



Office of the Chief Fire Officer
Pune Municipal Corporation

Outward No. : _____
Date : 31/3/2016

To,
ARUN BHASKAR JOSHI

Subject : Final Fire NOC for proposed building at Sr.No. _____

Ref. : Your Office letter Date 29/3/2016

Sir,

As per your request, visited the proposed site along with Mr. _____ on Dt. 31/3/2016 and discussed with him regarding the fire protection system to be installed in the proposed building

Current situation of the Land : _____
Motorable road is available for proposed site : Yes

As per plans submitted to this office, information of the building will be as below.

Plot area : 14 Sq. Meter
Total built-up area : _____
as per plans submitted to this office

Charges Paid towards Fire NOC

Challan No. : _____ Challan Date : _____
Fire premium : _____
Fire service fees and Annual fees is paid by : _____
Fire Infrastructure Charges are paid by : _____

This N.O.C. is valid subject to fulfillment of the following conditions in the building :

Marginal Space Chart : D.C.Rule No 21.6.6.

Sr.No	High Rise Building Height	Minimum Area of plot required	Minimum width of Access road required in Mtrs.	Marginal spaces on other sides in Mtrs.	Front set back in Mtrs.
1	Above 36.00 Mtrs. and up to 50.00 Mtrs.	2000	12	9	9
2	Above 50.00 Mtrs. and up to 70.00 Mtrs.	6000	18	10	12
3	Above 70.00 Mtrs. and up to 100.00 Mtrs.	8000	24	12	12

These requirements should be taken in account while developing / proposed development of the building.

- The access road mentioned in table above should join another street of equal or greater width.
- Basement & podium is not permissible width required front and other marginal open spaces.
- No construction of any sort shall be permissible within minimum required marginal Distances.
- Soft copy of the structural Design shall be submitted to Municipal Corporation at the time of submission of

Building Plan and should be submitted to this department also.

Considering the above, This office has No objection to construct the building as proposed subject to the compliance of following fire prevention & fire protection systems in the building.

This N.O.C. is valid subject to fulfillment of the following conditions in the building :

- 1 The plans of the proposed building should be approved by the competent authority of Pune Municipal Corporation.
- 2 The building completion certificate & drainage completion certificate should be obtained from Building Department of P.M.C. The completion certificate shall be issued subject to “Final No-Objection Certificate” from this department.
- 3 Proper roads in the premises is sufficient provided for easy mobility of the Fire Brigade Appliance & marginal spaces should be kept free from obstructions all the time.
- 4 The internal roads shall be able to with stand the load of minimum 45 Tons.
- 5 All fire fighting equipments to be installed as per NBC - 2005/ D.C. Rule. Must be strictly confirming to relevant I.S. specification.
- 6 All the fire fighting equipments shall be well maintained and should be easily accessible in case of emergency.
- 7 Emergency Telephone numbers like “Police”, “Fire Brigade”, “Hospital”, “Doctors”, and “Responsible persons” should be displayed in security cabin, Reception & lobbies, passages of the buildings.
- 8 It shall be ensured that security staff & every employee of the building are trained in handling fire fighting equipments & fire fighting.
- 9 Cautionary boards such as "DANGER", "NO SMOKING", "EXIT", "FIRE ESCAPE", "EXTINGUISHER", "HYDRANT", "MANUAL CALL POINT" etc. should be displayed on the strategic location to guide the occupants in case of emergency. The signs should be of florescent type and should glow in darkness.
- 10 The Fire drill & Evacuation drill (Mock Drill) should be planed & conducted after every six months and the instruction should be given to the entire staff minimum four times in a year.
11. Twice in a year service auditing should be carried out for the building.
- 11 Well equipped fire control room shall be provided on the ground floor /Entrance gate of the building & A qualified Fire Officer from “**National Fire Service College, Nagpur** shall be employed to maintain the all fire prevention & protection arrangements provided to various building in the campus.
- 12 Interconnectivity between firewater tank & Domestic water tank shall be provided with isolation valve which to be kept normally in close position so that during emergency the stored water in domestic water tank can be utilized for fire fighting.
- 13 Fire Escape Staircase shall be directly connected to the ground Fire escape constructed of M.S. angels is not permitted. Entrance to the Fire Staircase shall be separate and remote from the internal staircase.
- 14 Staircase shall always be kept in sound operable condition. Emergency lighting arrangements shall be provided in fire escape.
- 15 Emergency lights shall be provided in all the staircases & corridors, Passageways, Gangways etc
- 16 Transformer should not be installed in the basement or any upper floors; it should be outside the building. Installation should be done in accordance with relevant norms.
- 17 Refuge area should be provided on a floor immediate floor after Height 24.00 Mtrs., after 39.00 Mtrs & on every 15th Mtrs. height thereafter. The location of the Refuge area should be got approved from Chief Fire officer. The refuge area should be on the front side & should be easily accessible for fire brigade vehicles. If the refuge area is in flat, it shout be properly marked as “**REFUGE AREA**” & easily visible from ground level.
- 18 The inspection panel doors and any other opening in the shaft shall be provided with airtight fire doors having the fire resistance of not less than two hours.
- 19 Non- Smoking cables should be used for all installations.
2. 21. Dedicated fire duct to be provided with minimum clear size of 700 mm x 1200 mm

GENERAL REQUIREMENTS FOR SAFETY & LIFE SAFETY

GENERAL REQUIREMENTS FOR SAFETY & LIFE SAFETY

As per the National Building Code 2005, the other IS and various Acts and Rules, the following recommendations are given for better fire and life safety of occupants and general safety of the buildings:

1. Increase Structural Integrity:

The standards for estimating the load effects of potentials hazards (e.g. progress collapse, wind) and the design of structural systems to mitigate the effects of those hazards should be improved to enhance structural integrity. This aspect should be taken in to consider while finalizing the design and construction details of all high rise building in the complex.

