इंटरनेट मानक

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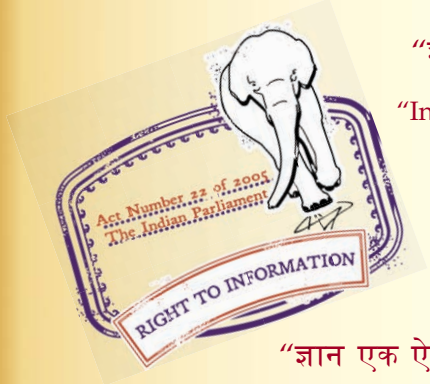
Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 9109 (2000): Fire Safety of Industrial Buildings - Paint and Varnish Factories - Code of Practice [CED 36: Fire Safety]



"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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भारतीय मानक

औद्योगिक भवनों की अग्नि सुरक्षा — पेंट और वार्निश की फैक्टरियाँ — रीति संहिता

(पहला पुनरीक्षण)

Indian Standard

FIRE SAFETY OF INDUSTRIAL BUILDINGS — PAINT AND VARNISH FACTORIES — CODE OF PRACTICE

(First Revision)

ICS 13.220; 87.040; 91.040.20

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

August 2000

Price Group 4

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Fire Safety Secttional Committee had been approved by the Civil Engineering Division Council.

Paint and varnish factories present considerable fire risk in most of the processes and storage areas. Presence of dense acid smoke, toxic fumes, explosion hazards, slippery floors, chances of boil over, burning liquids travelling long distances and involving other areas are some of the peculiar features of fires in such industries.

The hazards of fire and explosion in factories manufacturing and storing paints and varnishes may be considerably lowered by adoption of certain pre-determined safety measures with regard to proper planning of building, choice of proper materials and components, electrical equipment and making suitable provision for fire fighting arrangements, etc. This standard has therefore been formulated to give necessary guidance in this respect.

This standard was first published in 1979. This revision incorporates some new clauses pertaining to process safety provisions, fire protection arrangements and outdoor storage of paint/varnish with flammable liquid base in containers and portable tanks, in addition to modifications in various clauses.

In the formulation of this standard due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country.

The composition of the technical committee responsible for the formulation of this standard is given at Annex B.

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, 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 values in this standard.

Indian Standard

FIRE SAFETY OF INDUSTRIAL BUILDINGS — PAINT AND VARNISH FACTORIES — CODE OF PRACTICE

(First Revision)

1 SCOPE

This standard covers the essential requirements for the fire safety of premises, in which paints and varnishes are manufactured and/or stored.

2 REFERENCES

The Indian Standards listed in 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 given at Annex A.

3 TERMINOLOGY

For the purpose of this standard, definitions given in IS 1303 and IS 8757 shall apply.

4 LOCATION

4.1 To prevent and reduce possible damage from explosion or fire, or from both, to nearby property and community, the factory shall have enough open space around. It shall be so located as to be easily accessible for fire fighting. The premises shall be enclosed by a fencing or compound wall.

4.2 The factory buildings shall be at least 100 m away from railway siding, yard or lines, preferably on the windward wide of the tracks. Distance may be reduced to 30 m if these rail tracks are serviced by diesel or electrical locomotives only.

4.3 The factory buildings shall be at least 100 m away from public buildings, dwelling houses, warehouse or other manufacturing establishments.

5 COMPOUNDS

5.1 The compound shall be sufficiently large to house the manufacturing and storage sections as also utility buildings and shall allow for future expansion. The compound and buildings shall be kept clean of all combustible materials, such as grass, weeds and other vegetations.

5.2 The area shall have *pucca* roads not less than 5 m wide in between the blocks of buildings to allow free movement for fire engines and rescue operations.

5.3 The factory shall be located in an industrial area, preferably within 5 km of the nearest municipal fire brigade. The main gate of the factory shall be such that it allows easy access to the fire appliances of the factory and any assisting local fire brigades. The width and headroom in any case shall be not less than 5 m.

5.4 The minimum distance between any two buildings (from wall to wall) used for manufacturing purposes should preferably be 15 m and in no case less than 8 m.

