Delhi Building Bye Law Related Fire

11.1 No building shall be erected so as to deprive any other building of the means of access.

11.2 Every person who erects a building shall not at any time erect or cause or permit to erect or re-erect any building, which in any way encroaches upon or diminishes the area set apart as means of access.

11.3 For buildings identified in Bye-law No. 6.2.4.1, the following provisions of means of access shall be ensured

1. The width of the main street on which the building abuts shall not be less than 9 meters,
2. A building shall abut on a street or streets or upon spaces directly connected from the street by a hard surface approach road, width of which is not less than 9 meters,
3. If there are any bends or curves on the approach road, a sufficient width shall be provided at the curve to enable the fire appliances to turn, the turning circle being atleast of 9.0 m radius,
4. The approach road to the building and open spaces on its all sides (See Bye-law No. 12.4) unto 6 m width and the layout for the same shall be done in consultation with Chief Fire Officer, Delhi Fire Service and the same shall be of hard surface capable of taking the weight of Fire engine, weighing unto 1(18 tones. The said open space shall be kept free of obstructions and shall be motorable,
5. Main entrances to the premises shall be of adequate width to allow easy access to the fire engine and in no case it shall measure less than 5 meters. The entrance gate shall fold back against the compound wall of the premises, thus leaving the exterior access way within the plot free for movement of fire service vehicles. If archway is provided over the main entrance the height of the archway shall not be at a height less than 4 m, and
6. For multi-storeyed group housing schemes on one plot, the approach road shall be 9 m in width and between individual buildings; there shall be a space of 6 m around.

12.4 (B) For buildings identified in 8ye-law No. 6.2.4.1 the provisions of exterior open spaces around the buildings shall be as given below:

S. No.	Ht. of the building up to	Exterior Open spaces to be left our on all sides* (front, rear and sides in each plot)
1.	10 m	3m
2.	15 m	5m

S. No.	Ht. of the building up to	Exterior Open spaces to be left our on all sides* (front, rear and sides in each plot)
3	18m	6m
4	21 m	7m
5	24 m	8m
6	27 m	9m
7	30 m	10 m
8	35 m	11 m
9	40 m	12 m
10	45 m	13 m
11	50 m	15 m
12	55 m and above	16 m

12.7

1. The maximum height of building shall not exceed 1.5 times the width of road abutting plus the front open spaces.

2. If a building abuts on two or more streets of different widths, the building shall be deemed to face upon the street that has the greater width and the height of the building shall be regulated by the width of the street and may be continued to this height to a depth of 24 m along the narrower street subject to conformity of Bye-law No. 12.4

14.12 Basement

14.12.1 The construction of the basement shall be allowed by the Authority in accordance with the land use and other provisions specified under the Master Plan.*

14.12.1.1 Where the use, set backs and coverage is not provided in the Master Plan provisions, the same shall be allowed to be constructed in the plot leaving mandatory set backs and can be put to any of the following uses:

1. Storage of household or other goods of non-flammable materials;
2. Dark room;
3. Strong rooms, bank cellars etc.;
4. Air-conditioning equipment and other machines used for services and building;
5. Parking places and garages; .
6. stack rooms of libraries; and
7. Office or commercial purpose provided it is air-conditioned..

Note: Uses of basement from 14.12.1.1(i) to (vi) shall not be reckoned for the purposes of FAR whereas for uses in 14.12.1.1 (vii), the basement coverage shall be reckoned for the purpose of F.A.R.**

14.12.1.2 The basement shall not be used for residential purposes.

14.12.2 The basement shall have the following requirements:

1. Every basement shall be in every part at least 2.4 m in height from the floor to the underside of the roof slab or ceiling.
2. Adequate ventilation shall be provided for the basement. The standard of ventilation shall be the same as required by the particular occupancy according to Bye-laws. Any deficiency may be met by providing adequate mechanical! Ventilation in the form of blowers, exhaust fans (one exhaust fan for 50 sq. m. of basement area), air- conditioning system etc.
3. The minimum height of the ceiling of any basement shall be 0.9 m and maximum of 1;2 m above the average surrounding ground level.
4. Adequate arrangement shall be made such that surface drainage does not enter the basement.
5. The walls and floors of the basement shall be water-tight and be so designed that the effect of the surrounding soil and moisture, if any, are taken into account in design and adequate damp proofing treatment is given.
6. The access to the basement shall be separate from the main and alternate stair-case providing access and exit from higher floors. Where the staircase is continuous the same

shall be enclosed type serving as a fire separation from the basement floor and higher floors. Open ramps shall be permitted if they are constructed within the building line subject to the provision of (iv).

