



SAFE LIVING

A Hand Book By: Mrinal Mahapatra MIFireE



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Preface

Respected reader,

This “SAFE LIVING (Fire Safety)” handbook has been created for common people of India living in multi-stories building, various construction, occupancies use for any other purposes (categorized in our National Building Code of India) private or publicly, above primary students’ youth, and Fire Safety Professionals. Which attempts to underpinning knowledge in accordance with relevant Indian and International standards.

It should help readers obtain a better understanding of their own fire safety, role, duties and responsibilities and legal frame-work across a broad spectrum of different premises and fire risks. A general understanding of fire engineering, preventive and protective measures including instructions (DO’S and DON’T), inspection check-list and review format has incorporated in this book to assist the reader for best practice to create “SAFE LIVING (Fire Safety)”.

Living is an art - we create but fire destroys, push-back us to an extent what no one expects. Closing eye before a tsunami may not save us, so people need to understand the concerns of the fire accidents and prepare to.

“An accident is just the tip of the iceberg, a sign of a much larger problem below the surface” – DON BROWN.

Please come, join hand, and let’s create a mass awareness to SAFE LIVING.

Regards,

Mrinal Mahapatra MIFireE

Certified NEBOSH, IOSH -MS

FOREWORD

It is my pleasure to write a brief Foreword to this little handbook "SAFE LIVING" for the benefit of the youth of India and the citizens in general, for dealing with Fire Safety and Safety in general.

The greatest irony of Science is that the earliest scientific discovery and the technique of creating, preserving and managing FIRE has also been one which has not sustained public interest. People continue to look at "FIRE" as something to be tackled by the Fire Brigade, because the State or a local authority is maintaining it. This little book helps the readers understand the regulatory environment in India which seeks to prevent, suppress and fight fires. The citizen will benefit from a clear reading of the contents and will be able to put the knowledge gained to productive use.

I wish all success to the Author in his noble effort.

ASHOK MENON

DIRECTOR

GOA FIRE & EMERGENCY SERVICES

GOVT.OF GOA

SAFE LIVING

Introduction:

"Living" is a simple term where life gets sheltered them-selves for any purposeful and specific time being. This is a creation of a construction using either above land or any space artificially. In fire safety point of view, we generally consider the term of "Living" as any occupancy being construct for specific uses (e.g.: house, building, office, factory, ware-houses etc.)

The objective behind using a piece of land of any geographical area to accommodating life for any purpose must ensure safety of the life as well as the revenue invests to. Life is precious and revenues are most important to run a society. Apart from the consideration "The Appropriate Authority" must ensure "Safe Living" to "Save Lives and Society".

Since the beginning of civilization fire discover and uses for live hood. Cooking food, developing and managing land for living, production and industrial activities, operating vehicles etc. Uses of fire chronologically increased parallel to our social development but the considerations behind when it is under control and we will discuss further about this fire only. Uncontrolled or accidental fire is DANGER, it may cost property and/or Live. To ensure "SAFE LIVING" fire safety to be follow.

So far Indian constitution, Fire Safety is the subject matter which STATE implements through its DISTRICT and LOCAL AUTHORITY falling under the area. Hence there are a national policy which gives direction and standard (BIS) recommendation through National Building Code of India (N.B.C.I.) guide line and Part: IV deals with the fire safety subject matter are to serve whole.

Building codes

All buildings, whether existing or hereafter erected shall be classified according to the use or the character of occupancy in one of the following groups:

A) Residential

- i) Sub-division A-1 Lodging or rooming houses
- ii) Sub-division A-2 One or two- family private dwellings
- iii) Sub-division A-3 Dormitories
- iv) Sub-division A-4 Apartment houses (flats)
- v) Sub-division A-5 Hotels
- vi) Sub-division A-6 Hotels (starred)



B) Educational

- i) Sub-division B-1 Schools up to senior secondary level
- ii) Sub-division B-2 All others/training institutions



C) Institutional

- i) Sub-division C-1 Hospitals and sanatoria
- ii) Sub-division C-2 Custodial institutions
- iii) Sub-division C-3 Penal and mental institutions



D) Assembly

- i) Sub-division D-1 Buildings having a theatrical or motion picture or any other stage and fixed seats over 1000 persons.
- ii) Sub-division D-2 Buildings having a theatrical or motion picture or any other stage and fixed seats upto 1000 persons.
- iii) Sub-division D-3 Buildings without a permanent stage having accommodation for 300 or more persons but no permanent seating arrangement.
- iv) Sub-division D-4 buildings without a permanent stage having accommodation for less than 300 persons with no permanent seating arrangement
- v) Sub-division D-5 All other structures including temporary structures designed for assembly of people not covered by sub-divisions D-1 to D-4, at ground level
- vi) Sub-division D-6 buildings having mixed occupancies providing facilities such as shopping, cinema theatres, and restaurants
- vii) Sub-division D-7 All others structures, elevated or underground, for assembly of people not covered by sub-divisions D-1 to D-2

