

# NATIONAL BUILDING CODE OF INDIA

## PART 4 FIRE AND LIFE SAFETY

### 1 SCOPE

1.1 This Code (Part 4) covers the requirements for fire prevention, life safety in relation to fire and fire protection of buildings. This Code (Part 4) specifies occupancy-wise classification, constitutional aspects, egress requirements and protection features that are necessary to minimize danger to life and property from fire.

#### 1.2 The provisions of this Part are applicable to,

A. all high rise buildings;

B special buildings, those are,

1. hotel, educational, institutional, business, mercantile, industrial, storage, hazardous and mixed occupancies, where any of these buildings have floor area more than 500 m<sup>2</sup> on any one or more floors;
2. Educational buildings having height 9 m and above;
3. Institutional buildings having height 9 m and above;
4. All assembly buildings;
5. Buildings, having area more than 300 m<sup>2</sup> of incidental assembly occupancy on any floor; and
6. Buildings with two basements or more, or with one basement of area more than 500 m<sup>2</sup>

Unless otherwise mentioned specifically in the provisions.

### 2 TERMINOLOGIES

**2.7 Combustible Material**-A material which either burns itself or adds heat to a fire, when tested for non-combustibility in accordance with accepted standard [4(1)].

**2.16 Exit** - That unobstructed component of means of egress which is between the exit access and the exit discharge or public way. Exit components include exterior exit doors at the level of exit discharge, interior exit stairways, exit passageways, exterior exit stairways and exterior exit ramps (see Fig. 1).

**2.17 Exit Access** - That portion of a means of egress that leads to an exit (for example,

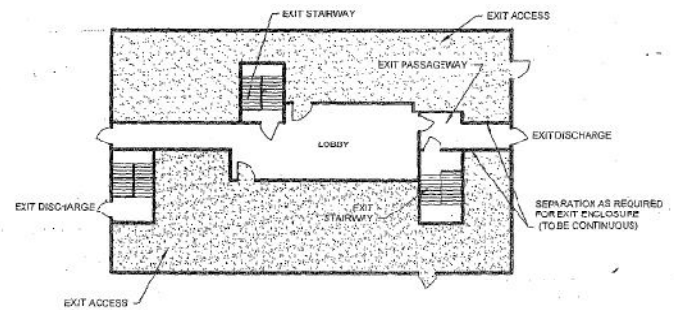


FIG. 1 COMPONENTS OF MEANS OF EGRESS

doorways, staircases, lobby, ramps, Veranda, corridor or passageway leading to an exit) (see Fig. 1).

#### 2.22 Fire Door and Fire Door Assembly-

Any combination of fire door, frame, hardware and other accessories that together provide a specific fire resistance rating to the opening in terms of its stability, integrity and insulation properties, when installed in the openings in fire separation walls. Fire door is a component of fire door assembly.

#### NOTES

1 Wherever reference has been made to fire door or fire check door in this Part, the same shall be construed as fire door assembly.

2 Fire doors in exits shall have fire rating as required in this Part to meet the requirement of integrity and stability; and the insulation criteria shall be 20 min.

3 Fire doors in exits shall be provided with intumescent seal.

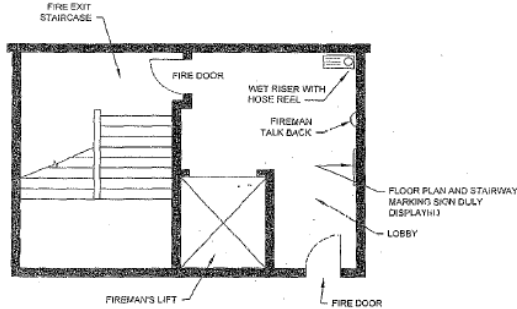
4 Fire doors in exits shall not be allowed to be on hold open position and kept closed and to close by 'door closure - spring mechanism'.

5 Fire curtains shall not be allowed as fire exits. If so provided for compartmentation, independent fire door shall be provided meeting the requirement for fire door in exits as above (of the width as required) within the prescribed travel distance requirement.