The recommendations are :

- Relevant standards should be adopted to prevent progressive collapse
- More reliable means of predicting the potential for complex failure in structures subjected to multiple hazards; and
- Adoption of accepted standards for wind tunnel testing of prototype structures and estimating wind load for tall buildings.

2. Enhanced Fire Resistance of Structures:

The material used in the construction stage and for carrying out internal finished should have the fire resistance of structures should be enhanced by improving the technical basis for construction classification and fire resistance ratings improving technical basis for standard fire resistance testing methods, using the “structural frame” approach to fire resistance ratings; and developing in service performance requirement and conformance criteria for spray applied fire resistive material (commonly referred to as “fireproofing”)

The recommendations are:

- valuating and where needed improving the technical basis for determining appropriate construction classifications and fire rating requirements-especially for tall buildings- and making related changes by considering a variety of factors (including timely access by emergency responders, full evacuation of occupants and redundancy in fire protection systems critical to structural safety);
- Adoption of standard for fire resistance testing of building components assemblies and systems - including establishing a capability for doing the improved testing under realistic fire and load conditions and
- Implementing criteria, test methods and standards for measuring the in service performance and as-installed conditions of “ fireproofing”

3. New Methods for Fire Resistance Design of Structures:

The procedures and practices used in the design of structures for fire resistance should be enhanced by requiring an objective that uncontrolled fires result in burnout without partial or global (total) collapse Performance- based methods are an alternative to prescriptive design methods. This should include.

- (1) Use of new fire resistive coating materials and technologies for limiting the spread of fire within the building and
- (2) Use of fire resistant steels and concretes should be done while construction of high rise buildings.

4. Active Fire Protection:

Active fire protection systems (i.e. sprinklers, standpipes/hoses, fire alarms and smoke management systems) should be enhanced through improvements to design performance reliability and redundancy of such systems.

Among the recommendations in this group are.

- Installation of fire protection systems to provide redundancy and accommodate the higher risks

associated with tall buildings.

- Installation of advanced fire alarms and communications systems that provide continuous, reliable and accurate information on life safety conditions; and
- The real time secure transmissions of data from fire alarm and other monitored building systems for use by emergency responders at any location and storage of that data off-site or in a black box.

5. **Improved Building Evacuation:**

The process of evacuating a building should be improved to include systems design that facilitate safe and rapid egress; methods for ensuring clear and timely emergency communications to occupants better occupant preparedness for evacuation during emergencies and incorporation of appropriate egress technologies should be implemented in high rise buildings.

Among the recommendations are

- Improving occupant preparedness for building evacuations through joint and wide public education and training campaigns;
- Designing tall building to accommodate timely full building evacuation of occupants if needed - including stairwell capacity and stair discharge door width that accommodates counter flow due to access by emergency responders;
- Maximizing the remoteness of egress components (i.e. stairs, elevators) without making them hard to reach.
- Using cell phones and I-pads for broadcast warning systems and Community Emergency Alert Networks; and
- Incorporation of future use such current and next-generation evacuation technologies as protect/hardened elevators, exterior escape systems and stairwell descent devices etc. should be incorporated in high rise building.

6. **Improved Emergency Response:**

Latest Technologies and procedures for emergency response should be incorporated which will improve better access to building response operations emergency communications, and command and control in large-scale emergencies for high rise building.

Among the recommendations are

- Installing fire-protected and structurally hardened elevators to improve emergency response activities, the evacuation of mobility impaired occupants and preferably, all occupants- in tall buildings.
- Installing, inspecting and testing emergency communications systems radio communications and associated operating protocols to ensure that the systems and their protocols will function in challenging radio frequency propagation environments and large-scale operations, and can be used to track emergency responders within a building and
- Developing and implementing codes and protocols for ensuring effective and uninterrupted operation of the command and control systems in large-scale building emergencies.

Improved Procedures and Practices:

The procedures and practices used in the design, construction, maintenance and operation of building should be improved to include encouraging code compliance by nongovernmental and quasi-governmental entities, adoption and application of egress and sprinkler requirements in coded for existing buildings and retention and availability of building documents over the life of a building.

7. **Education And Training :**

The professional skills of building and safety professionals should be upgraded through and education and training efforts for fire protection engineers structural engineers and architects. The skills of building regulatory and fire service personnel also should be upgraded to provide sufficient understanding of what is needed to conduct the review, inspection and approval tasks for which they are responsible.

Along with strongly urging that immediate and serious consideration be given to these

recommendations for the building safety and fire safety point of view.