E) Business Buildings

- i) Sub-division E-1 Offices, banks, professional establishments, like offices of architects, engineers, doctors, lawyers and police stations.
- ii) Sub-division E-2 Laboratories, research establishments, libraries and test houses.
- iii) Sub-division E-3 Computer installations.
- iv) Sub-division E-4 Telephone exchanges.
- v) Sub-division E-5 Broadcasting stations and T.V.



F) Mercantile Buildings

- i) Sub-division F-1 Shops, stores, departmental stores markets with area upto 500 msq.
- ii) Sub-division F-2 Shops, stores, departmental stores markets with area more than 500 msq.
- iii) Sub-division F-3 Underground shopping centres.
Storage and service facilities incidental to sale of merchandise and located in the same building shall included in this group.



G) Industrial Buildings

- i) Sub-division G-1 Buildings used for low hazard industries.
- ii) Sub-division G-2 Buildings used for moderate hazard industries
- iii) Sub-division G-3 Buildings used for high hazard industries



H) Storage Buildings



J) Hazardous

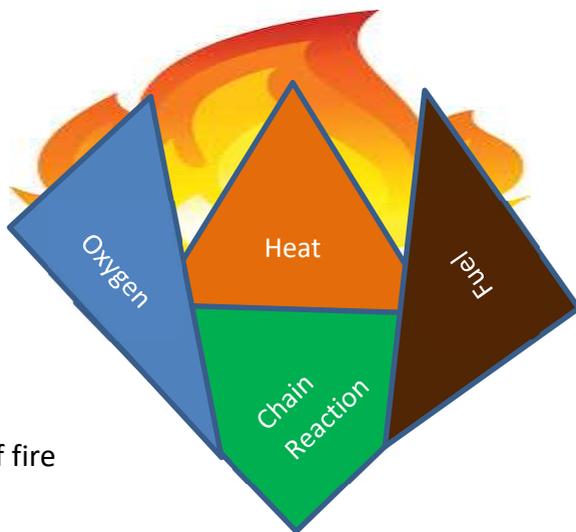


Buildings / Occupancies classified above as per N.B.C.I., a comprehensive guide line has been provided its Part IV by expert & advisory committee under the ministry of MHA - GOI. States and local authorities' responsibility are to ensure such implementations stipulated by the law and guide stockholders to comply. Fire safety recommendations / directives are mandatory minimum provision and enforce order concerned to Indian bye-laws. On failure to comply such orders – legal parameter of action is applicable. The prime objective of fire safety provisions is to ensure “life safety” and preserving revenue invest to properties from fire.

Let's understand what is fire?

Fire involves a chemical reaction between a combustible fuel and an oxidizing agent (usually supplied by oxygen in air) which releases heat and light.

The process of combustion is very complex and multifaceted topic, but in simple method we can understand that there is requirement of a) A source of oxygen b) Fuel (solid, liquid, gas, vapor or dust c) A heat or ignition source capable of imparting sufficient energy to initiate the combustion reaction, via spark, or even self-heating d) A self-sustaining chemical chain reaction.



Tetrahedron of fire

Solid carbonaceous fuels consist of atoms arranged together to form a molecular structure. At normal ambient temperatures, the atoms in this structure will be moving relative to each other. Raising heat levels will cause the atoms to absorb energy and vibrate more vigorously. For solids and liquids, increasing the heat exposure will eventually cause some of the molecular bonds to fracture and molecules, bits of molecules and atoms will be released. This process is called pyrolysis and the molecular "shrapnel" given off can be highly reactive and flammable. These products, along with any water, can usually be seen with the naked eye as light hazy smoke or vapor. These pyrolysis products can ignite, either from an external ignition source, or because they have reached their auto-ignition temperature.

Note: The term flashpoint describes the lowest temperatures at which the vapors can temporarily "flash" when exposed to an ignition source, and the ignition point is the lowest temperature which will sustain ignition once exposed to an ignition source.