7. In the case of basements for office and commercial occupancies sufficient number of exit ways and access ways shall be provided with a travel distance not more than 15 m.

8. The basement shall not be partitioned. In case the partitions in the basements are allowed by the Authority, no compartment shall tie less than 500 sq. ft. in area and each compartment shall have ventilation standards as laid down in sub-clause (ii) separately and independently. The basement partitions shall however conform to the norms laid down by the Chief Fire Officer Delhi.

9. Kitchen, bathroom and toilet shall not be permitted in the basement unless the sewer levels permit the same and there is no chance of back flow and flooding of sewerage. If permitted, this shall be placed against an external wall of the basement (which shall also be external wall of the building) and shall be adequately lighted and ventilated. The area of kitchen, bathroom and toilet so permitted in the basement shall be counted towards FAR calculations.

10. A kitchen when permitted in the basement shall be equipped with electric ovens, stoves, gas or similar equipments.

* The Master Plan 2001 provisions relating to basement ere given in Appendix J. Also see under comments.

** Under the MPD 2001 as amended on 15.5.1995, basement is to be included in FAR calculations.

16. Exit Requirements

16.1 General - The following general requirements shall apply to exits.

1. Every building meant for human occupancy shall be provided with exits sufficient to permit safe escape of occupants in case of fire or other emergency;

2. In every building exits shall comply with the minimum requirement of this part, except those not accessible for general public use;

3. All exits shall be free of obstructions;

4. No buildings shall be altered so as to reduce the number, width or protection of exits to less than that required;

5. Exits shall be clearly visible and the routes to reach the exit shall be clearly marked and sign posted to guide the population of floor concerned;

6. All exit ways shall be properly illuminated;

7. Fire fighting equipment where provided along exits shall be suitably located clearly marked but must not obstruct the exit way and yet there should beck indication about its location from either side of the exit way;

8. Alarm devices shall be installed to ensure prompt evacuation of the population concerned through the exits;

9. All exits shall provide continuous means of egress to the exterior of a building or to an exterior open space leading to a street;

10. Exits shall be so arranged that they may be reached without passing through another occupied unit, except in the case of residential buildings.

16.2 Types of Exits

1. Exits shall be either of horizontal or vertical type. An exit may be doorway, corridor, and passageways to an internal staircase or external staircase, ramps or to a verandah and/or terraces, which have access to the street or to roof of a building. An exit may also include horizontal exit leading to an adjoining building at the same level.

2. Lifts and escalators shall not be considered as exits.

16.3 Number and Size of Exits-The requisite number and size of various exists shall be provided, based on the population in each room, area and floor based on the occupant load, capacity of exits, travel distance and height of buildings as per provisions of Bye-Laws Nos. 16.3.1 to 16.3.3.

16.3.1 Arrangement of Exits - Exits shall be so located so that the travel distance on the floor shall not exceed 22.Sm for residential, educational, institutional and hazardous occupancies and 30m for assembly, business, mercantile, industrial and storage occupancies. Whenever more than one

exit is required for a floor of building, exits shall be placed as remote from each other as possible. All the exits shall be accessible from the entire floor area at all floor levels.

16.3.2 Occupant Load-The population in rooms, areas of floors shall be calculated based on the occupant load given in the table given below.

Occupant Load : TABLE 5*

S. No.	Group of Occupancy	Occupant Load Gross Area* in sqm/person
1.	Residential	12.5
2.	Educational	4
3.	Institutional	15**
4.	Assembly: (a) with fixed or loose seats and dance floors (b) without seating facilities including dinning rooms	0.6*** l.5***
5.	Mercantile: (a) Street floor and sales basement (b) Upper sale floors	3 6
6.	Business and Industrial	10
7.	Storage	30
8.	Hazardous	10

* The gross area shall mean plinth area or covered area.

** Occupant load in dormitory portions of homes for the aged, orphanages, insane asylums etc. where sleeping accommodation is provided, shall be calculated y not less than 75-sqm gross area/person.

*** The gross area shall include, in addition to the main assembly room or space, any occupied connection open or space in the same storey or in the storey above or below, where entrance is common to such rooms and spaced and they are available for use by the occupants of the assembly place. No deductions shall be made in the gross area for corridors, closets or other sub-divisions; one area shall include all space serving the particular assembly occupancy.

16.3.3 Capacity of Exits -The capacity of exits (doors and stairways) indicating the number of persons that could be safely evacuated through a unit exit width of 50 cm shall be as given below.

