REVISIONS TO FIRE & LIFE SAFETY CODE- NBC 2016

INTRODUCTION

NBC 2016, released on March 15th, is totally revised and updated considering the enormous experience gained in the implementation of NBC 2005. Many experts have contributed to bring out this latest code. It is heartening to note that the BIS committee had gone through each and every objection raised by many individuals across the country, especially on Fire & Life safety code, and discussed thoroughly and adopted the same in the revised code. Part IV of NBC, i.e. Fire and Life Safety Code, has assumed very high importance since many Fire Departments are adopting the clauses of this code as mandatory requirements for high rise buildings. An attempt is made in this paper to highlight some of the important changes that have been adopted in the code. However, a careful study of the entire code is suggested to understand the actual intent of each clause.

APPLICABILITY OF CODE

Provisions of code shall be applicable in case of following:

a. All high rise buildings
b. Educational buildings - height more than 9m
c. Institutional buildings - height more than 9m
d. All assembly buildings
e. Buildings having an area more than 300 sq.mt. of incidental assembly occupancy on any floor
f. Buildings with 2 basements or more or with 1 basement of area more than 500 sq.mt.
g. Hotel, educational, institutional, business, mercantile, industrial, storage, hazardous and mixed occupancies having an area more than 500 sq. mt. on any one or more floors

STRUCTURE OF THE CODE

The code has got three parts - Fire Prevention, Life Safety and Fire Protection.

Fire Prevention, which is covered under Clause 3, describes the Classification of Buildings (Group A to J) with their sub divisions and also clauses on mixed occupancy and fire zones have been incorporated. Many of the Fire Protection requirements have been related to type of occupancy and their sub division and hence assume importance.

FIRE PREVENTION

As per earlier code, the space between electrical cables/conduits and the walls/slabs shall be filled in by a fire resisting material of 1 hour but now the same is changed to 2 hours. Also, it is now mentioned that low voltage services shaft need not have any fire sealing. It is also added that for the plumbing shaft in the core of the building, with shaft doors opening towards the building, the shaft shall have inspection doors of half an hour fire rating. However, plumbing shaft doors, which open in wet areas or to naturally ventilated areas or on external wall of the building, need not have any specified fire rating.

A new clause is added with respect to refuse chutes. The chutes, if provided in the building, shall be with an enclosure of non combustible material with a fire resistance of not less than 120 minutes. These shall not be located within
staircase enclosure or service shafts or air conditioning shafts. Refuse inspection panel and doors shall have 60 minute fire resistance rating. The refuse chute select to be 1m above the roof for venting purpose. Refuse chute shall be at least 6 m away from staircases and provided with sprinkler protection.

Certain new clauses are added with respect to electrical installations. It is indicated that medium and low voltage wiring running in shafts and within false ceiling shall run in metal conduit and the wiring shall be laid in a separate shaft. High, medium and low voltage wiring, running in shaft and above false ceiling, shall run in separate conduits. Water mains, gas pipes and communication services shall not be laid in electrical shaft. Emergency power shall be extended for fire and life safety systems like fire pumps, pressurization systems, fireman’s lifts, exit lighting, emergency lighting, fire alarm and public address systems, magnetic door hold open devices and wiring in fire command centre and security room. Power supply to the panel /distribution board of these fire and life safety systems shall be through fire proof enclosures or circuit integrity cables or through alternate route in the adjoining fire compartment to ensure supply of power is reliable.

The medium voltage panel room shall be provided on the ground level or at first basement and shall be provided with fire resistance walls and doors of fire resistance of not less than 120 minutes. Oil field equipment shall be limited to be installed in utility building which shall be 7 metres away or in outdoor location. Diesel generator set shall not be installed at any floor other than ground or first basement and shall be separated by 120 minutes fire resistance rated walls and doors. The day fuel oil tank for the diesel generator set shall be provided with a dyked enclosure, having a volumetric capacity of at least 10% more than the volume of the oil tank and the enclosures shall be filled with sand for a height of 300 mm.

A detailed clause was added on escape lighting and exit signages, recommending the required level of illumination and also where all the fixtures are to be provided. Whereever batteries are provided, the same shall be segregated by 120 minutes fire rated construction.

