

# **E4-E5 (CFA)**

## **Energy Conservation and Fire Safety**

# WELCOME

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- This is a presentation for the E4-E5 Technical Module for the Topic: Energy Conservation and Fire safety.
- Eligibility: Those who have got the Upgradation to from E4 to E5.
- This presentation is last updated on 25-3-2011.
- You can also visit the Digital library of BSNL to see this topic.

# Agenda

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- Understand Energy Conservation, Energy Management System & objective
- Significance of Energy conservation
- Understand Active & Passive approach of Fire Protection
- Understand types of Fire & suitable fire extinguishers for quenching it.

# Energy Management

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- What ?
- Why?
- How?

- Operating Profit of BSNL
- PAT of BSNL
- Operating Cost of BSNL
- Energy Cost of BSNL

- The **ever-increasing cost** of energy (i.e. Electrical power & diesel) has contributed immensely to the operating expenses of BSNL. The solution for controlling this **operating expense** lies in conserving energy by effective **Energy Management**.

# Energy Management

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“Energy Management is the **judicious** and effective use of energy to **maximize profits** (minimizing costs) and enhance competitive positions”.

## Objective of Energy Management:

- To **minimize energy cost/waste** without affecting production and quality.
- To minimize **environmental effect**.



- Effective energy management can drive whole business to improved performance through its effect on production Operations, maintenance and environmental issues.
- Energy management can be incorporated in to safety, quality (ISO 9000) or environmental management system. (ISO 14001) or in TQM.

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# Principles of Energy Management

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- Procure all the energy needed at the lowest possible rate
- Manage energy use at the highest energy efficiency
- Reusing and recycling energy by cascading
- Use the most appropriate technology
- Reduce the avoidable losses.

# Energy Management Strategies

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1. Identify a Strategic Corporate Approach
2. Appoint Energy Manager
3. Set up an Energy Monitoring and Reporting System
4. Conduct Energy Audit
5. Formalize an Energy Management Policy Statement
6. Prepare and Undertake a Detailed Project Implementation Plan
7. Implement a Staff Awareness and Training Program
8. Annual Review

# Energy Audit

- Three **top operating expenses** are:
  1. Energy (both electrical and thermal)
  2. Labour
  3. Materials.
- **Energy** would invariably emerge as a top for the cost reduction or potential cost saving
- **Energy management** function constitutes a strategic area for cost reduction.
- **Energy Audit** helps to understand more about the ways energy and fuel used in identifying the areas where waste can occur and where scope for improvement exists.

- Objective of **Energy Audit** is to determine **ways** to **reduce energy consumption** per unit of product output or to lower operating costs.
- Energy Audit provides a “bench-mark” (Reference Point) for managing energy in the organization and also provides the basis for planning a more effective use of energy throughout the organization.

# Energy Management- Barriers in Implementation

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- Energy management is **side-lined** as a **technical specialty**
- Line management is **inadequate**
- There is insufficient interest and driving force from above
- There is **little incentive** for departmental managers and general staff to save energy.
- **Lack** of senior management commitment
- Senior management unaware of **potential savings**

- Higher priority given to “more important” issues.
- It is seen as an overhead cost.
- Energy is consumed by a large number of users.
- Users are unaware of energy use and costs.



## Four vital requirements for a successful energy management

- Total support of top management
- Strategy plan,
- An effective monitoring system
- Technical ability

# Energy Management System



# Energy Conservation

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- Coal and other fossil fuels, which have taken three million years to form, are likely to deplete soon. In the last two hundred years, we have consumed 60% of all resources. For sustainable development, we need to adopt energy efficiency measures.

- Today, 85% of primary energy comes from non-renewable, and fossil sources (coal, oil, etc.). These reserves are continually diminishing with increasing consumption and will not exist for future generations.

# Sustainable Development

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- Development is sustainable when it meets the needs of the present generation without compromising the ability of future generations to meet their own needs.

# Energy Conservation and Energy Efficiency

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- Energy Conservation and Energy Efficiency are separate, but related concepts. Energy conservation is achieved when growth of energy consumption is reduced, measured in physical terms. Energy Conservation can, therefore, be the result of several processes or developments, such as productivity increase or technological progress.