Occupants Per Unit Exit Width : TABLE 6

NUMBER OF OCCUPANTS

Sl. No	Group of Occupancy	Stairways	Doorways/Horizontal Exit
1	Residential	25	75
2	Educational	25	75
3	Institutional	25	75
4	Assembly	60	90
5	Business	50	75
6	Mercantile	50	75
7	Industrial	50	75
8	Storage	50	75
9	Hazardous	25	40

Notes :

1. Sprinkler Allowances -

When a building is protected with automatic sprinkler system and such a system is not required specifically by the Code, the capacity per storey per unit width of exit of stairways in Table 6 may be increased by 5O%.

2. Horizontal Exit Allowance -

When horizontal exit is provided in building of mercantile, storage, industrial, business and assembly occupancies, the capacity per storey per unit width of exit of stairways in Table 6 may be increased by 50% and in buildings of institutional occupancy by 100%.

3. Combine Total Allowance -

When both automatic sprinklers and horizontal exists are provided, the capacity per unit width of exit of stairways may be double the values specified in Table 6.

16.3.4 For building identified in Bye-law No. 6.2.4.1, there shall be a minimum of two staircase and one fo them shall be an enclosed stairway and the other shall be on the external walls of buildings and shall open directly to the exterior, interior open space or to any open place of safety.

16.3.5 Notwithstanding the detailed provision for exits as per Bye-law Nos. 16.3.1 to 16.3.3, the following minimum width provisions shall be made for each stairways :

1. (i) Residential building upto 3-1/2 storey ht. 0.9m
   (ii) Other residential building e.g. hotels, flats, group housing etc. 1.25m
2. Assembly buildings like auditorium, theatres and cinemas 1.5m
3. All other buildings 1.25m
4. Institutional buildings like hospitals 2.0m
5. Educational buildings like schools, colleges 1.5m

16.3.6 Notwithstanding the detailed provisions as per bye-law Nos. 16.3 to 16.3.3, the following minimum width provisions shall be made for each passage way :

1. (i) residential buildings, dwelling unit type 0.9m
   (ii) residential buildings e.g. hostels, hotels etc. 1.25m
2. assembly buildings like auditorium, theatres and cinemas 1.5m
3. all other buildings 1.25m

16.4.1 Doorways

1. Every doorways shall open into an enclosed stairway, a horizontal exit, on a corridor or passageway providing continuous and protected means of egress.

2. No exit doorway shall be less than 100cm in width. Doorways shall be not less than 200cm doorway shall be less than 100cm in width. Doorways shall be not less than 200cm in height. Doorways for bathrooms, water closet, stores etc. shall be not less than 75cm wide.

3. Exit doorways shall open outwards, that is, away from the room but shall not obstruct the travel along any exit. No door, when opened, shall reduce the required width of stairway or landing to less than 90cm, overhead or sliding doors shall not be installed.

4. Exit door shall not open immediately upon a flight or stairs; a landing equal to atleast the width of the door shall be provided in the stairway at each doorway, level of landing shall be the same as that of the floor which it serves.

5. Exit doorways shall be openable from the side which they serve without the use of a key.

16.4.2 Revolving Doors

1. Revolving doors shall not be used as required exits except in residential, business and mercantile occupancies, but shall not constitute more than half the total required door width.

2. When revolving doors are considered as required exist way the following assumptions shall be made-

    1. each revolving door shall be counted one half a unit exit width.

    2. Revolving doors shall not be located at the foot of a stairway. Any stairway served by a revolving door shall discharge through lobby or foyer.

16.4.3 Stairways

1. Interior stairs shall be constructed of non-combustible materials throughout.

2. Interior staircase shall be constructed as a self contained unit with at least one side adjacent to an external wall and shall be completely enclosed. For buildings more than 15m height, all staircases shall be enclosed.

3. A staircase shall not be arranged round a lift shaft unless the latter is entirely enclosed by a material of fire-resistance rating as that for type of construction itself. For buildings more than 15m in height, the staircase location shall be to the satisfaction of Chief fire Officer, Delhi Fire Service.

4. Hollow combustible construction shall not be permitted.

5. The minimum width of internal staircase shall be 1.00 m and as given in Bye-law No. 16.3.5

6. The minimum width of treads without nosing shall be 25cm for an internal staircase for residential buildings. In the case of other buildings the minimum tread shall be 30cm. The treads shall be constructed and maintained in a manner to prevent slipping. Winders shall be allowed in residential buildings provided they are not at the head of a downward flight.

7. The maximum height of riser shall be 19cm in the case of residential buildings and 15 cm in the case of other buildings. They shall be limited to 12 per flight.

8. Handrails shall be provided with a minimum height of 90cm from the center of the tread.

9. The minimum headroom in a passage under the lading of a staircase and under the staircase shall be 2.2m.

10. For buildings more than 24 m higher, access to main staircase shall be gained through atleast half an hour fire resisting automatic closing doors placed in the enclosing walls of the staircases. It shall be a swing type door opening in the direction of the escape.