5.5 Buildings separated by not less than 15 m of space may communicate through enclosed passageway of non-combustible construction provided that such enclosed passageways are specially designed for the release of internal pressures and all the openings to such passageways are protected by fire-proof doors conforming to IS 3614 (Part 1).

5.6 Transformer, electric generator, or boiler, any or all of these, shall be at least 15 m from the manufacturing building.

5.7 Residential and office buildings shall be at least 20 m away from the nearest manufacturing building.

6 BUILDING CONSTRUCTION

6.1 The construction of all buildings within the compound shall comply with the requirements of IS 1641.

6.1.1 There shall be separate buildings for raw materials, mixing, milling, melting processes and for finished products store. Each building shall be subdivided into smaller compartments as necessary by separating walls.

6.1.2 The separating walls shall be of sound construction, of non-combustible material and shall have the same fire resistance as the walls of the main building.

6.1.3 No openings shall be provided in these walls.

6.1.4 Buildings used for manufacturing purposes shall have a fire resistance equivalent to that of Type I structure, as specified in IS 1641.

6.1.5 Buildings used as godowns shall have a fire

resistance equivalent to that of Type II structure, as specified in IS 1641.

6.1.6 Utility buildings shall have fire resistance equivalent to that of Type III structures, as specified in IS 1641.

6.1.7 Manufacturing and storage buildings shall preferably be single storeyed. They shall be as low as possible, and in any case not more than 10 m measured from the average surrounding ground level to the highest point of roof. Wooden flooring shall be prohibited, except when laid on a concrete or masonry floor without any intervening space.

6.2 Roofs

6.2.1 Roofs shall be directly supported from wall without any intermediate columns or posts. The roof covering shall be as light as possible but fire resistant. Roofs of corrugated iron sheets shall be either galvanized or painted with aluminium paint and corrugated asbestos sheets shall be inserted along the lower edges of roof near the walls at intervals of 6 m to facilitate entry through the roof for fire fighting purposes. If underside or roof is to be painted, only fire-retardant paint shall be used. Such roofs shall be leak-proof and no piping and other equipment shall be supported on them. Where roofs are provided with skylight, the glasses shall be of glazed type.

6.2.2 Wherever roof is planned as a part of explosion venting methods, it shall be of fragile materials and shall be so fixed that it can provide adequate venting of explosion shock waves.

6.3 Godowns shall be essentially single storey structures.

6.4 Adequate ventilation shall be provided for the processing and storage blocks.

6.5 Circular chutes and ducts shall be preferred to square ones. Corners and dead ends in the ducts shall be avoided to prevent accumulation of dust.

7 DOORS AND WINDOWS

7.1 Doors shall be of non-combustible material and of self-closing fireproof type conforming to IS 3614 (Part 1). Doors for ventling shall lead to the open.

7.2 There shall be at least two doors in each room and where possible more than two doors shall be provided. These doors shall be protected against damage by lorries or other vehicles.

7.3 There shall be no other external windows or openings except those required for lighting and ventilation.

7.4 When explosion risk is involved, windows shall be fitted with 3 mm wired glass. They shall be hinged or pivoted so as to open outwards if an explosion occurs and shall be provided with devices to prevent opening inwards.

7.5 The bottom of windows shall be at least 2.2 m above floor level to deflect the full force of an explosion above working head.

7.6 Each room shall have at least two widely separated alternate exits to corridors or to the outside.

8 FLOOR

The floor of manufacturing area shall be water-proofed, curbed and drained to a point of safe discharge to safeguard property and to prevent against damage by over-flow of flammable liquids or by water in the event of fire.

9 VENTILATION

9.1 In order to properly ventilate a room where processing is carried out, all partitions of the enclosure must be considered and air inlets and outlets to the enclosure must be controlled in relation to location and capacity. Failure of ventilating fan shall automatically stop the heating and manufacture operation.

9.2 When ventilating system is associated with drying operations, utilizing a heating system, means shall be provided for pre-ventilation before heating system can be started.

10 PROCESSING TANKS/VATS

10.1 Processing tanks/vats shall not be less than 15 cm above the floor of the room where it is located to prevent water flowing into the tank/vat and over flowing contents during fire fighting.