Classification of fire:

Classification of fire considered according to the physical state of the materials (fuel) involving to fire as under:

A - Class: Any solid

B - Class: Any liquid,

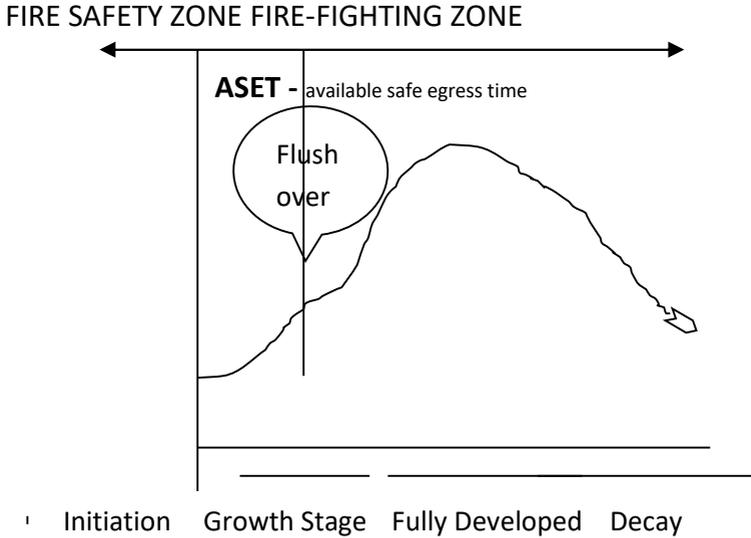
C - Class: Any Gas, vapor

D - Class: Active oxidizing metals; and

K - Class: A mixed (one or above) classes

Point to be noted, electricity or other ignition sources not considered a class of fire but while dealing to above appropriate measures / actions need to be taken.

Stages of fire:



a) Initiation b) growth or develop c) fully develop and flush out and d) decay. Hence the stages of fire are help to map-out and understand scientifically the fire behavior related to time span. As discussed earlier, fire is a spontaneous chemical chain reaction and very faster process when the conditions are in favor and the degree of severity is too high. So, when it is feasible, can be measured and preventive action can be taken materials-wise. Point to be noted, every material has its own boiling, flush point and ignition temperatures so its calculations to be consider with appropriate data. A typical diagram given under to understand FIRE SAFETY ZONE and FIRE FIGHTING ZONE.

Fire Spread:

What happen when fire took place?

1. Time: Fire growth in an enclosure can be unpredictable, over in seconds. However, under normal well-ventilated conditions most fires involving conventional solid fuels grow very quickly. The time to respond to a fire should be measured in seconds and a minute or two at most.
2. Visibility: Smoke consists of hot fire gases and other products of combustion which is usually thick, black and hot. It will rise in a buoyant plume until it meets an obstruction (usually the ceiling), then it will spread sideways until it meets a wall, where it will drop downwards.
3. Heat: The heat produced by a fire in an enclosure rapidly fast at the upper levels to many hundreds of °C. Inhaling fire gas at 100°C will scorch the lungs causing immediately life-threatening injury, and at 120°C it can cause pain and burns to expose skin.

How does fire and behaves?

Materials involving to a fire accident may not single product and after decomposition releases various types of poisonous gases, toxic fumes and smokes along with super-heat atmosphere when in an enclosure. Most of cases various hydro-carbons involved in the reaction and releases CO, CO₂, SO₂, H₂S, NO, NO₂, P₂O₃, P₂O₅, Cl₂ etc. Inhalation of such gases can cause physically damage our respiratory organs and when it is mix to blood-stream can asphyxiate blood and damage our red-cells and may cause unconsciousness, severe issue to health or may death in few seconds. In the extreme condition of fire when it is explosion or detonation may threat life immediately.

When fire lasts for such a long period and released heat raises in many more degrees, the construction it-self having the materials will start to decompose in

their burning point and may collapse. Additionally, the released heavy number of toxic smokes and poisonous gases impacting environmental disorders, promoting to global warming and immediate health disorders to surrounding lives.

How does fire spreads in an enclosure?

Once fire taken place, released heat and other bi-products behaves as per their own dynamics. At the beginning stage, the enclosure will have a negative pressure when it is sufficiently ventilated, after some time it will generate sufficient bi-products and create positive pressure inside the compartment. If the surrounding area have sufficient control to stop exchange natural air and withstand the pressure then the reaction speed will reduce and fire will come under control. Point to be noted, during the fire condition if suddenly the pressurization will fail to do so and fire not controlled then by consuming necessary oxygen the fire will suddenly flush-out again called back-draft and suddenly fire will show a special character drive called BLACKANDA effect which may give dangerous impact.



Once fire taken place in a well-ventilated enclosure, heat will spread in different way:

- a) Convection: Exchange the heat energy by molecular transformation through air present in adjacent atmosphere.
- b) Conduction: Exchange the heat energy by molecular transformation especially by any solids or may liquid.
- c) Radiation: Transmission heat energy by its own wave length without any media.

