

Chapter-7

FIRE PROTECTION AND FIRE SAFETY REQUIREMENTS

7.1 SCOPE

This part covers the requirements of the fire protection for the multi-storeyed buildings (high rise buildings) and the buildings, which are of 15 m. and above in height and low occupancies of categories such as Assembly, Institutional., Educational (more than two storeyed and built-up area exceeds 1000 sq m.), Business (where plot area exceeds 500 sq m.), Mercantile (where aggregate covered area exceeds 750 sq m.), Hotel, Hospital, Nursing Homes, Underground Complexes, Industrial Storage, Meeting / Banquet Halls, Hazardous Occupancies.

7.2 PROCEDURE FOR CLEARANCE FROM FIRE SERVICE

- a) The concerned Authority shall refer the building plans to the Chief Fire Officer for obtaining clearance in respect of building identified in clause 7.1 of these Bye-Laws.
- b) The Authority shall furnish three sets of complete building plans along with prescribed fee to the Chief Fire Officer, after ensuring that the proposals are in line with Master Plan/Zonal Plan of the area.
- c) The plans shall be clearly marked and indicate the complete fire protection arrangements and the means of access/escape for the proposed building with suitable legend along with standard signs and symbols on the drawings. The same shall be duly signed/certified by a licensed Fire Consultant/Architect. The information regarding fire safety measures shall be furnished as per Annexure 'D' along with details.

- d) The Chief Fire Officer shall examine these plans to ensure that they are in accordance with the provisions of fire safety and means of escape as per these bye- laws and shall forward two sets of plans duly signed for implementation to the building sanctioning Authority.
- e) After completion of fire fighting installations as approved and duly tested and certified by the licensed Fire Consultant / Architect, the Owner/ Builder of the building shall approach the Chief Fire Officer through the concerned Authority for obtaining clearance from fire safety and means of escape point of view. The concerned Authority shall ensure that clearance from Chief Fire Officer has been obtained for the building identified in clause 7.1 before granting the completion certificate.
- f) On receipt of the above request, the Chief Fire Officer shall issue the No Objection Certificate from fire safety and means of escape point of view after satisfying himself that the entire fire protection measures are implemented and functional as per approved plans.
- g) Any deficiencies observed during the course of inspection shall be communicated to the Authority for rectification and a copy of the same shall be forwarded to the concerned building owner /builder.

7.3 RENEWAL OF FIRE CLEARANCE

On the basis of undertaking given by the Fire Consultant / Architect, the Chief Fire Officer shall renew the fire clearance in respect of the following buildings on annual basis:-

- 1) Public entertainment and assembly
- 2) Hospitals
- 3) Hotels
- 4) Under ground shopping complex

7.4 FEE

- a) For augmentation of fire service facilities for effecting rescue/fire fighting operation in high rise building, fee payable to Chief Fire Officer by the applicant(s) along with sets of plans for obtaining the No Objection Certificate shall be as prescribed by the Authority.

7.5 FIRE CONSULTANT

The Architect of the project will be responsible for making provisions for fire protection and fire fighting measure as provided in this Chapter and for that she / he may consult an expert in this field, as in case of other professionals for structural, sanitary and others.

7.6 TERMINOLOGY

For the purpose of this Chapter all the technical terms shall have the meaning as defined in National Building Code of India, Part-IV, Fire Protection as amended from time to time but for the terms which are defined otherwise in these bye-Laws.

7.7 GENERAL

The Chief Fire Officer may insist on suitable provisions in the building from fire safety and means of escape point of view depending on the occupancy, height or on account of new developments creating special fire hazard, in addition to the provision of these building bye laws and part IV (Fire Protection) of National Building Code of India

7.8 MEANS OF ACCESS

As provided in Building Bye-Laws 4.7.

7.8.1 Provisions of Exterior Open Spaces around the Building :As provided in building bye laws 4.9.4.

7.9 EXIT REQUIREMENT

As provided in Building Bye-Laws 4.8.

7.9.1 Type of Exits: As provided in Building Bye-Laws 4.8.1

7.9.2 Number of Size of Exits: As provided in Building Bye-Laws 4.8.2

7.9.3 Arrangements of Exits: As provided in Building Bye-Laws 4.8.3

7.9.4 Occupant Load: As provided in Building Bye-Laws 4.1

7.9.5 Capacity of Exit: As provided in Building Bye-Laws 4.8.4

7.9.6 Staircase Requirements: As provided in Building Bye-Laws 4.8.5

7.9.7 Minimum Width Provision for Stairways: As provided in Building Bye-Laws 4.8.6

7.9.8 Minimum Width Provision for Passageway/Corridors: As provided in Building Bye-Laws 4.8.7

7.9.9 Doorways: As provided in Building Bye-Laws 4.8.8

7.9.10 Stairways: As provided in Building Bye-Laws 4.8.9

7.9.11 Fire Escapes or External Stairs:

- a) Fire escape shall not be taken into account while calculating the number of staircases for a building.
- b) All fire escapes shall be directly connected to the ground.
- c) Entrance to the fire escape shall be separate and remote from internal staircase.
- d) The route to fire escape shall be free of obstructions at all times except the doorway leading to the fire escape which shall have the required fire resistance.
- e) Fire escape shall be constructed of non-combustible materials.
- f) Fire escape stairs shall have straight flight not less than 125 cm wide with 25 cm treads and risers not more than 19 cm.
- g) Handrails shall be at a height not less than 100 cm.
- h) Fire escape staircase in the mercantile, business, assembly, hotel buildings above 24 m. height shall be a fire tower and in such a case width of the same shall not be less than the width of the main staircase. No combustible material shall be allowed in the fire tower.

