

भारतीय मानक

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*Indian Standard*

**FIRE SAFETY IN IRON AND STEEL  
INDUSTRIES — CODE OF PRACTICE**

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**BUREAU OF INDIAN STANDARDS**  
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## FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Fire Safety Sectional Committee had been approved by the Civil Engineering Division Council. Irrespective of size, all iron and steel industries have one thing in common, that is, all have ample combustible materials in the form of coal, fuel oil, combustible gases, inflammable liquids, book records, waste, jute etc. When any of the material catch fire, these materials burn and contribute to the growth of fire.

Fire in the iron and steel industries will jeopardise the lives of the workers and the equipment and destroy the total or partial equipment, which will represent a national wealth. Consequential loss due to iron and steel industry fire may not be assessed in terms of money. The losses are irreparable.

Iron and Steel industries of all types are expanding at an enormous rate. Increase in demand for iron and steel, official policy and increase in usage in various sectors makes this process inevitable. The consumption of steel per-capita indicates the national growth and prosperity. Since the development of new iron and steel industries takes several years, the protection taken to safeguard the industry play a vital role and be done in the planning stages of the industry and in the operating stage of the existing industry. Unless the industry is planned to meet the futuristic requirements it may result in haphazard growth, additions and alterations, later thereby adding to the fire hazard.

In all cases, it is of utmost importance that due emphasis should be laid, at the planning stage, to analyse the fire hazard and vulnerabilities embodied in the various producing units of the iron and steel industry and its operations, when it is on going, and to plan and implement suitable measures for mitigating the hazards and vulnerabilities.

While full compliance with the acceptable building and fire safety codes may ensure a reasonable level of public safety in the existing construction, it should be realised that reliance upon the codes may not provide adequate protection for high value equipment and other associated instruments and adequate measures as needed be assured.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 Rules for rounding off numerical values (*revised*). The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

# *Indian Standard*

## FIRE SAFETY IN IRON AND STEEL INDUSTRIES — CODE OF PRACTICE

### 1 SCOPE

**1.1** This code covers the fire safety and fire protection measures of iron and steel industries required after construction of structures.

**1.2** This code does not cover fire safety aspects of iron and steel industry in detail but will generally cover the major hazards and the procedures to be followed.

### 2 REFERENCES

The Indian Standards listed in Annex A are necessary adjuncts to this standard.

### 3 GENERAL

**3.1** Fire safety of iron and steel industry is based on prevention/early detection/suppression and the knowledge of the personnel at hand to cope with a possible fire emergency. This basic consideration for the design of iron and steel industry considering the following factors at the planning stage have been considered :

- a) The basic structure of each building, its layout, compartmentalisation and type of construction, whether independent or part of other building with/without segregation;
- b) Electrical installations, instrumentation, over head cranes, including internal and external lighting;
- c) Heating/ventilation and air-conditioning system;
- d) The number of workers present in each installation during peak hours;
- e) Storage of fuel oils, oxygen, Ammonia, coal sulphur etc;
- f) Various common facilities, distribution and consumption points;
- g) The number and location of exits and escapes and provision of self closing fire check doors of main exit/escape;
- h) The provision of primary fire fighting facilities to quench or restrain the spread of fire till the main fire fighting facilities reach;
- i) Provision of fixed systems like automatic fire detection-cum alarm, automatic fire suppression system and semi-automatic pressurised hydrant system; and
- k) The vulnerabilities of the fire incidence and protection for the equipment and man power.

**3.2** The iron and steel industry basically consists of the melting and finishing units.

**3.2.1** The melting units in a conventional system will be a blast furnace, the open hearth furnace, liquid oxygen furnace. The ingredients are the coke, coke oven gas ( carbon monoxide ) fuel oil, tar, pitch, iron ore, lime stone ore, carbon, manganese etc. The finishing units are the hot and cold mills where the finished products are manufactured. The ingredients are steel slabs, billets, blooms, coke oven gas, fuel oil, etc.

**3.2.2** Finishing equipment consists mainly of reheating furnances, hot mills, cold mills etc.

**3.3** The fire rating of the equipments like motors, generators and others should be to suit the surrounding conditions and never less than class A insulation.