10.1.1 Liquid level shall be maintained not less than 15 cm below top of tanks/vats to allow effective application of extinguishing agents in the event of fire.

10.2 Process tanks shall have metal covers arranged to close manually in the event of fire. Such covers should overlap the sides of the tank at least 25 mm and preferably have flange extending downward around the tank when it is closed.

10.3 Covers shall not be secured but loosely hung on hinges or guides.

10.4 Large heavy covers shall be provided with counter weights where necessary to prevent injury to workers.

10.5 All pipings shall be strongly erected and rigidly supported.

11 OVERFLOW PIPES

11.1 Tank or vat of 700 litres in capacity or about one square metre liquid surface area each, shall be

equipped with suitable overflow pipe leading to a safe location outside the building. The size of the overflow pipe shall be sufficient to drain at least 900 litres per minute of water expected to be applied to the liquid surface of the tank from automatic sprinkler, or from other sources in the event of fire.

11.1.1 In case of larger diameter tank or vat, overflow pipe shall be proportionately increased.

11.2 On large tanks/vats where more than one overflow pipes are provided, they can be joined to a single large pipe provided the aggregate cross-sectional area is equivalent.

12 BOTTOM DRAINS

12.1 Tanks over 2 200 litres liquid capacity shall be equipped with bottom drains which shall automatically or manually drain the entire content of the tank in the event of fire, unless the viscosity of the liquid at normal atmospheric temperature makes this impractical. Manual operated drain shall be located at a safe and accessible position. Where gravity flow is not practicable, automatic pumps shall be provided.

12.2 Such drains shall be piped or closed drains to discharge to a tank or vat or to a safe location outside the building.

13 ELECTRICAL INSTALLATIONS

13.1 All electrical installations shall be in accordance with IS 1646.

13.2 All wiring shall be carried out in heavy gauge screwed conduit. All lighting fittings and switches shall be of the enclosed type.

13.3 All electric motors and lighting fittings and switches shall be flame-proof and dust-proof in hazardous areas as defined in IS 5572 (Part 1).

13.4 Provision shall be made for remote control of the electrical circuits so that the current for lighting and power in the buildings and facilities can be switched off by switches outside the building at a distance of 1.25 m from the nearest doorway. Provision may also be made for switching off the whole factory by switches located at one or more central points, such as the office or watchman's cabin.

13.5 Use of properly earthed pumping system for the supply and removal of flammable liquids for the process shall be considered safe and use of portable containers avoided.

13.6 Electrical switches shall not be mounted on machines having excessive vibration.

13.7 In case of godown and other storage areas, the lighting cables shall be enclosed in screwed conduits and red pendants shall be erected for the lamps which shall be protected by well-glasses. Lighting shall be fixed at sufficient height (at least one metre) above the highest level of goods stored. A cutout shall be placed outside the godown or storage area in a convenient position.

14 ILLUMINATION

The factory shall be fully illuminated as indicated below:

Open compounds 20 lux;

Godowns 70 lux; and

Grinding, mixing, 200 lux milling, heating places.

15 STORAGE (OUTSIDE BUILDING)

15.1 Tank Storage

Tanks shall be of metal, gas-tight construction, equipped with venting facilities sufficient to provide for normal filling and emptying operations and also to relieve safely the internal pressure which may be caused by a fire around or outside the tank. Tanks shall be surrounded by bunds of sufficient height to retain the entire contents in case of rupture or leakage. Alternately, adequate drainage facility may be provided to carry the liquid to some area where it can burn without endangering adjacent buildings or other storage, subject to that no dykes are required around individual isolated tank or when no other tank or other property is exposed to the fire danger arising out of such tank.

15.2 Tanks shall be supported either by resting on the ground or on masonry supports. Wood or steel supports without fire-proofing shall not be permitted.

15.3 All openings to tanks except required vents shall be kept securely closed. The vents open to atmosphere shall be fitted with flame arrestors. Each tank shall be clearly marked regarding its capacity, flammability and nature of contents.

