IS 3079 : 1990
(Reaffirmed 1996)

भारतीय मानक

औद्योगिक इमारतों की अग्नि-सुरक्षा की रीति-संहिता : सूती वस्त्रादि मिलें

(पहला पुनरीक्षण)

Indian Standard

CODE OF PRACTICE FOR FIRE SAFETY OF INDUSTRIAL BUILDINGS: COTTON TEXTILE MILLS

(First Revision)

UDC 699·81:725·42:677·21·05

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

October 1990

Price Group 3

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.

Fire is fairly frequent in textile mills because textiles fibres are highly combustible. Processes preparatory to spinning have a particularly high fire frequency on account of the presence of fibres in loose form and probability of ignition by rapidly moving machinery. The main causes of fire in textile mills can be attributed to failure of electrical equipment, sparks from foreign matter in cotton stock, friction, faulty bearings, presence of excessive quantity of fly in the departments, use of flammable liquids and presence of high temperatures in the processing sections. This standard has therefore been formulated with a view to providing reliable and adequate guidance with regard to fire safety of cotton textile mills. This standard was first published in 1965. The revision has been prepared so as to keep in line with latest TAC rules besides updating other requirements.

Additional information for the fire prevention in textile mills reference may be made to 'Prevention Fires in Textile Industry' issued by the Loss Prevention Association of India Limited, Bombay.

Provisions of this code are supplimentary to the relevant Statutory requirements as laid down in Indian Factory Act, Petroleum Rules, Gas Cylinder Rules, etc.

Indian Standard

CODE OF PRACTICE FOR FIRE SAFETY OF INDUSTRIAL BUILDINGS: COTTON TEXTILE MILLS

(First Revision)

1 SCOPE

1.1 This standard covers the essential requirements for the fire safety of textile mills using cotton, cotton waste, regenerated cellulose, man made fibres or any grouping of these as raw materials.

2 REFERENCES

2.1 The Indian Standards given in Annex A are necessary adjuncts to this Standard.

3 TERMINOLOGY

3.0 For the purpose of this standard the definitions given in **3.1** to **3.7** in addition to those given in SP 45 : 1988 shall apply.

3.1 Cotton Textile Mills

Any of the following types of textile mills manufacturing and processing yarn and/or cloth from cotton or from a mixture of cotton and other natural or man-made fibres.

Spinning Mill

A separate unit manufacturing only yarn.

Weaving Mill

A separate unit manufacturing cloth from yarn obtained from outside.

Processing Mill

A separate unit (commonly termed as 'Dye and Bleach House') for processing of manufactured cloth (or yarn).

Spinning and Weaving Mill

A unit manufacturing yarn as well as cloth.

Weaving and Processing Mill

A unit manufacturing cloth from yarn obtained from outside and processing it before marketing.

Spinning, Weaving and Processing Mills

A composite unit manufacturing yarn, cloth and processed cloth.

3.2 Cotton Waste Textile Mill or Waste Plant

A unit manufacturing certain types of coarse fabrics from soft cotton (or cotton mixed with other natural or man-made fibres) wastes produced during carding and spinning processes.

3.3 Manufacturing

Physical operations and plant for manufacturing yarn and or cloth covering the processes commonly termed as carding, spinning, weaving, etc.

3.4 Processing

Physical and/or chemical operations for imparting finish to cloth (or yarn) covering the processes commonly termed as bleaching, singeing, mercerizing, dyeing, printing, raising, finishing, etc, and the bleaching and dyeing of cotton.

3.5 Working Blocks

Blocks where either manufacturing or processing is carried on.

3.6 Transformer Room

Building or enclosure housing power transformers.

3.7 Static Tank

A pucca lined reservoir containing water for fire fighting purposes.

4 LOCATION

4.1 Textile mills should be located preferably within 20 km of the nearest town's fire brigade. Access to the mills should be by way of well-paved roads at least 6 m in width.

4.2 When a textile mill is located near a railway line, the working blocks and storage areas 'of all combustible, flammable liquids the gases including packing and disposal materials' should be more than 30 m away from the railway line to eliminate the possibility of sparks from passing steam engines falling thereon.

5 COMPONENTS

5.1 The compound should be of sufficient area to house the manufacturing, processing, storage, and utility buildings at distance not less than those specified hereunder.