7.9.12 Spiral Stairs

- a) The use of spiral staircase shall be limited to low occupant load and to a building height 9 m.
- b) A spiral stair shall not be less than 150 cm in diameter and shall be designed to give the adequate headroom.

7.9.13 Staircase Enclosures

- a) The external enclosing walls of the staircase shall be of the brick or the R.C.C. construction having fire resistance of not less than two hours. All enclosed staircases shall have access through self-closing door of one-hour fire resistance. These shall be single swing doors opening in the direction of the escape. The door shall be fitted with the check action door closers.
- b) The staircase enclosures on the external wall of the building shall be ventilated to the atmosphere at each landing.
- c) Permanent vent at the top equal to the 5% of the cross sectional area of the enclosure and openable sashes at each floor level with area equal to 1 to 15% of the cross sectional area of the enclosure on external shall be provided. The roof of the shaft shall be at least 1 m. above the surrounding roof. There shall be no glazing or the glass bricks in any internal closing wall of staircase. If the staircase is in the core of the building and cannot be ventilated at each landing, a positive of 5-mm. w.g. by an electrically operated blower/blowers shall be maintained.
- d) The mechanism for pressurizing the staircase shaft shall be so installed that the same shall operate automatically on fire alarm system/sprinkler system and be provided with manual operation facilities.

7.9.14 Ramps

- a) Ramps of slope of not more than 1 in 10 may be substituted for and shall comply with all the applicable requirements of all required stairways as to enclosure capacity and limiting dimensions. Larger 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.

- b) The minimum width of the ramps in the Hospitals shall be 2.4 m. and in the basement using car parking shall be 6.0 m.
- c) Handrails shall be provided on both sides of the ramp.
- d) Ramp shall lead directly to outside open space at ground level or courtyards of safe place.
- e) For building above 24.0 m. in height, access to ramps from any floor of the building shall be through smoke fire check door.
- f) In case of nursing homes, hospitals etc. area exceeding 300 sq m. at each floor one of the exit facility shall be a ramp of not less than 2.4 m. in width.

7.10 PROVISION OF LIFTS

- a) Provision of the lifts shall be made for all multi-storeyed building having a height of 15.0 m. and above.
- b) All the floors shall be accessible for 24 hrs. by the lift. The lift provided in the buildings shall not be considered as a means of escape in case of emergency.
- c) Grounding switch at ground floor level to enable the fire service to ground the lift car in case of emergency shall also be provided.
- d) The lift machine room shall be separate and no other machinery be installed in it.

7.10.1 Lift Enclosure/lift

General requirements shall be as follows

- a) Walls of lift enclosures shall have a fire rating of two hours. Lift shafts shall have a vent at the top of area not less than 0.2 sq m.
- b) Lift motor room shall be located preferably on top of the shaft and separated from the shaft by the floor of the room.
- c) Landing door in lift enclosures shall have a fire resistance of not less than one hour.
- d) The number of lifts in one lift bank shall not exceed four. A wall of two hours fire rating shall separate individual shafts in a bank.
- e) Lift car door shall have a fire resistance rating of 1 hour.

- f) For buildings 15.0 m. and above in height, collapsible gates shall not be permitted for lifts and solid doors with fire resistance of at least one hour shall be provided.
- g) If the lift shaft and lobby is in the core of the building a positive pressure between 25 and 30 pa shall be maintained in the lobby and a possible pressure of 50 pa shall be maintained in the lift shaft. The mechanism for the pressurization shall act automatically with the fire alarm/sprinkler system and it shall be possible to operate this mechanically also.
- h) Exit from the lift lobby, if located in the core of the building, shall be through a self-closing fire smoke check door of one-hour fire resistance.
- i) Lift shall not normally communicate with the basement. If however, lifts are in communication, the lift lobby of the basement shall be pressurized as in (g) with self closing door as in (h).
- j) Grounding switch (es), at ground floor level shall be provided to enable the fire service to ground the lifts.
- k) Telephone/talk back communication facilities may be provided in lift cars for communication system and lifts shall be connected to the fire control room of the building.
- l) Suitable arrangements such as providing slope in the floor of the lift lobby shall be made to prevent water used during fire fighting, etc at any landing from entering the lift shafts.
- m) A sign shall be posted and maintained on every floor at or near the lift indicating that in case of fire, occupants shall use the stairs unless instructed otherwise. The sign shall also contain a plan for each floor showing the location of the stairways. Floor marking shall be done at each floor on the wall in front of the lift-landing door.
- n) Alternate power supply shall be provided in all the lifts.

