Fire Safety in High Rise Building
A stepping stone to Smart Cities

- by M. M. Bhuskute

The dreadful pressure on urban land resources owing to swelling population has dragged towards the vertical expansion of buildings, horizontal expansion possibly being largely limited. We cannot escape from the fact of emergence of high rise buildings.

The sky-scrappers have to stay and symbolize the modern city and its status. Unfortunately, these buildings have proved to be death traps in many fire incidents abroad and in India too.

Some of the examples of such fatal fire loss incidences are-
- Hotel M G M Grand, San Paulo
- State Bank of India Building, Mumbai
- LIC building, New Delhi
- Hotel Siddhartha, New Delhi
- Gopala Towers, New Delhi
- Hindustan Times Building, New Delhi
- Carlton Tower, Bangalore

All these fires have threatened the people at large, psychologically as also caused great damage to properties and human life.

The outburst of fires in high rise buildings of the past few years has shaken the traditional concept of fire protection/minimization of high rise buildings. This has forced statutory and governing bodies, engineers, architects and planners to think on the vast possibilities of fire loss protection/precautions in the high rise buildings. In India, from fire insurance point of view, the high rise buildings are defined...
Fire Protection & Safety

as buildings whose highest floor is more than 22 meters in height above the surrounding level.

The factors that accentuate the fire problems and create hazards in high rise buildings are:

- Large number of people required to be evacuated.
- Difficulty of fighting fire from outside.
- Rapid vertical spread of fire through lift openings, enclosed staircases.
- Lack of facilities to fight fire and evacuate people.
- Non availability of space for movement of snorkel and turn table ladders.
- Lack of independent power source.
- Inadequate water supply and in house fire fighting arrangement.

One has to really judge whether the high rise building occupied is safe enough in general and particularly during the fire/allied emergency situation.

Many of us are associated with high rise buildings as Developer, Architect, Builder, Electrical/ MEP contractor, Fire Protection System Installer, Fire Officer/ Consultant, Occupant and individual/ organization connected with.

Everybody is in some way responsible for the fire safe or unsafe status of high rise building. Do we ever think whether the high-rise building to which we are associated is fire safe?

A few questions to gauge the adaptability of a high rise building:

1. GENERAL LAYOUT

- Whether the high rise building is situated in its own compound?
- Is there a direct access from a minimum 10 mtrs wide road to the premises entrance?
- Whether the premise is provided with a gate of minimum size of 6 mtrs wide x 6 mtrs high head room? Is there additional gate of similar nature?

Everybody is in a way responsible for the fire safe or unsafe status of a high rise building.
- Whether car parking is done in basement, ground floor or in separate detached shed?
- Whether there is a clearance of minimum of 6 mtrs on ground on all sides or at least from 3 sides of boundary?
- Whether there is clear space available for parking and movement of fire tenders, ambulance, snorkel/turntable ladders?
- In case of more numbers of high rise buildings in the same compound whether adequate distances have been provided between them?
- Is there nearest fire brigade (public/private) within 12 kms of premise?

2. CONSTRUCTIONAL FEATURES
- Whether the buildings are of RCC/encased steel structure with fire resistance of 1 hr/2 hrs?
- Whether each high rise building is provided with at least 2 enclosed type protected staircases with RCC construction of at least 2 hr fire rating?
- Whether adequate smoke ventilation has been provided in such staircases without affecting their ‘separated’ nature?
- Whether there is an effective pressurization in such staircases?
- Whether separate enclosed/protected lift has been reserved for fire fighting purpose?
- Whether non-combustible materials are used for false ceiling, loft/mezzanines?
- Whether all the floors are segregated or at least zoned?
- Whether each floor is having area larger than 500 sq mtrs?
- Whether escape routes have been provided for all floors?
- Whether each storey has been provided with refuge of adequate space for e.g. 10% of each floor area for people who in case of evacuation under fire condition are unable to reach escape staircase in time?
- Whether high-rise buildings in the premises are connected with each other at higher levels to facilitate rescue operation?
- Whether such refuge are adequately protected with fire doors, and also adequately ventilated and/or pressurized?
- Whether service shaft, cable ducts are made of brick work only and/or provided with fire breaks of fire resistance materials?
- Whether trap doors leading to such shafts are provided with shutter of at least 1 hr fire rating?
- Whether the basement has been provided with proper ventilation/natural lighting?