General Requirement and conditions for the fire and life safety of the building:-

- (1) The plans of the building should be approved by the Building Control Department, P.M.C. Pune.
- (2) The building & drainage completion certificate should be obtained from B.C. Department, P.M.C. Pune. The Occupancy shall be issued subject to **“Final No-Objection Certificate” issued by this department.**
- (3) The approval from the **Aviation Authorities** i.e. Director General of Civil Aviation Cost Guard Indian Navy /Army / Air Force for the height clearance is required as the building height is above 60.00 Mtrs. from the ground level.
- (4) Proper roads around the building should be provided for easy mobility of fire Brigade Appliance for carrying out fire fighting and rescue operations & **marginal spaces as per above given chart** should be kept free from obstructions all the time. The side roads around the building should have the capacity to withstand the load of **45 tones** of fire appliances.
- (5) The basement and upper floors should be separated with proper fire resistance wall and doors of 4 hours fire rating. The staircase provided in high rise residential tower should be pressurized and provided with self closing fire doors of 2 hours fire resistance.
- (6) All portable fire fighting equipments installed at various locations as per local hazard such as Co2 - DCP,
 - i. Foam as per IS: 2190 & it must be strictly confirming to relevant IS specification. It is recommended for every 100 Sq. Mtrs. one fire extinguisher should be provided for electrical installation Co2 extinguisher of 4.5 Kg should be provided.
- (7) All fire fighting equipments shall be well maintained and should be easily accessible in case of emergency.
- (8) Emergency Telephone numbers like **“Police”, “Fire Brigade” “Hospital”, “Doctors”, and ii. “Responsible” persons of the office”** should be displayed in Fire Control Room, Security office and in Reception area.
- (9) It shall be ensured that security staff & every employee of the office security are trained in handling **fire fighting equipment & in fire fighting.**
- (10) Cautionary boards such as **“DANGER”, “NO SMOKING”, “EXIT”, “FIRE ESCAPE”, “FIRE HYDRANT”, “EXTINGUISHER”** etc. should be displayed on the strategic location to guide the occupants in case of emergency. The signs should be of florescent type and should glow in dark.
- (11) The Fire Exit Drill or Evacuation Drill should plan and instruction should be given to the staff minimum **four times in a year** and drill should be carried out **twice in a year.**
- (12) **“On-Site” & “Off-Site”** emergency plan shall be prepared & mock drills shall be conducted twice a year & instructions to every employee shall be given once in three months.
- (13) For construction of high rise building noncombustible material shall be used and the internal walls of staircase enclosures should be with minimum of 2 hrs Fire Resistance rating.
- (14) The construction should be done considering the seismic zoning and proper care should be taken while designing the building of such a high rise.
- (15) A high rise building during construction shall be provided with the following fire protection measures, which shall be maintained in good working conditions at all times.
 - a) Dry riser of minimum 150 m.m. dia. Pipe with hydrant outlets on the floors constructed with a fire service inlet.
 - b) Drums filled with water of 2000 Ltr. Capacity, with two fire buckets on each floor

floor

- c) A water storage tank of minimum 20,000 Ltrs. Capacity, which may be used for other construction purpose also.
- (16) The use of combustible surface finishes on walls (including façade of the building) and ceiling affects the safety of the occupants of the building. Such finishes tend to spread the fire and even though the structural elements may be adequately fire resistant, serious danger to life may result. It is therefore, essential to have adequate precautions to minimize spread of flame on wall facade of building and ceiling surfaces.
- (17) The finishing materials used for various purpose and decor shall be such that it shall not generate toxic fumes / smokes.
- (18) Automatic smoke venting facilities shall be provided for safe use of exits in windowless buildings.
- (19) Natural draft smoke venting shall utilize roof vents in walls at or near the ceiling level, such vents shall be normally open, or, if closed, shall be designed for automatic opening in case of fire, by release of smoke sensitive devices.
- (20) Where smoke venting facilities are installed for purpose of exist safety, these shall be adequate to prevent dangerous accumulation of smoke during the period of time necessary to evacuate the area served using available exit facilities with a merging of safety to allow for unforeseen contingencies.
- (21) The florescent glow signs like “Staircase”, “Extinguisher”, “Fire Escape”. “Hydrant Point”, Manual Call Point” “Exit”, “Lift” Shall be installed on strategic locations in all common areas of the building like passages Corridors etc.
- (22) Fire evacuation orders & exit map shall be provided in every floor & in lobbies of the buildings.
- (23) Portable rescue chute should be provided in Refuge area or in fire escape walls for easy evacuation of occupants in case of emergency.
- (24) The passage ways and the staircase width should be maintained as per NBC 2005 for all staircases and internal passages provided for the building.
- (25) The **Annex C** for Fire Protection Requirements for high rise Buildings - 15 Mtrs. in Height or Above of NBC 2005, part 4 should be strictly followed.
- (26) The **Annex E**, the Guidelines for Fire Drill and Evacuation Procedures For High Rise Buildings (Above 15m in Height) of NBC 2005, part 4 should be strictly followed and implemented.
- (27) Strom water management in case of 150 years contingency planning should be done in consultation with Town Planning Department of Govt. of Maharashtra and Pune Municipal Corporation.
- (28) All internal furniture and fixtures used for the building should be fire resistance type and it should not give toxic fumes and smoke in case involved in fire. It should have minimum Two hours Fire Resistance.
- (29) LPG banks should not be stored on upper floor for cooking etc.
- (30) The Glassing and façade other Glasses should have at least one hour fire resistance and be UL approved and in accordance with NFPA requirements.
- (31) Breaking of glass the glass can remain in its place some hours before replacement. This will reduce the risk of injuries to occupants and fire & rescue personal. In the event of blast the shock wave created which creates the damage to glass faced the use of film will help to reduce the damages due to glass breaking.
- (32) This being a very special type of building if any additional recommendations to be added or deleted depending upon the need of the fire safety requirement of buildings.
- (33) The Chief Fire officer reserves all right to modify the fire safety recommendations and it shall be responsibility of company authorities to maintained close liaison with fire department.
- (34) The Fire Officer to be appointed by the company should have advance Diploma of National Fire Service Collage, Govt. of India, Nagpur. He should be responsible for Fire

National Fire Service Collage, Govt. of India, Nagpur. He should be responsible for Fire Safety of the building and In charge of Fire Station maintained by the company.

