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Indian Standard
SELECTION, INSTALLATION AND MAINTENANCE OF FIRST-AID FIRE EXTINGUISHERS—CODE OF PRACTICE

(Fourth Revision)

ICS 13.220.10

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Price Group 8

i Fire Fighting Sectional Committee, CED 22

FOREWORD

This Indian Standard (Fourth Revision) 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.

Portable fire extinguishers are not expected to deal with large fires since they are essentially first-aid fire fighting equipment. Nevertheless, they are very valuable in the early stages of a fire when used promptly and effectively. Provision of unsuitable types, incorrect operation, or improper maintenance of the extinguishers have, at times, led to failure in tackling the fire effectively in the early stages, thus involving greater loss of life and property. This standard has, therefore been formulated for giving guidance regarding proper selection, installation and maintenance of portable first-aid fire extinguishers so that such extinguishers will function at all time as intended throughout their useful life. This standard does not cover the requirements applicable to fixed installation systems for extinguishing fire even though portions of such systems may be portable.

This standard was first published in 1962 and subsequently revised in 1970, 1979 and 1992. In the past 15 years, additional types of fire extinguishers both portable as well as wheeled/trolley-mounted type have been developed and are in use. It is, therefore, necessary to enlarge the coverage of this standard so as to include the provision of all types of fire extinguishers and wheeled fire extinguishers for which Indian Standards have been formulated till date. While doing so, opportunity has also been taken to update the maintenance requirements based on current international practices.

The halon based extinguishers have been restricted for essential use as long as the technically suitable replacements are not available, as per the Montreal Protocol.

In this standard provision of fire buckets has been mentioned. However, users may provide fire buckets [(*see* IS 2546 : 1974 'Specification for galvanized mild steel fire buckets (*first revision*)'] over and above the requirements given in this standard. The use of fire buckets, however, *in lieu* of fire extinguisher, is not recommended.

In order that fire extinguishers are effective, they should,

a. be portable/wheeled;
b. operate instantly;
c. have adequate throw;
d. have adequate quantity of extinguishant as per fire rating; and
e. specified shelf-life from the date of manufacture.

All these characteristics are incorporated in portable extinguishers and are manufactured to deal with different types of fires. In order that these could be effective, these should conform to relevant Indian Standards. Number and size for purpose of installations shall be determined by type, fire rating and fire hazard classification of protected risk.

As decided by the Committee, soda acid and chemical foam type extinguishers have been phased out. The halons have been restricted for essential use only. Number and size for purpose of installations shall be determined by type, fire rating.

It was also decided by the Committee that the following standards shall be withdrawn with the implementation of IS 15683 : 2006 'Portable fire extinguisher—Performance and construction' :

a. IS 940 : 2003 Specification for portable fire extinguishers, water type (gas cartridge) (*fourth revision*)
b. IS 2171 : 1999 Specification for portable fire extinguishers, dry powder (cartridge type) (*fourth revision*)
c. IS 6234 : 2003 Specification for portable fire extinguishers, water type (stored pressure) (*second revision*)
d. IS 10204 : 2001 Specification for portable fire extinguisher mechanical foam type
e. IS 13849 : 1993 Specification for portable fire extinguisher dry powder type (stored pressure)
f. IS 15397 : 2003 Specification for portable fire extinguisher mechanical foam type (stored pressure)

Clause **3.1**(a) of IS 2878 : 2004 'Specification for fire extinguisher, carbon dioxide type (portable and trolley mounted) (*third revision*)' shall also be deleted simultaneously with the implementation of IS 15683.

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 specified value in this standard.

Indian Standard

SELECTION, INSTALLATION AND MAINTENANCE OF FIRST-AID FIRE EXTINGUISHERS —CODE OF PRACTICE

(Fourth Revision)

1 SCOPE

This standard lays down recommendations for selection, installation, maintenance and testing of first-aid fire extinguishers.

NOTE—The water, carbon dioxide mechanical foam fire extinguishers of capacity 50 litre and above are termed as mobile extinguishers in the Indian Standards which have been formulated; however, for the purpose of this standard these as well as all other types of trolley mounted extinguisher will be treated under general classification of fire extinguishers.

2 REFERENCES

The standards listed at Annex A 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 at Annex A.

3 TERMINOLOGY

For the purpose of this standard, definitions given in IS 7673 shall apply.

4 GENERAL

4.1

None of the extinguisher covered in this standard is expected to deal with a large fire as all these are essentially first-aid fire-fighting appliances. Nevertheless, these are very valuable, if used promptly and efficiently in the early stages of a fire. In addition to the value of their portability and mobility, the most important feature of these extinguishers is their immediate

availability so that each extinguisher can be used by one/two persons. The usefulness of these extinguisher is limited, as it is entirely dependent upon the presence of persons having knowledge to operate them. Furthermore, there capacity is also limited and their operational value largely depends upon the initial charge being sufficient to overcome and extinguish the fire. The capacity of such extinguishers should commensurate with the risk these are intended to cover.

4.2

Since a variety of shapes or methods of operation of fire extinguishers have at times led to confusion and failure to quench the fire, it is recommended that extinguishers installed in any one building or single occupancy shall be similar in shape and appearance and should have the same methods of operation, as far as possible. All extinguishers shall be equipped with the same control devices even if their design is for different types of fire. This will also simplify the training of the large number of employees in the effective and efficient use of extinguishers.

4.3

Where employees have not been trained, operation of extinguishers may be seriously delayed, the extinguishing material may be wasted, and more extinguishers may have to be used, or the fire may not be extinguished.

4.4 Classification of Hazards

4.4.1 *Light (Low) Hazard*

Light hazard occupancies are locations where the total amount of Class A combustible materials, including furnishings, decorations, and contents, is of minor quantity. This can include some buildings or rooms occupied as offices, classrooms, churches, assembly halls, guest room areas of hotels/motels, and so forth. This classification anticipates that the majority of content items are either non-combustible or so arranged that a fire is not likely to spread rapidly. Duplicating machines, art departments, offices, classrooms, place of worship, assembly halls, guest room areas etc and so forth, are included, where Class B flammable liquids are less than 4 litre and provided that they are kept in closed containers and safely stored.

4.4.2 *Ordinary (Moderate) Hazard*

Ordinary hazard occupancies are locations where the total amount of Class A combustibles and Class B flammables are present in greater amounts that expected under light (low) hazard occupancies. These occupancies could consist of dining areas, mercantile shop and storage, light manufacturing operations, research labs, auto showrooms, packing garages workshops etc of light (low) hazard occupancies, and warehouses containing Class I or Class II commodities where Class B flammable liquids are 4 to 20 litre and provided that they are kept in closed containers and safely stored.

4.4.3 *Extra (High) Hazard*

Extra hazard occupancies are locations where the total amount of Class A combustibles and Class B flammables present, in storage, production, use, finished product, or combination thereof, is over and above those expected in occupancies classed as ordinary (moderate) hazard. These occupancies could consist of woodworking; vehicle repair; aircraft and boat servicing; cooking area; individual product display showrooms; product convention center displays; and storage and manufacturing processes such as painting; dipping, and coating, including flammable liquid handling. Also included is warehousing of or in-process storage of other than Class I and Class II commodities. The flammable liquids may be more than 20 litre.

5 NUMBER AND SIZE OF FIRE EXTINGUISHER

5.1

Fire extinguishers should be provided both for protecting building structure as well as occupancy hazard contained therein.

5.2

The number and size of fire extinguishers required for any particular premises shall be determined to minimize the hazards by the appropriate authority taking into consideration the severity of incipient fire anticipated behaviour characteristics of different materials and structure elements of buildings, rapidity with which a fire may spread, intensity of heat that may be developed, accessibility to fire, type of extinguisher, the smoke contributed by the burning material, special features of building construction and nature of occupancy (single or mixed) and electrical Fitting, equipment, etc, installed therein.

5.3

The required number of fire extinguishers may be determined by considering any single extinguisher of suitable type or a combination of two or more types. Recommendations made in Annex B may be taken as a guide.

5.4 Fire Extinguisher Size and Placement

5.4.1 *Fire Extinguisher Size and Placement for Class A Hazards*

Minimal sizes of fire extinguishers for the listed grades of hazards shall be provided on the basis of Table 1. Fire extinguishers shall be located so that the maximum travel distances shall not exceed those specified in Table 1.