5.2 Paved or pucca roads not less than 6 m wide should be constructed all round and to different buildings within the compound to facilitate the passage of fire engines and particularly to give easy access to the static tank.

5.3 The main gate for entry or to exit from the mill's compound should be such that clear width of 6 m and head room of five metres is available. At least one additional gate of similar dimensions and at suitable locations should also be provided for use in the event of the main gate getting blocked during an emergency. Also turning circle of not less than 9 m shall be provided in front of the main gate for easy withdrawal of fire appliances.

6 BUILDING CONSTRUCTION

6.1 The constructional features of all the buildings within the compound should comply with the requirements of IS 1642 : 1988.

6.2 Buildings, housing spinning and processes preparatory thereto, raising and singeing should have fire resistance of not less than that of Type I specified in IS 1642 : 1988.

6.3 Buildings used as godowns should also be of Type I structure as specified in IS 1642 : 1988.

6.4 Buildings, housing weaving, process preparatory thereto but subsequent to spinning, folding and processing (except raising and singeing) should of at least Type II as specified in IS 1642 : 1988.

6.5 Utility buildings should be of Type II specified in IS 1642 : 1988.

6.6 Buildings housing manufacturing and processing sections should preferably be single storey structures; but if they are required to be more than single storeyed should be in any case not more than 15 m measured from the average surrounding ground level to the highest point of the roof. Wooden flooring should be prohibited except where laid on a concrete or masonry floor without any intervening space. For such multistoried structures, adequate means of escape from upper floors shall be provided in conforming to IS 1644 : 1988.

6.7 Godowns should be essentially single storey structures.

6.8 As smoke logging, which is a common feature with cotton fires, considerably hampers fire fighting operations, adequate venting arrangements shall be provided for the working and storage blocks. Such venting arrangements shall comply with the requirements of IS 1642 : 1988.

6.9 The plinth area of each building (or the plinth area of each compartment where a building is divided into compartments by separating walls) and departments preparatory thereto should not exeed 2 500 m^2. The spinning department should be divided into two or more smaller compartments by separating walls.

7 SEPARATING WALLS

7.1 Separating walls should be constructed in order to segregate the following sections of the mill from one another:

a) Cotton storage area;
b) Rooms housing willowing, waste opening and thread extracting operation;
c) Mixing and blow rooms;
d) Card room;
e) Combing, drawing and fly frames and spinning rooms;
f) Doubling, reeling, bundling, conditioning, winding, wraping, sizing, weaving and/or other processes subsequent to spinning but excluding the processes referred hereafter;
g) Bleaching, mercerizing, dyeing, finishing, printing, cloth examining, folding, baling and storage preparatory to baling;
h) Raising department;
i) Singeing department;
j) Gas generating room; and
k) Waste plant using waste exclusively from the mill to which it is attached.

7.2 Separating walls should also be provided between the following godowns:

a) Cotton (in fully pressed bales) godown;
b) Loose cotton or clean waste godown;
c) Oily waste godown;
d) Oil godown (shall not be a part of any building but always as isolated building);
e) Stores for non-hazardous goods; and
f) Stores for hazardous good (including, colours and chemicals other than those specified in **9.4**).

7.3 Separating walls should also be provided between the following sections:

a) Fire pump house,
b) Boiler house,
c) Transformer house, and
d) Electric generating station.

7.3.1 Fire pump house shall be preferably in isolated building at least 6 m away from any work shed/storage building and over-head water tank to avoid any damage to this building either due to spread of fire or due to falling debris from adjoining tall structures/overhead tanks. However, the fire pump house can form part of a masonry building provided it is separated from such building by a complete party wall as per IS 1642 : 1988.

7.3.2 The location of the boiler house and its construction shall conform to relevant statutory regulations.

7.3.3 If the transformer house and substation are within the same building, that is, in case of indoor transformers there shall be a 4 hour rating wall as per IS 1642 : 1988, between the transformer rooms and the substation. Any door in between shall also be a fire check door of at least 2 hours' resistance. Such door shall be of top-hung sliding type with automatic closing device through a fusible element and shall cover the opening fully with at least 150 mm overlap on both sides of opening and top. If the access to the substation is from side opposite to the transformers, no such door is required. Additional requirements as laid down under IS 1642 : 1988 are to be followed.