Standard Specifications and Regulations to be followed:

D.C Rules for Class A & B Municipal Council & Part -3 & 4 National Building Code 2005.

- a) IS: 3844 - for installation and maintenance of internal fire hydrants and hose reels on premises.
- b) IS: 2189 - for selection, installation and maintenance of automatic fire detection and alarm system.
- c) IS: 2190 - for selection, installation and maintenance of portable first aid fire extinguishers.
- d) IS: 9583 : 1981 Emergency lighting units.
- e) IS: 12456: 1988 Code of practice for fire protection of electronic data processing installation.
- f) IS: 4963 : 1987 Recommendations for buildings and facilities for physically handicapped.
- g) IS: 3614 (Part I) : 1966 Specification for fire check doors.
- h) h) Code of practice for Fire Safety Building IS 1642 - for Details of Construction.
- i) Code of practice for Fire Safety Building IS 1643 - Exposure Hazard.
- j) Code of practice for Fire Safety Building IS 1644 - Exit requirement and Personal Hazard.
- k) IS : 15105 - Design and installation of fixed automatic sprinkler fire extinguisher system.
- l) IS: 9668 : 1990 Code of practice for provision and maintenance of water supplies and fire fighting.
- m) IS 2175 : 1988 Specification for heat sensitive fire detectors for use in automatic fire alarm system.
- n) IS 11360 : 1985 Specification for smoke detectors for use in automatic electrical fire alarm system.
- o) IS 9457 : 1980 Safety colour and safety signs.
- p) IS 12349 1988 fire Protection - Safety signs.
- q) IS 12407 : Graphic symbols for fire protection plan.

Required the Passive Fire protection in the building

Requirement and Provision: - The following passive fire protection systems will have to be followed and installed for the Life Safety of the building as per Part 3 & 4 of National Building Code 2005.

Sr. No	Description
1	Fire Test General Requirement: Element / Component shall have the requisite fire resistance performance when tested in accordance with the accepted standards.
2	Compartimentation: The Building shall be suitably compartmentalized so that the fire & smoke remain confined to the area where the fire incident has occurred & does not spread to other part of the building.
3	Smoke Extraction System: The exhaust system may be continued, provided the construction of the ductwork & fans is such that it will not be rendered inoperable by hot gases & smoke to other floors via the path of extraction system.
4	Smoke management: Where smoke venting facilities are installed for the purpose of exist safety these shall be adequate to prevent dangerous accumulation of smoke during the period of time necessary to evacuate the area served using available exit facilities with margin of safety to allow for unforeseen contingencies

	necessary to evacuate the area served using available exit facilities with margin of safety to allow for unforeseen contingencies.
5	Fire rated ducts: Where the ducts pass through fire walls the opening around the duct shall be sealed with fire resisting materials having the fire resistant rating of the compartment. Where the duct crosses the compartment which is fire rated for same fire rating. Depending on the services passing around the duct work, which may be affected in case of fire temperatures rising, the ducts shall be insulated.
6	Cable ducts: The electric distribution cables/ wiring shall be laid in separate duct. The duct shall be sealed at every floor with non combustible material having the same fire resistance as the fire rating of the duct.
7	Fire rated ceilings: The exhaust system may be continued, provided the construction of the ductwork & fans is such that it will not be rendered inoperable by hot gases & smoke & there is no danger of spread of smoke to other floors via the path of extraction system.
8	Steel protection: Load bearing steel beams & columns of building having total covered area of 500 Sq. Mtrs and above shall be protected against failure collapse of structure in case of fire. This could be achieved by using appropriate methodology using suitable fire rated materials as per the accepted standards.
9	Fire escape enclosure : Fire towers shall be constructed of walls with a 2 hours fire rating without opening other than the exist doorways, with platforms, landing & balconies with the same fire rating of 2 hours.
10	Glazing: If glazing or glass bricks are used in a staircase shall have fire rating of minimum 2 hours.
11	Glazing: If glass is used as a façade for building it shall have minimum 1 hours fire rating.
12	Fire Stopping: Every vertical opening between the floors of a building shall be suitably enclosed or protected as necessary to provide reasonable safety to the occupants while using the means of egress by preventing spread of fire smoke or fumes through vertical opening from floor to floor which will allow the occupants to complete their safe use of means of egress.
13	Fire Stopping : openings in the walls or floors which are provided for the passage of all building services like cables, electrical wiring & telephone cables etc. Shall be protected by the enclosure in the form of Ducts/shafts with a fire resistance of not less than 2 hours.
14	Fire Stopping service ducts & shafts: Service ducts & shafts shall be enclosed by wall of 2 hours & doors of 1 hour fire rating. All such ducts /shafts shall be properly sealed & fire stopped at all floors.
15	Fire stopping cable ducts penetration: The electrical distribution cables /wiring shall be laid in separate duct. The duct shall be sealed at every floor with non-combustible materials having the same fire resistance as the fire rating of the cable duct.