11. No living space, store or other fire risk shall open directly into the staircase or staircases.

12. External exit door of staircase enclosure at ground level shall open directly to the open spaces or can be reached without passing through any door other than a door provided to form a draught lobby.

13. The exit sign with arrow indicating the way to the escape route shall be provided at a height of 0.5m from the floor level on the wall and shall be illuminated by electric light connected to corridor circuits. All exist way marking signs should be flushed with the wall and so designed that no mechanical damage shall occur to them due to moving of furniture or other heavy equipments. Further all landings of floor shall have floor indication boards indicating the number of floor as per Bye-law No. 2.35. The floor indication board shall be

placed on the wall immediately facing the flight of stairs and nearest to the landing . It shall be of size not less than 0.5x0.5m

14. Individual floor shall be prominently on the wall facing the staircase.

15. In case of single staircase it shall terminate at the ground floor level and the access to the basement shall be by a separate staircase. However, the second staircase may lead to basement levels provided the same is separated at ground level by either a ventilated lobby with discharge points at two different ends or through enclosures [See Bye-law No. 14.22 (vii)]

16.4.2 Fire Escapes or External Stairs

1. Fire escapes shall not be taken into account in calculating the evacuation time of a building.

2. All fire escapes shall be directly connected to the ground.

3. Entrance to fire escape shall be separate and remote from the internal staircase.

4. The route to fire escape shall be free of obstructions at all times, except a doorway leading to the fire escape which shall have the required fire resistance.

5. Fire escape shall be constructed of non-combustible materials.

6. Fire escapes stairs shall have straight flight not less than 75cm wide with 25 cm treads and risers not more than 19 cm. The number of risers shall be limited to 16 per flight.

7. Handrails shall be of a height not less than 90cm.

16.4.5 Spiral Stairs (fire escape) -The use of spiral staircase shall be limited to low occupant load and to a building of height 9 m unless they are connected to platforms, such as balconies and terraces to allow escapes to pause.

A spiral fire escape shall be not less than 150cm in diameter and shall be designed to give adequate head room.

16.4.6 Ramps

1. Ramps with a slope of not more than 1 in 10 may be substituted for and shall comply with all the applicable requirements of required stairway as to enclosure, capacity and limiting dimensions., Large slopes shall be provided for special uses but in no case greater than 1

in 8. For all slopes exceeding 1 in 10 and where the use is such as to involve danger of slipping, the ramp shall be surfaced with approved non-slipping material.

2. The minimum width of the ramps in hospitals shall be 2.25m.

3. Handrails shall be provided opn both sides of the ramp.

4. Ramps shall lead directly to outside open space at ground level or courtyards or safe place.

5. For building above 24 m in height, access to ramps from any floor of the building shall be through smoke stop door.

16.4.7 Corridors

1. The minimum width of a corridor in a residential building shall be 1.0 m and in all other buildings shall be 1.5m

2. In case of more than one main staircase of the building inter-connected by a corridor or other enclosed space, there shall be atleast one smoke stop door across the corridor or enclosed space between the doors in the enclosing walls of any two staircases.

16.4.8 Refuge Area-For all buildings exceeding 15 m in height, refuge area shall be provided as follows :

1. for floors above 15 m and upto 24 m -one refuge area on the floor immediately above 18m.

2. for floors above 24 m and upto 36 m-one refuge area on the floor immediately above 24m.

3. for floors above 36 m-one refuge area per every five floors above 36m

16.4.8.1 Refuge area shall be provided on the external walls as cantilever projections or in any other manner (which will not be covered in FAR) with a minimum area of 15 sq mtr. And to be calculated based on the population on each floor at the rate of 1 sq.m. per person.

16.4.9 Lifts

1. All the floors shall be accessible for 24 hours by the lifts. The lifts provided in the buildings shall not be considered as a means of escape in case of emergency.

2. Grounding switch at ground floor level to enable the fire service to ground the lift in case of an emergency shall also be provided.

3. The lift machine room shall be separate and no other machinery shall be installed there in.

17 Fire Protection Requirements

17.1 Buildings shall be planned, designed and constructed to ensure fire safety and this shall be done in accordance with para IV Fire Protection of national Building code of India, unless otherwise specified in these bye-laws. In the case of buildings (identified in Bye-laws No. 6.2.4.1), the building schemes shall also be cleared by the Chief Fire Officer, Delhi Fire Service.