15.4 All tanks shall be suitably earthed to dissipate static charge.

15.5 The tank vents shall be provided with flame arrestors or pressure-vacuum vent.

15.6 The storage of liquid paint and varnish shall be made in accordance with Table 1.

16 STORAGE (INSIDE BUILDING)

16.1 The buildings shall be of non-combustible construction throughout.

16.2 There shall be no other combustible contents in the buildings or section used for storage.

Table 1 Outdoor Storage of Paint/Varnish with Flammable Liquid Base in Containers and Portable Tanks

(*Clause* 15.6)

Class	Containers Storage Maximum Per Pile		Portable Tanks Storage, Maximum		Distance Between Pile or Racks	Distance to Property Line that Can be Built Upon	Distance to a Street or a Public Way
	Litres	Height (M)	Litres	Height (M)	metres (*Min*)	metres (*Min*)	metres (*Min*)
A	18 000[1]	4	36 000	4	7	15	6
B	36 000	5	72 000	4	7	10	5
C	95 000	6	200 000	4	7	5	4

[1] Each lot should not excceed 4500 litres. Each lot of drums shall be separated from the adjoining lot in the same pile by 1.5 m wide aisles.

16.3 Tanks used for storage of products having a flash point below 65°C shall be vented to the outside of the building.

16.4 All buildings shall have adequate ventilation to prevent accumulation of flammable or toxic vapour or dust in case of leakage of containers. This aspect shall receive special attention in the case of liquids with flash point under 26°C and combustible dust producing substances.

17 DRUM STORAGE (OUTSIDE BUILDINGS)

17.1 Sites for drum storage shall be located at least 20 m from all buildings and other storage unless separated therefrom by solid masonry walls.

17.2 Storage shall be in small shipping containers to facilitate easy detection of leakage and to aid fire fighting and salvage operations.

17.3 Drums shall be stored in lots not exceeding 500 and separated from adjoining lots by a clear space of 7 m.

17.4 Drums shall be arranged in stacks of each not exceeding 4 500 litres capacity, each stack being separated by aisles of at least 1.5 m wide.

17.5 Drums shall be stored on their side to prevent infiltration of rain water and corrosion.

17.6 Drums shall be placed on suitable racks. Arranging in tiers shall be avoided as far as practicable and in no case shall be tiered more than 3 m high.

17.7 Any drums showing signs of leakage or corrosion or otherwise unserviceable shall be promptly removed from the storage area.

17.8 All combustibles and vegetation shall be removed from the vicinity of drums to a distance of at least 10 m.

17.9 All open storage areas shall be properly fenced and entry restricted. Smoking or naked lights shall not be permitted in and around the storage area.

18 MAINTENANCE AND HOUSEKEEPING

18.1 Combustible racks, trays or spacers, flammable deposits, drippings, dust or lint shall be regularly cleaned.

18.2 Oil or solvent impregnated rags or waste deposits shall be kept in closed metal waste cans. The contents of waste cans shall be properly disposed off at least once at the end of each shift.

19 PROCESS SAFETY PROVISIONS

19.1 General

19.2 Precautions shall be taken up to prevent the ignition of flammable vapours, source of ignition include open flames; lightening; smoking; cutting and welding; hot surface frictional heat; static, electrical and mechanical sparks; spontaneous ignition including heat producing chemical reactions and radiant heat, etc.

19.3 When the stirrer used for mixing paint and oil is cleaned of sticky materials, non-sparking or non-ferrous tools shall be used.

19.4 Heat generated by grinding shall be cooled. Roller mills may be cooled by circulating water inside rolls.

19.5 Temperature of paste shall not exceed the boiling point of the thinner.

19.6 Thinner shall be added to the varnish under a hood with mechanical exhaust to prevent flammable vapour causing hazard of fire or explosion from a spark.

19.7 A measured amount of thinner shall be introduced into the thinning tank and blanketted with carbon dioxide. The hot varnish shall be fed into the thinner by gravity.

19.8 Flammable solvents used, such as varnish, turpentine, thinner, or white spirit, shall not exceed their boiling point.