6. Where such lobbies and staircase in the firefighting shaft are naturally ventilated/cross-ventilated, the shaft may not be enclosed and fire door need not be provided

**2.23 Fire Exit-** A way out leading from exit access with or without panic bar provided on the door.

**2.24 Firefighting Shaft (Fire Tower) -** An enclosed shaft having protected area of 120 min fire resistance comprising protected lobby, staircase and fireman's lift, connected directly to exit discharge or through exit passageway with 120 min fire resistant wall at the level of exit discharge to exit discharge. The firefighting shaft



( )AYOUT TO BE PLANNED AS PER PROJECT BASIS MEETING ALL THE REQUIRED DETAILS)

**NOTES:**

- 1 Where such lobbies and staircase in the firefighting shaft are naturally ventilated/cross-ventilated, the shaft may not be enclosed and fire door need not be provided
- 2 For all enclosed firefighting shaft, the shaft's lobby should have floor plan duly displayed for the information of fire fighters.

FIG. 2 TYPICAL FIRE FIGHTING SHAFT

shall be equipped with 120 min fire doors. (see Fig. 2 for a typical firefighting shaft)

**2.28 Fire Resistance -** Fire resistance is a property of an element of building construction and is the measure of its ability to satisfy for a stated period, some or all of the following criteria:

- a) Load bearing capacity (**Stability**) (**R**) - The ability of a load bearing element to withstand fire exposure without any loss of structural stability.
- b) **Integrity** (**E**) - Resistance to penetration of flame and 'hot' gases.

**2.30 Fire Resistant Wall-** Fire resistance rated wall, having opening(s) with specified fire resistant rating, which restricts the spread of fire from one part of a building to another part of the same building.

**2.37 Fire Exit Hardware -** A door-latching assembly incorporating an actuating member or panic bar that releases the latch bolt upon the application of a force in the direction of egress travel, provided on exits.

**2.38 High Rise Building -** A building 15m or above in height (irrespective of its occupancy).

**2.39 Horizontal Exit-** A horizontal exit shall be through a fire door of 120 min rating in a fire

resistant wall. Horizontal exit require separation with the refuge area or adjoining compartment through 120 min fire barrier.

**2.43 Metro Station**

**2.43.1 Concourse -** Intermediate level(s) or area(s) connecting a station platform(s) to a public way through stairs, escalators or corridors.

**2.43.2 Crush Train Load -** The number of passengers inside a train when it is filled to maximum capacity permissible by rolling stock design.

**2.43.3 Entraining Load -** The number of passengers boarding a train at a platform.

**2.43.4 Headway -** The interval of time between the arrivals of consecutive trains at a platform in a station.

**2.43.5 Mass Rapid Transit -** Any station building or part thereof, permanent or temporary, through which people transit for the duration of time required' to enter the building and board the train to depart the station platform or to alight from the train and depart from the station building.

**2.43.6 Non-transit Occupancy-** Occupancy not under the control of the system operating authority.

**2.43.7 Point of Safety-** One of the following:

- (a) An enclosed exit that leads to a public way or safe location outside the station, train way, or vehicle,
- (b) An at grade point beyond the vehicle, enclosing stations, or train way,
- (c) A point on open track beyond the open or enclosed station or enclosed train-way, and
- (d) Any other location approved by the Authorities concerned.

**2.43.8 Station -** A place designated for the purpose of loading and unloading passengers, including service area and ancillary spaces associated with the same structure.

- ✓ 2.43.8.1 Composite station
- ✓ 2.43.8.2 Enclosed station
- ✓ 2.43.8.3 Open station
- ✓ 2.43.9 Station Platform

**2.51 Public Way -** A Street, alley, or other similar parcel of land essentially open to the outside air, dedicated, or otherwise permanently appropriated to the public for public Use and having a clear **width and height of not less than 3 m.**

**3.1 Classification of Buildings Based upon Occupancy**

All buildings, whether existing or hereafter erected shall be classified according to use or the character of occupancy in one of the following groups:

- Group A Residential
- Group B Educational
- Group C Institutional
- Group D Assembly
- Group E Business
- Group F Mercantile
- Group G Industrial
- Group H Storage
- Group J Hazardous