5.4.2 *Fire Extinguisher Size and Placement for Class B Fires other than for Fires in Flammable Liquids of Appreciable Depth*

Minimal sizes of fire extinguishers for the listed grades of hazard shall be provided on the basis of Table 2. Fire extinguishers shall be located so that the maximum travel distances do not exceed those specified in the Table 2 used.

5.4.3 *Fire Extinguisher Size and Placement for Class C Hazards*

Fire extinguishers with Class C ratings shall be required where energized electrical equipment can be encountered. This requirement includes situations where fire either directly involves or surrounds electrical equipment. Since the fire itself is a Class A or Class B hazard, the fire extinguishers shall be sized and located on the basis of the anticipated Class A or Class B hazard.

Table 1 Fire Extinguisher Size and Placement for Class A Hazards
(*Clause* 5.4.1)

Sl No.	Criteria	Light (Low) Hazard Occupancy	Ordinary (Moderate) Hazard Occupancy	Extra (High) Hazard Occupancy
(1)	(2)	(3)	(4)	(5)
i)	Minimum rated single extinguisher	1-A	1-A	2-A
ii)	Maximum floor area per unit of A, m^2	280	140	90
iii)	Maximum floor area for extinguisher, m	3 430	3 430	3 430
iv)	Maximum travel distance to extinguisher, m	15	15	15

Table 2 Fire Extinguisher Size and Placement for Class B Hazards
(*Clause* 5.4.2)

Sl No.	Type of Hazard	Basic Minimum Extinguisher Rating	Maximum Travel Distance to Extinguishers m
(1)	(2)	(3)	(4)
i)	Light (low)	8-B	Less than 9
		13-B	15
ii)	Ordinary (moderate)	21-B	15
iii)	Extra (high)	34-B	15

2 ### 5.4.4 *Fire Extinguisher Size and Placement for Class D Hazards*

Fire extinguishers Or extinguishing agents with Class D ratings shall be provided for fire involving combustible metals.

Fire extinguishers or extinguishing agents (media) shall be located not more than 15 m of travel distance from the Class D hazard.

Size determination shall be on the basis of the specific combustible metal, its physical particle size, area to be covered, and recommendations by the fire extinguishers manufacturer on data from control tests conducted.

6 SELECTION OF LOCATION

6.1

When selecting locations for fire extinguishers, due consideration should be given to the nature of risk to be covered. The extinguishers should be placed in conspicuous positions and shall be readily accessible for immediate use in all parts of the occupancy. It should always be borne in mind while selecting locations that fire extinguisher are intended only for the use on incipient fire and they will be of little value if the fire is not extinguished or brought under control, in the early stages.

6.2

Generally, fire extinguishers should be placed as near as possible to exits or stair lands without hindering the escape routes. Wherever possible, advantage should be taken of normal routes of escape by placing these in positions where these shall readily be seen by persons following the natural impulse to get out of danger.

6.3

The extinguishers should be available for immediate use at all times. Extinguishers should be sited in such a way that the user may not have to travel more than 15 m from the site of the fire to reach the extinguishers. Similar positions on each floor are advisable.

6.4

Extinguishers provided to deal with special risks should be sited near to risk area concerned but not so near as to be inaccessible in case of fire. If the special risk is contained in a confined space, it is generally advisable to position the extinguisher outside that space.

6.5

The extinguisher should be placed either in a trolley or mounted on wall firmly.

6.6

It may be necessary to construct suitable shades or covers to protect the extinguishers in the open from excessive heat and cold as well as from corrosive environment. Where such shades or covers are provided to house the extinguishers in the open, these should be designed so that the removal of the extinguishers is not hampered in emergency.

6.7

While selecting the location for higher capacity wheeled/trolley mounted extinguishers, consideration should be given to the mobility of the extinguisher within the area in which it will be used and, if indoors, the size of the doorways and passages which should allow easy movement of the extinguisher.

6.8

When installed in a building, the extinguisher should not be placed in a position where it is likely to gain heat from the surrounding equipment or process.

6.9

A framed plan showing the location of fire extinguishers, means of access and other useful information should be displayed at suitable places on each floor, but should be available near to the entrance to the premises preferably at the security gate or the reception office.

7 INITIAL INSPECTION

7.1

Each new extinguisher received at site should be inspected for its completeness of supply and checked with the packing and despatch documents of the manufacturer before installation. Check that there is no damage to the extinguisher in transit. In case of extinguishers covered by *Gas Cylinders Rules,* check the stamp of approval embossed on the neck of the cylinder.

7.2

On initial procurement, water type gas pressure and mechanical foam extinguishers are normally supplied in unfilled state and are charged at site. Dry powder extinguishers may be supplied duly filled and, if not, the same have to be filled at site. Carbon dioxide and clean agent type fire extinguishers are supplied duly charged. Clean agent, water type gas pressure, foam and dry powder extinguishers are to be charged with the refills separately provided by the extinguisher manufacturer as per there instruction given on the refill container. The refills used shall be of same fire rating as of original extinguishers and shall conform to relevant Indian Standards as given in Annex A.

NOTE—Halon extinguishers (restricted for essential use only) shall be supplied duly filled at site. In no circumstances, the halon gas shall be filled/discharged at site, as per the Montreal Protocol.

7.3

If the components of the fire extinguishers like container, cap assembly, hose assembly, nozzle, etc, are despatched separately by the manufacturer, assemble the components in the first instance before refilling as per the instructions given by the manufacturer.

7.4

After assembling and refilling, ensure that all joints are fully tightened and the nozzle vent holes are free of dust/dirt.

7.5

Immediately after refilling either stencil or paste the inspection card to the body of the extinguisher

3 indicating the serial numbers of the extinguishers, date of initial charging and also the next due date of refilling. Record of the date of inspection, initial charging, etc, should be maintained in the register for first-aid fire appliances.

8 INSTALLATION

8.1 General

Although fire extinguishers are not permanent and immovable fittings in a structure, these from a part of the whole system of fire protection and should receive consideration for provision at the design stage. In some cases, it may be necessary for the extinguishers to be housed in readily accessible and unlocked receptacles, clearly visible and unobtrusive.

8.2

Excepting particular cases where, as stated in **7.1,** it may be necessary for the extinguisher to be housed in specially prepared positions, no structural work is generally involved in the installations of the extinguishers dealt with in this standard as this normally takes place upon the completion of the construction. The general sequence of the building construction operation is not, therefore, usually affected. Where a special recess is to be formed in a wall, provision should be made as the work progress.

9 SELECTION OF FIRE EXTINGUISHERS

Various types of fire extinguishers specified in this standard are of value but all are not equally effective on all types of fire. For this reason, the nature of contents of a building, the processes carried out therein and the types of fire which may occur shall be taken into consideration while selecting fire extinguishers. For all practical purposes, the basic types of fires can be grouped into following four classes:

a. *Class A fires*—Fires involving solid combustible materials of organic nature such as wood, paper, rubber, plastics, etc, where the cooling effect of water is essential for extinction of fires.

b. *Class B fires*—Fires involving flammable liquids or liquefiable solids or the like where a blanketing effect is essential.

c. *Class C fires*—Fires involving flammable gases under pressure including liquefied gases, where it is necessary to inhibit the burning gas at fast rate with an inert gas, powder or vaporising liquid for extinguishment.

d. *Class D fires*—Fires involving combustible metals, such as magnesium, aluminium, zinc, sodium, potassium, etc, when the burring metals are reactive to water and water containing agents and in certain cases carbon dioxide, halogenated hydrocarbons and ordinary dry powders. These fires require special media and techniques to extinguish.

NOTE—It is important to decide selection and use of extinguisher on live electrical installations. The extinguisher that have passed electrical conductivity test should only be used.

10 SUITABILITY OF PORTABLE FIRE EXTINGUISHERS

10.1

The types of extinguishers mentioned below against each class of fire are generally most suited. Details of suitability as a guide of each type of extinguisher is shown in Table 3. It may, however, be noted that this is only for guidance and does not cover special cases.

a. *Class A fires*—Water, foam, ABC dry power and halocarbons.

b. *Class B fires*—Foam, dry powder, clean agent and carbon dioxide extinguishers.

c. *Class C fires*—Dry powder, clean agent and carbon dioxide extinguishers.

d. *Class D fires*—Extinguishers with special dry powder for metal fires.

