

Fire Safety- Systems, Norms & Guidelines



The Fire

Three things must be present at the same time to produce fire:

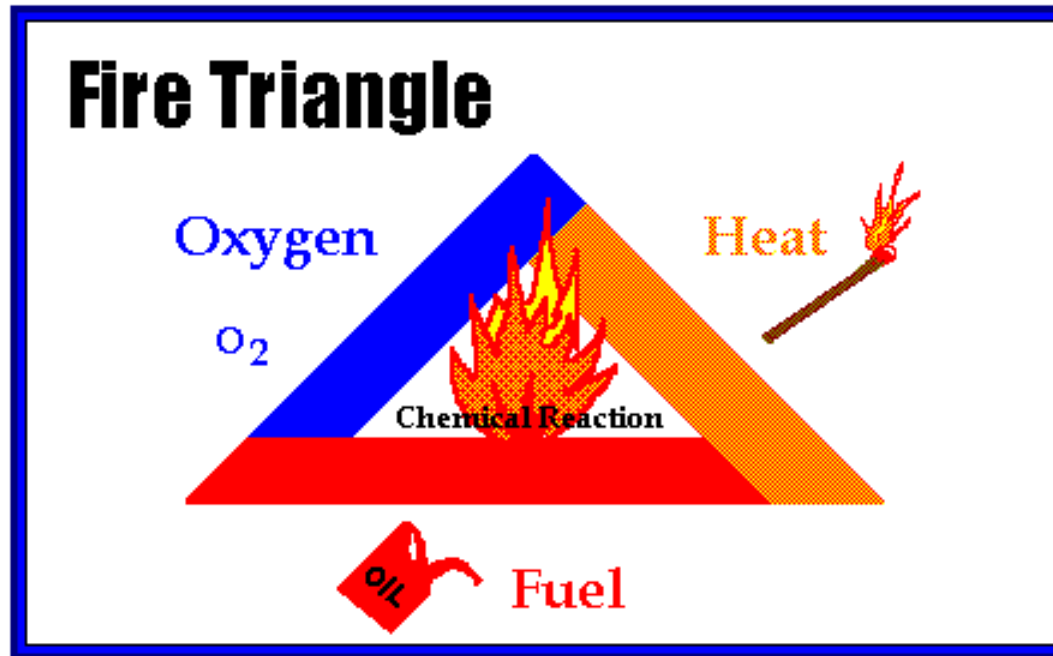
1. Enough **OXYGEN** to sustain combustion
2. Enough **HEAT** to reach ignition temperature
3. Some **FUEL** or combustible material

Together, they produce the **CHEMICAL REACTION** that is fire

Take away any of these things and the fire will be extinguished



The Fire Triangle



Fire Safety, at its most basic, is based upon the principle of keeping fuel sources and ignition sources separate.

FIRE Safety Approach - Passive

Passive Fire Protection approaches are those which are adopted at the planning stage of the building or facility:

- Provision of adequate Fire Resistance of the structure.
- Provision of proper FAR, open spaces.
- Provision of adequate access to sufficient and readily available water supply etc. for fire brigade.

FIRE Safety Approach - Passive

- **Compulsory open spaces**
 - Around the building (i.e 4.5 mtr(min)) [free from parking].
 - The radius at the turnings minimum 9 mtr. The width of entry shall not be less than 5 mtr (clear).
- **Sufficient no. of Exits**
- **Travel Distance** to the nearest exit - maximum 22.5 mt.

FIRE Safety Approach - Passive

- The panels of partitions shall be of **fire retarding Material** having metallic frame
- All furniture in technical rooms shall be of **steel**. Plastic or wooden furniture should not be used.
- **Escape routes** shall be marked clearly with red arrows and should be free from all obstructions.

FIRE Safety Approach - Passive

- **Cable trenches** inside substation shall be filled with pebbles or sand, and covered with rcc slabs or steel plates
- It is absolutely essential to ensure that **fuse wire of correct rating** are used in distribution system.
- The **false ceiling of Air-conditioning** and its fixtures shall be non-combustible material.