| Group   | Type                    | Locations   |
|---------|-------------------------|---|
| Group A | Residential Buildings   | Lodging and rooming houses, One or two family private dwellings, Dormitories, Apartment houses Hotels, Starred hotels   |
| Group B | Educational Buildings   | Schools up to senior secondary level, All others/training institutions  |
| Group C | Institutional Buildings | Hospitals and sanatoria, Custodial institutions, Penal and mental institution   |
| Group D | Assembly Buildings      | theatrical or motion picture or any other stage and fixed seats for over 1000 persons & Upto 1000 persons, Buildings without a permanent stage having accommodation for less than 300 or more than 300 persons, temporary structures designed for assembly of people, Buildings having mixed occupancies of assembly and mercantile (for example, shopping malls providing facilities such as shopping, cinema theatres, multiplexes and restaurants/food courts), Underground and elevated mass rapid transit system |
| Group E | Business Buildings      | Offices, banks, professional establishments, like offices of architects, engineers, doctors, lawyers, post offices and police stations, Laboratories, outpatient clinics, research establishments, libraries and test houses, Electronic data processing centers) computer installations, information technology parks and call centers, Telephone exchanges, Broadcasting stations, T.V. stations and air traffic control towers   |
| Group F | Mercantile Buildings    | Shops, stores, departmental stores, markets (any with covered area up to 500 m-), Shops, stores, departmental stores, markets (any with covered area more than 500 m-), Underground shopping centers  |
| Group G | Industrial Buildings    | Buildings used for low hazard industries, moderate hazard industries, high hazard industries.   |
| Group H | Storage Buildings       | warehouses, coldstorages, freight depots, transit sheds, storehouses, truck and marine terminals, garages, hangars, grain elevators, barns and stables.   |

|         |                     |   |
|---------|---------------------|---|
| Group J | Hazardous Buildings | storage, under pressure of more than 0.1 N/mm' and in quantities exceeding 70 111" of acetylene, hydrogen, illuminating and natural gases, ammonia, chlorine, phosgene, Sulphur dioxide, carbon dioxide, methyl oxide and all gases subject to explosion, fume or toxic hazard, cryogenic gases, etc.; storage and handling of hazardous and highlyflammable liquids, liquefiable gases like LPG, rocket propellants, etc.; explosive materials (other than liquids); manufacture of artificial flowers, synthetic leather, ammunition, explosives and fireworks. |
|---------|---------------------|---|

### 3.4.5 Openings in Fire Resistant Walls and Floors

**3.4.5.2** For Types I to 3 constructions, a doorway or. Opening in a fire resistant wall on any floor shall be limited to 5.6 m2 in area with a maximum height/width. 01'2.75 m. Every wall opening shall be protected with fire-resisting doors, having the fire rating of not less than 120 min.

#### 3.4.5.4 Service ducts and shafts

The inspection door for electrical shafts/duets shall be not less than 120 min.

For plumbing shafts in the core of the building, with shaft door opening inside the building, the shafts shall have inspection doors having fire resistance rating not less than 30 min.

#### 3.4.6.3 Substation/Transformers

The MV panel room shall be provided with fire resistant walls and doors of fire resistance of not less than 120 min.

### 3.4.12 Fire Command Centre (FCC)

Fire command center shall be constructed with 120 min rating walls with a fire door.

## 4.2 General Exit Requirements

4.2.7 For non-naturally ventilated areas, fire doors with 120 min fire resistance rating shall be provided and particularly at the entrance to lift lobby and stair well where a 'funnel or flue effect' may be created, inducing an upward spread of fire, to prevent spread of fire and smoke.

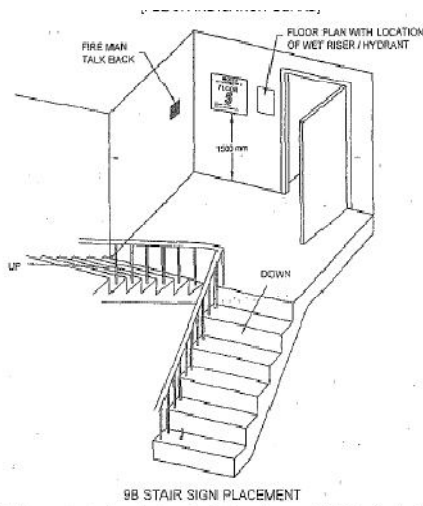
#### 4.4.2.4.3 Staircases

##### 4.4.2.4.3.2 Internal staircases

h) The design of staircase shall also take into account the following:

2) Access to exit staircase shall be through a fire door of 11 minimum 120 min fire resistance rating.

9) The floor indication board, indicating the location/designated number of staircase, respective floor number and direction to exit discharge shall be placed inside the staircase, on the wall nearest to the fire door. It shall have size not less than 300 mm x 200 mm (see Fig. 9).



NOTE — Block/Wing/Building name are to be project specific. Staircase shown as '3' is intending to show the number assigned to the staircase. All exits preferably to be assigned with number/identification enabling occupants/fire man to declare location/position.