Smoke releases from a fire scene is utmost life threaten and spread to the area very quickly:

The spread of smoke generally depends on the areas wind speed, direction of wind and available openings vide a shift, duct, void or any horizontal / vertical openings. In the beginning stage of design of a construction, the designer / architect must identify and consider the uses of the area (job shop lay-out), arrangement of zone and provide necessary considerations of compartmentalization in such a way to withhold for a certain time and safe ventilation to enhance ASET (Ref. page- 8 diagram) and tenability. Point to be noted that, the smoke alone is obviously danger for our lungs as explained earlier but the poisonous gases released from the burning materials have acute impact to lives and within a few second of expose can cause unconsciousness and death. Poisonous gases when enters and mixed to our blood streams may react with our R.B.C. and damage / block vascular blood flow immediately.

In order to time of fire growth, temperature of the building enclosures will increase if not ventilated properly; after such a long time when the temperature will reach to the building materials burning point can start burning the structure it-self and collapse. Any crack (opening) on walls /

structure, old or damaged building beams and pillars, improper construction may lead faster damage and accident.

Recent days, some combustible building materials and Class: B structures are in uses to get sophistication of construction like polymer plastics, polyisocyanurate core, polystyrene, polyurethane and rock-wool, sandwich panels are also creating big problem to a building when fire. Glass façade buildings which are not properly designed, constructed and managed may create big problem. In such event occupied people and fire fighters may come into vulnerability very quickly.

In high-rise building (Height more than 15 Meter) where electrical installations go through stairwell, ducts provided but not shielded vertically, elevator or lift-shifts not properly horizontally shield have additional risk. However, smoke to be arrest by compartmentalization and no additional hazards / combustibles to be allowed in escape route. The staircase and means of escape routes must be continue from terrace floor to ground floor without any break-up and hindering along with necessary lighting and ventilation. Pressurization fire doors (*as per N.B.C.I. part IV table no: 7-8*) to be in place as per relevant standards. Where minimum travel distance is more (*as per N.B.C.I. part IV table no: 20-22*) prior considering to dead-end a refuge area to be provided.

What is important, when you discover FIRE?

If the fire is in very early stage, you have clear exit-way and you are sure can control the fire then attempt to fight with necessary equipment being own-shelved towards the exit route. Call for help and let aware others for safe exit. In case the fire you discover which easily you can't control, depart towards a safe place "Assembly Point" designated out-side of the premises or "Refuge Area" near to you in case the assembly point is far and call for further help for final exit.

General Causes of Fire:

- 1) Electricity
- 2) Deliberate Ignition
- 3) Smoking
- 4) Hot work
- 5) Heating or cooking appliances
- 6) Mechanical heat
- 7) Unsafe storage of flammable materials
- 8) Chemical reaction



(1)



(2)



(3)



(4)



(5)



(6)



(7)



(8)

“Means of Escape” (MOE):

a) Management: Management is arguably the most important aspect of MOE from buildings, because unless management undertakes its fire safety responsibilities efficiently and effectively, even the best equipped buildings can quickly deteriorate and become dangerous in the event of fire. Planning, Organizing, Controlling, Monitoring and Review are the key role.

b) Occupancy: Occupancy considerations include how the building or premises is used and how it is populated. As per given building code (N.B.C.I.) it is further classified in main three categories:

- i) Ordinary Hazard
- ii) Light Hazard and;
- iii) High Hazard

A means of escape scheme designed for one occupancy or use may not be suitable for another. It may even be highly dangerous.

c) Construction: Construction has certain role for MOE, generally two type of construction classified:

i) **Primary Construction:** The main fabric of the building i.e., external load bearing walls, floors and some internal walls. The important part is its design and used materials to ensure stability of the structure (including under fire conditions), limit fire spread and achieve acceptable MOE. Fire compartmentation has important role to passive fire protection to minimize potential fire. Similarly, fire doors have important role for fire resisting compartment and pressurization an encloser to achieve a safe evacuation time span.