7.10.2 Fire Lift

Following details shall apply for a fire lift in addition to above requirements:

- a) To enable fire service personnel to reach the upper floors with the minimum delay, one or more of the lifts shall be so designed so as to be available for the exclusive use of the fireman in an emergency and be directly accessible to every dwelling/lettable floor space on each floor.
- b) The lift shall have a floor area of not less than 1.4 sq.mt. It shall have a loading capacity of not less than 545 kg. (8 persons lift) with automatic closing doors.
- c) The electric supply shall be on a separate service from electric supply mains in a building and the cables run in a route safe from fire, that is within a lift shaft. Lights and fans in the elevator having wooden paneling or sheet steel construction shall be operated on 24-volt supply.
- d) In case of failure of normal electric supply, it shall automatically switchover to the alternate supply. For apartment houses, this changeover of supply could be done through manually operated changeover switch. Alternatively, the lift should be so wired that in case of power failure, it comes down at the ground level and comes to stand still with door open.
- e) The operation of a fire lift shall be by a single toggle of 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 or on a priority control device. When the switch is off, the lift will return to normal working. This lift can be used by the occupants in normal times.
- f) The words 'FIRE LIFT' shall be conspicuously displayed in fluorescent paint on the lift landing doors at each floor level.
- g) The speed of the fire lift shall be such that it can reach to the top floor from ground level within one minute.

7.11 BASEMENT

As provided in Chapter- 3 and Building Bye-Laws 4.5.5

7.11.1 Requirements

- i) The access to the basement shall be either from the main or alternate staircase providing access and exit from higher floors. Where the staircase is continue 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 the (iv).
- ii) In case of basement for office, sufficient number of exit ways and access ways shall be provided with a travel distance not more than 15.0 m. The travel distance in case of dead-end shall be 7.5 m.
- iii) The basement shall be partitioned and in no case compartment shall be more than 500 sq m. and less than 50 sq m. area except parking. Each compartment shall have ventilation standards as laid down in Bye-Laws separately and independently. The partition shall be made in consultation with Chief Fire Officer.
- iv) The first basement (immediately below ground level) can be used for services/parking/other permissible services. Lower basement, if provided, shall exclusively be used for car parking only.
- v) Each basement shall be separately ventilated. Vents with cross-sectional area (aggregate) not less than 2.5 percent of the floor area spread evenly round the perimeter of the basement shall be provided in the form of grills or breakable starboard lights or pavement lights or by way of shafts. Alternatively a system of air inlets shall be provided at basement floor level and smoke outlets at basement ceiling level. Inlets and extracts may be terminated at ground level with starboard or pavement lights as before. But ducts to convey fresh air to the basement floor level have to be laid. Starboard and pavement lights should be in positions easily accessible to the firemen and clearly marked "SMOKE OUTLET" or AIR INLET" with an indication of area served at or near the opening.
- vi) The staircase of basement shall be of enclosed type having fire resistance of not less than two hours and shall be situated at the periphery of the basement to be entered at ground level only from the open air and in such positions that

smoke from any fire in the basement shall not obstruct any exit serving the ground and upper stories of the building and shall communicate with basement through a lobby provided with fire resisting self closing door of one hour rating. In case of basement being used as car parking only, the travel distance shall be 45 m.

- vii) In multi-storeyed basements, intake duct may serve all basements levels, but each basement and basement compartment shall have separate smoke outlet duct or ducts. Mechanical extractors for smoke venting system from lower basement levels shall also be provided. The system shall be of such design as to operate on actuation of smoke, heat sensitive detectors/sprinklers, if installed, and shall have a considerably superior performance compared to the standard units. It shall also have an arrangement to start it manually.
- viii) Mechanical extractors shall have an internal locking arrangement so that extractors shall continue to operate and supply fans shall stop automatically with the actuation of fire detectors. Mechanical extractors shall be designed to permit 30 air changes per hour in case of fire or distress call. However, for normal operation, only 30 air changes or any other convenient factor can be maintained.
- ix) Mechanical extractors shall have an alternate source of power supply.
- x) Ventilating ducts shall be integrated with the structure and made out of brick masonry or RCC as far as possible and when this duct crosses the transformer area of electrical switchboard, fire dampers shall be provided.
- xi) Kitchens working on gas fuel shall not be permitted in basement/sub-basement.
- xii) If cutouts are provided from basement to the upper floors or to the atmosphere, all side cutout openings in the basements shall be protected by sprinkler heads at closed spacing so as to form a water curtain in the event of a fire.
- xiii) Dewatering pump shall be provided in all basements.

7.12 PROVISION OF HELIPAD

All high-rise buildings 50 m. and above shall have provision for a Helipad on the terrace. The same shall be approved by the Authority.

7.13 SERVICE DUCTS/REFUGE CHUTE

- a) Service duct shall be enclosed by walls and door, if any, of 2 hours fire rating. If ducts are larger than 10 sq m. the floor should seal them, but provide suitable opening for the pipes to pass through, with the gaps sealed.
- b) A vent opening at the top of the service shaft shall be provided between one-fourth and one-half of the area of the shaft. Refuge chutes shall have an outlet at least of wall of non-combustible material with fire resistance of not less than two hours. They shall not be located within the staircase enclosure or service shafts or air-conditioning shafts. Inspection panel and door shall be tight fitting with 1 hour fire resistance; the chutes should be as far away as possible from exits.
- c) Refuge chutes shall not be provided in staircase walls and A/C shafts etc.