Energy efficiency is achieved when energy intensity in a specific product, process or area of production or consumption is reduced without affecting output, consumption or comfort levels. Promotion of energy efficiency will contribute to energy conservation and is therefore an integral part of energy conservation promotional policies .

Energy Efficient Equipment uses less energy for same output and reduces CO<sub>2</sub> emissions



Incandescent Lamp  
60 W

CO<sub>2</sub> Emission – 65 g/hr



Compact fluorescent Lamp  
15 W

CO<sub>2</sub> Emission – 16 g/hr

Figure 2

For



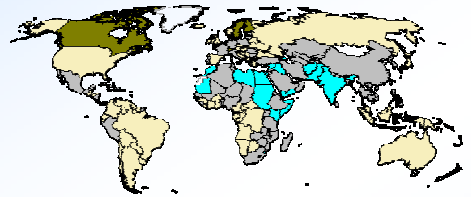
# Energy Efficiency Benefits

## Industry



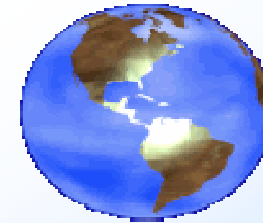
- Reduced energy bills
- Increased Competitiveness
- Increased productivity
- Improved quality
- Increased profits !

## Nation



- Reduced energy imports
- Avoided costs can be used for poverty reduction
- Conservation of limited resources
- Improved energy security

## Globe



- Reduced GHG and other emissions
- Maintains a sustainable environment

# Conclusion

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- The energy management can be effectively used by BSNL to reduce its operating expense and increasing profitability. Energy conservation is not only useful for the organization, but also for the protection of the global environment.

# FIRE SAFETY

# **FIRE Safety Approach – Active & Passive**

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- Fire
- Passive approach for Fire Safety
- Active Approach for Fire Safety
  - Fire Extinguisher
    - Fire Class
    - Types of Fire Extinguishers
  - Automatic/Manual Fire Alarm System
  - Wet Riser System
- Rules for Fighting the Fire

# **FIRE Safety Approach – Passive**

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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- Contd.**

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- 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- Contd.

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- 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**

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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



# The Fire



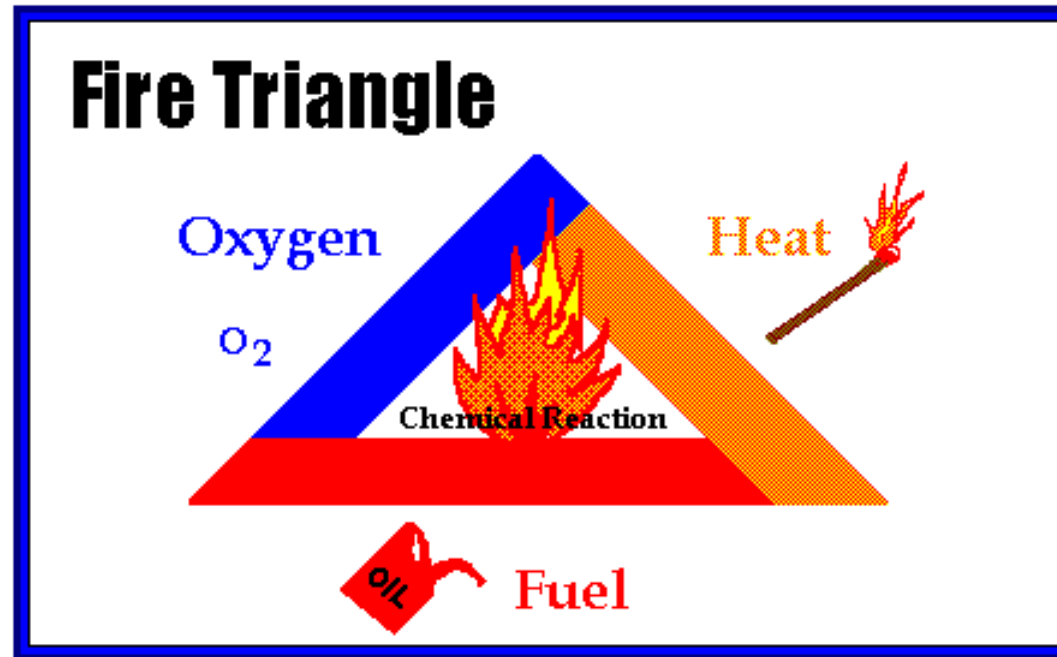
Three things must be present at the same time to produce fire:

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.**

# 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...

# Types of Fire



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.