8 DISTANCES

8.1 A minimum distance of 30 m should be maintained between cotton (in fully pressed bales or otherwise) godowns or cotton waste (oily or clean) godowns and the manufacturing and processing sections of the mills.

8.2 A minimum distance of 15 m should be maintained between other godowns and manufacturing and processing sections except that such distance may be reduced to 6 m in case of engineering and hardware stores.

8.3 Waste plant should be spaced not less than 15 m from the mills' working and storage blocks unless separated therefrom by separating wall.

8.4 Godowns for storage of extra hazardous chemicals should be located at a minimum distance of 15 m from all surrounding structures.

8.5 Fire pump house, boiler house, transformer house and electric generating station should be spaced not less than 15 m from the manufacturing processing and storage sections.

9 MACHINERY

9.1 The speed of horizontal and vertical openers should under no circumstances exceed as designed.

9.2 Cotton should not be fed directly into a vertical opener but should be first broken in a bale breaker or blender.

9.3 The amount of cotton handled per opener line should not exceed that specified by the manufacturers and under normal circumstances should be limited to 500 kg/h.

9.4 Magnetic separators which may be either electro magnets or permanent magnet units should be provided in the bale break and blow room lines.

9.5 A clear distance of at least 2 m should be provided between any two blow room lines.

9.6 The cards front and back alleys should be of 1·5 m clear width. After every four cards a side alley of 1 m clear width shall be provided. A clear space of 1·5 m should also be kept between the cards and department walls.

9.7 It is advisable to install continuous stripping arrangement on cards so as to minimize the frequency of hand stripping operation which produces a large amount of cotton fly and dust.

9.8 The spacing of fly frames and ring frames should be such as to provide a clear distance of at least 2 m between the rows of frames (that is, between the ends of any two frames) and also between the frames and the walls. The working space between two frames should be not less than 750 mm and after every sixteen frames an alley of 2 m width shall be provided.

9.9 The spacing of other machinery should be as given in the provisions of the Factories Act, 1948 and the rules and regulations made thereunder.

9.10 Broken end collection systems of the pneumafil or equivalent type should be provided on ring frames.

9.11 Dust extraction systems make possible better cleanliness and greatly improve housekeeping. Hence blow lines, barber colman spoolers, raising, shearing and cropping machines should be provided with such systems.

9.12 Cotton yarn drying chambers should be constructed in incombustible materials and should be fitted with thermostatic controls in order to cut off the supply at predetermined temperature.

10 ELECTRICAL INSTALLATION

10.1 The electrical installation should be in accordance with IS 1646 : 1982.

10.2 All motors should be of the totally enclosed type.

10.3 All equipment should be of metal clad construction throughout, dust tight and of adequate capacity.

10.4 Fitting for lamps in places where considerable dust of fluff is present, such as willowing, lap breaking, waste opening, mixing, blow and raising rooms or in wet area should be of dust-tight type.

10.5 In case of godowns and other storage areas the lighting fittings should be industrial dust-proof type Fittings for lamps should be fixed at sufficient height above the highest level of goods stored. A cutout should be placed outside the godown or storage area in a convenient position.

In case of tube lights with/without plastic diffusers, wire netting shall be placed at both ends of the tube light immediately below the chokes, so that burning chokes may not fall down to start a fire involving cotton fluffs/loose cotton, etc.

10.6 Machines having excessive vibration should not have the electrical and switchgear mounted thereon.

10.7 All electrical equipment in gas singeing rooms should be of the flame proof type.

10.8 In case of machines for singeing of yarn by electricity, interlocking arrangement to ensure that heating elements cannot be switched on while yarn is stationary in machines should be provided.

10.9 Similarly for infrared or similar heating devices inter-locking arrangements should be provided to ensure that the heating elements cannot be switched on while the machine is stationary but separate arrangement may be made for preheating at the start of the day.

NOTE — Electrical circuits for devices should be taken from a separate distribution board and the wiring to these devices should of a permanent nature.

10.10 Drawing frame transformers should comply with IS 1646 : 1982.

10.11 Stop-motion devices on frames should be totally dustlight.

10.12 The cooling air for variable speed motors of the ring frames should not be taken from inside the department but from the outside of the building.