### 4 BLAST FURNACE

**4.1** A blast furnace shall be a completely fire resisting enclosure, having an internal capacity varying on the technological requirements which is used exclusively for the manufacture of pig iron. It should be so equipped, maintained and supervised that the possibilities of an out-break of fire outside the furnace should be reduced to the minimum possible.

**4.2** Depending on the total fire load and the expected security of fire outside the furnace, the fire resisting rating may not be less than 2 hours.

**4.3** The blast furnace shall have adequate clearance on all sides so that when exposed to a fire, the temperature on the external face of the building and immediate surrounding does not exceed 500°C and the electrical instrumentation do not get damaged.

**4.4** The structures and the equipment should be suitably insulated from the direct heat and should not be peeled or damaged at any point except the hot metal runners.

**4.5** The control room and the other equipment should have the same resistance of the furnace area.

**4.6** Combustible materials like cotton waste, oxygen cylinders, lubricants, inflammable liquids should not be permitted in the vicinity of furnace.

**4.7** When small quantities of lubricants and maintenance materials are to be stored, they should be properly protected and kept under insulated atmosphere to prevent any occurrence of fire.

4.8 All instrumentation rooms and power control rooms should be properly insulated and exposure of cables or instruments direct to the fire should be eliminated.

## 5 MELTING SHOP

5.1 A steel melting shop shall be a completely fire resisting enclosures having an internal capacity to suit the technological requirements which are used exclusively for the manufacture of steel. It should be so equipped, maintained and supervised that the possibilities of an outbreak of fire outside the furnace should be reduced to the minimum possible.

5.2 Depending on the total fire load and expected security of fire outside the furnace, the fire resisting rating may not be less than 2 hours.

5.3 The furnace shall have adequate clearance on all sides so that when exposed to a fire, the temperature on the external face of the building and immediate surrounding does not exceed 1 000°C and the electrical instruments do not get damaged.

5.4 The structures and the control equipment should be suitably insulated and cooled with water circulation from the direct heat and should not be peeled or damaged at any point except the hot metal handling equipment.

5.5 The control room, the water circulating system, the electrical cable should have the same resistance of the furnace area.

5.6 Combustible materials like fuel gas, oxygen pipes, lubricants, inflammable liquids are to be protected, suitably either with circulating water, refractory insulation or thermal insulation. No cotton waste or inflammable liquids, or lubricants should be stored near the furnace area.

5.7 When small quantity of lubrication and maintenance materials are to be stored, they should be properly protected and kept under special insulated enclosures to prevent any occurrence of fire.

5.8 All instrumentation rooms, power control room should be properly insulated and exposure of cables or instruments direct to the fire shall be eliminated.

## 6 COKE OVEN

6.1 A coke oven shall be a completely fire resisting enclosure having an internal capacity to suit the technological requirements which are exclusively for the manufacture of coke from metallurgical coal. It should be so equipped, maintained and supervised that the possibilities of an outbreak of fire outside the coke oven. Battery limits should be reduced to the minimum possible.

6.2 Depending on the total fire load and expected security of fire outside the furnaces, the fire resisting rating may not be less than 2 hours.

6.3 When exposed to a fire during operation the external temperature and that of surroundings should not exceed 500°C so that the electrical instrumentation, the structure, the gas main and the conveyor belts do not get damaged.

6.4 The structure and the control equipment should be suitably insulated and cooled from the direct heat and should not be peeled or damaged at any point except the time while coke is pushed from the oven.

6.5 The control room, the pusher car, the coke car, the conveyor belts, the charging car and the electrical cables should have the same resistance of the coke ovens.

6.6 Combustible materials like fuel oil, oxygen pipes, lubricants, inflammable liquids are to be protected suitably. High temperature resistant graphite grease should be used in the pusher car, coke car, charging car, conveyor idlers to prevent the fire hazard. No cotton waste or inflammable liquids should be stored near the furnace area.

6.7 Where small quantity of lubricants and maintenance materials are to be stored they should be properly protected and kept under special insulated enclosures to prevent any occurrence of fire.

6.8 All instrumentation rooms, power control rooms, should be properly insulated and exposure of cables or instruments direct to fire hazard should be eliminated.

## 7 REHEATING FURNACE

7.1 A soaking pit or a reheating furnace, annealing furnace shall be completely fire resisting enclosure having an internal capacity to suit the technological requirements which are exclusively used for the manufacture of finished steel products. It should be so equipped, maintained and supervised that the possibilities of an outbreak of fire outside the furnace should be reduced to the minimum possible.