10.2

Where energized electrical equipment is involved in a fire, non-conductivity of the extinguishing media is of utmost importance, and only extinguishers expelling dry powder, carbon dioxide (without metal horn) or clean agent should be used. Once the electrical equipment is de-energized, extinguishers suitable for the class of the fire risk involved can be used safely.

10.3

Where cleanliness and contamination of sensitive electrical equipment are of importance or where the sensitivity of the control instruments or electronic equipment and systems are likely to be affected, only carbon dioxide or clean agent type extinguishers should be used.

10.4

For fires involving polar solvents and other water miscible flammable liquids, dry powder type or mechanical foam extinguisher with alcohol-resistant foam should be used.

10.5

Dry powder extinguishers, when used in confined areas may reduce visibility for a few minute, which may temporarily jeopardize escape, rescue or other emergency action.

10.6

Dry powder extinguishers are probably the most effective medium against Class B fires, but where the fuel surface is shielded from the powder discharge, they are not effective. Further, as the discharge ceases, there is a danger of re-ignition which has to be countered either by continued powder discharge for some more

time, or by covering the surface by foam. Dry powder, being a quick knockdown agent, is ideal for tackling 'running' or 'three-dimensional' fires involving flammable liquids.

10.7

Consideration should be given for providing special protection or treatment for extinguisher located in places exposed to unduly corrosive atmospheres or to splashing by corrosive fluids.

10.8

Appropriate size of extinguishers, including wheeled/trolley mounted type should be provided for use depending upon hazard classification as per the fire ratings given in IS 15683.

10.9

Although clean agent type extinguisher have low toxicity in the free state, when used on fires they are liable to produce toxic decomposition products. Hence, when used in extinguishing fires in confined unventilated rooms, closets, etc, the occupants should immediately vacate such spaces. It will be advisable to take the same precaution when carbon dioxide extinguishers are used under similar circumstances.

10.10

The fire extinguishers, extinguishing media, and the charges/refills used should conform in all respects to the relevant Indian Standards given in Annex A.

10.11

While replacing component parts, it should be ensured that only the correct components specified by the manufacturer or equivalents are used.

11 INSPECTION AND MAINTENANCE OF FIRE EXTINGUISHERS

11.1

The owner or designated agent or occupant of a property in which fire extinguishers are located shall be responsible for such inspection, maintenance, and recharging.

11.2

Maintenance, servicing, and recharging shall be performed by trained persons having available the appropriate servicing manual(s), the proper types of tools, recharge materials, lubricants, and manufacturer's recommended replacement parts or parts specifically listed for use in the fire extinguisher.

11.3

Labels indicating fire extinguisher use or classification or both shall be placed on the front of the fire extinguisher.

11.4

A well-planned and approved maintenance schedule is essential to ensure that extinguishers,

a. will operate properly between the time intervals stipulated in the maintenance programme for periodical inspection/ maintenance; and
b. will not constitute a potential hazard to persons in its vicinity or to those who operate or recharge the extinguishers.

11.5

Periodic inspection of fire extinguishers shall include a check of at least the following items:

a. Location in designated place;
b. No obstruction to access or visibility;
c. Operating instructions on nameplate legible and facing outward;
d. Safety seals and tamper indicators not broken or missing;
e. Fullness determined by weighing or lifting;
f. Examination for obvious physical damage, corrosion, leakage, or clogged nozzle;
g. Pressure gauge reading or indicator in the operable range or position; and
h. Condition of tyres, wheels, carriage, hose, and nozzle checked (for wheeled units).

Table 3 Suitability of Different Types of Fire Extinguishers for Different Classes of Fires
(*Clause* 10.1)

Sl No.	Type of Extinguisher	Type of Fires			
(1)	(2)	(3)			
		A	B	C	D
i)	Fire extinguisher, water type (gas cartridge), IS 940 and IS 13385	S	NS	NS	NS
ii)	Fire extinguisher, water type (stored pressure), IS 6234	S	NS	NS	NS
iii)	Fire extinguisher, mechanical foam type (gas cartridge), IS 10204 and IS 13386	S	S	NS	NS
iv)	Fire extinguisher, mechanical foam type (stored pressure), IS 14951 and IS 15397	S	S	NS	NS
V)	Fire extinguisher, dry powder type (stored pressure), IS 13849	S	S	S	NS
vi)	Fire extinguisher, dry powder type (gas cartridge), IS 2171 and IS 10658	S	S	S	NS
vii)	Fire extinguisher, dry powder type for metal fires, IS 11833	NS	NS	NS	S
viii)	Fire extinguisher, carbon dioxide type, IS 2878 and IS 8149	NS	S	S	NS
ix)	Fire extinguisher, clean agent gas type, IS 15683	S	S	S	NS
x)	Fire extinguisher, halon 1211 type, IS 4862 (Part I) and IS 11108	S	S	S	NS

NOTES

1. S – Suitable, NS – Not Suitable.
2. See Annex A for list of Indian Standards.

11.6 Corrective Action

5

When an inspection of any fire extinguisher reveals a deficiency in any of the conditions, immediate corrective action shall be taken.

11.7 Rechargeable Fire Extinguishers

When an inspection of any rechargeable fire extinguisher reveals a deficiency in any of the conditions, it shall be subjected to applicable maintenance procedures.

11.8 Non-rechargeable Dry Chemical Fire Extinguisher

When an inspection of any non-rechargeable dry chemical fire extinguisher reveals a deficiency in any of the conditions, it shall be removed from further use, discharged, and destroyed at the instruction of the owner or returned to the manufacturer.

11.9 Non-rechargeable Halon/Clean Agent Fire Extinguisher

When an inspection of any non-rechargeable fire extinguisher containing a halon/clean agent reveals a deficiency in any of the conditions, it shall be removed from service, not discharged, and returned to the manufacturer. If the fire extinguisher is not returned to the manufacturer, it shall be returned to a fire equipment dealer or distributor to permit recovery of the halon.

11.10 General Safety Precautions for Maintenance

11.10.1

While opening any extinguisher for maintenance,

a. ensure that there is no residual pressure in any hose and/or nozzle assembly;
b. unscrew the cap or valve assembly slowly for two or three turns only, to allow any residual pressure to escape via the vent holes and do not unscrew it further until all pressure is released, keep away the head and body to avoid injuries;
c. do not depend on pressure indicating devices like gauges (in the cases of stored pressure type extinguisher) to verify whether the container is under pressure or not, as they could malfunction;
d. if pressure is not being released after unscrewing the cap or valve assembly two or three turns, then do not unscrew it further without taking appropriate safety measures; sudden release of pressure may eject parts, cap assembly, or the contents of the extinguisher. The use of suitable clamping arrangements and appropriate personal protection is advisable;
e. under no circumstances should the valves of carbon dioxide or stored pressure type extinguisher of gas cartridges/ containers be attempted to be removed under filled conditions; and
f. at all times when attempting to remove parts from extinguisher at the time of inspection/ maintenance, persons, should ensure that they are clear of any parts which may be ejected.

11.10.2 ***Other Safety Guidelines***

a. Dry powder extinguisher should be opened only in the driest available conditions and for the minimum time, necessary for examination, to minimize the effect of atmospheric moisture on the powder. Moisture causes caking of the powder.
b. It is even more important that mixing or cross-contamination of different types (BC/ABC/D) of powder be avoided as it may cause chemical reaction resulting in a dangerous pressure build-up in the container. This reaction may become apparent only after a few weeks.
c. All sealing components should be cleaned and properly lubricated to prevent leakage after recharge.
d. Check pressure indicating devices to ascertain that it gives proper readings.
e. Never connect a stored pressure extinguisher to be charged directly to the high pressure source. Connecting directly to the high pressure source could cause damage or even rupture of the container and may result in the injury.
f. Only those gas cartridges which will suit the particular type and capacity of the extinguisher should be used. Do not use higher capacities than recommended.

g. Certain recharging materials deteriorate with age, exposure to excessive temperature and moisture. Storage of recharge materials for long periods should be avoided.

h. Normal workshop compressors deliver air with high moisture content. Moisture traps will only remove the moisture partly, and may lead to caking of powder, hydrolysis of halogenated agents, clogging of pressure gauges and internal corrosion. Blowers/dryers should be used to clean hose and hose fittings.

i. On all higher capacity dry powder and carbon dioxide extinguisher equipped with a shut-off nozzle, the hose (without the nozzle) should be removed and tested annually.