10.13 Maintenance of Equipment

10.13.1 All motors should be completely overhauled every 2 years.

10.13.2 Line shaft bearing should be checked and overhauled every year.

10.13.3 All switchgear contact should be thoroughly checked every six months.

10.13.4 The electric wiring should be regularly inspected.

10.13.5 Heavy cables shall be protected in accordance with the provisions of IS 12459 : 1988.

11 FIRE FIGHTING ARRANGEMENTS

11.1 The first aid fire fighting arrangemets should be in accordance with IS 2190 : 1979. The internal and external hydrant should be accordingly to IS 3844 : 1989 and IS 9668 : 1980.

11.2 It is desirable to have as much area possible protected by automatic sprinklers. In any case, sprinklers should be installed in bale breakers, hopper feeders, blenders and similar machines having spiked lattices or rollers, in blow room cellers, cotton godowns and dust collectors. Automatic high velocity water spray system should be provided for transformers and oil godowns with aggregate oil capacity exceeding 2 000 litres.

11.3 While in rest of areas single headed hydrant and landing valve conforming to IS 908 : 1975 and IS 5290 : 1983 shall be provided double headed hydrants should be provided near blow and mixing rooms, singeing and raising rooms and godowns for storage of cotton or cloth bales, oil or other hazardous goods.

11.4 Fire fighting operations in textile mills assume a peculiar importance because of presence of dense smoke, the naturally high temperature of the room, slippery floor surfaces, inadequate accessibility between machines; all of which create a need for specialized knowledge and training. For these a trained fire fighting squad should be maintained round the clock within the mill premises. Within the mill premises and regular practice drills be conducted with mills fire fighting system.

11.5 On account of the excessive noise set up by the machinery in the fly frames and weaving compartments, clearly audible fire alarms and warning lights visible throughout the compartments are essential.

11.6 The procedure to be followed by the operators working in the plant and those comprising the fire fighting squad in the event of a fire should be strictly laid down and observed.

12 ILLUMINATION

12.1 For effective fire fighting purpose the minimum illumination required for the various sections of the mills is indicated below:

	Lux
Working blocks	150
Godowns	50
Open compound	20

12.2 Emergency lighting system should be provided.

13 GENERAL SAFETY PROVISIONS

13.1 Compounds

13.1.1 All roads within the compound should be kept clear and in good motorable condition. Further, a clear head room in each room if at least 6 m should be available on the roads for passage of fire engines.

13.1.2 Stacking of materials in the open should be 15 m clear from all process blocks and godowns.

13.1.3 All internal and external fire fighting equipment/hydrants, hose boxes, etc, should be kept easily accessible at all times.

13.1.4 Car and truck parking should be confined to parking lots only.

13.1.5 Steam locomotives without spark arrestors should be prohibited within the compound.

13.2 Godowns

13.2.1 Storage of materials/chemicals, etc, in godowns should comply with the provisions of relevant Indian Standards/Safety Codes/Statutory Rules, etc, as applicable. Where no such standard or code is laid down (in case of new chemicals) manufacturer's instructions/safety guidelines shall be followed.

13.2.2 The floor levels of the godowns should be at least 750 mm above the surrounding ground level and the floor shall be made sloping towards the door sills, a slope of 1 in 100 being considered adequate.

13.2.3 The maximum height of storage of cotton *BORAS* or cotton or cloth bales should not exceed six meters or up to a level which is one metre below the roof, whichever is less.

13.2.4 Cotton or cloth bales should preferably be stacked or wooden sleepers instead of directly on the floor, and in no case should combustible dunnage, such as rice husk, be used in the godowns.

13.2.5 Passageways should be provided between stacks of bales or goods. These passageways shall be not less than two metres wide and not more than ten metres apart. The passages should be always kept clear of bales by night fall.

13.2.6 A minimum clear distance of one meter should be maintained between stacks of fully pressed bales and the godowns walls.

13.2.7 The roofs of cotton godowns should be made thoroughly watertight to prevent leakage of rain water.

13.3 Working Blocks

13.3.1 Smoking should be prohibited. However, where so desired, smoking may be permitted in a specified area, provided such areas are separately enclosed and made dust proof. Smoking should be prohibited in locker rooms.

13.3.2 Loose rivets and short ends of bale iron of each bale should be carefully collected and accounted for before the next bale is opened as otherwise they are likely to find their way into the blow lines.