7.2 Depending on the total fire load and the expected security of fire outside the furnaces, the fire resisting rate may not be less than one hour.

7.3 The reheating furnace shall have adequate clearance on all sides so that when exposed to a fire, the temperature on the external face of the building and immediate surrounding does not exceed 500°C and the electrical instrumentation do not get damaged.

7.4 The structures and the control equipment should be suitably insulated and cooled with

water circulation from the direct heat and should not be peeled or damaged at any point except the loading and unloading of the ingots, billets with the handling equipment.

**7.5** The control room, the cable tunnels, the water circulating system should have the same resistance of the furnace area.

**7.6** Consumable materials like fuel oil gas, oxygen pipes, lubricants, inflammable liquids are to be protected suitably either keeping away from the furnace or keeping them in an insulated enclosure. No cotton waste or inflammable liquids or lubricants should be stored near the furnace.

**7.7** All instrumentation rooms, power control rooms should be properly insulated and exposure of cables or instruments direct to the furnace should be eliminated.

## **8 HOT MILL**

**8.1** A blooming mill, slabbing mill, wire rod mill, hot strip mill, plate mill, section mill or rail and structural mill is a completely open process of finishing into the desired technological requirements which are exclusively meant for the manufacture of finished steel products. It should be so equipped, maintained and supervised that the possibilities of an outbreak of fire outside the mills or in the cellars should be reduced to the minimum possible.

**8.2** Depending on the total fire load and the expected security of fire outside the mills the fire resisting rate may not be less than half an hour.

**8.3** The hot mill shall have adequate clearance on all sides so that when exposed to a fire, the temperature on the external face of the building and immediate surrounding does not exceed 500°C and the electrical instrumentation do not get damaged.

**8.4** The structures, the oil cellars, the control equipment, the cable tunnels, the service tunnels should be suitably insulated and cooled with water circulation, cold air blowing from the direct heat and should not be damaged or interrupted at any point of time except the shut down.

**8.5** The control room, the oil cellar, a cable tunnel, the service tunnel should have the same resistance of the mill area.

**8.6** Consumable materials like fuel oil gas, oxygen pipes, lubricants, inflammable liquids are to be protected suitably either keeping away from the hot working areas or keeping them in an insulated enclosures. No cotton waste or inflammable liquids or lubricants should be stored near the mills.

**8.7** All instrumentation rooms, power control rooms oil cellars should be properly insulated

and exposure of cables or services direct to the rolling area should be laminated.

## **9 PRECAUTIONS**

**9.1** It is important that certain minimum precautions given in 9.2 to 9.17 are observed with a view to preventing an outbreak of fire and loss of equipment and machinery.

**9.2** Smoking should be prohibited in the area of gas mains, fuel storages, fuel gas storages, fuel oil injection areas, coal storages, oil cellars, electrical rooms, oxygen plant Acetylene plant and consuming plants, stores, substores, parking area where inflammable materials like wood, paper are stored.

**9.3** 'No Smoking' signs painted in large readable letters on a contrasting background should be displayed conspicuous in one or more areas. Each sign should have a photograph. Lighting of matches in darkness in the area should be prohibited. Fluorescent paint should be used to signify the prohibited area.

**9.4** Welding by electric or gas should be permitted in the no smoking areas unless a safety protocol is made taking all precautionary measures and should be done under proper supervision.

**9.5** Fire check doors should be provided in the oil cellars, control rooms, instrumentation racks, service tunnels to check the spread of fire. Such doors shall meet the requirements as laid down in IS : 3614 ( Part 1 ) - 1966.

**9.6** Loose electrical connections and improper ventilation resulting in the ignition or rise in temperature should be checked.

**9.7** Spillage of any lubricants, fuel oil, inflammable materials should be cleared by spraying sand and clearing the surface.

**9.8** No loose wires or temporary wire connections should be permitted in the control rooms, oil cellars, cable tunnels service tunnels etc.

**9.9** No wooden door or window should be provided in the control room, instrumentation room, oil cellar, cable tunnel.

**9.10** All partitions should be of steel frame and wood wool board or non-combustible sheets. No wooden partition is permitted within the plant premises.