Exit Requirement :

1. An exit may be doorway, corridor, Passageway(s) to an internal staircase or external staircase, or to a verandah or terrace(s), which have access to the street, or to the roof of a building or a refuge area. An exit may also include a horizontal exit landing to an adjoining building at the same level
2. free of all obstructions or impediments to full use in the case of fire or other emergency.
3. Exits shall be clearly visible and the route to reach the exits shall be clearly marked and signs posted to guide the occupants of the floor concerned. Signs shall be illuminated and wired to an independent electric circuit on and alternate source of supply.
4. To prevent spread of fire and smoke, fire doors with 2 hours fire resistance shall be provided at appropriate places along the escape routes and particularly at the entrance to lift lobby and stair well where a funnel or flue effect may be created inducing an upward spread of fire.
5. All exits shall provide continuous means of egress to the exterior of a building or to an exterior open spaces leading to the street.

Staircase Design Requirement:

1. The minimum headroom in passage under the landing of a staircase and under the staircase shall be **2.2 Mtrs.**
2. Access to main staircase shall be through a fire / smoke check door of a minimum 2 hours fire resistance rating.
3. No living space, store or other fire risk shall open directly in to the staircases.
4. The main and external staircase shall be continuous from ground floor to the terrace level.
5. No electrical shafts, A/c ducts or gas pipe etc. shall pass through or open in the staircases Lifts shall not open in staircases.
6. All the staircases shall be provided with mechanical pressurization devices, which will inject the air into staircase, lobbies or corridors to raise their pressure slightly above the pressure in adjacent parts of the building so the entry of toxic gases or smoke in to the escape routes is prevented.

External Staircase or Fire Escape Staircase:- Should be comply the following.

1. Fire Escape shall not be taken into consideration while calculating the number of staircases for the building.
2. Fire escape constructed of M.S. Angles, wood or glass is not permitted.
3. Staircase shall always be kept in sound operable conditions.
4. Fire Escape Staircase shall be directly connected to the ground.
5. Entrance to the Fire Staircase shall be separate and remote from the internal staircase.
6. Care shall be taken to ensure that no wall opening or window opens on to or close to fire Escape Stairs.
7. The route to the external staircase shall be free of obstruction at all times.
8. The Fire Escape stairs shall be constructed of noncombustible materials, and any doorways leading to it shall have the required fire resistance.
9. Not more than 45 Degree from the horizontal.
10. Fire Staircase shall have straight flight not less than 150 c.m. wide with 25 c.m treads and risers not more than 19 c.m. The number of risers shall limited to 15 per flight.
11. Handrails shall be of a height not less than 100 c.m. and not exceeding 120 c.m.
12. The width of the staircase should be maintained as per NBC 2005 for all staircases. All the staircases in the building shall be provided with Pressurization devices. In this method air is injected to the staircases, lobbies, corridors, to raise their pressure slightly above the pressure in the adjacent part of the building. This will prevent ingress of smoke or toxic gases into the escape routes. The Pressurization devices shall

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13. All the staircase doors on every floor shall be provided with two hours fire resistive doors having panic bars at both the sides.

Staircase Enclosures:-

1. The external enclosing walls of the staircase shall be of the brick or the RCC construction having the fire resistance of not less than two hours. All enclosed staircase shall have access through self closing door of one hour fire resistance. These shall be single swing doors opening in the direction of escape. The door shall be fitted with the check action door closers.
2. The staircase enclosure on the external wall of the building shall be ventilated to the atmosphere at each landing.
3. Permanent vent at the top equal to the 5% of the cross section area of the enclosure and open able 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 meter 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 pressure of 5 mm w.g. by an electrically operated blower/blower shall be maintained.
4. 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.

Pressurization of Staircases (Protected Escape Routes):

1. Though in normal building design compartmentation plays a vital part in limiting the spread of fire, smoke will readily spread to adjacent spaces through the vertical leakages opening in the compartment enclosure, such as cracks, opening around pipes ducts, airflow grills and doors, as perfect sealing of all these opening is not possible. It is smoke and toxic gases, rather than flame, that will initially obstruct the free movement of occupants of the building through the means of escape (Escape Routes) Hence the exclusion of smoke and toxic gases from the protected routs is of great importance.
2. Pressurization is the method adopted for protected escape routs against ingress of smoke, especially in high rise building. In pressurization, air is injected into the staircases, lobbies or corridors, to raise their pressures slightly above the pressure in adjacent parts of the building. As a result, ingress of smoke or toxic gases into the escape routes will be prevented. The pressurization of staircases shall be adopted for high rise building and building having mixed occupancy.

3. The pressure difference for staircases shall be as under :

Building height	Pressure Difference	
	Reduced operation (Stage 1 of a 2 Stage System)	Emergency Operations (Stage of a 2 stage system or Single Stage System)
15m or Above	15 Pa	50 Pa

It is possible the same levels shall be used for lobbies and corridors but levels slightly lower may be

	Reduced operation (Stage 1 of a 2 Stage System)	Emergency Operations (Stage of a 2 stage system or Single Stage System)
15m or Above	15 Pa	50 Pa

It is possible the same levels shall be used for lobbies and corridors but levels slightly lower may be used for these if desired. The difference in pressurization levels between staircase and lobbies (or corridors) shall not be greater than 5 Pa.

4. **Pressurization system may be of two types:-**

- a. Single Stage, designed for operation only in event of an emergency, and
- b. Two stage; where normally a level of pressurization is maintained in the protected escape routes and an increases level of pressurization can be brought into operation in an emergency.