# Types of Fire Extinguishers

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Different types of fire extinguishers are designed to fight different classes of fire.

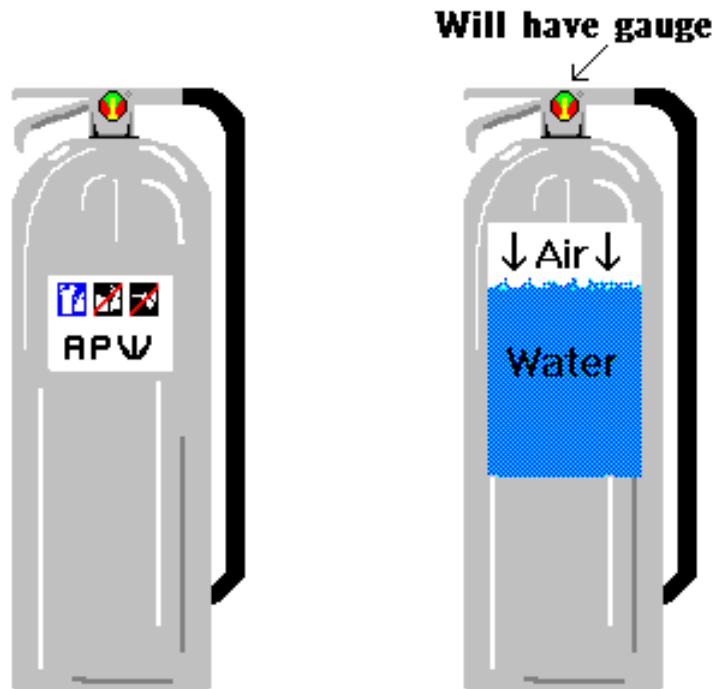
The most common types of fire extinguishers are:

1. Water (APW)
2. Carbon Dioxide (CO<sub>2</sub>)
3. Dry Chemical (ABC, BC, DC)
4. Foam etc....

# Types of Fire Extinguishers- Contd.



## 1. Water (APW) Fire Extinguishers



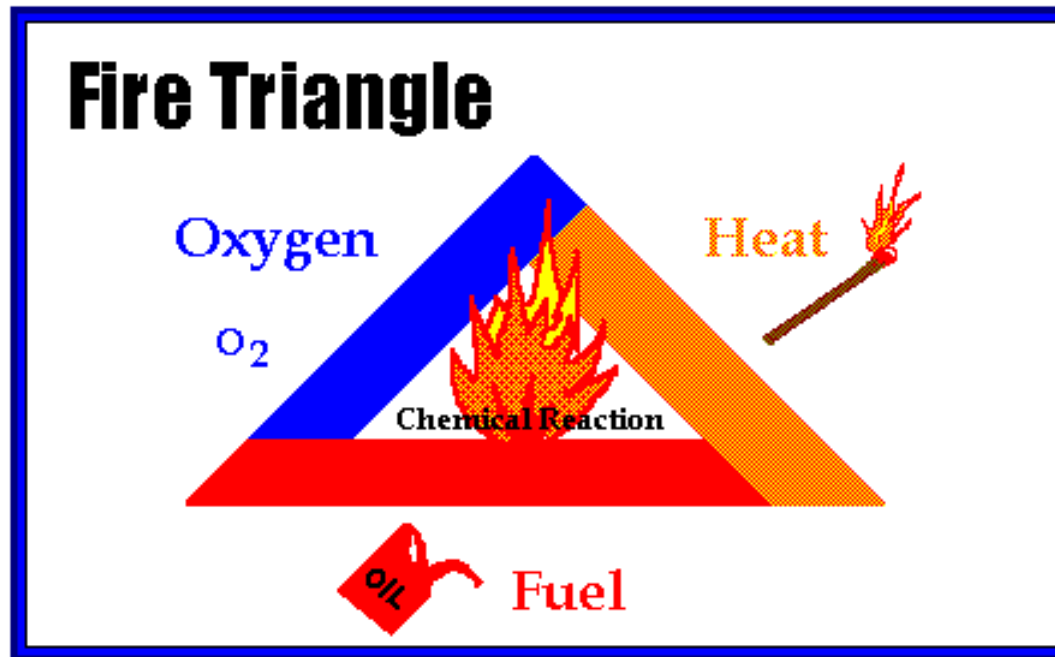
APW stands for  
“Air-Pressurized  
Water.”