17.2 The additional Provisions related to fire protection of buildings more than 15 m is height and buildings identified in Bye-law No. 6.2.4.1, shall be as given in Appendix-K

APPENDIX K

(Bye-Law No. 17.1)

Additional Fire Protection Requirements for Buildings more than 15m. in Height & Buildings as Covered by Bye-law No. 6.2.4.1

K-1 General

K-1.1. In addition to the provisions of part IV Fire Protection of National Building Code of India, the Chief Fire Officer, Delhi Fire Service may insist on suitable provisions in the buildings from fire safety and fire fighting point of view depending on the occupancy and height of buildings.

K-2 Staircase Enclosures

K-2.1 The internal enclosing walls of staircase shall be of brick or R.C.C. construction having fire resistance of not less than two hours. All enclosed staircases shall have access through self-closing doors of at least half-hour fire resistance- These shall be single swing doors opening in the direction of the escape. The door shall be fitted with check action door closers.

K-2.2 The staircase enclosure on external wall of the building shall be ventilated to atmosphere at each landing.

K-2.3 Permanent vent at the top equal to 5% of the cross sectional area of the enclosure and openable sashes' at each floor level with area equal to 15% of the cross sectional area of the enclosure of external wall shall be provided. The roof of the shaft shall be at least lm above the surrounding roof. There shall be no glazing or glass bricks in any internal enclosing wall of a

staircase. 1f the staircase is in the core of the building and cannot be ventilated at each landing, a positive pressure of 5-mm. w.g. by an electrically operated blower/blowers shall be maintained.

K-2.4 The mechanism for pressurizing the staircase shaft shall be so installed that the same shall operate automatically and also with manual operation facilities, when the automatic fire alarm (See Bye-law No. K. 11) operates.

K-3 Lift Enclosures

K-3.1 The walls enclosing lift shafts shall have a fire resistance of not less than two hours. Shafts shall have permanent vents at the top not less than 1 800 sq. mm. in clear area. Lift motor rooms preferably be sited at the top of the shaft and shall be separated from lift shafts by the enclosing wall of the shaft or by the floor of the motor rooms.

K-3.2 Landing doors in lift enclosures shall open in the ventilated or pressurized corridor/lobby and shall have fire resistance of not less than one hour.

K-3.3 The number of lifts in one lift bank shall not exceed four. Shaft for fire lift in a lift bank shall be separated from each other by a brick masonry or RCC wall of fire resistance of not less than two hours.

K-3.4 If the lift shaft and lift lobby are in the core of the building a positive pressure of not less than 2.5 mm and not more than 3 mm. w.g. by an electrically operated blower shall be maintained in the lift lobby and positive pressure of not less than 5 mm w.g. shall be maintained in the lift shaft. The mechanism for pressurising the lift shaft and lift lobby shall be so installed that they shall operate automatically when the automatic fire alarm operates. The mechanism shall have facilities to operate manually.

K-3.5 Exit from the lift lobby shall be through a self-closing smoke stop door of half-hour fire resistance.

K-3.6 The lift machine room shall be separate and no other machinery shall be installed therein.

K-3.7 Lifts shall not normally communicate, with the basement. However, one of the lifts may be permitted to reach the basement levels provided the lift lobby at each basement level is pressurized and separated from the rest of the basement areas, by smoke actuated fire resisting door of two hours fire resistance.

K-4 Basements

K-4.1 Each basement shall be separately ventilated. Vents with cross sectional area (aggregate) not less than 2.5% of the floor area spread evenly round the perimeter of the basement shall be provided in the form of grills or breakable stall-boards light or payment light or by way of shafts.

K-4.2 The staircase of basements shall be of enclosed type having fire resistance of not less than two hours and shall be situated at the periphery of the basement and shall communicate with basement through a lobby provided with fire resisting self-closing doors of half-hour fire resistance. If the travel distance exceeds 18.50m additional staircases at proper places shall be provided.

K-5 Service Ducts

K-5.1 Service ducts for electrical conduits, cables etc.shall be enclosed by walls having a fire resistance of not less than two hours. Doors for inspection or access shall also have a fire resistance of not less than two hours.

K-5.2 If the. Cross-sectional area exceeds 1 sq. m. it shall be sealed where it passes a floor by carrying the floor through the duct. The floor within the duct shall be pierced for any service pipe or ventilation trunk and shall fit as closely as possible around any such pipe or trunk.

K-6. Refuse Chutes and Refuse Chambers

K-6.1 Hoppers to refuse chutes shall be situated in well ventilated positions and the chutes shall be continued upwards with an outlet above roof level and with an enclosure wall of non-combustible material with fire resistance of not less than two hours. The hoppers shall not be located within the staircase enclosure.

K-6.2 Inspection panel and hopper (charging station) opening shall be fitted with tight fitting metal doors, covers, having a fire resistance of not less than one hour.

