m/m*) (*see also* **5.2**)

It is essential that the safe working pressure of the supply container is not exceeded.

NOTES

1 Excessive moisture in containers may lead to corrosion, either directly or indirectly by causing hydrolysis of the halon.

2 Halon 1211 and Halon 1301 can be propelled from extinguishing equipment by using nitrogen.

8.3 Pumping

The pump should be located as near as possible to the supply container. If a positive displacement pump is used, provision should be made to recycle halon back to the supply container, so as to avoid the need to stop the pump every time that halon is not being dispensed.

9 FILLING OPERATIONS

9.1 General

To avoid contamination, operations involving the filling and/or re-filling of shipping containers, halon extinguishers and/or halon extinguishing system containers should be completely separate from recovery operations.

9.2 Filling Rig Construction

The rig should withstand, without leakage or permanent deformation, a test pressure of not less than twice the anticipated normal working pressure. Pipe runs should be as short as possible. Hose of a suitable pressure rating may be used to make any necessary flexible connections. The filling hose should be as short as possible and should be valved at the outlet.

9.3 Filling Rig Use

The rig should be dry before use. It should be tested for leaks before use and at regular intervals during service.

NOTE — Soap solution or an electronic leak detector may be used.

9.4 Containers for Filling or Re-filling

Only extinguishers and halon containers complying with appropriate standards should be filled or re-filled.

Extinguishers for re-filling should be free of halon residues from the original filling. This recommendation should also be followed when re-filling other halon containers, except where the original manufacturer can advise appropriate procedures and good practice. Where extinguishers or containers are to be emptied before refilling, residual halon should not be discharged to atmosphere but transferred to suitable containers using the recovery rig (*see* **10**). Extinguishers and containers should be checked and rectified as necessary and should be free from external and internal corrosion or damage, and should be clean and dry at the time of filling or re-filling.

Large containers should be checked for leakage before re-filling with halon.

After filling or re-filling, it is essential that containers are checked for leakage and that any showing excessive leakage that cannot be corrected should be emptied as soon as it practicable using the recovery rig.

9.5 Shipping Containers

On delivery of shipping containers, the valves should be checked for leaks before transfer to the store or connection to the filling rig.

When the container has been emptied, the valves should be closed and the container disconnected from the transfer system. The protective covers should be fitted immediately over the valves.

NOTE — If the valves are left open, the inside of the container will be exposed to atmospheric moisture and the risk of corrosion.

10 RECOVERY OPERATIONS

10.1 General

To avoid contamination, recovery operations should be completely separate from filling and re-filling operations.

10.2 Recovery Rig Construction

The rig should withstand, without leakage or permanent deformation, a test pressure of not less than twice the anticipated normal working pressure. Pipe runs should be as short as possible. Hose of a suitable pressure rating may be used to make any necessary flexible connections.

10.3 Recovery Rig Use

The rig should be dry before use. It should be tested for leaks before use and at regular intervals during service.

NOTE — Soap solution or an electronic leak detector may be used.

All liquid halon, and in the case of Halon 1301 as much vapour as possible, should be recovered from each container presented for halon recovery.

10.4 Receiving Containers

Receiving containers should comply with an appropriate standard for pressure vessels.

It is essential that receiving containers are not overfilled, and a means of weighing the containers should be provided.

To minimize the need for reprocessing, it is essential that separate receiving containers are used for Halon 1211 and Halon 1301 and for any mixtures which may be presented for recovery (*see* **5.1**).

Receiving containers should be clearly labelled to identify the halon contents and whether the halon is, is not, or may be contaminated.

10.5 Recovered Halon

It is essential that recovered halon is not used unless it can be properly checked and shown to comply with the requirements of IS 15220. Where this cannot be done, or if the halon is contaminated, it is essential that the material is reprocessed so that it complies with the requirements of IS 15220 before it is used.