**9.11** Waste cotton should be disposed of in the bins filled with half water so that the cotton is damp and will not catch fire.

**9.12** Where considerable amount of combustible materials are stored cordoning off the area and adequate provision to supervise the area by installing monitors should be made.

**9.13** Any electrical defect or any leakage in the gas mains or leakage of any oils should be

checked and rectified immediately. Suitable gas detectors should be installed.

**9.14** Welding and flame cutting operation should be properly supervised. For carrying out welding or flame cutting on gas lines, a fire safety protocol listing out the precautions to be taken and responsibility assigned should be made before taking up the job which may include placement of persons with adequate fire fighting equipment at their disposal and they should be assigned to observe the welding and cutting operation only. Where more than one floor is exposed additional fire watches may be required.

**9.14.1** Flying sparks from welding and flame cutting operations are frequently thrown or fallen into places where inflammable material may smolder for hours before bursting into flame. A careful inspection of all areas near the welding site including floors above and below shall be made when the job is finished or interrupted and such areas are kept under watch for a period long enough to make certain that no smoldering fires have developed.

**9.15** Spilling of hot material on the structures, cable trays, conveyor belts should be immediately quenched to stop spread of fire.

**9.16** Where gas or inflammable liquids are stored and are being used explosion proof lighting should be provided.

**9.17** Any rats or any other insects should be killed or driven out by pest control methods as they are of the sources of snapping the wires and causing short circuits.

## 10 FIRE DETECTION AND ALARM SYSTEM

**10.1** For minimization of losses due to fire it is imperative that any outbreak of fire in the steel industry is detected as early as possible so that the fire suppression can commence promptly. The likely hazardous area should therefore be protected with the following :

- a) An automatic fire detection and alarm system, and
- b) Manually operated fire alarm system.

**10.2** Automatic fire detection and alarm system shall be installed in accordance with IS 2189 : 1988 and smoke and heat detectors with IS 2175 : 1988. The manual call boxes and control panel shall also conform to IS 2189 : 1988.

**10.3** A hot line telephone connecting the various zonal offices to the central fire station with battery back up should be provided as a means of rapid communication at the central manned post so that the fire brigade may be alerted without delay. Alternatively, the detector in the zone namely blast furnace, steel melting shop, soaking pits, hot rolling mills, cold rolling mills, sinter plant, sponge iron

plant, electric arc furnace, ladle repair shop, acetylene plant, oxygen plant, oxygen storage area, central LPG gas storage area, HS diesel storage area, central repair shop area, main office area, etc. may be arranged to actuate audio-visual alarm at the nearest public fire brigade station.

**10.4** While selecting a suitable detector and deciding upon the type and spacing, the following should be borne in mind:

- a) The oil cellars, the HSD storage and pumping area, and dust generating areas should be provided with heat detectors (rate of rise-cum-fixed temperature heat detectors type.)
- b) Cable tunnels should be protected with optical type of detectors. Control rooms and offices should have ionisation/optical type detectors. As the cable tunnels, control rooms, offices have positive air pressure, the smoke gets carried away with the wind and as such the sensitivity should be high.
- c) The beam type of detector in the steel industry will not be effective as the light beams are frequently intercepted by the maintenance people and other objects.
- d) Cable tracer type of detectors shall be laid along the cable in the cable trays to indicate rise in temperature and actuate the fire detection system. These detectors are suitable for cable tunnels and electrical control room.
- e) The cable tunnels are laid in accordance with IS 12459 : 1988.
- f) The computer rooms and offices with false ceiling should have smoke type detectors provided both in open areas and the false roof areas to detect the occurrence of fire.
- g) Gas vapour detector should be provided in the inflammable liquid storage areas, gas storage areas, rolling grinding and beaming assembly areas so that the alarm signals are given when the concentration of the vapours reach maximum and preventive measures are taken before the explosion takes place. The occurrence of explosion will be due to any electrical sparks and welding operation in the area.
- h) In the main shops, where the areas are open and the processing equipment is stalled, the provision of any automatic detection and alarm system is not necessary.
- j) The general stores and laboratory where costly equipment are existing, detection system and alarm system should be provided.