Filled with ordinary  
tap water and  
pressurized air,  
they are  
essentially large  
squirt guns.

# Types of Fire Extinguishers- Contd.



## 1. Water (APW) Fire Extinguishers



APW's extinguish fire by taking away the "heat" element of the Fire Triangle.



# Types of Fire Extinguishers- Contd.



## 1. Water (APW) Fire Extinguishers



APW's are designed for Class A fires only: Wood, paper, cloth.

- ✿ Using water on a flammable liquid fire could cause the fire to spread.
- ✿ Using water on an electrical fire increases the risk of electrocution. If you have no choice but to use an APW on an electrical fire, make sure the electrical equipment is un-plugged or de-energized.

# Types of Fire Extinguishers- Contd.



## 1. Water (APW) Fire Extinguishers

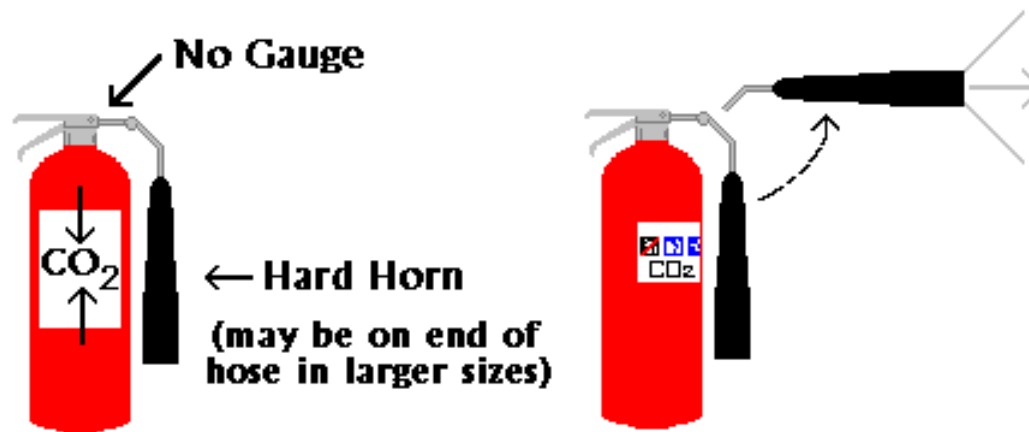


They will be found in halls, computer laboratories. It is important to remember, however, that computer equipment must be disconnected from its electrical source before using a water extinguisher on it.

# Types of Fire Extinguishers- Contd.



## 2. Carbon Dioxide Fire Extinguishers



The pressure in a CO<sub>2</sub> extinguisher is so great, bits of dry ice may shoot out of the horn!

# Types of Fire Extinguishers- Contd.



## 2. Carbon Dioxide Fire Extinguishers



CO<sub>2</sub>'s are designed for Class B and C (Flammable Liquids and Electrical Sources) fires only!

CO<sub>2</sub>s will frequently be found in laboratories, mechanical rooms, kitchens, and flammable liquid storage areas.