11.10.3 *Guidelines for the Evaluation of Damage and Corrosion*

11.10.3.1

It is difficult to precisely define the limits to the extent of damage or corrosion that makes an extinguisher 'unsafe' or 'unfit' for service. Evaluation largely depends on the judgement of the competent person based on experience. However, some typical examples are cited below for guidance.

11.10.3.2 ***Typical conditions indicating that an extinguisher is unsafe for use***

Potentially the most serious hazard of defective extinguishers is the sudden uncontrolled release of pressure or ejection of parts. It could be caused due to any one of the following causes:

a. Corrosion, wear arid tear or damage to threads of any pressure retaining part;

b. Corrosion of welds; and

c. Extensive general corrosion or severe pitting.

11.10.3.3 ***Typical conditions indicating that an extinguisher is unfit for use***

An extinguisher may be considered unfit for use either because it is unlikely to operate correctly or because damage or corrosion is likely to become worse and make the extinguisher unsafe for use. Some of such conditions being:

a. Bubbling or separation from the metal of a plastic lining/powder coating;

b. Corrosion of the metal body under a plastic lining/powder coating;

c. Corrosion of the metal body under a zinc of tin/lead lining; and

d. Corrosion, wear or damage to any part of the operating or control mechanism.

11.10.3.4 ***General conditions not affecting function or safety***

An extinguisher shall remain safe and functional under the following typical conditions:

a. Staining or discoloration of lining or dip tubes;

b. External blemishes or slight scratches or dents;

c. Slight rusting of parts not subject to pressure; and

d. The presence of corrosion products from any metal lining (typically white salts of zinc, or tin and lead).

11.11

All the extinguishers installed in the premises should be subjected to detailed inspection as per the check list (applicable to monthly as inspection) and after thorough examination and rectification, if found suitable, be re-charged and put in service.

11.12

The maintenance, inspection and testing of all extinguisher in respect of mechanical parts, extinguishing media and expelling means should be carried out by properly trained and competent personnel at frequent intervals, but at least once a month, to ensure that these are in their proper condition and have not been accidentally discharged or lost pressure or suffered damage. Regular inspection of all extinguishers and their components like spare cartridges and refills kept in the stores should also be done to ensure that these are in proper condition and fit for use.

11.13

The following procedure shall be followed for quarterly maintenance:

a. Clean the exterior of the extinguisher, polish the painted portion with wax polish, the brass/ gun metal parts with metal polish, chromium plated parts with silver polish and plastic components to be thoroughly washed with soap solution and sun dried.

b. Check the nozzle outlet and vent holes as well as the threaded portion of the cap for clogging, and check that plunger is clean and moving freely.

c. Ensure that the cap washer is intact and also grease the threads of the cap, plunger, etc, and wipe clean.

d. Make sure that the extinguisher is in proper condition and is not accidentally discharged. In case of stored pressure extinguisher, pressure gauge is to be checked for correct pressure.

e. Check all the components of the extinguisher as per the maintenance check list given for each type of extinguisher under Annex C.

f. Maintenance shall be carried out by the manufacturers or his authorised agent or professional firemen.

11.14

Over and above the quarterly inspection, all the extinguisher shall be subjected to a more thorough inspection atleast once in a year. Advantage should be taken of this annual

inspection to train personnel in the operation of extinguishers. The annual inspection should consist of the following procedure:

a. In the first instance, by rotation if the extinguisher is due for discharge test, after ensuring that the cap and components are fully tightened nozzles and vent holes are free of any dust or dirt, operate the extinguisher for testing the performance.

7 b. In case the extinguisher is not falling due for discharge test (*see* **12.3**) as per the schedule of records, empty the contents of the extinguisher in clean buckets and remove all the components. In case the extinguisher is operated, after operation clean the extinguisher and remove all components. In case it is failing in discharge test, procedure given in this standard is to be followed.

c. Examine the inside surface of the cylinder as well as the surface of the containers for the condition of plating, for any rust formation, etc.

d. If there are visible rust marks, wash the cylinder thoroughly with clean water, dry it and fill it with water for 24 h and observe the surface again. If there are still signs of rust formation and plating thickness is not adequate, the surface should be freshly plated or phosphated as the case may be (*see also* **11.10.3**).

e. The above procedures are for water type gas pressure, foam and dry powder type fire extinguisher. In case of CO_2 and clean agent extinguisher if the cylinders are not due for recharging than check the weight of the contents and the pressure of the container with its contents. If the same is in order as per the monthly checklist, then the contents need not be discharged. If, however, these extinguishers are due for an operational test, then after operational test, if facilities are available for pressure testing and recharging, the cylinders can be pressure tested and recharged at site after checking up the exterior and other components, or alternately should be sent to the manufacturer or other competent agency for pressure testing and re-charging.

f. Examine the external surface of the fire extinguisher in respect of painting and if there is damage to the painting, the surface should be re-painted as per the requirements of relevant Indian Standard.

g. Check up the condition of the label and if it is not in order ensure to replace with correct label.

h. Examine the cylinder and its components in detail apart from functional point of view for any physical damage, cracks, dents, etc. In case of any doubt, such components, if those are pressure parts, should be subjected to hydraulic pressure test. If the damage is beyond repair, the part should be replaced by a correct component.

i. The annual inspection should be combined with the testing requirements as given under **12** for operational test and hydraulic pressure test.

j. The extinguishers after inspection should be refilled immediately and the date of inspection and refilling should be indelibly marked on the extinguishers and recorded in the register of fire extinguishers.

11.14.1 *Water (Stored Pressure)/Powder (Stored Pressure) Extinguisher*

As this type of extinguisher is pressurized, it can be opined for inspection/maintenance after discharge only. It should be tested for discharge as per Annex D and maintenance described in **11.14.1** (a) to (h), carried out:

a. Check the pressure gauge, discharge the extinguisher and check its performance;
b. Check the pressure gauge before and after discharge for its correctness;
c. Open the extinguisher and check the body externally and internally using an illuminating probe; for corrosion or damage take action as per **11.10;**
d. Examine valve assembly, discharge hose, nozzle, strainer, vent holes, siphon tube and clean;
e. Examine sealing washers, siphon tube and hose (if fitted), and replace, if necessary;
f. Check the operating mechanism for free movement and clean, rectify or replace, if necessary;
g. Refill the extinguisher with fresh water or powder (stored pressure), screw cap tightly and pressurise the extinguisher, checking the pressure gauge for correct pressure (*see also* **11.10**); and
h. Replace safety clip/wire seal or equivalent as originally fitted.

12 TESTING OF FIRE EXTINGUISHERS

12.1

The testing of fire extinguishers consists of a hydraulic pressure test and a performance test. These tests shall be carried out as per the norms and frequency given below.

12.2 Hydraulic Pressure Test

12.2.1

The pressure test of all types of extinguisher should be carried out at intervals mentioned against each extinguisher at pressure and for the period mentioned against them in Annex E. The hydraulic pressure testing should be carried out such that atleast one-third (1/3) of

the extinguishers installed in a premises are tested as per Annex E every year. If any of the extinguishers fails in the hydraulic pressure test to meet the requirements given in Annex E, then after repairs, the extinguisher should be subjected to pressure testing. If it passes the test as per the requirements mentioned above, the extinguisher shall be retained and, if it fails, the extinguisher should be rejected and condemned as per the procedure and after record the same in the register of fire extinguishers and replace with new fire extinguishers. On the basis of life of extinguisher, the extinguishers shall not be used after expiry of its life as given in Annex F.