19.9 Solvent, flammable vapours, dust, fumes, shall not be permitted to accumulate in the work area. They shall be connected to an effective exhaust system to the atmosphere through stack.

19.10 Not more than 900 litres shall be processed at a time because of danger to foaming due to chemical reaction during boiling or forming of steam from water present in the original resin or oil.

19.11 If agitation is provided by mechanical agitators, a mixture of nitrogen and CO_2 shall be bubbled through the batch.

19.12 Air under pressure shall not be used to fill or to agitate oil/flammable liquids in tanks, unless the flash point of such oil or flammable liquids is over 93°C.

19.13 Combustible deposits shall not be allowed to accumulate in the ducts or ovens.

19.14 Dripping in ovens and on drain boards shall be collected by using metal trays. Trays shall be of removable type for cleaning purposes.

19.15 All paints and varnishes are capable of self heating specially when they are in close contact with cellulosic materials particularly fibres.

19.16 Temperature control at each stage of process should be monitored by fail safe method either by automatic or by manual system, and an excess temperature alarm system shall be provided to attract attention of the persons in the surroundings to automatic control the situation.

20 EQUIPMENT FACILITIES

20.1 Conical hoods over the kettles shall be provided with dampers. These dampers shall be so made to enable closing them manually easily and quickly in the event of a fire.

20.2 Oven shall be constantly watched during the process. An excess temperature alarm shall be provided to attract attention of persons to manually control the situation.

20.3 Safe operating temperature shall not be exceeded. An automatic control shall be provided to ensure against excessive temperature. Such a system shall be interlocked with a device to shut off the heating medium.

20.4 A separate excess-temperature-limit switch shall be provided when temperature rises 25-50°C above normal.

20.5 Where conveyor system is employed, it shall automatically cease motion in the event of a fire.

20.6 Periodical test schedules shall be drawn to test and inspect all processes and equipment facilities.

21 OPEN FLAMES

21.1 No open flames, naked lights, smoking electric or gas cutting and welding equipment shall be permitted within the building, or at tankage area. If such work is essential it shall be carried out after obtaining clearance from the officer-in-charge of the section concerned of the factory. During such operation all necessary precautions shall be taken and skeleton fire staff with first aid fire fighting appliances detailed for standby duties.

21.2 There shall be no open flame, spark producing devices, or heated surface having a temperature sufficient to ignite vapours in any vapour area.

21.3 Unless electric or muffled furnace is used, the flames under the kettle shall be shielded from the oven. Lighting of the fire shall be done from the opposite side of partition and from the back of the kettles.

21.4 Locomotives, cranes, road rollers, etc, using coal or wood as fuel shall not be permitted inside the factory. Diesel locomotives with spark arrestors may however be used, if necessary.

21.5 Aluminium and other metallic enamels when struck by a steel object produce sparks capable of igniting flammable vapours and the hazard is especially severe with nitro-cellulose based metallic enamels. Only non-ferrous tools shall be used in such cases.

NOTE — The use of non-ferous tools may also produce sparks and caution has to be exercised.

22 SIGNS

22.1 'No Smoking' sign written in large letters on a background of contrasting colours shall be conspicuously displayed in the vicinity of the processing, tank farm and storage area.

22.2 Signs designating the process zone as dangerous in regard to fire and accident shall be displayed.

23 PROTECTIVE EQUIPMENT

Personal protective equipment namely, breathing apparatus and fire suit shall be provided and maintained in good condition for all employees to protect them against inhalation, ingestion and contact of harmful substances.

24 EFFLUENT

Process effluent shall be collected and treated before disposal to comply with the requirements of local polluttion conrol authorities

25 FIRE PROTECTION ARRANGEMENTS

25.1 Paint and varnish factories present considerable fire risk in most of the processes and storage areas. To guard against these risks suitable fire prevention, first aid fire fighting and major fire fighting arrangements shall be provided.

25.2 The extent of the protection arrangements to be provided will depend on various factors like size of the factory, risk involved, availability of outside help for major fire fighting and so on. However, all factories irrespective of their size shall employ at least one whole time supervisory officer assisted by a minimum of two trained personnel to look after the day to day fire prevention and first aid fire fighting arrangements.

