

National Building Code - NBC

What's new in terms of Fire
Safety?

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History of NBC

The Planning Commission of India entrusted Indian Standard Institution to form a uniform National Building Code (NBC).

First published in 1970.

Major Revisions:

- National Building Code 1983
- National Building Code Part IV (revised in 1997)
- National Building Code 2005
- National Building Code Amendment—2
- National Building Code 2016



Why Revision of NBC-2016 is required?

- Previously, a building having a height of 15 m or more was termed as High Rise Building but due to scarcity of space, it is spreading wings both horizontally like multi-complexes and vertically upward even up to height of 200 m to accommodate more habitat; Metro rail and recent hospital fires & high rise building fires are the eye opener for revision.
- **Fire, smoke or fumes** and **panic** are in focus as hazards

Part 4 of NBC aims to tackle these problems in case of a fire emergency



Fire prevention

Fire prevention is based on the following:

- Occupancy
- Fire zones
- Types of construction
- General requirement of all occupancies
- Electrical installation
 - a. Emergency power for fire and life safety system
 - b. Substation
 - c. Lightning protection
 - d. Escape lighting and exit signage
 - e. HVAC and smoke control
 - f. Glazing
 - g. Surface interior finish
 - h. Fire Command Centre



Fire prevention

- Fire resistance rating of structural and non-structural elements updated
- Fire resistance rating of service shaft and duct opening of 2 hours. Inspection door and duct opening should have same resistance rating of service shaft.
- Facade protection and openable windows in facade shall have fire protection and smoke exhaust aspects
- Compartment criteria of different occupancies and fire separating wall & floor partitions are modified

Fire prevention

- Provision of fire/smoke damper design more elaborated like provision of damper
 - a. At the fire separation wall
 - b. Where ducts/passage enter the vertical shaft
 - c. Where the duct passes through floor
 - d. At the inlet of supply air duct and return air duct of each compartment on every floor

Occupant Load Factor (sq.m/person)

1. Group A - Residential: 12.50 sq.m/person
2. Group B - Educational: 4.0 sq.m/person
3. Group C - Institutional: Indoor patient area: 15 sq.m/person; Outdoor patient area: 10 sq.m/person
4. Group D - Assembly:
 - Concentrated without fixed seating 0.65 sq.m/person
 - Less concentrated without fixed sitting 1.40 sq.m/person
 - Fixed sitting based on number of person multiplied by 1.2 sq.m/person
 - Dining and Restaurant with seating & table 1.8 sq.m/person
5. Group E - Business: 10.0 sq.m/person
6. Group F - Mercentile:
 - Street floor and sale basement 3 sq.m/person
 - Upper sales floor 6 sq.m/person
 - Storage/warehouse receiving 20 sq.m/person
7. Group G - Industrial: 10.0 sq.m/person
8. Group H - Storage: 30.0 sq.m/person
9. Group J - Hazardous: 10.0 sq.m/person

Glass façade:

- a. For fully sprinkler building having fire separation of 9 m or more, tampered glass in a non-combustible assembly with ability to hold the glass in position shall be provided

- b. It shall be ensured that sprinklers are located within 60 cm and there is full coverage of glass. All the gaps between floor slab and facade assembly shall be sealed at all level by fire resistant sealant material of equal rating of floor slab to prevent fire and smoke propagation from one floor to another.



- c. Openable panel shall be provided in each floor and shall be spaced not more than 10 m apart, measured along the external wall from the centre to centre of the access opening. Such opening shall be operable at a height between 1.2 m and 1.5 m from the floor in the form of openable panel (Fire Access Panel) not less than 1000 mm x 1000mm opening outward.

FIRE OPENABLE PANEL DO NOT OBSTRUCT IN 25 mm lettering in the inner side can also act as smoke exhaust at the time of distress.



Service Sector in Focus

Some important features considered in Hospitals

- Each compartment shall be able to accommodate patients from adjoining compartment and Density Factor (Number of patient) area to be allotted 3.5 sq.m/person
- Critical patients, incapable of self preservation and physical impairment shall be housed within 30 m height
- Other types of patient and occupancy like Nurses' centre, Medical shop, Canteen, etc to be in between 30-45 m in height
- Operation theatre, Delivery room, ICU, Recovery room shall have a separation with 2 hours of fire resistance rating
- Passage width of aisles, corridor, ramp, etc shall be 2.4 m unobstructed through which patients are being moved and in case of inpatient width not less than 1.5

Service Sector in Focus

Some important features considered in Hospitals

- All exits from Hospital or Infirmary Section shall not be less than 2m
- Minimum door width single/double occupancy shall be 1.25 m; for 3-5 patients, door width shall be 1.50 m; for more than 5 patients and patient evacuation bed (i.e. ICU) it shall be 2.0 m; for single/double doors, it shall be 1.5 m
- Any sleeping accommodation or suite exceeding 100 sq.m in area, 2 no.s of access door leading to escape route, corridor, etc to be provided
- Room designed for laboratory or like facility shall be limited to 100 sq.m in area for additional area coverage. Fire separation shall be done by 2 hours fire resistance.
- A stretcher lift in the lift bank shall also act as a fireman lift

Life safety is based on:

- General exit
- Occupant load
- Declaration of occupant load
- Egress components
- Smoke control of exit
- Compartmentation
- Smoke control above and below ground
- Gas supply
- Hazardous area
- Fire detection
- Fire drill



Safe electrical supply system

- The electrical supplies towards the critical aspects of emergency power for fire and life safety addressed for respective system.
- Power supply to the panel and distribution board be through fire proof enclosure or circuit integrity cable or through alternate route in the adjoining fire compartment is protected within the compartment of vulnerability and require location of the panel/distribution board feeding shall be in fire and safety zone and ensure supply of power to these system.