7.14 ELECTRICAL SERVICES

Electrical Services shall conform to the following:

- a) The electric distribution cables/wiring shall be laid in a separate duct shall be sealed at every floor with non-combustible material having the same fire resistance as that of the duct. Low and medium voltage wiring running in shaft and in false ceiling shall run in separate conduits.
- b) Water mains, telephone wires, inter-com lines, gas pipes or any other service lines shall not be laid in ducts for electric cables.
- c) Separate conduits for water pumps, lifts, staircases and corridor lighting and blowers for pressuring system shall be directly from the main switch panel and these circuits shall be laid in separate conduit pipes, so that fire in one

circuit will not affect the others. Master switches controlling essential service circuits shall be clearly labeled.

- d) The inspection panel doors and any other opening in the shaft shall be provided with airtight fire doors having fire resistance of not less than 1 hour.
- e) Medium and low voltage wiring running in shafts, and within false ceiling shall run in metal conduits. Any 230 voltage wiring for lighting or other services, above false ceiling should have 660V grade insulation. The false ceiling including all fixtures used for its suspension shall be of non-combustible material.
- f) An independent and well-ventilated service room shall be provided on the ground floor with direct access from outside or from the corridor for the purpose of termination of electrical supply from the licenses service and alternative supply cables. The doors provided for the service room shall have fire resistance of not less than 1 hour
- g) MCB and ELCB shall be provided for electrical circuit.

7.15 STAIRCASE AND CORRIDOR LIGHTS

The staircase and corridor lighting shall be on separate circuits and shall be independently connected so that 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 individual control of the light points, if any. It should be of miniature circuit breaker type of switch so as to avoid replacement of fuse in case of crisis.

- a) Staircase and corridor lighting shall also be connected to alternate source of power supply.
- b) Suitable arrangement shall be made by installing double throw switches to ensure that the lighting installed in the staircase and the corridor does not get connected to two sources of supply simultaneously. Double throw switch shall be installed in the service room for terminating the stand by supply.
- c) Emergency lights shall be provided in the staircase and corridor.

7.16 AIR-CONDITIONING

- a) Air- conditioning system should be installed and maintained so as to minimise the danger of spread of fire, smoke or fumes thereby from one floor of fire area to another or from outside into any occupied building or structure.
- b) Air -Conditioning systems circulating air to more than one floor area should be provided with dampers designed to close automatically in case of fire and thereby prevent spread of fire or smoke. Such a system should also be provided with automatic controls to stop fans in case of fire, unless arranged to remove smoke from a fire, in which case these should be designed to remain in operation.
- c) Air- conditioning system serving large places of assembly (over one thousand persons), large departmental stores, or hostels with over 100 rooms in a single block should be provided with effective means for preventing circulation of smoke through the system in the case of fire in air filters or from other sources drawn into the system even though there is insufficient heat to actuate heat smoke sensitive devices controlling fans or dampers. Such means shall consist of approved effective smoke sensitive controls.

7.16.1 Air- Conditioning should conform to the following:

- a) Escape routes like staircase, common corridors, lift lobbies; etc should not be used as return air passage.
- b) The ducting should be constructed of metal in accordance with BIS 655:1963
- c) Wherever the ducts pass through fire walls or floor, the opening around the ducts should be sealed with fire resisting material of same rating as of walls / floors.
- d) Metallic ducts should be used even for the return air instead of space above the false ceiling.
- e) The material used for insulating the duct system (inside or outside) should be of flame resistant (IS 4355: 1977) and non- conductor of heat.
- f) Area more than 750 sq m. on individual floor should be segregated by a firewall and automatic fire dampers for isolation should be provided.

- g) In case of more than one floor, arrangement by way of automatic fire dampers for isolating the ducting at every floor from the floor should be made. Where plenums used for return air passage, ceiling and its features and air filters of the air handling units, these should be flame resistant. Inspection panels should be provided in the main trenching. No combustible material should be fixed nearer than 15 cm. to any duct unless such ducting is properly enclosed and protected with flame resistant material
- h) In case of buildings more than 24 m. in height, in non-ventilated lobbies, corridors, smoke extraction shaft should be provided.

7.16.2 Fire Dampers

- a) These shall be located in air ducts and return air ducts/passages at the following points:
 - i) At the fire separation wall.
 - ii) Where ducts/passages enter the central vertical shaft.
 - iii) Where the ducts pass through floors.
 - iv) At the inlet of supply air duct and the return air duct of each compartment on every floor.
- b) The dampers shall operate automatically and shall simultaneously switch off the air- handling fans. Manual operation facilities shall also be provided.

Note: For blowers, where extraction system and dust accumulators are used, dampers shall be provided.

- c) Fire/smoke dampers(for smoke extraction shafts) for building more than 24 m. in height.
For apartment houses in non-ventilated lobbies /corridor operated by detection system and manual control sprinkler system.
For other buildings on operation of smoke/ heat detection system and manual control/sprinkler system.
- d) Automatic fire dampers shall be so arranged so as to close by gravity in the direction of air movement and to remain tightly closed on operation of a fusible link.