25.3 Adequate fire prevention measures in consultation with local fire authority shall be laid down for all fire risk areas and these measures checked at least once every month. Any irregularities observed shall be brought to the notice of the top management and remedial action taken immediately.

25.4 First aid fire appliances of appropriate type and size as specified in IS 2190 shall be provided in all parts of the factory. In addition minimum of 50 kg capacity foam compatible A, B, C dry powder trolley mounted extinguishers shall be provided to cover process and storage area where large quantities of flammable liquids are involved.

25.5 First aid fire appliances shall be properly maintained, checked, tested and refilled as specified in IS 2190 and proper records maintained.

25.6 All employees shall be periodically exposed yearly to basic rules of prevention measures and proper use, upkeep and maintenance of first aid fire appliances provided near their place of work. They shall be made fire conscious by repeated lectures, demonstrations, display of posters and other methods.

25.7 Clearly audible fire alarm shall be provided in all areas of the factory to alert the workers so that they can evacuate themselves and also engage in fire fighting operations immediately.

25.8 For high fire risk areas, specially those which remain unattended for considerable periods, a suitable automatic fire detection and alarm system directly connected to a central control room shall be provided. All other areas shall be periodically visited for fire watching. Suitable communication system from different areas to a central control room operatable both during working and non-working hours shall be provided.

25.9 All factories irrespective of their size and risk shall make suitable provision for water supplies for fire fighting. The requirement of water will vary according to the size and risk. However, generally the minimum requirement for a medium size factory of size about 1 000 sq. m. will be 1 800 l/min. The total provision of water always available shall be for 3 hours at the above rates. In case there is replenishment of water, the total provision of water may be reduced to 2 hours at the above rates. Storage tanks containing flammable liquids shall be protected by fixed foam or water spray or any other suitable fire suppression system.

25.10 Arrangements for water supplies for fire fighting shall be in form of fire hydrants and static water tanks. At least one half of the total requirements shall be in the form of static water tanks and these shall be located at a distance not exceeding 180 m from the buildings/risks to be protected.

25.11 Factories which are located at a distance exceeding 8 km from the nearest well equipped local fire brigade shall make their own arrangements for major fire fighting. The requirements of major fire appliances, water supplies for fire fighting, fire station buildings, fire fighting staff and their duty system shall be planned and worked out in consultation with the local fire authority.

25.12 Where main reliance for major fire fighting is placed on the assisting local fire brigades close liaison shall always be maintained and periodical fire practices held to ensure prompt attendance. Special requirements mentioned in **23.1** shall be checked and provided by the factory if these are not available with the assisting fire brigade.

25.13 Suitable arrangements shall be made for expeditious communication of fire messages between the factory and the assisting local fire brigades.

25.14 Notices in regional language, Hindi and English shall be displayed in prominent places of the factory indicating the action to be taken in case of an outbreak of fire.

25.15 An emergency fire fighting and rescue procedure shall be worked out, regularly practiced and periodically revised when necessary.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
1303 : 1983	Glossary of terms relating to paints (*second revision*)
1641 : 1988	Code of practice for fire safety of buildings (general): General principles of fire grading and classification (*first revision*)
1646 : 1982	Code of practice for fire safety of buildings (general): Electrical installations (*first revision*)
2190 : 1992	Selection, installation and maintenance of first-aid fire extinguishers — Code of practice (*second revision*)
3614 (Part 1) : 1966	Specification for fire check doors: Part 1 Plate metal covered and rolling type
5572 (Part 1) : 1994	Classification of hazardous areas (other than mines) having flammable gases and vapours for electrical installation (*second revision*)
8757 : 1999	Glossary of terms associated with fire safety

ANNEX B

(Foreword)