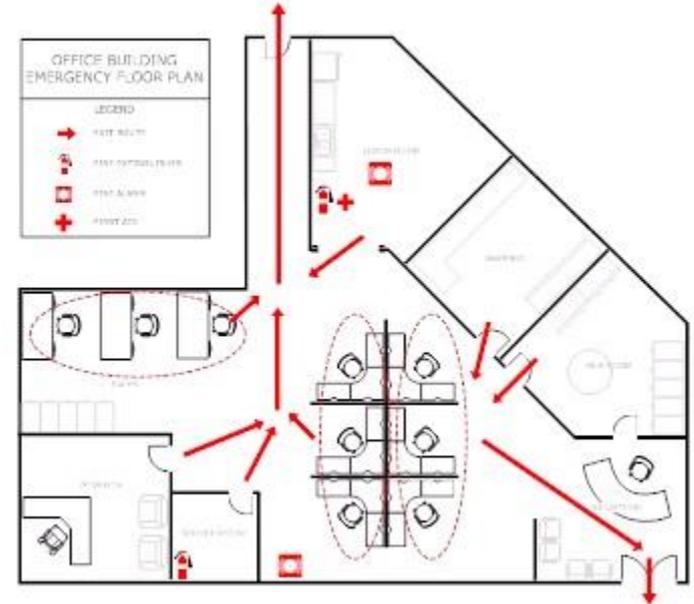
Safe electrical supply system

- The high voltage electrical equipment safety including aspects of emergency and exit lighting of large and public assembly occupancies
- HVAC system, smoke control and mitigation also to be taken care of with comprehensive approach towards compartmentation and spread of fire and smoke.



Life safety

- To calculate the number of exit requirement with **Density Factor**
- **Exit Layout** for better understanding of various aspects of means of egress, corridor, passageways, stair ways and exit
- Provision for **access control** door, electro magnetic door, revolving door and turnstile (conditions to be fulfilled)



Life safety

- Provision of **hand rail** at both sides of stairs and ramp width exceeding 1.5m
- **Internal stair width** of residential building increased to 1250 mm from 1000 mm
- **External stairs width** increased from 1250 mm to 1500 mm
- Each **fire rated door** shall have marking on the product of its **certification**. Door assembly parts like hinges, locks, panic bars, door closer and door viewer shall be certified.



Life safety

- Means of escape

Means of escape can be defined as the structural means from where a safe route or routes are provided for persons to escape in case of fire from any point of the building to a place of safety by their own unaided efforts.

- Escape route design

- Escape Route Planning
- Escape Route Protection
- Escape Route Recognition
- Warning and Alarm System



Several other factors influencing travel distance

- Type of occupancy and nature of fire risk associated with materials, plant and process
- The design and construction of the building whether fire or smoke could spread readily from floor to floor
- Type of occupants of building (their age & mobility, that is, are they young or old)
- The maximum number of people to be present at a particular point of time and duration of stay
- How will people in the building know or are familiar with the escape routes

Escape is generally considered in four distinct 'Stages' as follows:

- **Stage 1:** Escape from the room or area of fire origin
- **Stage 2:** Escape from the compartment of origin via the circulation route to a protected stairway or an adjoining compartment offering refuge
- **Stage 3:** Escape from the floor of origin to the ground level
- **Stage 4:** Escape at ground level, away from the building at a designated assemble point

It is necessary to study each floor plan and consider the layout of each room or compartment. It is necessary to understand the travel distance from the furthest point of that room or compartment to a place of safety (either comparative or ultimate) is less than the maximum travel distance.

Life safety

- Updated staircase pressurisation requirement (Smoke control of exit) for lobbies & corridors
- Smoke exhaust and pressurisation of area below the ground floor
- Requirement of smoke exhaust system having make up air system for the theatre and atrium
- Smoke exhaust fan in the mechanical ventilation system shall be fire rated of 250 degree centigrade for 2 hours (120 minutes)
- Provision of smoke barrier and sprinkler around the opening for escalator
- Requirement of display of occupancy load for assembly occupancy and call centre



Refuge area:

- Specification for super high rise residential, assembly occupancy and additional area consideration while calculating refuge area to accommodate wheel chair.

Fire protection:

- Displayed in table 23 based on types of building in NBC
- Fire protection and firefighting system table 7 storage tank and pump house, sprinkler system and special system

Special features

- A. Multiple car parking
 - Open multilevel car parking
 - Stilt parking
 - Mechanical and computerised car parking
 - Enclosed car parking
- B. Atrium
- C. Commercial kitchen and cooking place
 - Fire separation
 - Fire protection of cooking equipment
 - Fume hood
 - Duct and smoke extraction system
- D. Metro station and metro ways



Fire and Life safety requirement for Metro Station

(As per Annex J, K)

Fire protection system shall be based on:

- Gas based system
 - Water system
 - Mist system
 - Foam based system (Elaborated in Table-7 of NBC-2016)
1. NBC part-4 of the code is comprehensive and has fire and life safety aspects in design, planning, installation and maintenance. It is an integrated approach to increase occupants' awareness for the cause of safety.
 2. Third party audit to be carried out once in 2 years (necessary to have fire NOC before occupancy/Completion certificate)