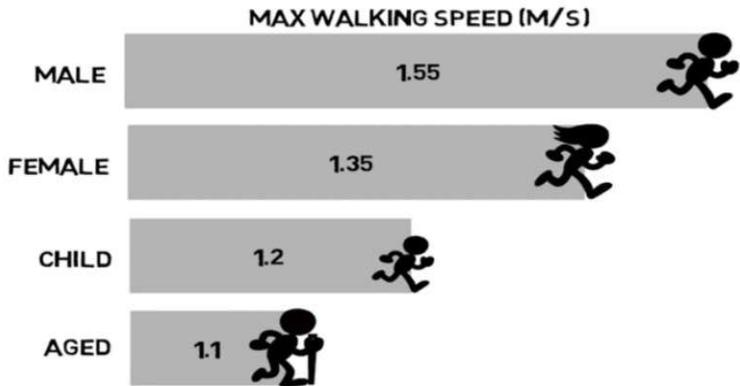
ii) **Secondary Construction** refers to all those building elements which do not fall under the category of primary construction. This is including internal partitioning, temporary non-load bearing walls and screens, wall linings, floor coverings, fixtures and fittings etc. In MOE the selection of the materials as per scope, quality and design equally important.

d) Time of Evacuation: To achieve a good level of MOE, the arrangements identify Available Safe Egress Time (ASET) and can be manage well in advance.

e) Exit: Exit routes in fire condition are main life line, the staircase numbers, width, distance, quality, and conditions etc. have very vital role to MOE. N.B.C.I. defines the position, number and width of staircases as per Indian Standard.

f) Travel Distance: Travel distance has big role to MOE in consideration of the "Dead Ends". The minimum travel distance has predetermined by law as per statistical data of walking different speed of different people in fire condition hereunder:

EVACUATION TIME IS BASED ON THE WALKING SPEED OF DIFFERENT PEOPLE



Do you know fire accident statistics in India?

- a) People have lost their lives due to fire in a year: 10915
- b) Women died: 5968
- c) Men died: 4947
- d) People died in fire accidents due to electricity: 1990
- e) People lost their lives caused by cooking gas fire accident 2143
- f) Indian die due to daily fire accidents: 30
- g) 51% deaths are reported from Madhya Pradesh, Karnataka, Maharashtra, Odisha and Chhattisgarh.

Preparedness:

Fire break-out without prior notice if the probability is in certain favor, watching entire premises round o'clock quite impossible by an individual. As briefed earlier- fire takes only second or maximum two minute to reach growth stage, people must prepare to leave the fire spot and reach a safe place to avoid life threat. Fire alarm is very important to install such areas where individual control limited. Beside fire alarm, fire plan has to be pre-determined and displayed in prominent place to assist even an unknown person may appear to the premises immediately. Plan must be incorporated to the special classes of people who are more vulnerable e.g., pregnant woman, new-born baby and mother, old person, physically challenged persons, critical patients, babies so on.

A personal evacuation plan must establish in such a way can satisfy the minimum evacuation time without aid. Necessary arrangements including fire marshal / warden to be placed as necessary. Clear role and responsibilities to be finding and practice by E.R.T. where it is applicable as per guide-lines. Emergency call list with necessary data i.e., contact number of fire, police, ambulance, incident commander, hospital and such other necessary agencies to be displayed at entrance and in prominent places. Courtyard, internal and access roads permit width to be strictly maintain without hindering any service. No obstruction should be allowed to access the emergency vehicles and staircases too. Refuge and other designated areas to be maintain, unlocked including the terrace doors. A periodical inspection of the hazardous installation is most important, fire protection system and other arrangements to be installing mandatorily and maintain 24X7 hrs. Smoke - Heat ventilation system and other occupational conditions must be fulfilled. Keeping record of the installation / maintenance and review at least once in a year is necessary. Train your people, test the preparedness regularly can ensure "SAFE LIVING".

Dealing Fire Accident:

General people have a mind-set that tackling fire is responsibility of fire service agencies. They hardly make a post fire accident call and leaves all to the authority or luck and resultant loses life and living hood. Let's understand the scenarios in general:

1. Fire service peoples are same people as we individuals, difference is only they have trained up to a level according to their roll assignment like fireman, fire tender operator, fire marshal, officers etc.
2. Availability of appropriate tools, vehicles, equipment and PPE
3. There is a time span to initiate one fire call, reaching out fire service on the fire scene, situation mapping and actions.
4. The hurdles of mobilization emergency personals in place, heavy-duty vehicles, ladder and equipment – “Response Time”.
5. The road size and conditions.
6. Environmental conditions and difficulties.
7. Fire site conditions it-self.
8. Water supply.
9. Co-operations and mutual aids with other agencies.
10. Behavioral issues of general people and political interpretations
11. Management and media

To overcome the above issues in favor, responding, handling evacuations, rescues and casualties, fighting fire and restoration of an occupancy is not so easy. Question raises regarding responsibilities and accountability, who?