7.17 BOILER ROOM

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

- a) The boiler shall not be allowed in sub-basement, but may be allowed in the basement away from the escape routes.
- b) 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 pits shall be provided at the low level.
- c) Entry to this room shall be provided with a composite door of 2 hours fire resistance.
- d) The boiler room shall be provided with fresh air inlets and smoke exhaust directly to the atmosphere.
- e) The furnace oil tank for the boiler if located in the adjoining room shall be separated by fire resisting wall of 4 hours rating. The entrance to this room shall be provided with double composite doors. A curb of suitable height shall be provided at the entrance in order to prevent the flow of oil into boiler room in case of tank rupture.
- f) Foam inlets shall be provided on the external walls of the building near the ground level to enable the fire services to use foam in case of fire.

7.18 ALTERNATE SOURCE OF ELECTRIC SUPPLY

A stand by electric generator shall be installed to supply power to staircase and corridor lighting circuits, lifts detection system, fire pumps, pressurization fans and bowlers, P.A system, exit sign, smoke extraction 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 standby pump is driven by diesel engine, the generator supply need not be connected to the standby pump. The generator shall be automatic in operation.

7.19 SAFETY MEASURES IN ELECTRIC SUB-STATION

- 1) Clear independent approach to the sub-station from outside the building shall be made available round the clock
- 2) The approaches/corridors to the sub-station area shall be kept clear for movement of men and material at all times.
- 3) The sub-station space is required to be provided with proper internal lighting arrangements.
- 4) In addition to natural ventilation proper ventilation to the sub-station area is to be provided by grill shutters and exhaust fans at suitable places so as to discharge all smoke from the sub-station without delay in case of fire so that sub-station operations can be carried out expeditiously.
- 5) Cable trenches of 0.6 m. X 0.6 m. dummy floor of 0.6 mt. depth shall be provided to facilitate laying of cable inside the building for connecting to the equipment.
- 6) Steel shutters of 8' X 8' with suitable grills shall be provided for transformers and sub-station room.
- 7) The floor of the sub-station should be capable of carrying 10 tons of transformer weight on wheels.
- 8) Built up substation space is to be provided free of cost.
- 9) Sub-station space should be clear from any water, sewer, air conditioning, and gas pipe or telephone services. No other service should pass through the sub station space or the cable trenches.
- 10) Proper ramp with suitable slope may be provided for loading and unloading of the equipment and proper approach will be provided.
- 11) RCC pipes at suitable places as required will be provided for the cable entries to the sub station space and making suitable arrangement for non-ingress of water through these pipes.
- 12) The sub station space is to be provided in the approved/sanctioned covered area of the building.

- 13) Any other alteration /modification required while erection of the equipment will be made by the Owner / builder at site as per requirement.
- 14) Adequate arrangement for fixing chain pulley block above the fixing be available for load of 15 tons.
- 15) Provision shall be kept for the sumps so as to accommodate complete volume of transformer oil, which can spillover in the event of explosion of the transformer in the basement of the building. Sufficient arrangement should exist to avoid fire in the sub-station building from spread of the oil from the sumps.
- 16) Arrangement should be made for the provision of fire retardent cables so as to avoid chances of spread of fire in the sub-station building.
- 17) Sufficient pumping arrangement should exist for pumping the water out, in case of fire so as to ensure minimum loss to the switchgear and transformer.
- 18) No combustible material should be stacked inside the substation premises or in the vicinity to avoid chances of fire.
- 19) It should be made mandatory that the promoters of the multi-storeyed building should get substation premises inspected once a year to get their license revalidated for the provision of electric supply from Electricity Board so that suitable action can be taken against the Owner / Builder in case of non-implementation of Bye-Laws.
- 20) The sub-station must not be located below the 1st basement and above the ground floor.
- 21) The sub station space should be totally segregated from the other areas of the basement by fire resisting wall. The ramp should have a slope of 1 : 10 with entry from ground level. The entire Sub-station space including the entrance at ground floor be handed over to the licensee of electricity free of cost and rent.
- 22) The sub-station area shall have a clear height of 12 feet (3.65 m.) below beams. Further the Sub-station area will have level above the rest of basement level by 2 feet.
- 23) It is to be ensured that the Sub-station area is free of seepage / leakage of water.

- 24) The licensee of electricity will have the power to disconnect the supply of the building in case of violation of any of the above points.
- 25) Electric sub station enclosure must be completely segregated with 4-hours fire rating wall from remaining part of basement.
- 26) The Sub-station should be located on periphery /sub basement and (not above ground floor).
- 27) Additional exit shall be provided if travel distance from farthest corner to ramp is more than 15 m.
- 28) Perfect independent vent system 30 air changes per hour linked with detection as well as automatic high velocity water spray system shall be provided.
- 29) All the transformers shall be protected with high velocity water spray system / Nitrogen Injection System Carbon Dioxide total flooding system in case of oil filled transformer. In addition to this, manual control of auto high velocity spray system for individual transformers shall be located outside the building at ground floor.
- 30) Suitable arrangement for pump house, water storage tanks with main electrical pump and a diesel-operated pump shall be made if no such arrangement is provided in the building. In case the water pumping facilities are existing in the building for sprinkler system, the same should however be utilized for high velocity water spray system. Alternatively automatic CO2 total flooding system shall be provided with manual controls outside the electric sub-station.
- 31) System shall have facility to give an audio alarm in the basement as well as at the control room.
- 32) Fire control room shall be manned round the clock.
- 33) The electric sub station shall have electric supply from alternate source for operation of vent System lighting arrangements.
- 34) Cable trenches shall be filled with sand
- 35) Party walls shall be provided between two transformers as per the rules.
- 36) Electric control panels shall be segregated.
- 37) Exits from basement electric substation shall have self-closing fire smoke check doors of 2-hours fire rating near entry to ramp.