COMMITTEE COMPOSITION

Fire Safety Sectional Committee, CED 36

Chariman	*Representing*
SHRI J. N.VAKIL	Tariff Adivsory Committee, Ahmedabad
Members	
ASSISTANT SECURITY COMMISSIONER	Ministry of Railways, New Delhi
DIRECTOR (FIRE SAFETY)	Ministry of Defence, (CEESO), New Delhi
DY DIRECTOR (FIRE SAFETY) (*Alternate*)	
CHIEF FIRE OFFICER	Municipal Corporation of Mumbai (Mumbai Fire Brigade), Mumbai
CHIEF FIRE OFFICER	Bhabha Atomic Research Centre, Mumbai
SHRI R.N. CHACHRA	Metallurgical and Engineering Consultants (India) Ltd, Ranchi
SHRI SUNIL DAS (*Alternate*)	
SHRI S. K. DHERI	Delhi Fire Service, Government of Delhi, New Delhi
SHRI SURINDER KUMAR (*Alternate*)	
SHRI S. M. DESAI	In personal capacity (*B-4/5 A.G. Khan Road Municipal Officers Society, Worli, Mumbai*)
SHRI OM PRAKASH	Ministry of Home Affairs, New Delhi
SHRI D. K. SHAMI (*Alternate*)	
CHIEF ENGINEER (E-I)	Central Public Works Department, New Delhi
SHRI P. N. GHOSH	In personal capacity (*J-1916, Chittranjan Park, New Delhi-19*)
SHRI J. S. GAHLAUT	State Bank of India, Mumbai
SHRI S. C. GUPTA	Lloyd Insulation (India) Pvt Ltd, New Delhi
SHRI SANJEEV ANGRA (*Alternate*)	
SHRI M. M. KAPOOR	Engineers India Ltd, New Delhi
SHRI P. C. SINGHAL (*Alternate*)	
SHRI T. R. A. KRISHNAN	Tariff, Advisory Committee, Delhi/Ahmedabad
SHRI P. K. MAJUMDAR (*Alternate*)	
COL. KULDEEP SINGH	Controllerate of Quality Assurance, Pune
SHRI A. J. PAWAR (*Alternate*)	
SHRI A. R. KHAN	Bharat Heavy Electricals Ltd, Bhopal/Trichy
SHRI NATRAJAN (*Alternate*)	
SHRI G. B. MENON	In personal capacity (*16, Aniket Society Manjalpur, Vadodara*)
MEMBER	Hydro-Construction Central Electricity Monitoring Authority, New Delhi
MANAGING DIRECTOR	Loss Prevention Association of India Ltd, Mumbai
SHRI D. K. SARKAR (*Alternate*)	
SHRI V. B. NIKAM	In personal capacity (*4/34, Haji Ali Municipal Officers Cooperative Housing Society, Mumbai*)
SHRI P. N. PANCHAL	In personal capacity (*46, Block E-1, Pocket II, Sector 15, Rohini, Delhi*)
PRESIDENT	Institution of Fire Engineers (India), New Delhi
SHRI D. PADAMHABHA	Tata Consulting Engineers, Mumbai
SHRI B. S. VENKATESH (*Alternate*)	
SHRI V. M. RANALKAR	Ministry of Petroleum and Natural Gas, New Delhi
SHRI P. MADHUSUNDAVA RAO	Directorate General Factory Advice Service and Labour Insitute, Mumbai
SHRI D. R. KRISHNA (*Alternate*)	
DR. T. P. SHARMA	Central Building Reserach Institute, Roorkee
DR GOPAL KRISHNAN (*Alternate*)	
SHRI R. SUNDARAJAN	National Thermal Power Corporation Ltd, New Delhi
SHRI S. K. CHATTOPADHYAY (*Alternate*)	
SHRI S. K. SHANGARI	Engineer-in-Chief's Branch, New Delhi
LT-COL A. T. PARNAIK (*Alternate*)	
SHRI P. K. SUNKARIA	Department of Industrial Policy and Promotion, Ministry of Industry, New Delhi
SHRI K. C. MATHUR (*Alternate*)	
SHRI S. S. SETHI, Director (Civ Engg)	Directorate General, BIS (*Ex-officio Member*)
Member-Secretary	
SHRI S. CHATURVEDI	
Joint Director (Civ Engg), BIS	

Bureau of Indian Standards

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Review of Indian Standards

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This Indian Standard has been developed from Doc : No. CED 36 (5793).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Printed at : Prabhat Offset Press, New Delhi-2