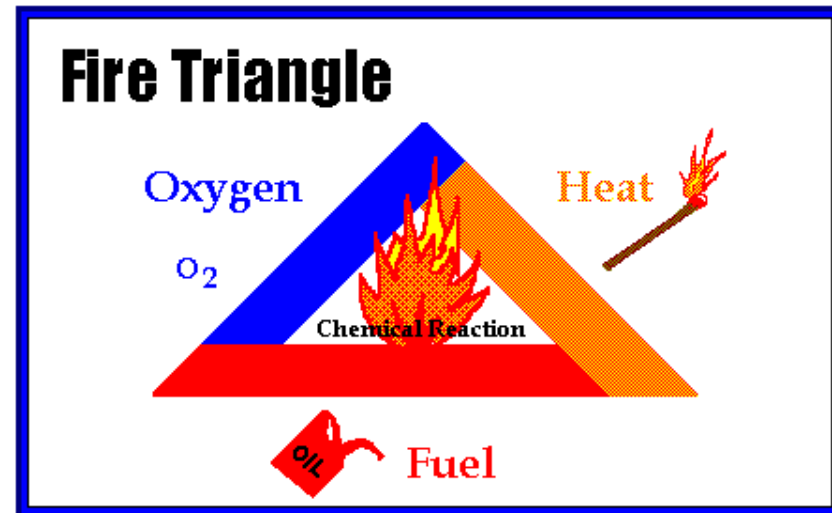
In accordance with NFPA regulations (and manufacturers' recommendations), all CO<sub>2</sub> extinguishers undergo hydrostatic testing and recharge every 5 years.

# Types of Fire Extinguishers- Contd.



## 2. Carbon Dioxide Fire Extinguishers

Carbon dioxide is a non-flammable gas that takes away the oxygen element of the fire triangle. Without oxygen, there is no fire.

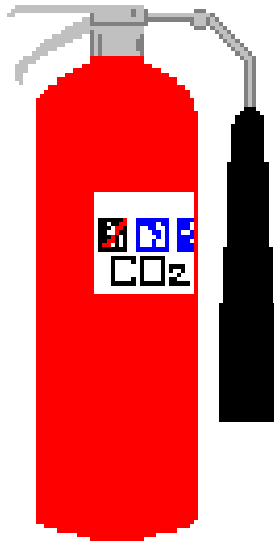


$CO_2$  is very cold as it comes out of the extinguisher, so it cools the fuel as well.

# Types of Fire Extinguishers- Contd.



## 2. Carbon Dioxide Fire Extinguishers



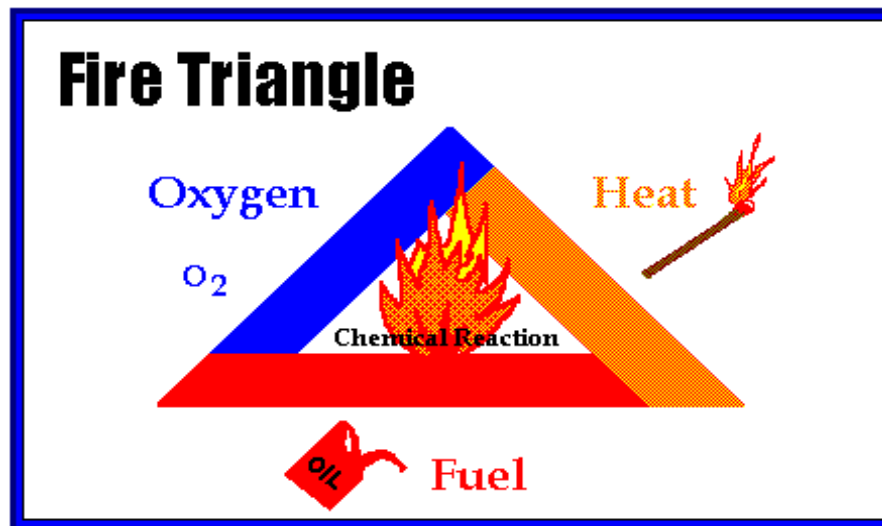
A CO<sub>2</sub> may be ineffective in extinguishing a Class A fire because it may not be able to displace enough oxygen to successfully put the fire out.

Class A materials may also smolder and re-ignite.