ANNEX A

(Foreword)

COMMITTEE COMPOSITION

Fire Fighting Sectional Committee, CED 22

Organization	*Representative(s)*
Ministry of Home Affairs, New Delhi	SHRI OM PRAKASH (***Chairman***)
Airport Authority of India, New Delhi	SHRI L. C. GUPTA SHRI H. S. RAWAT (*Alternate*)
Andhra Pradesh Fire Services, Hyderabad	SHRI SWARANJIT SEN
Bhabha Atomic Research Centre, Mumbai	CHIEF FIRE OFFICER
Bombay Fire Brigade, Mumbai	CHIEF FIRE OFFICER SHRI G. S. SAWANT (*Alternate*)
Central Building Research Institute, Roorkee	DR T. P. SHARMA DR A. K. GUPTA (*Alternate*)
Central Industrial Security Force, New Delhi	DEPUTY INSPECTOR GENERAL (FIRE) SHRI S. L. NAGARKAR (*Alternate*)
Central Public Works Department, New Delhi	CHIEF ENGINEER (E) I
Centre for Environment and Explosive Safety, Delhi	SHRI A. K. KAPOOR SHRI H. S. KAPARWAN (*Alternate*)
Concord Arai Pvt Limited, Chennai	SHRI R. RAMAKRISHNAN
Controllerate of Quality Assurance (Fire), Pune	COL G. P. KRISHNAMURTHY
Defence Research and Development Organization, Delhi	DIRECTOR (FIRE SAFETY) DEPUTY DIRECTOR (FIRE SAFETY) (*Alternate*)
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Directorate General of Supplies and Disposals, Hyderabad	SHRI M. GANGARAJU SHRI V. K. VERMA (*Alternate*)
Engineer-in-Chief's Branch, Army Headquarter, New Delhi	SHRI R. A. DUBEY SHRI AJAY SHANKAR (*Alternate*)
Fire and Safety Appliances Company, Kolkata	SHRI S. N. KUNDU
Home (Police Department), Hyderabad	DEPUTY DIRECTOR (FIRE SAFETY)
Home Department (Fire Service), Chennai	DIRECTOR DEPUTY DIRECTOR (*Alternate*)
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In personal capacity (*29/25, Rajendra Nagar, New Delhi*)	SHRI S. K. DHERI
Institution of Fire Engineers (India), New Delhi	PRESIDENT GENERAL SECRETARY (*Alternate*)
Kooverji Devshi & Co (P) Limited, Mumbai	SHRI P. H. SETHNA SHRI N. T. PANJWANI (*Alternate*)
K.V. Fire Chemicals, Navi Mumbai	SHRI H. M. SABADRA
Loss Prevention Association of India, Mumbai	MANAGING DIRECTOR SHRI D. K. SARKAR (*Alternate*)
Mather and Platt (India) Limited, New Delhi	SHRI DEEPAK AGARWAL
MECON Limited, Ranchi	SHRI R. N. CHACHRA SHRI SUNIL DAS (*Alternate*)
Ministry of Home Affairs, New Delhi	SHRI D. K. SHAMI
Newage Industries, Mumbai	SHRI B. J. SHAH SHRI A. M. SHAH (*Alternate*)

(*Continued on page 5*)

(*Continued from page* 4)

Organization	*Representative(s)*
Northern Railway, New Delhi	SHRI I. M. MANSOORI
Oil and Natural Gas Commission, Dehra Dun	SHRI R. P. SAXENA SHRI NEERAJ SHARMA (*Alternate*)
Oil Industry Safety Directorate, New Delhi	JOINT DIRECTOR (PROCESS)
Real Value Appliances Limited, New Delhi	SHRI ASHUTOSH MANGAL
Safex Fire Services Limited, Mumbai	SHRI JITENDRA SHAH SHRI SANDIP SHAH (*Alternate*)
State Bank of India, Mumbai	SHRI J. S. GAHLAUT
State Fire Training Centre, Mumbai	DR NAVINCHANDRA JAIN
Steel Authority of India, Rourkela	SHRI B. N. DAS SHRI B. P. DAS (*Alternate*)
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Vijay Fire Protection Systems Pvt Limited, Mumbai	SHRI HARISH SALOT
West Bengal Fire Service, Kolkata	SHRI B. PATHAK
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Member Secretary
SHRI S. CHATURVEDI
Joint Director (Civ Engg), BIS

Bureau of Indian Standards

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