Some guidelines have been added under air conditioning, ventilation and smoke control. Air handling unit shall be provided with effective means for preventing circulation of smoke through the system. The air filters of the air handling units shall be made of non combustible materials. Air duct serving main floor areas, corridor etc. shall not pass through the exits/ exit passageway or exit enclosure. Exit and lift lobby shall not be used as return air passage. The ducting within compartments shall have a minimum fire resistance rating of 30 minutes. If that duct crosses adjacent compartment/ floor and not having fire dampers in such compartment/ floor, the duct work requires a fire resistance rating of 120 minutes. A clause has been added identifying the location of fire and smoke dampers.

The requirements for glazing have been elaborated. For fully sprinklered buildings, having fire separation of 9m or more, tempered glass in a non combustible assembly with ability to hold the glass in place shall be provided. Sprinklers shall be located within 600 mm of the glass.

Openable panels shall be provided on each floor and shall be spaced not more than 10m apart measured along the external wall from centre to centre of the access opening and provided at a height between 1.2 metres to 1.5 metres from the floor and shall be in the form of openable panels of size not less than 1m x 1m.

A clause has been added about fire command centre - the fire command centre shall be on the entrance floor of the building with a direct access. The center shall house the main fire alarm panel and communication system to all floors and facilities. Fire Command Centre shall be constructed with 120 minutes fire rating walls with a fire door and shall be provided with emergency lighting.

LIFE SAFETY

General Exit requirements have been elaborated. It is indicated that in case of assembly building and institutional buildings, exit door shall open through a landing so that the movement of people descending from a higher level do not impede the movement of people from that floor. At least half of the required exit styles from upper floor shall discharge directly to the exterior.

The occupant loading for some occupancies has been modified. In Institutional buildings, for outdoor patient areas, the occupant load factor is revised to 10 sq.mt. per person. The occupant loading factor for assembly building is also modified. For Mercantile occupancy, storage/ ware house the occupant factor is included as
20 sq.mt. per person. For assembly buildings, parameters are modified. For less concentrated use without fixed seating the occupancy factor is included as 1.0 sq.mt./person. For assembly buildings/call centers, notices shall be displayed at conspicuous places about the occupant load details to avoid overcrowding. In case of travel distances calculation, capacity factors are specified as width per mm instead of occupants per unit exit width and there will be a change in widths. E.g. in case of residential occupancy, as per NBC 2005, 25 occupants are to be considered per unit exit width i.e. 500mm - i.e. 20mm per person. As per NBC 2016, it is reduced to 10mm per person and hence 50 persons are allowed per unit exit width and hence total stair case width is reduced to half. However a minimum of 2 staircases are to be provided for all buildings for which NBC- Part 4 is applicable and also travel distance criterion shall be met.

Another important point indicated in the code is that the fire rated doors and assembly shall be provided with certificate and labels, prominently indicating the manufacturer’s name, fire resistance rating, year of manufacture, serial number etc. Some new precautionary guidelines are added with respect to access controlled doors and turnstiles.

With regard to staircases, the following points are added:

a) For Residential A-1, A-2, A-3 & A-4 type of occupancies minimum width of 1.25 mt is specified
b) All internal staircases shall terminate at exit discharge. In earlier code, if there are two staircases, the second one can lead to a basement, provided the same is separated by a lobby at ground level
c) Scissors type staircases are not allowed
d) Planning shall be in such a way to ensure that no external wall or window opening is towards the external stair within 3 mt. Otherwise the openings shall be with 60 minutes fire rating

Regarding the pressurization the following is specified:

a) All staircases not on external wall shall be pressurized, except residential buildings of height less than 15 m
b) Staircases and lift lobbies on external wall can be either naturally ventilated or pressurized upto 30 m in height and, if above 30 m, it shall be cross ventilated or pressurized
c) Upto 15 mt, the lift lobby is not required to be pressurized, if naturally ventilated, but lobby segregation and pressurization is required to basements
d) For pressurization systems, activation shall be from fire alarm panel and fresh air intake shall be 4 m away from any exhaust grill

The areas for compartmentalization is almost same as per amendment No. 2, except that area for Business buildings is increased to 3,000 sq.mt. from 2,000 sq.mt. and that for Assembly Buildings reduced from 3,000 sq.mt. to 2,000 sq.mt. Also, it is specified that there shall be minimum two compartments for all floor plates above 750 sq.mt.