Construction of an occupancy made for specific uses either it is private or public interest. It is the occupier's responsibility to construct, maintain and monitor the whole in such a safe manner for which it is made of. Fire accidents has collective impact to entire stack holders and on environment.

Do's:

- Acquaint yourself with the layout of the escape routes, staircases, refuge areas and the location of fire alarms.
- Train yourself and the security personnel in the proper operation and use of first-aid hose reel provided at each floor level and fire extinguishers. Also train them in switching on the fire pump, at ground/basement level and also the booster pump at terrace level, and the method of summoning the Fire Brigade Department in the event of a fire.
- Keep always closed the fire doors of staircases, main entrance to the factory building/ company
- All the fire protection installations such as fire pumps, wet riser-cum-down comer, sprinkler installation, fire extinguishers etc should be kept in a good state. Timely use of these will help in controlling/extinguishing the fires in the early stages, thereby minimizing life losses and property losses.
- Always maintain good house-keeping.
- Ground all the lifts, including FIRE LIFT, in case of a fire.
- Practice evacuation drills periodically.
- Irrespective of the magnitude of fire, summon the Fire Brigade at the earliest.
- Seek the advice and guidance of Fire Brigade Department in the matter of fire safety.
- In case of fire, guide the Fire Brigade Department personnel about the location and extent of fire, information about trapped persons, if any, and provide any other information they may request. Help them to help you.

Don't:

- Acquaint yourself with the layout of the escape routes, staircases, refuge areas and the location of fire alarms.
- Train yourself and the security personnel in the proper operation and use of first-aid hose reel provided at each floor level and fire extinguishers. Also train them in switching on the fire pump, at ground/basement level and also the booster pump at terrace level, and the method of summoning the Fire Brigade Department in the event of a fire.
- Keep always closed the fire doors of staircases, main entrance to the factory building/ company
- All the fire protection installations such as fire pumps, wet riser-cum-down comer, sprinkler installation, fire extinguishers etc. should be kept in a good state. Timely use of these will help in controlling/extinguishing the fires in the early stages, thereby minimizing life losses and property losses.
- Always maintain good house-keeping.
- Ground all the lifts, including FIRE LIFT, in case of a fire.
- Practice evacuation drills periodically.
- Irrespective of the magnitude of fire, summon the Fire Brigade at the earliest.
- Seek the advice and guidance of Fire Brigade Department in the matter of fire safety.

- In case of fire, guide the Fire Brigade Department personnel about the location and extent of fire, information about trapped persons, if any, and provide any other information they may request. Help them to help you.

Passive Fire Protection:

Passive fire protection system is an encompassing fire safety concept, which embraces the passive measures in fire containment design, and in addition, augments the active measures. It is the proactive approach taken at the building design stage, aimed at addressing a comprehensive solution to the fire problem

It is the primary measure integrated within the constructional fabric of a building provide inherent fire safety & protection by responding against flame, heat & smoke to maintain the fundamental requirements of building compartmentation, structural stability, fire separation & safe means of escape.

The characteristics of passive fire protection system is intended purpose by rising the fire resistance of the structure against the effects of fire spread through secondary ignition, limiting the movement of flame & smoke, & minimizing the danger of fire – induced collapse or structural distortion.

Passive fire protection design, incorporating passive fire protection materials, system and assemblies, serves by fire containment to protect life, safe guard the building structures, protect assets, maintain building serviceability after fire, minimize rebuild costs, & facilitate quick business recovery & continuity.

Point to be noted, this type of system does not require any type of outsource power to function in case of fire. It is in the form of fire rated doors, barriers, ceilings & structural fire protection.

Active Fire protection:

Fire can be protected by some conventional method called 'beating the fire' or blanketing. However, the basic principle of fire protection is including starvation, smothering, cooling and inhabitation.

Above principle can be applied through various manual or automatic procedure but few important considerations must be taken as appropriate –

- a) Type of materials involved in the fire
- b) Estimation of fire load (quantify releasing heat)
- c) Assumed maximum area operation (AMAO)
- d) Selection of best method

In general practice, some fire protection method is in practice as bellow:

- 1) Manual fire extinguisher (Water, foam, powder and gas type)
- 2) Fire blanket
- 3) Fire hydrant system
- 4) Fire sprinkler system
- 5) Fire drenchers system
- 6) Water curtains system
- 7) High & medium velocity water spray system
- 8) Foam system
- 9) Dry powder system
- 10) Wet-chemical spray system
- 11) Gas suppression system

Fire Detection and Alarm:

Fire can't detect always by person in the early stage physically or feasible in such a vast area of a building 24X7 hours. Without discovering a fire in the early stage dealing will be quite difficult or may not can be control and the vulnerability may put its dangerous footprint. Response must be set before the ASET and evacuation process to be least initiate or achieved.