- 38) All openings to lower basement or to ground floor shall be sealed properly.
- 39) Yearly inspection shall be carried out by electrical load sanctioning Authority.
- 40) Ramp to be designed in a manner that in case of fire no smoke should enter the main building.
- 41) Electric sub station transformer shall have clearance on all sides as per BBL/relevant electric rules.
- 42) Other facility will be as per Building Bye-Laws and relevant electric rules.
- 43) Rising electrical mains shall consist of metal bus bars suitably protected from safety point of view.
- 44) Oil less transformer shall be preferred.

7.20 FIRE PROTECTION REQUIREMENTS

Buildings shall be planned, designed and constructed to ensure fire safety and this shall be done in accordance with part 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. 7.1) the building schemes shall also be cleared by the Chief Fire Officer.

7.20.1 First Aid /Fixed Fire Fighting /Fire Detection Systems and other Facilities

Provision of fire safety arrangement for different occupancy from. SI no. 1 to 23 as indicated below shall be as per Annexure 'A' 'B' & 'C'.

1. Access
2. Wet Riser
3. Down Comer
4. Hose Reel
5. Automatic Sprinkler System
6. Yard Hydrant
7. U.G. Tank with Draw off Connection
8. Terrace Tanks
9. Fire Pump

10. Terrace Pump
11. First Aid Fire Fighting Appliances
12. Auto Detection System
13. Manual operated Electrical Fire Alarm System
14. P.A System with talk back facility
15. Emergency Light
16. Auto D.G. Set
17. Illuminated Exit Sign
18. Means of Escape
19. Compartmentation
20. MCB /ELCB
21. Fire Man Switch in Lift
22. Hose Boxes with Delivery Hoses and Branch
23. Pipes Refuge Area

Note for Annexure ‘A’ ‘B’ & ‘C’

- 1 Where more than one riser is required because of large floor area, the quantity of water and pump capacity recommended in these Annexures should be finalized in consultation with Chief Fire Officer.
- 2 The above quantities of water shall be exclusively for fire fighting and shall not be utilized for domestic or other use.
- 3 A facility to boost up water pressure in the riser directly from the mobile pump shall be provided in the wet riser, down comer system with suitable fire service inlets (collecting head) with 2 to 4 numbers of 63 mm inlets for 100-200 mm dia main, with check valve and a gate valve.
4. Internal diameter of rubber hose for reel shall be minimum 20 mm. A shut off branch with nozzle of 5 mm. size shall be provided.
- 5 Fire pumps shall have positive suction. The pump house shall be adequately ventilated by using normal/mechanical means. A clear space of 1.0 m. shall be kept in between the pumps and enclosure for easy movement /maintenance. Proper testing facilities and control panel etc. shall be provided.

- 6 Unless otherwise specified in Bye-Laws, the fire fighting equipments /installation shall conform to relevant Indian Standard Specification.
- 7 In case of mixed occupancy, the fire fighting arrangement shall be made as per the highest class of occupancy.
- 8 Requirement of water based first aid fire extinguishers shall be reduced to half if hose reel is provided in the Building.

7.21 STATIC WATER STORAGE TANK

- a) A satisfactory supply of water exclusively for the purpose of fire fighting shall always be available in the form of underground static storage tank with capacity specified in Annexure-A with arrangements of replenishment by town's main or alternative source of supply @ 1000 liters per minute. The static storage water supply required for the above mentioned purpose should entirely be accessible to the fire tenders 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 45 tonnes in case of high rise and 22 tonnes in case of low rise buildings. A draw off connection shall be provided. The slab need not strengthened if the static tank is not located in mandatory set- back area.
- b) To prevent stagnation of water in the static water tank the suction tank of the domestic water supply shall be fed only through an over flow arrangement to maintain the level therein at the minimum specified capacity.
- c) The static water storage tank shall be provided with a fire brigade collecting branching with 4 Nos. 63mm dia instantaneous male inlets arranged in a valve box with a suitable fixed pipe not less than 15 cm dia to discharge water into the tank. This arrangement is not required where down comer is provided.

7.22 AUTOMATIC SPRINKLERS

Automatic sprinkler system shall be installed in the following buildings:

- a) All buildings of 24 m. and above in height, except group housing and 45 m. and above in case of apartment /group housing society building.
- b) Hotels below 15 m. in height and above 1000 sq m. built up area at each floor and or if basement is existing.
- c) All hotels, mercantile, and institutional buildings of 15 m. and above.
- d) Mercantile building having basement more than one floor but below 15 m. (floor area not exceeding 750 sq m.)
- e) Underground Shopping Complex.
- f) Underground car / scooter parking /enclosed car parking.
- g) Basement area 200 sq m. and above.
- h) Any special hazards where the Chief Fire Officer considers it necessary.
- i) For buildings up to 24 m. in height where automatic sprinkler system is not mandatory as per these Bye-Laws, if provided with sprinkler installation following relaxation may be considered.
 - i) Automatic heat/smoke detection system and M.C.P. need not be insisted upon.
 - ii) The number of Fire Extinguisher required shall be reduced by half.