LIFT ENCLOSURES:

1. The walls enclosing lift shafts shall have a fire resistance of not less than **two** hours.
2. Shafts shall have permanent vents at the top not less than 18 c.m. (0.2 sq.m.) in clear area.
3. Lift motor room shall be preferably be sited at the top of the shaft and shall be separate from lift shafts by the enclosing wall of the shaft or by the floor of the motor room.
4. Landing doors in lift enclosures shall open in the ventilated corridor/ lobby & shall have fire resistance of not less than one hour.
5. The number of lifts in one lift bank shall **not exceed four**. Lift car doors shall have fire resistance of not less than one hour. A wall of two hours fire rating shall separate individual shafts in a bank. Minimum one lift in every lift bank must be a **“Fire Lift”**
6. For the building 15 meters and above in height, collapsible gates shall not be permitted for lifts and shall have solid doors with fire resistance of at least one hour.
7. 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.
8. 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.
9. Lift shall not normally communicate with the basement. If however, lifts are in communication, the lift lobby of the basement shall be pressurized as mention above with self closing doors.
10. The lift machine room shall be separate and no other machinery shall be installed therein.
11. Ground switch/switches at ground floor level to enable the fire service personnel to ground the lift car/cars in emergency shall be provided.
12. Telephone or other communication facilities shall be provided in the lift cars which shall be connected to fire control room of the building.
13. 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 landing from entering the lift shaft.
14. A Sign shall be posted & maintained on every floor at or near lift indicating that in case of fire occupants shall use the stairs unless instructed by otherwise. The sign shall also contain a plan for each floor showing the locations of the stairway.
15. Alternate source of supply shall be provided for all the lifts through a manually operated change over switch.

13. 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 landing from entering the lift shaft.
14. A Sign shall be posted & maintained on every floor at or near lift indicating that in case of fire occupants shall use the stairs unless instructed by otherwise. The sign shall also contain a plan for each floor showing the locations of the stairway.
15. Alternate source of supply shall be provided for all the lifts through a manually operated change over switch.

FIRE LIFTS: (For High Rise Buildings)

1. To enable the fire service personnel to reach the upper floors with minimum delay, one fire lift per 1200 Sq. Mtrs. of floor area shall be provided and shall be available exclusive use of the fireman in an emergency.
2. The lift shall have floor area not less than 1.4 Sq. Mtrs. It shall loading capacity of not less than 545 Kg (8 person Lift) with automatic closing doors of minimum 0.8 m width.
3. The electrical supply shall be on separate service from electric mains in a building and the cables run in a safe route from fire that is within the lift shaft Lights & Fans in the elevators having wooden paneling or sheet steel construction shall be operated on 24 Volts supply.
4. Fire fighting lift shall be provided with a ceiling hatch for the use in case of emergency, so that when lift car gets stuck up, it shall be easily open able.
5. In case of failure of normal electric supply, it shall automatically trip over to alternate supply. This change over of supply could be done through manually operated changeover switch. Alternatively the lift shall be so wired that in case of power failure, it comes down at ground level and comes to stand still with door open.
6. The operation of lift shall be by 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 & the lift will be on car control 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.
7. The words "**Fire Lift**" shall be conspicuously displayed in fluorescent paint on the lift landing doors at each floor levels.
8. The speed of the fire lift shall be such that it can reach topmost floor from ground level in 1 Minute.
9. In Multi Storied and high-rise buildings more than 36 Mtrs. in height, one stretcher lift should be installed.

SERVICE DUCTS /REFUGE CHUTE:

1. Service duct shall be enclosed by walls and doors, if any of two hours fire rating. If ducts are larger than 10 Sq. Meters the floor should seal them, but provided suitable opening for the pipes to pass through with the gaps sealed.
2. A vent opening at the top of the service shaft shall be provided between on fourth and on half of the area of the shaft. Refuge chutes shall have an outlet at least wall of non combustibile 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 one hour fire resistance, the chutes should be as far away as possible from exists.
3. Refuge Chutes shall not be provided in staircase wall and A/c shaft etc.

ELECTRICAL SERVICES:

1. The electric distribution cables/wiring shall be laid in separate duct. The duct shall be sealed at every alternate floor with non-combustible materials having same fire resistance as that of the duct. Low & medium voltage wiring running in shaft & false ceiling shall run in separate conduit.
2. Water mains, telephones lines, intercom lines, gas pipes or any other service lines shall not be laid in the duct of electric cables, use of bus ducts /solid rising mains instead of cables shall be preferred.
3. Separate circuits for water pumps, lift, staircase & corridor lighting shall be provided directly from the

medium voltage wiring running in shaft & false ceiling shall run in separate conduit.

2. Water mains, telephones lines, intercom lines, gas pipes or any other service lines shall not be laid in the duct of electric cables, use of bus ducts /solid rising mains instead of cables shall be preferred.
3. Separate circuits for water pumps, lift, staircase & corridor lighting shall be provided directly from the main switch gear panel and these circuits shall be laid in separate conduit pipes so that fire in one circuit will not affect the other. Such circuits shall be protected at the origin by an automatic circuit breaker with its no-volt coil removed. Master switches controlling essential service shall be clearly labeled.
4. The inspection panel doors and any other opening in the shaft shall be provided with air tight fire doors having the fire resistance of not less than **one hour**.
5. Medium & low voltage wiring running in shaft and within false ceiling shall run in metal conduit. Any 230 Volt wiring for lighting or other services, above false ceiling, shall have 660 Volt grade insulation. The false ceiling including all fixtures for its suspension, shall be of non-combustible material and shall provide adequate fire resistance to the ceiling in order to prevent spread of fire across ceiling.
6. An independent & 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 electric supply from service & alternative supply cables. The doors provided for the service room shall have fire resistance of not less than **two hours**. If service room is located at the first basement, it should have automatic fire extinguishing systems.
7. Suitable circuit breakers shall be provided at the appropriate points.