FIRE Safety Approach - Passive

- To enable fire service personnel, one lift shall be designated as “**FIRE LIFT**” with provision of alternative source of supply. The word “**FIRE LIFT**” shall be displayed at each floor.

FIRE Safety Approach - Active

Active fire protection approaches are those which **operate** (manual/Automatic) in the event of out break of fire

- **Fire Extinguisher**
- **Automatic/Manual Fire Alarm System**
- **Wet Riser System**

Active FIRE Safety Approach - Fire Extinguisher



Fuel Classifications

- Fires are classified according to the type of fuel that is burning.
- If we use the wrong type of fire extinguisher on the wrong class of fire, we might make matters worse.
- Its very important to understand the four different fire (fuel) classifications...



Fuel Classifications



Class A: Wood, paper, cloth, trash, plastics—solids that are not metals.



Class B: Flammable liquids—gasoline, oil, grease, acetone, petrol, diesel. Includes flammable gases.



Class C: Electrical—energized electrical equipment. As long as it's “plugged in.”



Class D: Metals—potassium, sodium, aluminum, magnesium.



Extinguishers



Class A: Wood, paper, cloth, trash, plastics—solids that are not metals. **WATER, FOAM**



Class B: Flammable liquids—gasoline, oil, grease, acetone, petrol, diesel. Includes flammable gases. **FOAM, CO2, , DRY POWDER**



Class C: Electrical—energized electrical equipment. As long as it's "plugged in." **CO2**



Class D: Metals—potassium, sodium, aluminum, magnesium. **SPECIAL DRY CHEMICAL POWDER**

Fire Extinguisher

- **Admn. Building:-** For every 300 sq mt of floor area - 1 no. 4.5 Kg CO2 type extinguisher
- **Tech. Building:-** For every 100 sq mt of floor area - 1 no. 4.5 Kg CO2 type extinguisher
- A person does not have to travel more than 15 mt. to reach the nearest extinguisher

Active FIRE Safety Approach

- Automatic / Manual fire Alarm System**

Automatic / Manual fire Alarm System

- Exchanges up to 1K are to be provided with **manual fire alarm system** (Hooter & Pill boxes)
- **Automatic Fire Alarm System :**
 - For exchanges more than 1K lines.
 - Building other than Telephone Exchange
 - It should be as per Local fire by laws. If it is not available than & If building height > 15m - Automatic fire alarm is must.



Components

Automatic / Manual fire Alarm System

- Manual Call points shall be so located to ensure that these are readily accessible to occupants without having to travel more than 22.5 mt.
- Detectors are provided by utilizing Zonal Concept- **Z 5/7 → Zone 5 & Sr. No. 7 detector**
- **Provision for automatic connection to fire station through external public telephone lines.**

Automatic / Manual fire Alarm System

- Fire control room of *4m x 4m (min.) at ground floor entrance lobby* for high-rise buildings.
- Mimic diagram near panels
- Talk Back facilities between panels

Active FIRE Safety Approach

- Wet riser System

Wet riser System

- There may be Dry or Wet riser
- For buildings above 15 mt. in height one wet riser for every 1000 sq. mtr or part is required.
- Underground water storage capacity:-
50,000 lt (up to 15m); 1,00,000 lt (15m to 24m)



Components

Wet riser System- Components

- Down comers- pressure at topmost point 3.5 Kg/cm²
- Landing Valves
- Hose Pipes in hose box (2 nos 15 m length)
- Hose reel/ first aid reel

Wet riser System- Components

- **Pumps**

- Jockey Pump (for small pressure drop)
- Main Electrical Fire Pump (manual shut off)
- Standby Diesel Fire Pump

- **Fire Brigade Inlet**

Organization structure in a Multistory building

1. Fire Safety Officer/Dy. Fire Safety Officer
2. Floor Warden/ D. Floor Warden
3. Staff

Duties-Fire Safety Officer :

- Responsible for maintenance and upkeep of **Fire Alarm & Fire Fighting (FA & FF)** system.
- Organize periodical inspections & performance Tests.
- Responsible for **training** of **Floor Warden/Dy. Floor Warden (FW/DFW)**.