FIG. 9 SIGN MARKING AND REQUIREMENT IN EXIT

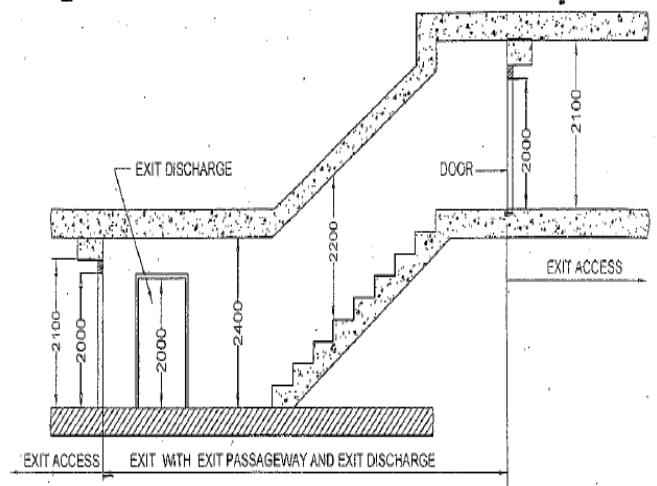


FIG. 5 MINIMUM HEAD ROOM MEASUREMENT

#### 4.4:2.4.1 Doorways

- b) No exit doorway shall be less than 1000 mm in width except assembly buildings, where door width shall be not less than 2000 mm (see Fig. 8). Doorways shall be not less than 2000mm in height.
- c) Exit doorways shall be operable from the side which they serve, without the use of a key.
- f) All fire rated doors and assembly shall be provided with certificate and labels prominently indicating the manufacturer's identification, door details covering door type, serial/batch number, month and year of manufacture, fire resistance rating, etc. The doors and assembly shall be certified with all prescribed hardware such as hinges, locks, panic bars, door closer, and door viewers.

### 4.6 Smoke Control

#### 4.6.1 Smoke Exhaust and Pressurization of Areas above Ground

Exit access corridors of guest rooms and indoor patient department/areas having patients lacking self-preservation and for sleeping accommodations such as apartments, custodial, penal and mental institutions, etc., shall be provided with 60 min fire resistant wall and 20 min self-closing fire doors.

#### 5.1.2.2 Firefighting pump house

The requirements shall be as given below:

- c) Pump house shall be separated by fire walls all around and doors shall be protected by fire doors (120 min rating).

4.2.11 unless otherwise specified, all the exits and exit passageways to exit discharge shall have a clear ceiling height of at least 2.4 m. However, the height of exit door shall be at least 2.0 m (see Fig. 5).



FIG. 8 MINIMUM CLEAR DOOR WIDTH

### 6.1.2 Additional Precautions

Stores, engineering workshop, areas of high hazard, etc. used for storage of substantial amount of flammable liquids shall be of 120 min fire resistance rating wall. Such areas shall be provided with fire doors,

#### 6.1.1.4 Subdivision A-5

- a) Panic bars shall be provided in the fire exits. Panic bars shall be located at a height between 865 mm and 1220 mm from the floor level.

### 6.1.2 Additional Precautions

- d) Stores, engineering workshop, areas of high hazard, etc. used for storage of substantial amount of flammable liquids shall be of 120 min fire resistance rating wall. Such areas shall be provided with fire doors, to be kept closed and shall be posted with a sign of each side 0"1' the door in 25 mm high block letters stating - 'FIRE DOOR --KEEP CLOSED'.

### 6.2.2 Life Safety

- a) Every room with a capacity of over 45 persons in area shall have at least two doorways. Exit doors shall be operated by panic bars except that doors leading from classrooms directly to the outside may be equipped with the same type of lock as is used on classroom doors leading to corridor, with no provision whatsoever for locking against egress from the classroom.

### 6.3.2 Life Safety

All compartments shall be divided with self-closing (door closers) fire doors with electromagnetic hold open. A coordinator shall be provided to sequence the closing of double leaf in case of emergency.

- d) Doors in fire resistant walls shall be so installed that these may normally be kept in open position, but will close automatically. Corridor door openings shall be not less than 2.0 m in width of double swing double leaf type door. A coordinator shall be provided as above, for closing of double leaf in case of emergency.