- k) All manual call boxes should form part of the general detection system.
- m) The manually operated electrical fire alarm system should also be arranged to give an audio visual warning at the same central location and shop floor location as the automatic fire detection and alarm system, according to provision given in IS 2189 : 1988.
- n) The location of the manually operated call boxes should be visible and easily approachable. A white circle of 300 mm dia should be drawn around the call box with a red circle of 100 mm dia drawn inside the same where the call box is located for easy identification. The call boxes should be numbered and the location should be indicated in the cellars and the halls for easy reach. The logo should be written that in case of fire reach the call box located at....., the location of the call box should not exceed 100 m in the travel distance.

### 11.2.2 Carbon dioxide system ( See IS 6382 : 1984 )

Carbon dioxide system of total flooding can be very effective but has the following limitations:

- a) The rate of discharge from a total flooding type fixed carbon dioxide fire extinguishing system is high and effective concentration of the gas can be maintained for an extended period to ensure complete extinction.
- b) Carbon dioxide is highly corrosive and will take time to fill big oil cellars and electrical control rooms. The corrosion effects the electrical contact points.
- c) The system requires a full-proof method of evacuating people before the carbon dioxide is let out.
- d) It is highly asphyxiating and all care should be taken to see all persons are evacuated before release of carbon dioxide. In open shops, a skirting is to be provided to attain the effective concentration. The skirt should drop and cover the equipment while carbon dioxide is being discharged.
- e) Hence this system is adopted normally for enclosed unoccupied spaces.

## 11 FIRE EXTINGUISHING SYSTEMS

**11.1** Steel industries should be equipped with suitable fire extinguishing systems and equipment both fixed and portable.

**11.2** Fixed fire extinguishing systems may be automatic or manually operated. The decision about the installation of any particular type of fixed fire extinguishing system depends on the value of the fire occurrence. The choice also depends upon each situation, local preferences, the degree of sophistication and degree of occupancy desired. Broad guidelines are indicated in 11.2.1 and 11.2.2.

**11.2.1** As the medium of extinguishing consists of spray of water the following should be taken into consideration to arrive at a decision :

- a) Sprinklers actuated in the early stages of a fire may localise the fire and prevent it from spreading.
- b) Fuel oil storage tanks, out door transformers, oil cellars, electrical control rooms near hot processing equipment like blast furnace steel melting shop or furnace, sintering plant, sponge iron plant, coke storage, coal storages, gas storages etc. are some of the areas where sprinkler system will be effective to quench the fire in the initial stages.
- c) A sprinkler system is a comparatively more economical than the other extinguishing media.
- d) The sprinkler system contains the fire to a limited extent and cannot be the main media of quenching fire in a steel industry.

### 11.2.3 Halon System

Halon system is more efficient than CO<sub>2</sub> system. It occupies less space and volume. It requires only 25% of halon to control a similar fire. Further, maintenance is also much easier. However, because of its adverse affect on environment, use of halon should be restricted to only most expensive equipments which otherwise cannot be protected, like computer room, main control room panel, etc.

### 11.2.4 High Expansion Foam System

High expansion foam is capable of successful controlling fires at speed compared to sprinklers. In oil cellars, continuous cast equipment, and hot rolling mill drives, hydraulic cellars, this is very effective as it has a very low water content and water damage to any area is low. Since the entire room/compartment should be filled with high expansion foam for achieving complete extinction, the low water content foam is spread over all the items in the cellars — rooms and extensive slow age operations are

necessary immediately after the fire is extinguished. The fuel oil storage tanks and the other explosive areas of LPG storages are engulfed in the high expansion foam system. The basic advantage is that the foam will contain fire due to the stoppage in oxygen supply from the air and will extinguish the fire. In cable tunnels and oil cellars, the usage of high expansion foam system is very effective.

#### **11.2.5 Water Spray and Fixed Manually Operated Fire Extinguishing System**

In a steel industry where the technology is based on the reduction of materials is with the heat, the existence of fire is in the process itself. Water is the main source for quenching the fire. The usage of water on hot metal will explode and as such the technology of fire fighting has to be properly adopted.

Irrespective of the type of fixed automatic fire extinguishing system that may be installed, fire hydrants and first aid hose reels should also be installed both indoors and out-doors because water is still necessary in plentiful supply for extinguishing any fire that may otherwise burn unabated.