12.2.2 *Pressure Test Procedure and Safety Precautions*

a. All valves and internal parts shall be removed and the extinguisher emptied;

b. All traces of extinguishing materials like dry powder/mechanical foam should be removed from inside the shell before filling with water;

c. In the case of externally mounted gas cartridges/containers for higher capacity dry powder extinguishers, the cartridge/container must be removed and shell opening be suitably plugged;

d. The hose of the hydrostatic test pump is then attached to the flexible connection to the discharge nozzle, hose assembly or test fitting, as the case may be;

e. The extinguisher should then be placed in a suitable protective test case or behind a protective shield/barrier before applying the test pressure;

f. The cap or the test fitting, as the case may be, must be tightened slowly while the water supply remains open. When all the entrapped air within the shell has been bled off, and water emerges the cap/test fitting must be tightened fully,

g. Pressure is then applied slowly so that the test pressure (as given in Annex E) is reached slowly within 1 min, and maintained for the duration of 2.5 min. Observation are made about distortion or leakage of the extinguisher body; if any.

h. After hydraulic testing, all traces of water and moisture must be removed from dry powder and stored pressure extinguishers preferably by use of a suitable cylinder dryer taking care that the temperature within the shell does not exceed 65°C.

12.3 Discharge Test

All extinguishers installed in a premise irrespective of being use in a live fire condition shall be subjected to an operational test as per the frequency of testing given in Annex D. The operational test should be carried out in such a frequency, keeping in view the frequency given in Annex D for type of the extinguisher, in annually cyclic manner so that all the extinguishers installed in a premise are subjected to discharge test. If more than 10 percent of the extinguishers, subjected to discharge test fail during the testing, then all the extinguishers installed in the premises shall be subjected to the discharge test.

12.4 Gas Cartridge

In case of gas cartridges, if there is loss of more than 10 per cent of original mass, these should be sent for recharging and replaced with fresh charge. At the time of recharging the cartridge, the cartridge should be tested for hydrostatic test according to the provisions of IS 4947 and should be re-used only subject to passing of requirement.

13 MAINTENANCE OF RECORDS

The records of maintenance, inspection and testing of all fire extinguishers including its operational history shall be maintained in a register as per the formant given in Annex G.

14 REJECTED EXTINGUISHERS

The rejected fire extinguishers should be cut centrally across the body and made unusable before disposal so as to prohibit their subsequent use. The date of rejection and the mode disposal should be recorded in the register of fire extinguisher (*see* Annex G).

15 RECHARGING

15.1 General

15.1.1

All rechargeable-type fire extinguishers shall be recharged after any use or as indicated by an inspection or when performing maintenance. Extinguishers which are out of service for maintenance or recharging should be replaced by extinguisher(s) having the same class and at least equal rating. In no case, extinguishers of other facility should be withdrawn for this purpose.

15.1.2

When performing or recharging, the recommendations of the manufacturer shall be followed.

15.1.3

The amount of recharge agent shall be verified by weighing. The recharged gross mass shall be the same as the gross mass that is marked on the label. For those fire extinguishers that do not have the gross mass marked on the label, a permanent label that indicates the gross mass shall be affixed to the cylinder. The label containing the gross weight shall be a durable material of a pressure-sensitive, self-destruct type.

15.1.4 *Conversion of Fire Extinguisher Types*

No fire extinguisher shall be converted from one type to another, or shall any fire extinguisher be converted to use a different type of extinguishing agent. Fire extinguishers shall not be used for any other purpose than that of a fire extinguisher.

15.1.5 *Leak Test*

After recharging, a leak test shall be performed on stored-pressure and self-expelling types of fire extinguishers.

15.2 Frequency

15.2.1 *Pump Tank (Every 12 months)*

Pump tank water and pump tank calcium chloride based anti-freeze types of fire extinguishers shall be recharged with new chemicals or water, as applicable.

15.2.2 *Wetting Agent*

The agent in stored-pressure wetting agent fire extinguishers shall be replaced annually. Only the agent specified on the nameplate shall be used for recharging. The use of water or other agents is prohibited.

15.2.3 *AFFF and FFFP*

The premixed agent in liquid charge-type AFFF (aqueous film-forming foam) and FFFP (film-forming fluoro-protein foam) fire extinguishers shall be replaced at least once every year. The agent in solid charge-type AFFF fire extinguishers shall be replaced once every 5 years.

15.3 Procedures

15.3.1 *Recharge Agents*

Only those agents specified on the nameplate or agents proven to have equal chemical composition, physical characteristics, and fire extinguishing capabilities shall be used. Agents listed specifically for use with that fire extinguisher shall be considered to meet these requirements.

15.3.2 *Mixing of Dry Chemicals*

Multipurpose BC or ABC dry chemicals shall not be mixed with alkaline-based dry chemicals.

15.3.3 *Topping Off*

The remaining dry chemical in a discharged fire extinguisher shall be permitted to be re-used, provided that it is thoroughly checked for the proper type, contamination, and condition. Dry chemical found to be of the wrong type, or contaminated, shall not be reused.

15.3.4 *Dry Chemical Agent Re-use*

Fire extinguishers removed after 5 years for maintenance or hydrostatic testing shall be emptied. The dry chemical agent shall be permitted to be reused, provided a closed recovery system is used and the agent is stored in a sealed container to prevent contamination. Prior to re-use, the dry chemical shall be thoroughly checked for the proper type, contamination, and condition. Where doubt exists with respect to the type, contamination, or condition of the dry chemical, the dry chemical shall be discarded.

15.3.5 *Dry Powder*

Pails or drums containing dry powder agents for scoop or shovel application for use on metal fires shall be kept full and covered at all times. The dry powder shall be replaced if found damp.

15.3.6 *Removal of Moisture*

For all non-water types of fire extinguishers, any moisture shall be removed before recharging.

15.3.7 *Halogenated Agent*

Halogenated agent fire extinguishers shall be charged only with the proper type and weight of agent as specified on the nameplate.

15.3.8 *Halogenated Agent Re-use*

The removal of Halon 1211 from fire extinguishers shall be done only using a listed halon closed recovery system. The removal of agent from other halogenated agent fire extinguishers shall be done only using a closed recovery system. The fire extinguisher shall be examined internally for contamination or corrosion, or both. The halogenated agent retained in the system recovery cylinder shall be re-used only, if no evidence of internal contamination is observed in the fire extinguisher cylinder. Halogenated agent removed from fire extinguishers that exhibit evidence of internal contamination or corrosion shall be processed in with the fire extinguisher manufacturer's instructions.

15.3.9 *Carbon Dioxide*

The vapour phase of carbon dioxide shall be not less than 99.5 percent carbon dioxide. The water content of the liquid phase shall be not more than 0.01 percent by weight [−30°F (−34.4°C) dew point]. Oil content of the carbon dioxide shall not exceed 10 ppm by weight.

15.3.10 *Water Types*

When stored-pressure fire extinguishers are recharged, overfilling will result in improper discharge. The proper amount of liquid agent shall be determined by using one of the following:

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a. Exact measurement by weight;

b. Exact measurement in volume;

c. An anti-overfill tube, if provided; and

d. A fill mark on fire extinguisher shell, if provided.

15.3.11 *Wet Chemical Agent Re-use*

These agents are not to be re-used. If a wet chemical extinguisher is partially discharged, all remaining wet chemical shall be discarded. Wet chemical agent shall be discarded and replaced at the hydrostatic test interval.

15.4 Precautionary Pressurization Measures

15.4.1 *Pressure Gauges*

Replacement pressure gauges shall have the proper indicated charging (service) pressure, shall be marked for use with the agent in the fire extinguisher, and shall be compatible with the fire extinguisher valve body material.

15.4.2 *Stored-Pressure-Type Fire Extinguishers*

A rechargeable stored-pressure-type fire extinguisher shall be pressurized only to the charging pressure specified on the fire extinguisher nameplate. The manufacturer's pressurizing adapter shall be connected to the valve assembly before the fire extinguisher is pressurized. A regulated source of pressure, set no higher than 25 psi (172 kPa) above the operating (service) pressure, shall be used to pressurize fire extinguishers. The gauge used to set the regulated source of pressure shall be calibrated at least annually.

15.4.2.1

An unregulated source of pressure, such as a nitrogen cylinder without a pressure regulator, shall never be used because the fire extinguisher could be overpressurized and possibly rupture.