K-6.3 Refuse chutes shall not be provided in staircase walls, air-conditioning shafts, etc. K-6.4 Refuse chambers shall have walls and floors of roofs constructed of non-combustible and impervious material and shall have a fire resistance of not less than two hours. They shall be located at a safe distance from exit routes.

K-7. Lifts and Fire Lifts

K-7.1 Public address system in the lift car with speaker/telephone assembly shall be provided.

K-7.2 Provisions for a fire lift shall be made as per the following details:

1. To enable Fire Services personnel to reach to the upper floors with the minimum delay, one of the lifts shall be so designed so as to be available for the exclusive use of the Firemen in an emergency and be directly accessible to every dwelling lettable floor space on each floor.

2. The lift shall have a floor area of not less than l.5 sq.m. It shall have loading capacity of not less than 500 kg. (8 persons lift) with automatic closing doors.

3. The electric supply shall be on a separate service from electric supply mains in a building and cables run in route safe from fire, that is, within the lift shaft. In case of failure of normal electric supply it shall automatically trip over to alternate supply.

4. The operation of a fire lift is a simple toggle or two button switch situated in a glass fronted box adjacent to the lift at the entrance level. When the switch is on, landing call-points will become inoperative and the lift will be on car control only. When the switch is off, the lift will return to normal working. This lift can be used by the occupants in normal times.

5. The words "FIRE LIFT" shall be conspicuously displayed in fluorescent paint on the lift landing doors at each floor level.

6. For buildings above 15 m in height collapsible gates shall not be permitted for lifts and shall have solid doors with fire resistance of 2 hours.

K-8. Building Services

K-8.1 Electrical Services

1. The electric distribution cables/wiring shall be laid in separate duct (See Bye-law No. K-5-1). The duct shall be sealed at every alterative floor with non-combustible materials having the same fire resistance as that of the duct.

2. Water mains, telephone lines, intercom lines, gas pipes or any other service line shall not be laid in the duct for electric cables.

3. Separate circuits for water pumps lifts, staircases and corridor lighting and blowers for pressurizing system shall be provided directly from the main switchgear panel.

K-8.2 Staircase and Corridor Lighting

1. The staircase and corridor lighting shall be on separate service and shall be independently connected so as it could be operated by one switch installation on the ground floor, easily accessible to fire fighting staff at any time irrespective of the position of the individuate control of the light points, if any.

2. Staircase and corridor lighting shall also be connected to alternate supply from parallel high-tension supply or to the supply from the stand-by generator.

3. Emergency lights shall be provided in staircase corridor.

K-8.3 Alternate Source of Electric Supply - A stand-by electric generator shall be installed to supply power to staircase and corridor lighting circuits, fire lifts, the stand-by fire pump, pressurization fans and blowers, smoke extraction and damper system in case of failure of normal electric supply. The generator shall be capable of taking starting current of all the machines and circuits stated above simultaneously. If the stand-by pump is driven by diesel engine, the generator supply need not be connected to the stand-by pump. Where parallel HV/ LV supply is provided with appropriate transformer for emergency, the provision o1 generator may be waived in consultation with Chief Fire Officer, Delhi Fire Service.

K-8.4 Transformers

1. If transformers are housed in the building below the ground level it shall be necessarily in the first basement in separate fire resistance room of 4 hours rating. The room shall necessarily be at the periphery of the basement. The entrance to the room shall be provided with a steel door of 2 hours fire rating. A curb of a suitable height shall be provided at the entrance in order to prevent the flow of oil from ruptured, transformer into other parts of the basement. The direct access to that transformer room shall be provided preferably from outside. The switchgears shall be housed in a separate room separated from the transformer bays by a fire-resisting wall with fire resistance not less than four hours.

2. The transformer shall be protected by an automatic high-pressure water spray or a foam sprinkler system. When housed at ground floor level it/they shall be cut-off from the other portion of premises by Fire Resisting Walls of 4 hours fire resistance. They shall not be housed on upper floors.

3. A tank of RCC construction of adequate capacity shall be provided at lower ba9ement level, to collect the oil from the catch pit in case of emergency. The pipe connecting the catch-pit to the tank shall be of non-combustible construction and shall be provided with a flame-arrester.

K-8.5 Air-conditioning

1. Proper arrangements by way of automatic fire dampers working on smoke/heat detectors for isolating all ducting at every floor from the main riser shall be made.

2. When the automatic fire alarm operates, the respective air handling units of the air conditioning system shall automatically be switched off.

3. Automatic fire dampers shall be so arranged so as to close by gravity in the direction of the air movement and to remain tightly closed upon operation of a smoke/heat detector-cum-fire alarm.