13.3.3 Bales should not be opened in a cotton godown.

13.3.4 Cotton bales storage in mixing and blow room should be restricted to the requirement of one shift only and the bales shall be stored at a distance of not less than three meters from the blow lines.

13.3.5 A minimum distance of six metres should be maintained between the drying chamber and cotton storage. In case of yarn drying this distance may be reduced to three metres.

13.3.6 No cotton drying should be permitted on roofs of working or storage blocks or within 15 m thereof. Drying of cotton should also be prohibited inside boiler house.

13.3.7 Sliver waste obtained from cards, combers, drawing frames and slubbers should be opened before reuse.

13.3.8 Separate space should be provided for storage of laps in carding department.

13.3.9 Dust collectors of the blow lines, barber colman spooler, raising, shearing and cropping machines should be cleaned after every shift.

13.3.10 Blow room cellars and all roof and structural members of manufacturing buildings be cleaned at least twice in a month.

13.3.11 In order to minimize fluff accumulation it is advisable to install dust extraction system in departments housing spinning and processes preparatory to spinning.

13.3.12 Magnetic separator units should be cleaned after each shift.

13.3.13 Loose cotton from under and around machinery should be cleaned constantly and stored in self-closing waste bins provided near machinery which should be periodically cleaned preferably by vacuum cleaned.

13.3.14 All light fittings and structural members should be cleaned of fluff once in a fortnight.

13.3.15 Use of polythene canopies over the machines and jute/hessian/curtains on window/door and north lights should be prohibited.

13.3.16 In order to keep machinery in good condition, a definite cleaning and maintenance schedule should be set up and observed.

13.3.17 All fire check doors should be kept closed during non-working hours and should be cleaned and oiled regularly.

13.3.18 When lubricating machinery parts and bearings, care should be taken to see that the bearings or the parts being lubricated are not usually hot.

13.3.19 Lubricating oil in excess of daily requirements should not be stored in working places.

13.3.20 Storage of colours and chemicals in the processing house should be restricted to a day's supply only.

13.3.21 The use of welding sets and blow lamps inside working or storage blocks should be carried out in the presence of the fire or safety officer after all precautions are taken.

13.3.22 Care should be taken to see that hessian canopies which are normally tied at the time of painting or repairs of the roofs of the working blocks, do not come within 500 mm of a bearing or line shaft.

13.3.23 Materials handling appliances should be of battery operated type.

13.3.24 Fire safety requirements and orders should be prominently displayed at conspicuous places in the factory.

ANNEX A

(*Clause* 2.1)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
908 : 1975	Fire hydrant, stand post type (*second revision*)
1642 : 1988	Code of practice for fire safety of buildings (general): Details of construction (*first revision*)
1644 : 1988	Code of practice for fire safety of buildings (general): Exit requirements and personal hazard (*first revision*)
1646 : 1982	Code of practice for fire safety of buildings (general): Electrical installations (*first revision*)
2190 : 1979	Code of practice for selection, installation and maintenance of portable first-aid fire extinguisher (*second revision*)
3844 : 1966	Code of practice for installation and maintenance of internal hydrants and hose-reel on premises (*first revision*)
5290 : 1983	Landing valves (*second revision*)
9668 : 1980	Code of practice for provision and maintenance of water supplies and fire fighting
12459 : 1988	Code of practice for fire potection in cable runs
SP 45 : 1988	Handbook on Glossary of textile terms

Standard Mark

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Revision of Indian Standards

Indian Standards are reviewed periodically and revised, when necessary and amendments, if any, are issued from time to time. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition. Comments on this Indian Standard may be sent to BIS giving the following reference:

Doc : CED 36 (4506)

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters :

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 331 01 31, 331 13 75

Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices :	Telephone
Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	331 01 31 331 13 75
Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola CALCUTTA 700054	37 86 62
Northern : SCO 445–446, Sector 35–C, CHANDIGARH 160036	2 18 43
Southern : C. I. T. Campus, IV Cross Road, MADRAS 600113	41 29 16
Western : Manakalaya, E9 MIDC, Marol, Andheri (East) BOMBAY 400093	6 32 92 95

Branches : AHMADABAD. BANGALORE. BHOPAL. BHUBANESWAR. COIMBATORE. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. PATNA. THIRUVANANTHAPURAM.

Printed at New India Printing Press, Khurja, India