15.4.2.2

A fire extinguisher shall never be left connected to the regulator of a high-pressure source for an extended period of time. A defective regulator could cause the container to rupture due to excess pressure.

15.4.3 *Pressurizing Gas*

Only standard industrial-grade nitrogen with a dew point of −60°F (−51°C) or lower shall be used to pressurize stored-pressure dry chemical and halogenated-type fire extinguishers. Compressed air through moisture traps shall not be used for pressurizing even though so stated in the instructions on older fire extinguishers.

15.4.3.1

Compressed air shall be permitted to be used from special compressor systems capable of delivering air with a dew point of −60°F (−51.1°C) or lower. The special compressor system

shall be equipped with an automatic monitoring and alarm system to ensure that the dew point remains at or below –60°F (–51.1°C) at all times.

15.4.3.2

Class D and halocarbon fire extinguishers shall be re-pressurized only with the type of expellant gas referred to on the fire extinguisher label.

15.5 Recharge Record Keeping

Each fire extinguisher shall have a tag or label securely attached that indicates the month and year recharging was performed and that identifies the person performing the service. A 'Verification of Service' (maintenance or recharging) collar shall also be attached to the extinguisher.

15.5.1

Liquefied gas, halogenated agent, and carbon dioxide extinguishers that have been recharged without valve removal shall not be required to have a 'Verification of Service' collar installed following recharge.

15.5.2

Cartridge and cylinder-operated extinguishers shall not be required to have a 'Verification of Service' collar installed.

16 SPARE REFILLS

It is important that a minimum of 10 percent (of the number of various types of extinguishers on charge) replacement charges/refills should always be available in stock so that discharged extinguisher can be recharged and brought into use promptly.

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ANNEX A
LIST OF REFERRED INDIAN STANDARDS

(*Clauses* 2, 7.2 *and* 10.10)

IS No.	*Title*
940 : 1989	Portable Fire extinguisher, water type (gas cartridge)—Specification (*fourth revision*)
1641 : 1988	Code of practice for fire safety of buildings (general): General principles of fire grading and classification (*first revision*)
2171 : 1999	Specification for portable fire extinguishers, dry powder (cartridge type) (*fourth revision*)
2546 : 1974	Specification for galvanized mild steel fire buckets (*first revision*)

IS No.	Title
2878 : 2004	Fire extinguisher, carbon dioxide type (portable and trolley mounted)—Specification (*third revision*)
4308 : 2003	Dry chemical powder for fighting B and C class fires—Specification (*second revision*)
4862 (Part 1):1986	Specification for portable fire extinguishers for air craft: Part 1 Halon 1211 type (*first revision*)
4947 : 2006	Gas cartridges for use in fire extinguishers—Specification (*third revision*)
6234 : 2003	Portable fire extinguishers, water type (stored pressure)—Specification (*first revision*)
7673 : 2004	Fire fighting equipment—Glossary of terms (*first revision*)
8149 : 1994	Functional requirements for twin CO_2 fire extinguishers (trolley mounted) (*first revision*)
10204 : 2001	Specification for portable fire extinguisher, mechanical foam type (*first revision*)
10658 : 1999	Specification for higher capacity dry powder fire extinguisher (trolley mounted) (*first revision*)
11108 : 1984	Specification for portable fire extinguishers—Halon 1211 type
11833 : 1986	Specification for dry powder fire extinguishers for metal fires
13385 : 1992	Specification for fire extinguisher 50 litre capacity wheel mounted water type (gas cartridge)
13386 : 1992	Specification for 50 litre capacity fire extinguisher, mechanical foam type
13849 : 1993	Specification for portable fire extinguisher dry powder type (stored pressure)
14609 : 1999	Dry chemical powder fighting A, B, C class fires—Specification
14951 : 2001	Fire extinguisher—135 litre capacity chemical foam type—Specification
15397 : 2003	Portable fire extinguisher mechanical foam type (stored pressure)—Specification
15683 : 2006	Portable fire extinguisher—Performance and construction

ANNEX B
RECOMMENDATIONS FOR INSTALLATION OF FIRE EXTINGUISHERS

(*Clause* 5.3)

B-1

Occupancies classified according to IS 1641 are given together with nature of fire hazard and type of fire risk along with typical examples. The classifications, groupings, etc, given in this Annex are only for general guidance for installation of fire extinguishers, and not for other purposes.

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Class of Occupancy	Type of Occupancy	Nature of Occupancy	Class of Fire	Typical Examples

Class of Occupancy	*Type of Occupancy*	*Nature of Occupancy*	*Class of Fire*	*Typical Examples*
Group A	Residential buildings	LH	Class A	Lodging or rooming, one or two family houses, private dwellings, dormitories, apartment houses, flats, upto 4 star hotels, etc
		LH	Class C	Small kitchens having LPG connection, electrical heaters, etc
		MH	Class A	Multi-storeyed buildings, multi-risk buildings, five star hotels, etc
Group B	Educational buildings	LH	Class A	Tutorials, vocational training institutes, evening colleges, commercial institutes
		MH	Class A	Schools, colleges, etc
Group C	Institutional buildings	MH	Class A	Hospitals, sanatoria, homes for aged, orphanage jails, etc
Group D	Assembly buildings D-l	HH	Class A	Theatres, assembly halls, exhibition halls, museums, restaurants places of worship, club rooms, dance halls, etc, having seating capacity of over 100 persons
	D-2	MH	Class A	Theatres, assembly halls, exhibitions halls, museums, restaurants, places of worship, club rooms, dance halls, etc, having seating capacity less than 1000 persons
	D-3	MH	Class A	Theatres, assembly halls, exhibition halls, museums, restaurants, places of worship, club rooms, dance halls, etc, but having accommodation for more than 300 persons, but less than 1000 persons, with no permanent seating arrangement
	D-4 D-5	LH	Class A	Theatres, assembly halls, exhibition halls, museums, restaurants, places of worship, club rooms, dance halls, etc, but having accommodation less than 300 and those not covered under D-1 to D-3
Group E	Business buildings E-1	SH	Class A	Offices, banks, record rooms, archives, libraries, data processing centres, etc
	E-2	MH	Class B	Laboratories, research establishment, test houses, etc
	E-3	SH	Class A	Computer installations
Group F	Mercantile buildings	MH	Class A	Shops, stores, markets, departmental stores, underground shopping centres, etc
Group G	Industrial buildings	LH	Class A	Small industrial units

Class of Occupancy	Type of Occupancy	Nature of Occupancy	Class of Fire	Typical Examples
		MH	Class A	Corrugated carton manufacturing units, paper cane units, packing case manufacturing units, cotton waste manufacturing units
		HH	Class A	Large number yards, saw mills, godowns and warehouses storing combustible materials, cold storages, freight depots, etc
		LH	Class B	Demonstration chemical plants, small chemical processing plants, pilot plants, etc
		MH	Class B	Workshops, painting shops, large kitchens, industrial canteens, generator rooms, heat treatment shops, tread rubber manufacturing units, petrol bunks, tubes and flaps units, etc
		HH	Class B	Petroleum processing units, chemical plants, industrial alcohol plants, effluent treatment plants, etc
		LH	Class C	—
		MH	Class C	—
		HH	Class C	Fertiliser plants, petrochemical plants, LPG bottling plants, etc
		HH	Class D	All processes involving use of combustible highly flammable materials, reactive metals and alloys, including their storage
Group H	Storage buildings	MH	Class B	Flammable liquid stores, storage in drums and cans in open, paints and varnishes godown
		HH	Class B	Tank farms, chemical and petroleum bulk storage depots, large service stations, truck and marine terminals, underground LDO/furnace oil storage yards, etc
		MH	Class C	LPG distribution godown/office, distribution storage godowns/offices of D, N, H, Argon and other industrial gases
		HH	Class C	Storage and handling of gas cylinders in bulk, gas plant, gas holders (Horton), spheres, etc
Group J	Hazardous	—	—	Buildings used for storage, handling, manufacture and processing of highly combustible explosive materials. (Risks involved in terms of class of fire and intensity of fire has to be assessed on case to case basis and statutory authorities to be consulted, environmental factors and mutual aid facilities to be taken into account before deciding on the fire extinguisher requirements.)