**11.2.5.1** Various technological shops are located in the steel industry, water for the fire fighting should be provided through fire hydrants and static water tanks.

**11.2.5.2** In order to provide immediate attack on the fire, in addition to the external and internal hydrant system which may take time to operate, it is recommended that first aid hose is provided at suitable points inside the shop. These first aid hoses are 32 mm dia and kept in a flaked condition inside the hose box with a branch pipe of 12 mm dia permanently fixed on the same. Such first aid hose shall be directly tapped from the pressurised hydrant line. All normal hydrants in the shops should have single outlet. Adequate capacity of static water tank should be provided at suitable points for direct fire fighting by fire tenders and pumps.

#### **11.2.6 Fire Extinguishers**

Portable fire extinguishers of appropriate types should be provided and maintained throughout the building ( *see* IS 2190 : 1992 ). The guiding principle is that fire extinguisher should be readily available so that these can be used without any delay in the initial stages of fire. In cable tunnels, oil cellars, control room, foam type and foam/CO<sub>2</sub> type should be provided. In the sub-stations and transformer stations foam/CO<sub>2</sub> type and powder type should be provided. The blast furnace, and its auxiliaries will call for foam type, water and carbon dioxide. The coke oven and its auxiliaries call for foam and water type.

**11.2.6.1** Fire extinguishers shall be selected and installed in accordance with IS 2190 : 1992.

## **12 FIRE CHECK DOORS**

**12.1** Fire check doors shall be installed to withstand the fire and to prevent the spread of fire in the steel industry.

**12.2** The entry of cable tunnel into the cellars should be through fire check doors.

**12.3** The oil cellars and the electrical cellar should be separated by a fire check door.

**12.4** All doors in cellars or offices or control rooms should open to open air so that in case of fire the persons working can escape by opening the door. Provision of door openings into the cellars will be a cause of disaster as the persons working in the areas will try to push the door for opening which will not open outside as it is designed to open inside and will be trapped.

## **13 MAINTENANCE**

**13.1** The fire detection and alarm installations ( *see* IS 2189 : 1988 ) and fire suppression system/equipment should be maintained in serviceable conditions at all times.

**13.2** Building(s) should be maintained in such a manner that horizontal and vertical fire compartmentation are not disturbed or adversely affected at any place any time. Particular attention should be paid to the continuity and repair of all walls and floors and the fire/smoke check doors. It should be ensured that the doors are not wedged open and the door closers function effectively.

**13.3** All water supply sources should be inspected once in a week and replenished as necessary.

**13.4** All portable fire extinguishers should be inspected and maintained according to IS 2190 : 1992.

## **14 EMERGENCY ORGANIZATION**

**14.1** An emergency organization should be set up by giving them first aid fire fighting training. The training of usage of detection system, fixed and portable system and for action during a fire emergency.

**14.2** Detailed orders should be drawn up for action to be taken and responsibility of all individuals in the event of fire and copies should be made available to all concerned.

**14.3** The details of fire fighting techniques should be conspicuously displayed in all places. These details should be painted on walls or partitions and should be maintained periodically for visibility and prominence. The exits should be marked in local language.

**14.4** It should be the duty of the fire fighting department and the plant operating people to know that maintenance and operation of the



equipment as a training will help to save the men and machinery from the fire hazards.

**14.5** All employees of steel industry should be

acquainted with the equipment installed and the action to be taken in the event of an outbreak of fire and in the operation and use of first aid hose reels and fire extinguishers.

## ANNEX A ( Clause 2 )

### LIST OF REFERRED INDIAN STANDARDS

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
2175 : 1988	Specification for heat sensitive fire detectors for use in automatic fire alarm system ( <i>second revision</i> )	3614 ( Part 1 ) : 1966	Specification for fire check doors: Part 1 Plate metal covered and rolling type
2189 : 1988	Code of practice for selection, installation and maintenance of automatic fire detection and alarm system ( <i>second revision</i> )	6382 : 1984	Code of practice for design and installation of fixed fire extinguishing system ( <i>first revision</i> )
2190 : 1992	Code of practice for selection, installation and maintenance of portable first-aid fire extinguishers ( <i>third revision</i> )	11360 : 1985	Specification for smoke detectors for use in automatic electrical fire alarm system
		12459 : 1988	Code of practice for fire-protection of cable runs

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