4. Air ducts saving main floor areas corridors, ete. shall not pass through the stair wall.

5. Wherever the ducts pass through fire walls or floors the opening around the ducts shall be seated with fire resisting materials such as rope asbestos, mineral wool, etc. The air filters of the air-handling units shall be of non-combustible materials.

6. Automatic fire dampers shall. be provided at the inlet of the fresh air duct and the return air duct of each compartment/stop on every floor.

Note: The use of type of detectors shall be to the satisfaction of Chief Fire Officer, Delhi Fire Service.

K-8.6 BoilerRoom-Provisions of Boiler and Boiler Rooms shall conform to Indian Boiler Act.

Further, the following additional aspects may be taken into account in the location of Boiler/Boiler Room:

1. The boiler shall not be allowed in sub-basement but be allowed in the basements away from the escape routes.

2. The boilers shall be installed in a fire resisting room of 4 hours fire resistance rating, and this room shall be situated on the periphery of the basement. Catch pit shall be provided at the low level.

3. The boiler room shall be provided with fresh air inlets and smoke exhausts directly to the atmosphere.

4. Foam inlets shall be provided on the external walls of the building at the ground floor level to enable the fire services to use foam in case of fire.

K-9 Provision of First Aid Fire Fighting Appliances

K-9.1 The first aid fire fighting equipments shall be provided on all floor including basements, occupied terrace, lift rooms in accordance with IS : 2217-1982 Recommendations for providing First Aid Fire Fighting Arrangements in Public Buildings in consultation with the Chief Fire Officer.

K-9.2 The fire fighting appliances shall be distributed over the building in accordance with IS 2190 Code of Practice for selection, installation and maintenance of portable first aid fire appliances.

K-10. Fixed Fire Fighting Installations

K-10.1 Buildings above 15m in height depending upon the occupancy use shall be protected by wet riser or sprinkler installation system with the fire service connections at the base or sprinkler installa6on as per details given below :

Details given below	
Type of the Building Occupancy	Requirements
(a) Apartment building below 15m. in height irrespective of floor area	Nil
(b) Apartment buildings exceeding 15m. in height	Wet Risers and (or) Down Comers
(c) Non-apartments buildings 15m. and above in height irrespective of floor area	Wet Risers and (or) Down Comers
(d) All basements, sub-basements having special risks like storage of hazardous Sprinkler" System and explosive material in a building 15m. and above	High Pressure Water Spray or foam
(e) Any of the above categories may incorporate an automatic sprinkler*/ drencher system if the protective methods.	

*Those buildings provided with smoke/heat detection system backed by 24 hour caretaker (trained in fire fighting) staff, the installation of sprinklers need not be insisted.

The hydrants shall be provided within the courtyard, the location of which shall be decided in consultation with the Chief Fire Officer.

Note: The Dry Riser installations may be permitted by the Chief Fire Officer, Delhi Fire Service, for buildings under (b) and (c) for heights above 15m. and below 24m. if he is satisfied with the arrangements for water supply

K-10.2 The Wet Riser installations shall conform to lS: 3844-1966CodeofPracticefor Installation of internal fire hydrants in multi-storey buildings.

In addition, Wet Risers shall be designed for Zonal distribution ensuring that unduly high pressure are not developed in risers and have ripes.

In addition to wet risers, first aid hose reels shall be installed on all the floors of the buildings and shall conform to IS: 884-1969 specification for first aid hose reel for fire fighting (fixed installations). The first aid hose reel shall be connected to one of the female couplings of twin couplings of landing valves of the wet riser installations by means of adopter.

K-10.2.1 The riser shall be fed through the booster pump from either of the two water sources round the clock :

1. Town mains of suitable size which can supply requisite quantity of water.
2. Static tanks. The capacity of the static tank shall be given as below :
    1. Apartment building 15m. and above in height 50,000 liters but below 24m. in height.
    2. Non-apartment building 15 m. and above but below l,00000 liters 24m. in height used for mixed occupancies like offices, shops, department stores
    3. Apartment buildings 24m. and above in height l,00000 liters
    4. Non-apartment buildings 24m. and above in height 2,00,000 liters

Note 1. In case of group housing of apartment buildings 15m and above in height but below 24m. a centrally located tank having a capacity of 2,00,000 liters may be provided.

Note 2. The above quantities of water shall be exclusively for fire fighting and shall not be utilized for domestic or other use.

K-10.2.2 Static Water Storage Tank - A satisfactory supply of water for the purpose of fire fighting shall always be available in the form of underground static storage tank with capacity specified

for each building by the local Fire Authority with arrangements of replenishment by town's main or alternative source of supply @ 1,0001itres per minute. The static storage water supply required for the abovementioned purpose should entirely be accessible to the fire engines of the local Fire Service. Provision of suitable number of manholes shall be made available for inspection, repairs, and insertion of suction hose etc. The covering slab shall be able to withstand the vehicular load of 18 tons.