Fire can be detected in such a best way of discovering its early stage and probable finding of the presence of heat, smoke, flame or an active source present. Considering a building structure design have important role on above.

Spreading heat is not similar to its bi-products, heat spreads has discussed earlier but the flame, smoke and other gases spreads in different way. Surrounded air dynamics has a big role in such cases and it is unique to each building structure. However, in general practice different type of fire detectors are available in market in different principle and integration to other system can be achieved, monitor and alarm can be sound respectively.

Water supply and reservoirs:

Water is blood of fire service, once fire taken place in most of cases water is require for firefighting. Application of water manually through various pipes and hoses, water foam, automatic fire sprinklers, drenchers, water curtain etc. can be operated by pumping and such cases needed sufficient water.

Calculated amount of water requires in ready position at water reservoirs and town supply / additional provision from any other sources to be ensure in

advance. Water supply to the pumps can be negative or positive suction type but positive suction is most recommended to avoid priming or suction failure.

Fire risk assessment:

Risk assessment is a means of making sure that the most serious occupational fire risks are managed by cost effective control measures. Assessing the risks allows you to prioritize the right action you take to control them. There are following steps, calculations based on quantitative and qualitative figures to deep study of the accident probabilities and the severity / consequences level and based upon the figures an occupancy fire safety can be judge appropriately.

Step: 1

- a) Identification of the potential fire hazards
- b) Identify the most vulnerable person present in the scenario

Step: 2

Record the findings

Step: 3

Assess and analysis how does the level goes high (normally - probability X consequence < 9 out of 25)

Step: 4

Implement and monitor

Step: 5

Review

Checklist:

Sl. No	Subject	Weekly Checks	Monthly Checks
1.	Electrical Switch Gears and Distribution Points	<input type="checkbox"/>	<input type="checkbox"/>
2.	Machinery and Equipment	<input type="checkbox"/>	<input type="checkbox"/>
3.	Lighting Ventilation	<input type="checkbox"/>	<input type="checkbox"/>
4.	Exit and Fire Doors	<input type="checkbox"/>	<input type="checkbox"/>
5.	Smoke Curtain	<input type="checkbox"/>	<input type="checkbox"/>
6.	Signage	<input type="checkbox"/>	<input type="checkbox"/>
7.	Manual Fire Extinguishers	<input type="checkbox"/>	<input type="checkbox"/>
8.	Fire Pumps	<input type="checkbox"/>	<input type="checkbox"/>
9.	Fire Hydrants	<input type="checkbox"/>	<input type="checkbox"/>
10.	Hoses	<input type="checkbox"/>	<input type="checkbox"/>
11.	Equipment and accessories	<input type="checkbox"/>	<input type="checkbox"/>
12.	Fire Plans	<input type="checkbox"/>	<input type="checkbox"/>
13.	Fire Alarms	<input type="checkbox"/>	<input type="checkbox"/>
14.	Fire Sprinklers	<input type="checkbox"/>	<input type="checkbox"/>
15.	Fire Drenchers	<input type="checkbox"/>	<input type="checkbox"/>
16.	Manual Call Points	<input type="checkbox"/>	<input type="checkbox"/>

17.	Fire Dumpers	<input type="checkbox"/>	<input type="checkbox"/>
18.	Public Announcements	<input type="checkbox"/>	<input type="checkbox"/>
19.	First-Aid Box	<input type="checkbox"/>	<input type="checkbox"/>
20.	Evacuation and Rescue Tools	<input type="checkbox"/>	<input type="checkbox"/>
21.	PPE	<input type="checkbox"/>	<input type="checkbox"/>
22.	Evacuation Test Hrs.	<input type="checkbox"/>	<input type="checkbox"/>

Remarks:

Important Emergency contact numbers:

POLICE: 100

FIRE: 101

AMBULANCE: 102

Disaster Management Service: 108

National Emergency: 112

Women Helpline: 1091

Fire Plan:

Every occupancy must predetermine a comprehensive, suitable and appropriate fire plan. The plan includes necessary arrangements, information and instruction (i.e., escape routes, refuges, assembly point, facilities) evaluate in preparedness stage. Considerations to be taken such an extent, where each

individual (special attention to be pay for probable vulnerable persons) can be safely escape in case of fire in 24X7 hrs. time-line either aided or unaided.