- g) For hospitals (Subdivision C-1), the following shall also

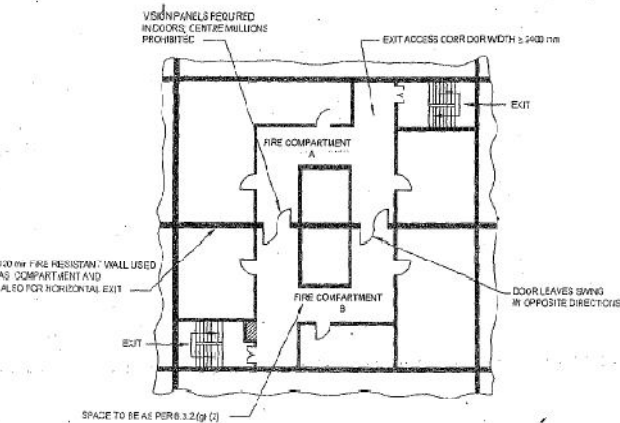


FIG. 14 PART PLAN INDICATING CONCEPT OF HORIZONTAL EXIT IN HOSPITAL

be complied with:

- 9) Minimum width of door of single or double occupancy patient room shall be 1.25 m while for the wards for 3 to 5 patient beds shall be 1.50 m, to permit movement of patients. The minimum width of

door for wards for more than 5 patient beds and for areas necessarily requiring patient evacuation on bed (such as ICU, recovery units, delivery rooms, etc.), shall have door width of 2.0 m. The width of 2.0 m may be reduced to minimum of 1.5 m where two such doors are provided in such areas.

- 12) Exit access corridors from a compartment to another compartment shall be divided at the compartment intersection by a fire door of 120 min fire rating in the fire compartment wall.

## 6.2 Industrial Buildings (Group G)

- g) Doors and window openings in external walls within 3 m of the fire separating walls shall be protected by fire doors having a rating of at least 60 min and window openings may be protected by fire resistant glass assembly having same fire rating.
- m) Moderate and high hazard areas in industrial to have two fire doors each having 180 min fire resistance rating.

## 6.7 Industrial Buildings (Group G)

### 6.7.1 Fire Prevention

#### 6.7.1.1 Fire separating walls, fire separating floors and fire partitions

- g) Doors and window openings in external walls within 3 m of the fire separating walls shall be protected by fire doors having a rating of at least 60 min and window openings may be protected by fire resistant glass assembly having same fire rating.

## ANNEXE (Clauses 5. 1.4 and 6)

### ADDUCTIONAL REQUIREMENTS FOR HIGH RISE BUILDINGS

#### E-4 HORIZONTAL EXITS/REFUGE AREA

A horizontal exit shall be through a fire door of 120 min rating in a fire resistant wall.

#### Requirements of horizontal exits are as under:

- Doors in horizontal exits shall be openable at all times from both sides.
- All doors shall swing in the direction of exit travel. For horizontal exits, if a double leaf door is used, the right hand door leaf shall swing in the direction of exit travel

#### G-3 FIRE SEPARATION REQUIREMENTS

- Food serving areas shall be fire separated from the kitchens/cooking areas by fire rated elements having a resistance of at least 60 min. Doors shall have fire resistance of 60 min rating and fitted with automatic self-closing device.

## **J-6.5 Fire Doors**

Fire doors shall comply with the following requirements:

- a) Fire doors shall be constructed of noncombustible material having appropriate fire resistance, and two fire doors may be fitted in an opening if each door by itself is capable of closing the opening and the two doors together achieve the required level of fire resistance.
- b) All fire doors shall be fitted with an automatic self-closing device, of same fire rating as of the door, which is capable of closing the door from any angle and against any latch fitted to the door.
- c) Any fire door fitted within an opening which is provided as a means of escape shall be capable of being opened manually, not be held open by any means other than by an electromagnetic or electro-mechanical device which can be activated by the presence of smoke and/or the fire alarm system, provided that this shall not apply in the case of fire doors opening into pressurized exit staircases.

## **K-4 EMERGENCY EGRESS**

### **K-4.1 Location of Egress Routes**

K-4.1.5 where cross passageways are utilized in-lieu of emergency exit stairways, the following requirements shall apply:

- d) Cross-passageways shall be separated from each train way with separate self-closing fire or assemblies having a fire protection rating of minimum 90 min.

### **K-4.2 Size of Egress Routes**

K-4.2.3 If double leaf doors wider than 1 200 mm are provided in egress routes serving train ways, then size of active leaf shall not be less than 810 mm

### **M-2.31 types of Vents**

M-2.3.2 Where monitor type vent' are installed, wireglass or metal panels shall be used only if the sash is arranged to open automatically