7.23 FIXED CARBON DI-OXIDE / FOAM / DCO WATER SPRAY EXTINGUISHING SYSTEM

Fixed extinguishing installations shall be provided as per the relevant specifications in the premises where use of above extinguishing media is considered necessary by the Chief Fire Officer.

7.24 FIRE ALARM SYSTEM

All buildings of 15 m. and above in height shall be equipped with fire alarm system, and also residential buildings (Dwelling House, Boarding House and Hostels) above 24 m. height.

- a) All residential buildings like dwelling houses (including flats) boarding houses 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 their floor without having to travel more than 22.5 m.
- b) 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 boxes.
- c) All call boxes shall be wired in a closed circuit to a control panel in a control room, located as per Bye-Laws so that the floor number 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 hours normal working at full load. The battery shall be arranged to be a continuously trickle charged from the electric mains.
- d) The call boxes shall be arranged to sound one or more sounders so as to ensure that all occupants of the floor shall be warned whenever any call box is actuated.
- e) 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 1.5 m. from the floor level.
- f) All buildings other than as indicated above shall, in addition to the manually operated electrical fire alarm system, be equipped with an automatic fire alarm system.
- g) Automatic detection system shall be installed in accordance with the relevant standard specifications. In buildings where automatic sprinkler system is provided, the automatic detection system may not be insisted upon unless decided otherwise by the Chief Fire Officer.

Note: Several type 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.

7.25 CONTROL ROOM

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 all floor plans along with the details of fire fighting equipment and installation shall be maintained in the Control Room. The Control Room shall also have facility to detect the fire on any floor through indicator boards connecting fire detection and alarm system on all floors. The staff in charge of the Control Room shall be responsible for the maintenance of the various services and fire fighting equipment and installation. The Control Room shall be manned round the clock by trained fire fighting staff.

7.26 FIRE DRILLS AND FIRE ORDERS

The guidelines for fire drill and evacuation etc. for high-rise building may be seen in Appendix (B) of National Building Code part IV. All such building shall prepare the fire orders duly approved by the Chief Fire Officer.

7.27 A qualified fire officer and trained staff shall be appointed for the following buildings.

- a) All high rise buildings above 30 m. in height where covered area of one floor exceeds 1000 sq m. except apartments / group housing.
- b) All hotels, identified under classification three star and above category by Tourism Department and all hotels above 15 m. in height with 150 beds capacity or more without star category.
- c) All hospital building of 15 m. and above or having number of beds exceeding 100.
- d) Underground shopping complex where covered area exceeds 1000 sq m.
- e) All high hazard industries.
- f) Any other risk which Chief Fire Officer considers necessary.

7.28 The lightning protection warning light (red) for high-rise buildings shall be provided in accordance with the relevant standard. The same shall be checked by electrical department.

7.29 MATERIAL USED FOR CONSTRUCTION OF BUILDING

- a) The combustible/flammable material shall not be used for partitioning, wall paneling, false ceiling etc. Any material giving out toxic gases/smoke if involved in the fire shall not be used for partitioning of a floor or wall paneling or a false ceiling etc. The surface frames spread of the lining material shall conform to class-I of the standard specification. The framework of the entire false ceiling would be provided with metallic sections and no wooden framework shall be allowed for paneling/false ceiling.
- b) Construction features/elements of structures shall conform to National Building Code and BIS code

7.30 LPG

The use of LPG shall not be permitted in the high-rise building except residential/hotel/hostel/kitchen/pantry (if any) and shall be located at the periphery of the building on the ground level.

7.31 HOUSE KEEPING

A high standard of house keeping must be insisted upon by all concerned. There must be no laxity in this respect. It must be borne in mind that fire safety is dependent to a large extent upon good housekeeping.

7.31.1 Good House-Keeping includes the following:-

- a) Maintaining the entire premises in neat and clean condition.

- b) Ensuring that rubbish and combustible material are not thrown about or allowed to accumulate, even in small quantity, in any portion of the building. Particular attention must be paid to corners and places hidden from view.
- c) Providing metal receptacles/waste paper basket (of non-combustible material) at suitable locations for disposal of waste. Separate receptacles must be provided for disposal of cotton rags/waste, wherever it is generated, these must under no circumstances be left lying around in any portion of the building.
- d) Ensuring that receptacles for waste are emptied at regular intervals and the waste removed immediately for safe disposal outside the building.
- e) Ensuring that all doors/fixtures are maintained in good repairs, particular attention must be paid to self-closing fire smoke check doors and automatic fire/doors/rolling shutters.
- f) Ensuring that self-closing fire/smoke check doors close properly and that the doors are not wedged open.
- g) Ensuring that the entire structure of the building is maintained in good repairs.
- h) Ensuring that all electrical and mechanical service equipments are maintained in good working condition at all times.
- i) Ensuring that Cars / Scooters etc. are parked systematically in neat rows. It is advisable to mark parking lines on the ground in the parking areas near the building and in the parking area on ground floor and in basement(s); as applicable, inside the building. A parking attendant must ensure that vehicles are parked in an orderly manner and that the vehicles do not encroach upon the open space surrounding the building.