Requirements:

1. Building and floor plans (prior marked to indicate escape route guided from any point / part of the building)
2. Auto-glow signages and special lights (may be self-powered up-to certain time or power back-up from separate circuit) in escape routes and assemble point
3. Exits (in certain interval with standard width and walking distance)
4. Protected staircase
5. Refuges (where it necessary)
6. Alternate escapes (equipped)
7. Starcher / wheelchair or other appropriate movement aid
8. Rope and Ladders
9. Breathing apparatus
10. Emergency contact list and call facility
11. Fire alarm
12. Public Announcement
13. Emergency Response Team (E.R.T.)

Emergency Evacuation:

Emergency is an unexpected and usually dangerous situation that calls for immediate action, considering a fire accident – evacuation to be set out within ASET as discussed earlier. To ensure safe living or get control over casualty or death, emergency evacuation to be planned, established, practiced and tested to ASET.

Roll by an individual:

1. Discover fire at early stage and alert others
2. If fire set-out near to you, and you can extinguish the fire then do otherwise
3. Find your nearest escape route to reach assembly point
4. Before leaving, close the doors and window if possible, without westing more time
5. Try to protect yourself by wet cloth, if breathing difficulties (hankey can be use as face shield) or adjacent temperature is high
6. Be calm, crawl and go out towards exit, if any difficulties shout and call for help
7. On reach the assembly point, report to Incident Commander (I.C.) reached at site
8. Call fire brigade and other emergency agencies followed by the number displayed in emergency contact
9. Follow further instruction until unless the emergency has closed and re-entry to the premises been declared by I.C.

Role of E.R.T.:

1. Member of an E.R.T. must always dressed up (PPE) and ready at (H)is/er right location in such a manner he has been appointed
2. Be familiar and responsible to take care your work / functional area without excuses
3. Special focus to pay for personal evacuation and rescue of vulnerable person
4. Train your self and lets people to understand their roll and responsibility
5. Set "Response Time" less than ASET and practice drill in a frequent interval

6. Ensure necessary firefighting equipment / appliances and rescue vehicle and/or tools in good working condition at place and tested as per order / guide-line
7. Be familiar with building's existing evacuation process, and necessary "Rescue Technique" may applicable to any part of the building
8. Mock-Drill and record keeping
9. Report your fire compliance (as per law) and be advised from your fire expert and local fire department.
10. Participate "Mutual Aid" and help your area disaster management team where necessary.
11. Maintain first aid facility, practice Cardio pulmonary resuscitation (CPR) and use of Breathing Apparatus (BA)

However, fire accidents are not similar to other and can't be compare while dealing. Participating to attempt a firefighting or rescue work is professional task. Without sufficient knowledge and training, no person should attempt to do so. If you reach early to the fire scene and stand at safe place then call your fire department and ensure following:

1. Give correct information in detail to fire brigade while registering a fire call
2. Ensure the periphery of the premises not obstructed by other vehicles or anyway
3. Handover the call / incident details to fire brigade personal or any other government agency reached at site
4. Dis-allow any unwanted gatherings and help crews to work freely

Important referential codes and recommended reading references:

National Building Code of India (N.B.C.I.), National Fire Protection Association (N.F.P.A.), Indian Codes and Standard Practices.

END

Fire Safety Audit

Dear Petron,

We Welcome to Delta Fire Engineers.

Audit is a process of thorough inspection and analysis of relevant documents including physical phenomena of target area. Fire Safety is the matter of concern to life and property saving.

So far as life safety concern, it is quite important to go through the entire arrangements, work process, work culture, human behaviors or any materialistic involvement which may consist a potential hazard of said occupancy beside it; Fire is a chemical and physical phenomenon of fuel in to a given environment.

There are various method involved in to the process. Risk Assessment is the scientifically proven method which includes HAZIN and HAZOP study beside other parameter like Identification, Recording of findings, Process Analysis etc so on. The assessment is including all passive and active arrangements along with process flow chart in practice.

Once the data's are in board of available materials (may be MSDS), HR involved in the process in any aspect, the auditor uses his expertise in scientific (mathematical or logical) way to measure the risks and it's most effective remedies with estimated time and value. Point is to keep in mind is evaluation of probabilities and consequences or severity.

Fire accidents are danger due cause of casualties / fatalities by burn, inhalation of poisonous smoke and fumes emits or spread how quickly to the adjacent areas!!! Generally in an enclosure fire requires about 30 minutes from its initiation stage to full flush out phase. So time is essence there, as well as the manner of provision to be arranged with (systems)will be the preparedness.

Protecting the sources and the path way of spread is the effective way to fire control. Our audit can ensure all those relevant factors to be evaluating in most effective and efficient manner.

Regards,

From Auditor's Desk:

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