Either smoke ventilation system with fresh air and exhaust or pressurization of exit access corridors which are not naturally ventilated to be planned in Hospitality/ Healthcare occupancies. Smoke exhaust systems shall be with minimum 12 air changes per hour and pressurization systems shall be for a differential of 25-30 Pascals.

Impulse fans are also allowed for basement ventilation, provided fans are rated for 250°C for 120 minutes and power supply cables are of circuit integrity type, conforming to IS 16246 and electrical panels for the same are kept in fire safe zone.

Fire alarm detectors shall be provided inside electrical shafts and lift machine rooms for assembly & institutional buildings and also all buildings above 30 m in height, panels shall be connected in peer to peer network with redundant cables run in different shafts. Voice evacuation systems shall employ pre-recorded messages in English, Hindi and local language.

Fire detection system, wherever specified, shall monitor/ control the following leading to life safety:

a) Water level in fire tanks
b) Hydrant and sprinkler pressures of respective zones as provided
c) Pump 'ON/OFF' status
d) All isolation valves wherever provided with supervisory switch (non-padlock valves)
e) Sprinkler flow switches
f) AHUs  
g) Pressurization systems  
h) Smoke management systems  
i) Hold up fire doors  
j) Release of access control doors  
k) Release of fire barriers  

**FIRE PROTECTION:**

The required Fire protection systems such as fire extinguishers, hose reel, yard hydrant, automatic sprinkler system, manually operated electronic fire alarm system, UG tank, terrace tank and pumps with capacity have been specified for various occupancies under Table 7.

Fire fighting system shall be designed in such a way that pressure at remotest hydrant shall be not less than 3.5 bar. The hydrants shall be located inside shafts within 5 m of existing staircase. Shaft doors maybe finished to match with interior finishes but with a glass panel to see the installations. Wet risers shall be interconnected in the form of a ring at terrace with a cut-off valve to enable maintenance.

It is suggested to make the fire tank in two compartments to facilitate cleaning without shutdown. Also, it is suggested that domestic and fire tank could be combined, provided suction tapping for domestic water is taken after leaving the required amount of dedicated storage for fire. The fire tanks shall not be below 7 mt from the access level of fire brigade inlet. The fire brigade inlet shall be connected to fire tank with GI pipe of not less than 150 mm diameter.

It is preferable to install fire pump house at ground level but in any case not lower than second basement with a direct access from ground level. Pump house shall be with 2 hour fire rated compartment. **Fire pumps shall be provided with soft starter or Variable Frequency Drives.**

Sprinklers may be avoided in substation and DG rooms. A sprinkler installation control valve (ICV) shall not cover beyond 4,500 sq.mt. for all occupancies other than industrial and hazard occupancies. ICVs shall be located in fire pump rooms. Flow switches shall be monitored by fire alarm panel. Ramps at all levels shall be with sprinklers.

Automatic water mist system and clean agents extinguishing systems are included in the code.

Occupancy wise, various requirements have been amended / added to give clarity on various clauses. For Institutional buildings, height is relaxed upto 45 mt. and many clauses on Life safety along with progressive evacuation requirements are included.

The annexures are also modified. Annexure A & B are retained but in Annexure B some changes have been made. The Structural fire resistance ratings have been brought out as Annexure C. Earlier Annex E (Guidelines for Fire Drills) has become Annex D. Earlier Annex C (Requirements for High rise Buildings) has become Annex E. Earlier Annex D (Venting in Industrial Buildings) has become Annex M. New Annexes i.e. Annex F (Atrium), Annex G (Commercial Kitchens), Annex H (Car parking facilities), Annex J (Metro stations), Annex K (Metro tramways) have been added.

In High Rise Buildings ( Annex E), requirements of refuge area in detail have been included. The redundancy in case of sprinkler risers for residential occupancies above 120m and other occupancies above 60m have also been specified. The static storage tanks, along with pumps, at 160-180m level with transfer pumps from ground have also been specified. Helipad is now specified for buildings above 200m, as given in the amendment.

It is good that Fire and Life safety audit have been made mandatory once in two years by a third party auditor for all high rise buildings.

**CONCLUSION:**

The Fire and Life safety code has come out with many changes and it is difficult to bring out all the major changes in an article. It is advised to check the code for relevant clauses in detail while working on projects.

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