# Types of Fire Extinguishers- Contd.



## 3. Dry Chemical (ABC) Fire Extinguishers



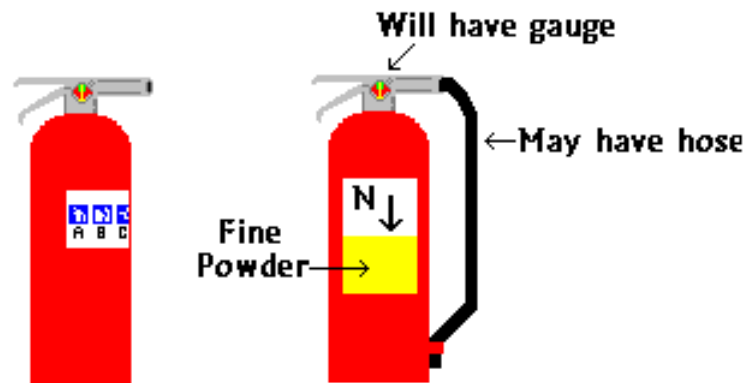
Dry chemical extinguishers put out fire by coating the fuel with a thin layer of powder. This separates the fuel from the oxygen in the air.

The powder also works to interrupt the chemical reaction of fire. These extinguishers are very effective at putting out fire.

# Types of Fire Extinguishers- Contd.



## 3. Dry Chemical (ABC) Fire Extinguishers



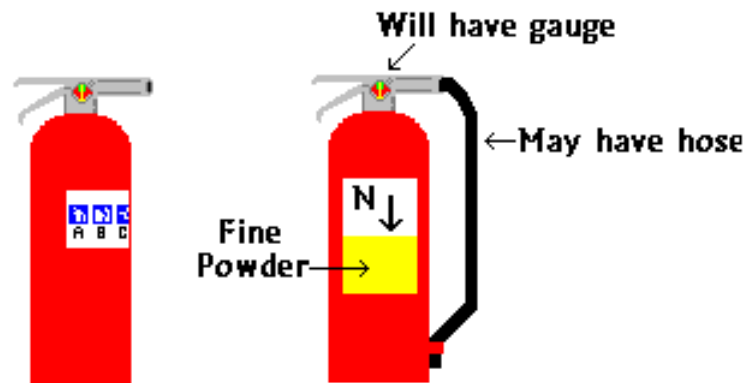
The “ABC” fire extinguishers are filled with a fine yellow powder. The greatest portion of this powder is composed of monoammonium phosphate. The extinguishers are pressurized with nitrogen.



# Types of Fire Extinguishers- Contd.



## 3. Dry Chemical (ABC) Fire Extinguishers



Dry chemical extinguishers come in a variety of types...

You may see them labeled:

- DC (for “Dry Chemical”)
- ABC (can be used on Class A, B, or C fires)
- BC (designed for use on Class B and C fires)

# Types of Fire Extinguishers- Contd.



## 3. Dry Chemical (ABC) Fire Extinguishers

It is extremely important to identify which types of dry chemical extinguishers are located in your area!



An “ABC” extinguisher will have a label like this, indicating it may be used on Class A, B and C fires.

You don’t want to mistakenly use a “BC” extinguisher on a Class A fire thinking that it was an “ABC” extinguisher.

# Types of Fire Extinguishers- Contd.



## 3. Dry Chemical (ABC) Fire Extinguishers



Dry chemical extinguishers with powder designed for Class B and C fires (“BC” extinguishers) may be located in places such as commercial kitchens and areas with flammable liquids.

We may find ABC’s in public halls of new buildings, in laboratories, offices, chemical storage areas, mechanical rooms, University vehicles, etc.

# Fire Extinguisher

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- **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

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- 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
  - If **building height > 15m** – Automatic fire alarm is must.



## Components

For internal circulation of BSNL only

# Automatic / Manual fire Alarm System

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- 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

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- 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

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- 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 It (up to 15m); 1,00,000 It (15m to 24m)

# Wet riser System- Components

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

# Wet riser System- Components

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- **Pumps**
  - **Jockey Pump** (for small pressure drop)
  - **Main Electrical Fire Pump** ( manual shut off)
  - **Standby Diesel Fire Pump**
- **Yard Hydrant** (**one hydrant for every 60m length of building with 2 nos. 15 m length hose pipes**)
- **Fire Brigade Inlet**



## Components

ALL OF US HAVE  
TO CONTRIBUTE  
for the  
CAUSE OF FIRE SAFETY  
AS A DAILY ROUTINE