Class of Occupancy	*Type of Occupancy*	*Nature of Occupancy*	*Class of Fire*	*Typical Examples*
NOTES 1. LH—Low hazard. 2. MH—Medium hazard. 3. HH—High hazard. 4. SH—Special hazard.				

B-2 RECOMMENDED SCALE OF EQUIPMENT TO BE INSTALLED

B-2.1 Class A

LH	Occupancy	One 9 litre water expelling extinguisher or ABC 5 kg/6 kg fire extinguisher, for every 200 m^2 of floor area or part thereof with minimum of two extinguishers per compartment or floor of the building. The extinguishers should be so located as to be available within 15 m radius.
MH	Occupancy	Two 9 litre water expelling extinguishers or ABC 5 kg/6 kg fire extinguisher, for every 200 m^2 with minimum of 4 extinguishers per compartment/floor. The extinguisher should be so located as to be available within 15 m radius.
HH	Occupancy	Provision as per MH occupancy; in addition to one 50 litre water CO_2/25 kg ABC fire extinguisher for every 100 m^2 of floor area or part thereof.
Special Hazard		One 4.5 kg capacity carbon dioxide or one 2/3 kg capacity clean agent extinguisher for every 100 m^2 of floor area or part thereof with minimum of two extinguishers so located as to be available within 10 m radius.

B-2.2 Class B

LH	Occupancy	One 9 litre foam extinguisher, mechanical or BC or ABC, 5 kg/6 kg fire extinguisher, for every 200 m^2 of floor area or part thereof with minimum of two extinguishers per compartment or floor. The extinguishers should be so located as to be available within 15 m radius.
MH	Occupancy	Two 9 litre foam extinguisher, mechanical type, or 5/6 kg dry powder extinguisher (or one of each type) for every 200 m^2 area with minimum of four extinguisher per compartment. Extinguisher should be available within 15 m radius.
HH	Occupancy	Provision as per MH, and in addition to one 50 litre mechanical foam type extinguisher or 25 kg BC fire extinguisher for every 100 m^2 or part thereof one 135 litre foam mechanical extinguisher for every 300 m^2 of floor area or part thereof.

B-2.3 Class C

LH	Occupancy	

		One 2/3 kg dry powder of clean agent extinguisher for every 20 m^2 of floor area or part thereof; extinguisher available within 15 m radius.
MH	Occupancy	One 10 kg dry powder extinguisher (stored pressure) or 6.5 kg carbon dioxide extinguisher or 5 kg clean agent for 100 m^2 of floor area or part thereof, with minimum of one extinguishers of the same type for every compartment; extinguisher should be available within a radius of 15 m.
HH	Occupancy	Dry powder extinguisher (stored pressure) of 10 kg or 6.5 kg CO_2 extinguisher, or 5 kg clean agent extinguisher for every 100 m^2 of floor area or part thereof, subject to a minimum of two extinguishers of same type per room or compartment. Extinguishers should be available within a radius of 10 m.

B-2.4 Class D

HH Occupancy	One 10 kg dry powder extinguisher with special dry powder for metal fires for every 100 m^2 of floor area or part thereof with minimum of two extinguishers per compartment/room. Extinguishers should be available within a radius of 10 m.

NOTES

1. The recommendations are minimum for a specific area. In case, the area is more than specified, high capacity extinguisher may be used based on these minimum requirements, that is proportionately higher capacity can be used.
2. In case of dry powder/CO_2/clean agent types, equivalent lower capacities may also be used.
3. The halons shall be restricted for essential use only.
4. On implementation of IS 15683, 6 kg and 9 kg dry powder extinguishers shall be replaced by 5 kg and 10 kg dry powder extinguishers.

ANNEX C
MAINTENANCE CHECK LIST FOR FIRE EXTINGUISHERS (FOR ROUTINE CHECK AND QUARTERLY MAINTENANCE)

[*Clause* 11.13 (e)]

NOTE—During inspection/maintenance of extinguisher the general safety precautions prescribed under **11.10** should be complied with.

C-1 FIRE EXTINGUISHER, WATER TYPE GAS CARTRIDGE (*see* IS 940, IS 13385 and IS 15683)

a. Open the extinguisher, see the water level and throw away the water charge.
b. Examine the extinguisher body internally and externally for corrosion and damaged conditions with illuminating probe. Damaged and corroded extinguishers should be removed from service. Corroded gas cartridge should also be replaced.
c. Examine the gas cartridge for mass. If there is loss of more than 10 percent of original mass, the cartridge should be sent for recharging after being replaced by a charged one.

For recharging, procedure given in **12.4** should be followed.

d. Examine nozzle, strainer, vent holes, internal discharge tube and sealing washer; replace them if not in good condition. Otherwise clean them thoroughly.

15 e. Check the operating mechanism for free movement and piercing mechanism if working properly.

f. Refill the fire extinguisher with clean water.

C-2 FIRE EXTINGUISHER, WATER STORED PRESSURE TYPE (*see* IS 6234 and IS 15683)

a. Examine and verify that the pressure gauge or any other pressure indicating device fitted in is indicating the internal pressure correctly, if the extinguisher shows a loss of pressure of more than 10 percent, refer to the manufacturer's instructions for appropriate action.

b. Examine the extinguisher body externally for corrosion or damage (*see* **11.10**).

c. Weigh the extinguisher (with or without the operating mechanism according to the manufacturer's instructions) or use suitable alternate means to check that it contains the correct mass of liquid. Check the mass against the mass recorded when it was first put into service.

d. Examine the nozzle and hose and clean, if necessary.

e. Examine the hose for wear and replace, if not in good condition.

f. Where the extinguishers are designed to have the operation mechanism removed, check the operating mechanism and discharge control (where fitted) for free movement, clean, rectify or replace, if necessary.

g. Replace safety clip/wire seal or equivalent device as originally fitted.

h. Refill the fire extinguisher with clean water.

NOTE—As this type of extinguisher is pressurised, it can be opened for inspection only after discharge of the extinguisher. It should be subjected to discharge/ performance test every two years.

C-3 FIRE EXTINGUISHER, FOAM TYPE MECHANICAL (*see* IS 10204, IS 13386 and IS 15683)

a. Open the extinguisher, check the liquid lever. Pour liquid in separate clean receptacle to see if there is any sediment at the bottom of the cylinder. Reject the charge if there is sufficient sludge formation.

b. Examine the extinguisher externally and internally for any corrosion or damage. Damaged and corroded extinguisher should be removed from service. Corroded gas cartridge should also be replaced.

c. Examine the gas cartridge of mass. If there is loss of more than 10 percent of original mass, replace it with fully charged one.

d. Examine the foam generating nozzle, strainer, vent holes, internal discharge tube ceiling washer, etc. Replace them, if not in good condition. Otherwise clean them thoroughly.

e. Check the operating mechanism for free movement and piercing mechanism for proper working.

f. Clean the hose assembly and check it for any dust/sediment at either shank ends.

C-4 FIRE EXTINGUISHER, FOAM TYPE MECHANICAL STORED PRESSURE (*see* IS 15397 and IS 15683)

Examine and verify that the pressure gauge or any other pressure indicating device fitted in is indicating the internal pressure correctly, if the extinguisher shows a loss of pressure of more than 10 percent, refer to the manufacturer's instructions for appropriate action.

Open the extinguisher, check the liquid lever. Pour liquid in separate clean receptacle to see if there is any sediment at the bottom of the cylinder. Reject the charge, if there is sufficient sludge formation.

a. Examine the extinguisher body externally for corrosion or damage (*see* **11.10**).

b. Examine the foam generating nozzle, strainer, vent holes, internal discharge tube ceiling washer, etc. Replace them, if not in good condition. Otherwise clean them thoroughly.

c. Weigh the extinguisher (with or without the operating mechanism according to the manufacturer's instructions) or use suitable alternate means to check that it contains the correct mass of liquid. Check the mass against the mass recorded when it was first put into service.

d. Examine the nozzle and hose and clean, if necessary.

e. Examine the hose for wear and replace, if not in good condition.

f. Where the extinguishers are designed to have the operation mechanism removed, check the operating mechanism and discharge control (where fitted) for free movement, clean, rectify or replace, if necessary.

g. Replace safety clip/wire seal or equivalent device as originally fitted.

h. Refill the fire extinguisher with compound.