K-10.2.3 To prevent stagnation of water in the static water storage tank the suction tank of the domestic water supply shall be fed only through an overflow arrangement to maintain the level therein at the minimum specified capacity.

K-10.2.4 The static water storage tank shall be provided with a fire brigade collecting breaching with 4 Nos.-65 mm dia. instantaneous male inlets arranged in a valve box at a suitable point at street level and connected to the static tank by a suitable fixed pipe not less than 15 cm. dia. to discharge water into the tank when required at a rate of 1,000 liters per minute.

K-10.3 Automatic Sprinklers-Automatic high pressure water spray or foam sprinklers system shall be installed.

1. In basements, sub-basements which are used as car parks, storage of combustible article, laundry etc.
2. On floors used as departmental stores, shops and traders involving fire risks.
3. On all floors of the buildings other than apartment buildings, if the height of the building exceeds 45m.

Note: See Footnote under Table K-1D.1 across Sl. Nos. (d) & (e).

K-10.4 Carbon-Di-Oxide Fire Extinguishing System. Fixed CO_2 fire extinguishing installation shall be provided as per IS: 6382-1971 Code of Practice for design and installation of fixed CO_2 fire extinguishing system on premises where water or foam cannot be used for fire extinguishments because of the special nature of the contents of the buildings/ areas to be protected.

K-11 Fire Alarm System

K-11.1 All buildings above 15m. in height shall be equipped with fire alarm system as given in bye-laws No. K-11.1.1 & K-11.1.2.

K-11.1.1 Residential Building (Dwelling Houses, Boardinghouses & Hotels)

1. All residential buildings like dwelling houses (including flats), boardinghouses and hostels shall be equipped with manually operated electrical fire alarm system with one or more call boxes located at each floor. The location of the call boxes shall be decided after taking into consideration the floor plan with a view to ensure that one or the other call box shall be readily accessible to all occupants of the floor without having to travel more than 22.5m.

2. The call boxes shall be of the 'break-glass' type without any moving parts, where the call is transmitted automatically to the control room without any other action on the part of the person operating the call box.

3. All call boxes shall be wired in a close circuit to a control panel in the control room, located as per Bye-law No. K-12 so that the floor No. from where the call box is actuated is clearly indicated on the control panel. The circuit shall also include one or more batteries with a capacity of 48 hrs. normal working at full load. The battery shall be arranged to be a continuously trickle charged from the electric mains.

4. The call boxes shall be arranged to sound one or more sounders so as to ensure that all occupants of the building shall be warned whenever any call box is actuated.

5. The call boxes shall be so installed that they do not obstruct the exit ways and yet their location can easily be noticed from either direction. The base of the call box shall be at a height of 1 m from the floor level.

K-11.1.2 All other Buildings-All buildings other than as indicated under Bye-law No. K-11.1.1 shall, in addition to the manually operated electrical fire alarm system, be equipped with an automatic fire a1arm system. The latter shall be in addition to the alarm, which may be sounded by the actuation of any automatic fire extinguishing system, which may be installed in any particular occupancy in accordance with these byelaws. Unless otherwise decided by the Chief Fire Officer, Delhi Fire Service, the detectors for the automatic fire alarm system shall conform to 1S: 217S-1962 Heat Sensitive Fire Detectors and the system shall be installed in accordance with IS: 2189-1962 Code of Practice for Automatic Fire Alarm system, or any other relevant Indian Standards prepared from time to time.

Note: Several types of fire detectors are available in the market, but the application of each type is limited and has to be carefully considered in relation to the type of risk and the structural features of the building where they are to be installed.

K.12 Control Room

K.12.1 There shall be a control room on the entrance floor of the building with communication system (suitable public address system) to all floors and facilities for receiving the message from different floors. Details of al1 floor plans along with the details of fire fighting equipment and installations shall be maintained in the Control Room. The control room shall also have facilities to detect the fire on any floor through Indicator Boards connecting fire detecting and alarm system on all floors. The staff incharge of control room shall be responsible for the maintenance of the various services and fire fighting equipment and installations.

K-13 House Keeping

K-13.1 To eliminate fire hazards a good house keeping inside the building and outside the building shall be strictly maintained by the occupant's and/or the owner of the building.

K-14 Fire Drills and Fire Orders

K- 14.1 Fire notices/orders shall be prepared to fulfill the requirements of the fire fighting and evacuation from the building in the event of fire and other incidents. The occupants shall be made thoroughly conversant with their action in the event of the emergency, by displaying fire notices at vantage points. Such notices should be displayed prominently in broad lettering.