Staircase and Corridor Lighting:

- a) 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 individual control of the light points, if any. It should be of miniature circuit breaker type of switch so to avoid replacement of fuse in case of crisis.
- b) Staircase and corridor lighting shall also be connected to alternate source of supply. The alternative source of supply may be provided by battery continuously trickle charged from the electric mains.
- c) Suitable arrangement shall be made by installing double throw switches to ensure that the lighting installed in the staircase and the corridor do not get connected to the source of supply simultaneously. Double throw switch shall install in the service room for terminating the stand by supply.
- d) Emergency lights shall be provided in the staircase/corridor.
- e) All wires & other accessories used for emergency lights shall have fire retardant property.
- f) 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 & 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 & circuits stated above simultaneously. If the stand-by pump is driven by diesel engine, the generator supply need to be connected to the stand-by pump or parallel HV/LV supply from a separate sub station shall be provided with appropriate transformer for emergency. If this arrangement is provided then the arrangement of generator is not mandatory.

Emergency and Escape lighting.

1. Emergency lighting shall be powered from a source independent of that supplying the normal lighting.
2. Escape lighting shall be capable of
 - A. Indicating clearly and unambiguously the escape routes.
 - B. Providing adequate illumination along such routes to allow safe movement of persons towards and through the exists.
 - C. Ensuring that fire alarm call points and fire fighting equipments providing along the escape routes can be readily located.
3. The horizontal luminance at floor level on the centerline of an escape route shall be not less than 10 lux. In addition , for escape routes up to 2 m wide, 50 percent of the route width shall be lit to a minimum of 5 lux.
4. The emergency lighting shall be provided to be put on within 1 hours of the failure of the normal lighting supply.

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4. The emergency lighting shall be provided to be put on within 1 hours of the failure of the normal lighting supply.
5. Escape lighting luminaries should be sited to cover the following locations
 - a) Near each intersection of corridors
 - b) At each exit door
 - c) Near each change of direction in the escape rout
 - d) Near each staircase so that each flight of staircase receives direct light.
 - e) Near any other change of floor level.
 - f) Outside each final exit and close to it.
 - g) Near each fire alarm call point.
 - h) Near fire fighting equipment, and
 - i) To illuminate exit and safety sign as required by the fire department.
6. Emergency lighting systems shall be designed to ensure that a fault or failure in any one luminaries doe not further reduce the effectiveness of the system.
7. The luminaries shall be mounted as low as possible but at least 2 Mtrs. above the floor level.
8. Signs are required at all exits emergency exits and escape routes. Which Should comply with the graphic requirements of the relevant Indian Standard
9. Emergency lighting luminaries and their fitting shall be of non Flammable type
10. It is essential that the wiring and installing of the emergency lighting system are of high quality so as to ensure their perfect serviceability at all times
11. The emergency fighting system shall be capable of continuous operation For a minimum duration of 1 hour and 30 minutes even for the smallest premises
12. The emergency lighting system shall be well maintained by periodical Inspections and tests so as to ensure their perfect serviceability at all times.

Illumination of Means of Exit : Staircase and corridor lights shall confirm to the following.

- a) The staircase and corridor lighting shall be on separate circuit 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 crises.
- b) Staircase and corridor lighting shall may be connected to alternative supply The alternative source of supply may be provided by battery continuously trickle charges from the electrical mains: and
- c) Suitable arrangements shall be made by installing double throw switches to ensure that the lighting installing 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 sand by supply.

AIR - CONDITIONING:

- a) Air conditioning system should be installed and maintained so as to Minimize the danger of spread of fire smoke and 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 closed automatically in case of fire and thereby prevent spread of fire or smoke. Such a system should also be arranged 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) should be provided with effective means for preventing circulation of smoke through the system in the case of fire
air insufficient heat to actual heart sensitive devices controlling fans or Dampers. Such means shall consist of approved effective sensitive control.

6. Where plenum is used for return air passage, ceiling & its fixtures shall be non - combustible material.
7. The materials used for insulating the duct system (inside or outside) shall be non -combustible material. Glass wool shall not be wrapped or secured by any combustible material.
8. Area more than 750 Sq. Mtrs. on individual floor shall be segregated by a fire wall & automatic fire dampers for isolation shall be provided.
9. The fire dampers shall be capable of operating manually
10. Air ducts serving main floor area corridors etc. shall not pass through the staircase enclosure.
11. The air handling units shall be separate for each floor & air ducts for every floors shall be separated & in no way inter connected with the ducting with the ducting of any other floor.
12. If the air handling units serves more then one floor, the following conditions shall be completed
 - i) Proper arrangements by way of automatic fire dampers working on smoke detectors or fusible link for isolation all ducting at every floor from the main riser shall be made.
 - ii) When the automatic fire alarm operates the respective air handling units of the air condition system shall automatically be switched off
13. The vertical shaft for treated fresh air shall be of masonry construction
14. The air filters of air handling units shall be of non combustible materials. The A.H.U. room shall not be used for storing any combustible materials.
15. Inspection panels shall be provided in the main turning to facilitate the cleaning of the ducts of accumulated dusts and to obtain access for maintenance of fire dampers.
16. No combustible material shall be fixed nearer than 150 mm to any duct unless such duct is properly enclosed & protected with non combustible material (glass wool or sunglass with neoprene facing enclosed & wrapped with aluminum sheeting) at least 3.2 mm thick and which would not readily conduct heat

Fire Dampers:

- a) These shall be located in conditioned air ducts/ passages at the following points.
 1. At the fire separation wall
 2. Where ducts /passages enter the central vertical shaft.
 3. Where the ducts pass through floors.
 4. At the inlet of supply air ducts & the return air ducts 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.
- c) Fire /Smoke dampers for smoke extraction shafts for the building more than 24 Mtrs. in height should be provided.
- 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.