7.31.2. Smoking Restrictions

- a) Smoking shall be prohibited throughout the basement(s) and in all areas where there is a profusion of combustible materials. Easily readable "NO SMOKING" signs must be conspicuously posted at locations where they can catch the eye. Each sign must also include a pictograph. The sign may also be illuminated.

- b) In all places where smoking is permitted ashtrays, half filled with water, must be placed on each table/at each other suitable locations for safe disposal of spent smoking material. The design of the ashtrays must be such that they cannot easily topple over. If, for any reason, this is not practicable a minimum of one metal bucket or other non-combustible container half filled with water must be provided in each compartment for disposal of spent smoking materials.

7.31.3 Limiting the Occupant Load in Parking and Other Areas of Basement(s)

Where parking facility is provided in the basement(s) no person other than the floor-parking attendant may be allowed to enter and remain in the parking areas except for parking and removal of Cars/Scooters. Regular offices must not be maintained in the storage /parking area in the basement(s). The stores / godowns must be opened for the limited purpose of keeping or removing stores.

No person other than those on duty may be permitted in the air-conditioning plant room(s), HL/LT switch room, transformer compartment, control room pump-house, generator room, stores and records etc.

7.32 FIRE PREVENTION

In addition to the measures recommended above, the following fire prevention measures must be implemented when the building is in occupation.

- a) Storage of flammable substances, such as diesel oil, gasoline, motor oils, etc must not be allowed anywhere within the building. The only exception to this rule may be:
 - i) Storage of diesel oil in a properly installed tank in a fire-resisting compartment in the generator room;
 - ii) Diesel oil, gasoline, motor oil etc, filled in the vehicle tanks.
- b) Preparation of tea and warming of food must be prohibited throughout the building.
- c) Where heaters are used during winters, the following precautions must be taken.
 - i) All heaters, except convector heaters, must be fitted with guards.

- ii) Heaters must not be placed in direct contact with or too close to any combustible material.
 - iii) Heaters must be kept away from curtains to ensure that the latter do not blow over the heater accidentally.
 - iv) Heaters must not be left unattended while they are switched on.
 - v) Defective heaters must be immediately removed from service until they have been repaired and tested for satisfactory performance.
 - vi) Use of heaters must be prohibited in the entire basement, fire control room and in all weather maker rooms throughout the building. Also in all places where there is profusion of combustible flammable materials.
- d) Use of candles or other naked light flame must be forbidden throughout the building, except in the offices (for sealing letters only) and kitchen. When candles/ spirit lamps are used for sealing letters/packets, extreme care must be take to ensure that paper do not come in direct contact with the naked flame and the candle/spirit lamp does not topple over accidentally while still lighted. All candles/spirit lamps kitchen fires must be extinguished when no longer required.
- e) Fluorescent lights must not be directly above the open file racks in offices/record rooms. Where this is unavoidable, such lights must be switched on only for as long as they are needed.
- f) Filling up of old furniture and other combustible materials such as scrap paper, rags, etc. must not be permitted anywhere in the building. These must be promptly removed from the building.
- g) More than one portable electrical appliance must not be connected to any single electrical outlet.
- h) Used stencils, ink smeared combustible materials and empty ink tubes must not be allowed to accumulate in rooms/compartments where cyclostyling is done. These must be removed and disposed off regularly.
- i) All shutters/doors of main switch panels and compartments/shafts for electrical cables must be kept locked.

- j) Aisles in record rooms and stores must have a clear uniform width of not less than 1.0 m. Racks must not be placed directly against the wall/partition.
- k) In record rooms, offices and stores, a clear space of not less than 30 cm. must be maintained between the top-most stack of stores/records and the or lighting fittings whichever is lower.
- l) A similar clearance, and at (k) above must be maintained from fire detectors.
- m) Fire detectors must not be painted under any circumstances and must also be kept free from lime/distemper.
- n) Records must not be piled/dumped on the floor.
- o) Welding or use of blow torch shall not be permitted inside the building, except when it is done under strict supervision and in full conformity with the requirements laid down in IS: 3016-1966 code of practice for fire precautions in welding and cutting operation.
- p) Printing ink/oil must not be allowed to remain on the floor, the floor must be maintained in a clean condition at all times.

7.33 OCCUPANCY RESTRICTIONS

- a) The premises leased to any party shall be used strictly for the purpose for which they are leased.
- b) No dangerous trade/practices (including experimenting with dangerous chemicals) shall be carried on in the leased premises;
- c) No dangerous goods shall be stored within the leased premises.
- d) The common/public corridor shall be maintained free of obstructions, and the lessee shall not put up any fixtures that may obstruct the passage in the corridor and/or shall not keep any wares, furniture or other articles in the corridor.
- e) The penalty for contravention of the condition laid down below must be immediate termination of lease and removal of all offending materials.
- f) Regular inspection and checks must be carried out at frequent intervals to ensure compliance with conditions above.