3. MEP, ELECTRICAL INSTALLATION AND P.A. SYSTEM
- Whether high rise building is centrally air conditioned?
- Are A.C. ducts of combustible material or lined with fire proof materials?
- Do A.C. ducts pass from one compartment to the other, segregated/otherwise?
- Whether A.C. duct pass through escape route refuge area?
- Whether main switch for entire building is installed at the main entrance and accessible all the time?
- Whether main transformer is outside the building OR particularly in basement?
- Whether electrical wiring has been –
  o Concealed in wall?
  o Carried out in H.G conduit/armored/XLPE cables?
  o Carried out with wooden batten/PVC conduits?
- Whether main switch for each floor is installed at the respective entrances?
- Whether all the electrical circuits have been provided with ELCBS?
- Whether public address system has been provided on each floor including facilitating the security and fire fighting staff to give evacuation instructions to the occupants in case of fire?
- Whether an electrically insulated metal strip 25 mm side x 3 mm thick section has been provided in the staircase enclosure running throughout the height of the building to facilitate transmission and reception of fire message through walkie talkie sets used by brigade personnel?

4. STORAGE RISK
- Whether gas/fuel storage is done in separate detached enclosure?
- Whether bulk liquid fuel is stored above ground/under ground?
- Is there hazardous storage in high rise building?
5. FIRE PROTECTION SYSTEMS IN THE PREMISES

Whether the minimum fire fighting arrangement provided for the buildings comprise of the following:

- Fire extinguishers
- Small bore hose reels
- Hydrant system (wet risers)
- Automatic sprinkler system

Fire Extinguishers

- Whether the extinguishers are ISI marked and installed in the premises according to class of fire and comply with BIS provisions?
- Are the extinguishers located within the reach of 15 mts from anywhere?
- Whether the extinguishers are placed on ground or on the wall properly placed?
- Are the extinguishers maintained in working condition duly filled & hydro-tested periodically?

Small bore hose reel

- Whether the hose reel are connected with permanent water supply & installed near the entrance of all floors?
- Whether the hose reel are as per BIS Approved and has reach up to 36 mts with the minimum discharge capacity of 22.5 LPM?

Fire protection pump & water reservoir

- Whether these is provision of fire pump of at least capacity of 2275 LPM with adequate pressure ratings duly supported by stand by fire pump of differentially driven type of similar capacity of providing minimum pressure 3.5 Kg/cm2 at all points?
- Whether there is a jockey pump to keep the system pressurized at all times?
- Whether fire pump room has been located at a safe place & easily approachable at all times?

- If the fire pump room is at the basement level, whether there is a direct approach to enter easily without crossing any occupancy like vehicle parking, storage or any other area?
- Whether the electric supply to fire pump is reliable and duly supported by DG set of adequate capacity?
- Whether there are two compartments for fire water storage tank with sufficient capacity to run the fire pumps for at least one hour subject to minimum prescribed?
- Whether there is water treatment plan for wastage water to feed back to fire water tank to maintain the availability of water for fire safety at all times?
- Whether overhead tanks with adequate capacity are connected with fire water network?

Hydrant System

- Whether there are ground hydrants provided in addition to staircase hydrant at all floors?
- Whether every hydrant is duly provided with hose box, min two hoses of 15 mtrs length & 1 nozzle?
- Whether at least one public fire brigade inlet is planned and connected with system and water reservoir?

The minimum fire fighting arrangement to be provided for the buildings should comprise of fire extinguishers, small bore hose reels, hydrant system & automatic sprinkler system.
• Whether the maintenance of the fire protection system has been given to independent agency on AMC contract?
• Whether an elevator serving all floors, reserved for its use for firefighting operations be controlled by Fire Department from concourse level and not to respond to any other signal after the fire department key has been activated?
• Whether there is employee’s fire brigade or emergency squad consisting of security and maintenance personnel under the command of a trained fire chief having complete knowledge of the buildings fire control system?
• Whether the public fire department is also acquainted with the building details and the operation of fire?

If we get the satisfactory answers to the above queries, we may call the high-rise building to be reasonably FIRE SAFE.

It is obvious that one will not get all positive answers. However, knowing the shortcomings, one can improve upon the situation and prepare to face the consequential problems in a relatively better manner.

India very soon is entering the era of “Smart Cities”. High-rise buildings would be essential and inevitable part of these modern cities.

If we are able to learn to make our present high rise building fire safe, we can say that we are just getting passing marks to qualify to go for ‘SMART CITIES’.

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