TRANSFORMER :

1. Transformers shall not be installed on upper floors on in the basement.
2. The switchgears shall be housed in a separate room separate from the transformer bays by a fire resisting wall with fire resistance of not less than four hours.
3. The transformers shall be protected by providing proper fire protection
4. A tank of RCC construction of capacity capable of accommodating entire oil from the transformers shall be provided at lower level to collect the oil from the catch pit to the tank shall be of non-combustible construction and shall be provided with a flame-arrestor.
5. No grass or shrubs shall be allowed to grow in transformer switchyard.
6. A barbed wired fencing of minimum 1.5 height shall be provided around transformer switchyard & the gate shall be provided for entrance. The gate should be always locked & the keys should be kept with authorized/ responsible person of the company.
7. Danger/ No smoking board shall be displayed at the entrance gate of Transformer switchyard.

GUIDELINES FOR ROOFTOP LANDING FACILITIES (For the building above 60 Mtrs. height, as per NBC 2005 part 4, annex C.) (NFPA 418 STANDARDS FOR HELIPORTS) :

1. **Structural Support** : Main structural support members that could be exposed to a full spill shall be made fire resistant using listed materials and methods to provide a fire resistance rating of not less than 2 hour

7. Danger/ No smoking board shall be displayed at the entrance gate of Transformer switchyard.

GUIDELINES FOR ROOFTOP LANDING FACILITIES (For the building above 60 Mtrs. height, as per NBC 2005 part 4, annex C.) (NFPA 418 STANDARDS FOR HELIPORTS) :

1. **Structural Support** : Main structural support members that could be exposed to a full spill shall be made fire resistant using listed materials and methods to provide a fire resistance rating of not less than 2 hour
 2. **Landing Pad Pitch**: The roof top landing pad shall be pitched to provide drainage that flows away from passenger holding areas access points. Stairways, elevator shafts ramps, hatches,& other openings
 3. **Landing Pad Construction Materials**: The rooftop landing pad surface shall be constructed of noncombustible nonporous materials that are approved. The contiguous building roof covering within 50 Feet (15.2Mtrs.) of the landing pad age shall have class A ratings.
 4. **Means of Egress**: At least two approved means of egress from the roof top landing pad edge shall be provided and shall be remotely located from each other to the extent practical
 5. For heliports occupied by 50 or more people two approved means of egress from the roof shall be provided shall be remotely located from each other to the extent practical but shall not be located less than 30 feet (9.1Mtrs) from each other. For helipads occupied by less then 50 people one approved means of egress from the roof shall be provided.
 6. Means of egress from the roof top landing pad and roof shall not obstruct flight operations
 7. **Fire Protection** : A foam fire extinguishing system shall be designed and shall to protect the roof top landing pad For H-1 heliports two portable foam extinguishers each having a rating of 20 -A 160 -B shall be permitted to be used to satisfy this requirement.
The foam discharge rate shall be as following

AFF	4.1 L/min/sq. Mtrs
Fluor protein	6.5 1 L/min/sq. Mtrs
Protein	8.1 L/min/sq. Mtrs
 8. The area of application of form discharge for fixed discharge outlet systems shall be the entire roof top landing pad. The duration shall be minutes.
 9. The area of application of foam discharge for hose line system shall be the practical critical area for the category of the helicopter landing facility. The duration shall be 2 minutes.
 10. The water supply for the foam system shall be from a reliable source. The fire pumps for the system shall be installed in accordance with NFPA 20 “Standard for the installing of centrifugal fire pumps.
 11. Stand pipes and hose station shall be installing in accordance with NFPA 14 “Standard for the installation of stand pipe & hose system
 12. The foam components shall be installing in a readily accessible area of the heliport and shall not penetrate the primary approach departure and transitional surfaces defined in paragraphs 3J, 3k, 3L, 13 &21 of FAA A/C 150/5390-2 Heliport design advisory circular.
 13. If building shall more than one rooftop landing pad the supply of foam available shall be sufficient to cover incident on at least one of the pads.
 14. If fixed foam system utilizing fixed deck nozzles or oscillating foam turrets or both are installing system components shall be listed or approved by relevant standards.
- Stand Pipes** : If a building with roof top heliport is supplied with a standpipe system a class II standpipe shall be extended to roof level on which the rooftop heliport is located Such stand pipe shall be

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Stand Pipes : If a building with roof top heliport is supplied with a standpipe system a class II standpipe shall be extended to roof level on which the rooftop heliport is located Such stand pipe shall be installed in accordance with NFPA-14 Standard for the installing of stand pipe & hose system.

Fire Alarm : Where building are provided with a fire alarm system a manual pull station shall be provided for each designated means of egress from the roof.



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Portable Fire Extinguishers: At least one portable extinguisher as specified in below given table shall be provided for each take - off & landing area. parking area. Fuel storage area.



provided for each take - off & landing area. parking area. Fuel storage area.



Chief Fire Officer
Pune Municipal Corporation

Copy To
Asst. Engineer (B.C.)
Pune Municipal Corporation