C-5 FIRE EXTINGUISHER, DRY POWDER TYPE GAS CARTRIDGE (*see* IS 2171, IS 10658, IS 11833 and IS 15683)

All dry powder extinguishers should be inspected and maintained in accordance with the following. The dry powder extinguisher should be opened in a dry room and for a minimum possible time to avoid effect to atmospheric moisture on powder.

a. Dry powder extinguisher, where discharge control is fitted on the nozzle, should be operated before opening the extinguisher to ensure that there is no pressure in the extinguisher.

b. Weigh the extinguisher to check the correct mass of powder filled in it which should be marked on the body of extinguisher and record book when it was first put into service.

c. Open the extinguisher and remove gas cartridge and see that sealing disc is intact. Weigh and compare its mass with full mass of cartridge marked on it. In case, loss of mass is more than 10 percent, it should be replaced by new cartridge.

d. Check the operating mechanism, discharge control for fire movement and closing. Examine nozzle, hose, vent holes, piercing mechanism of cap cartridge holder, grease and wipe clean.

e. Remove the inner shell (if any) and clean port holes.

f. Empty the dry powder in a dry container and examine for caking, lumps and foreign matter, in which case replace it with new dry powder charge.

g. Examine the extinguisher body internally for any damage or corrosion and replace corroded or damaged extinguisher.

h. Clean the extinguisher using dry air.

i. Return the original charge to the extinguisher and fit the cartridge and other fittings.

j. In case of higher capacity dry powder fire extinguisher as per IS 10658, remove the carbon dioxide cylinder and check the weight marked on the cylinder to ensure that the size conforms to that stipulated in the specification. On weighing, if the loss of mass is more than 10 percent it should be sent for recharging. Also examine the wheel carriage and discharge hose assembly with control nozzle for free flow and test it with dry air.

k. In case of dry powder extinguisher for metal fire as per IS 11833, in addition to (j) above, examine the applicator pipe and the discharge shower head for freedom from clogging and clean it with dry air. Sample of the dry powder for metal fire may be tested on a small fire of magnesium turning or chips to ensure that the powder is suitable for metallic fire risks.

l. The safety valves and pressure gauges fitted on higher capacity extinguishers should be calibrated once in 3 years and recorded in the register.

C-6 FIRE EXTINGUISHER, CARBON DIOXIDE TYPE (*see* IS 2878, IS 8149 and IS 15683)

a. Examine extinguisher body externally. Damaged or corroded extinguisher should be replaced.

b. Weigh the extinguisher, compare mass against the mass marked on it for fully, charged extinguisher. It should be sent for refilling if the loss is more than 10 percent of mass. Clean and polish externally.

c. Examine hose, horn and assembly and clean. In case of trolley mounted extinguisher, examine the wheel carriage for free movement.

C-7 FIRE EXTINGUISHER, CLEAN AGENT GAS TYPE (*see* IS 15683)

a. Examine extinguisher body externally. Damaged or corroded extinguisher should be replaced.

b. Check the pressure gauge to see that extinguisher is pressured correctly. Extinguisher showing loss in pressure should be sent to manufacturer for pressurisation.

c. Weigh the extinguisher to check its contents of the extinguishing media and compare it with mass recorded on the cylinder. In case of loss of more than 10 percent, the extinguisher should be sent for recharging.

C-8 FIRE EXTINGUISHER, DRY POWDER TYPE STORED PRESSURE (*see* IS 13849 and IS 15683)

All dry powder extinguishers should be inspected and maintained in accordance with the following. The dry powder extinguisher should be opened in a dry room and for a minimum possible time to avoid effect to atmospheric moisture on powder.

a. Examine and verify that the pressure gauge or any other pressure indicating device fitted in is indicating the internal pressure correctly, if the extinguisher shows a loss of pressure of more than 10 percent, refer to the manufacturer's instructions for appropriate action.

b. Examine extinguisher body externally. Damaged or corroded extinguisher should be replaced.

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ANNEX D
REFILLING SCHEDULE FOR FIRE EXTINGUISHERS AND SCHEDULE FOR OPERATIONAL TEST ON FIRE EXTINGUISHERS

(*Clauses* 11.4.1 *and* 12.3)

D-1 EXTINGUISHERS TO BE REFILLED/OPERATED FOR PERFORANCE TEST IN ANNUALLY CYCLIC MANNER

D-1.1 Once in Two Years

a. Portable tire extinguisher, water type stored pressure.

b. Portable fire extinguisher, mechanical foam type stored pressure.

c. 135 litre fire engine, foam type.

D-1.2 Once in Three Years

BC and ABC powder extinguisher confirming to IS 4308 and IS 14609 respectively.

D-1.3 Once in Five Years

a. Portable fire extinguisher, water type 9 litre (gas cartridge).

b. Portable fire extinguisher, mechanical foam type 9 litre (cartridge type).

c. Portable fire extinguisher, water type 50 litre (gas cartridge).

d. Portable fire extinguisher, mechanical foam type 50 litre (cartridge type).

e. Fire extinguisher, carbon dioxide type (portable and trolley mounted).

f. Higher capacity dry powder fire extinguisher (trolley mounted).

g. Dry powder fire extinguisher for metal fires.

h. Clean agent fire extinguishers.

NOTES

1. In corrosive environments, it is desirable to have the discharge test carried out at half the frequency mentioned.
2. As per the restriction on release of halon in atmosphere, it need not be necessary to refill/operate Halon 1211 type portable fire extinguisher with in any stipulated period. However, as regards the pressure of injections gas, that is dry N, should be checked up for the adequate pressure on the pressure gauge/indicating gauge and the contents by weighing the fire extinguisher.

ANNEX E
SCHEDULE FOR HYDRAULIC PRESSURE TESTING OF FIRE EXTINGUISHERS

[*Clauses* 12.2.1 *and* 12.2.2 (g)]

E-1

Every extinguisher installed in premises shall be hydraulically pressure tested as per the schedule given below. There shall not be any leakage or visible distortion. Extinguisher which fails in this requirement shall be replaced.

E-2

The carbon dioxide type and clean agent type fire extinguishers shall be pressure tested every time when the cylinders are sent for recharging (after periodic discharge test or otherwise) to the pressure specified in the relevant Indian Standard specifications.

Sl No.	*Type of Extinguisher*	*Test Interval Year*	*Test Pressure kg/cm^2*	*Pressure Maintained for min*
i)	Water type (gas cartridge) (IS 940)	3	35	2.5
ii)	Water type (stored pressure) (IS 6234)	3	35	2.5
iii)	Water type (gas cartridge) (IS 13385)	3	35	2.5
iv)	Mechanical foam type (gas cartridge) (IS 10204)	3	35	2.5
V)	Mechanical foam type (stored pressure) (IS 15397)	3	35	2.5
vi)	Mechanical foam type (gas cartridge) (IS 13386)	3	35	2.5
vii)	Mechanical foam type (gas cartridge) 135 litre (IS 14951)	3	35	2.5
viii)	Dry powder (stored pressure) (IS 13849)	3	35	2.5

Sl No.	*Type of Extinguisher*	*Test Interval Year*	*Test Pressure kg/cm²*	*Pressure Maintained for min*
ix)	Carbon dioxide IS 2878	5	250	2.5
x)	Clean agent (IS 15683)	3	35	2.5
xi)	Dry powder (gas cartridge) (IS 2171, IS 10658 and IS 11833)	3	35	2.5
NOTE—Extinguisher's should be hydraulically tested with cap.				

ANNEX F
LIFE OF FIRE EXTINGUISHERS

(*Clauses* 12.2.1)

Sl No.	*Type of Extinguisher*	*Life Time, Year*
i)	Water type	10
ii)	Foam type	10
iii)	Powder type	10
iv)	Carbon dioxide	15
V)	Clean agent	10

NOTES

1. Life of extinguishers shall be considered from date of manufacture of extinguishers.
2. In case of failure in hydraulic pressure testing, extinguisher shall be rejected immediately before the life time given above.

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