- Go round the building once in a day; check the **housekeeping operations**; Inspect FF appliances for any **visible damage**; Check **availability** of FW/DFW.
- Familiarize himself with **fire safety plan** & operation of FA & FF system.
- Maintain liaison with **local fire brigade**.

➤ Organize **fire drills** with assistance of local fire brigade - **once in six months**.

➤ In the **event of fire** - take overall command of FF and evacuation operations; position himself in **control room & give necessary instructions** to FW/DFW on PA system/ Telephone; Ensure fire brigade intimation; Assist fire brigade.

Duties- Deputy Fire Safety Officer :

- **All functions of fire safety officer in his absence; perform routine functions delegated to him.**

Duties- Floor Warden/ D. Floor Warden :

- Shall **familiarize** themselves with FA & FF appliances on the floor, location of exist etc.
- **Damages** if noticed-- shall be reported to fire safety officer.
- Shall check for **obstructions**, if any in escape route and arrange to remove them promptly.

- Shall check **fire telephone** daily.
- Shall keep particulars of **physically handicapped occupants** on each floor for timely evacuation.
- In case of fire - ascertain the location of fire & take steps to extinguish it with available appliances; **Intimation to fire safety officer**; **organize evacuation operations** on the floor;

- Check the **environment** in the stairs prior to evacuation. If it is affected by smoke, alternative stairs shall be used.

Fire Safety Plan

- Fire safety plan shall be drawn up in consultation with the local fire brigade and concerned Electrical units; it also includes printing and displaying of fire safety instructions to the staff.
- Fire safety plan shall specify action to be taken by FW/DFW, A/C Staff, liftmen, pump operator, S/Stn staff; copy av. with fire brigade.

Records : Log books of following should be maintain -

1) Fire Alarm System - Record of inspection notes, details of replacements, modification, abnormal behavior, corrective measures etc.

2) Wet Riser System - Inspection notes of pump, wet risers, static water tanks etc.; record of deficiencies, replacements etc.

3) Fire Extinguisher - S.No..
Of extinguisher, type,
location, date of
purchase, inspection,
repairs and recharging.

Typical Action Plan in Case of Fire

Action by Staff (General Instructions) :

- 1) On discovering fire, **break the glass** of the nearest pill box.
- 2) Attack the fire with nearest accessible extinguisher. *Handle the extinguisher only if you know how to operate it.*

- 3) Do not use water for extinguishing fire in electrical installations unless power supply is disconnected.
- 4) Inform your FW/DFW & Fire brigade.
- 5) In case of fire in electrical installation, inform substation to disconnect mains supply.

6) If you hear evacuation alarm/instructions, leave the floor immediately.

- Follow the nearest escape route unless otherwise instructed. Do not create panic.
- Do not crowd in staircase lobby.
- Do not use lifts for escape unless instructed.
- Do not go to toilets.

Action by FW/DFW :

In addition to earlier general instructions -

- 1) If fire in your floor, **take charge** of FF operation.
- 2) Ensure **to alert** all staff members.
- 3) If fire on another floor, **send one representative to the warden of the affected floor** and rush extra manual help/ first aid equipment, if required.

- 4) Ensure **A.C. blowers are switched OFF.**
- 5) In case of fire in Telecom equipment/ power distribution system, inform **power room to disconnect mains** as well as batteries.
- 6) On getting evacuation instructions, examine the escape routs on floor and arrange evacuation in orderly manner. **DO NOT LEAVE TILL ALL THE STAFF MEMBERS ARE EVACUATED.**

- 7) After fire is extinguished, inform all other FWs/ Fire safety officer.
- 8) In case of absence of fire safety officer or Dy. F.S.O., **the senior most available F.W.** shall take over all command of FF/evacuation operators.

Thank You