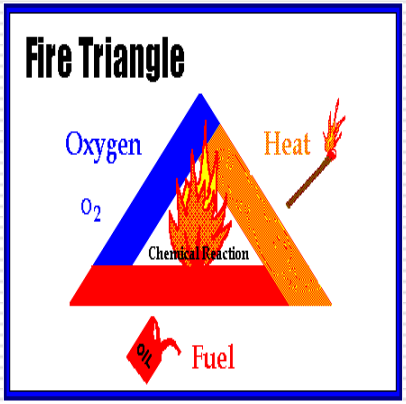
FIRE DETECTION & PROTECTION SYSTEMS



Engr. ZAFAR AHMED
Superintending Engineer
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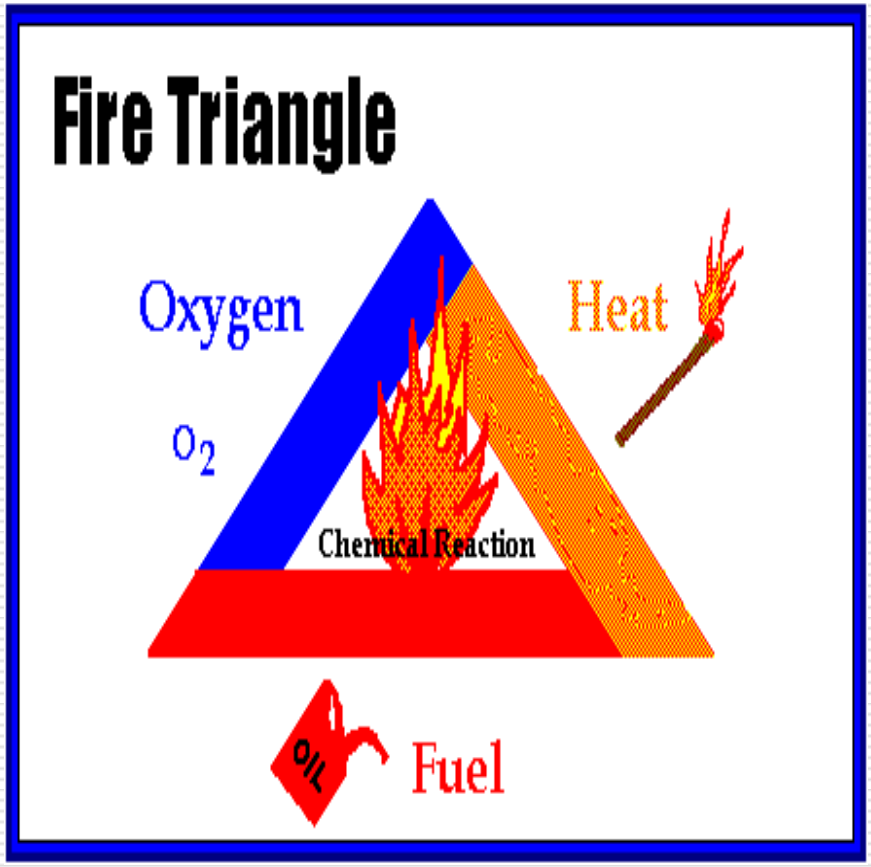
How Does a Fire Work?

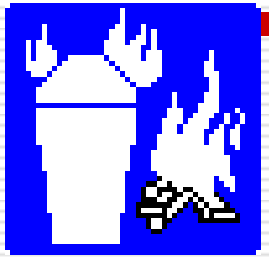


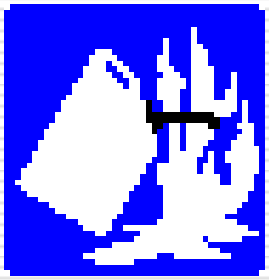
- Need all three components to start a fire
- Fire extinguishers remove one or more of the components

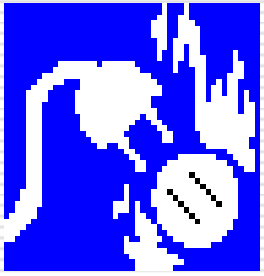
Fire Tetrahedron

- Basic components of a fire are:
  - fuel
  - source of ignition
  - oxygen
  - process of combustion
- Commonly referred to as the "fire tetrahedron"

Types of Fires





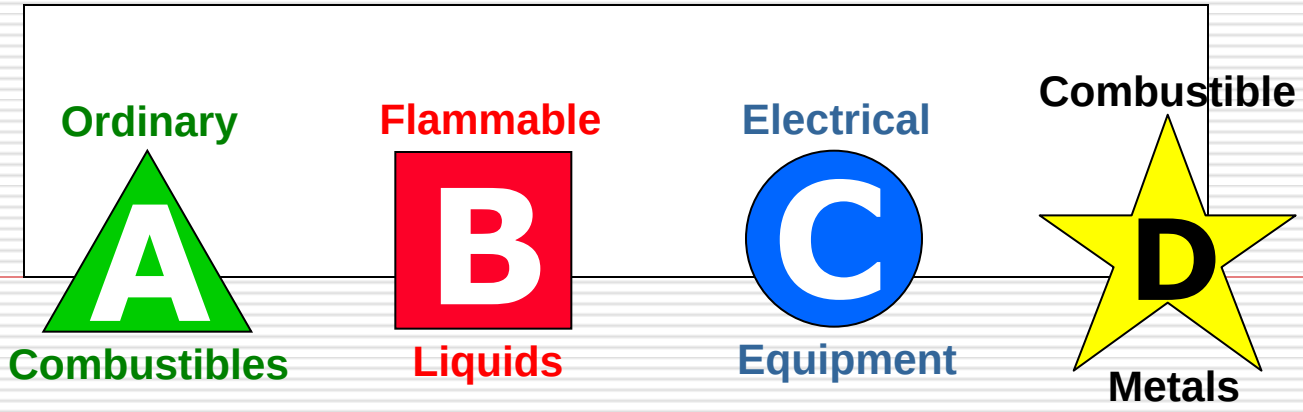


- **Class A** - fires occur in ordinary materials, such as wood, paper, cloth, carpets, and rubbish.
- **Class B** - fires occur in the vapor-air mixture over the surface of flammable liquids, such as gasoline, oil, grease, paints, and thinners.
- **Class C** - fires occur in or near energized electrical equipment
- **Class D** - fires occur in combustible metals such as magnesium, titanium, zirconium, lithium, potassium, and sodium.

Extinguisher Classification

Letter classification given an extinguisher to designate the class or classes of fire on which it will be effective.

- **Class A** – ordinary combustibles (wood, cloth, paper)
- **Class B** – flammable liquids, gases, greases
- **Class C** – energized electrical equipment
- **Class D** – combustible metals



Fire/Life Safety

Fire Protection

- Class A Fires: Ordinary combustibles such as wood and paper.
- Class B Fires: Flammable and combustible liquids and gases.
- Class C Fires: Energized electrical equipment.
- Class D Fires: Combustible metals.
- Class K Fires: Cooking Oils and Fats.

COMPARISION OF FIRE CLASSES

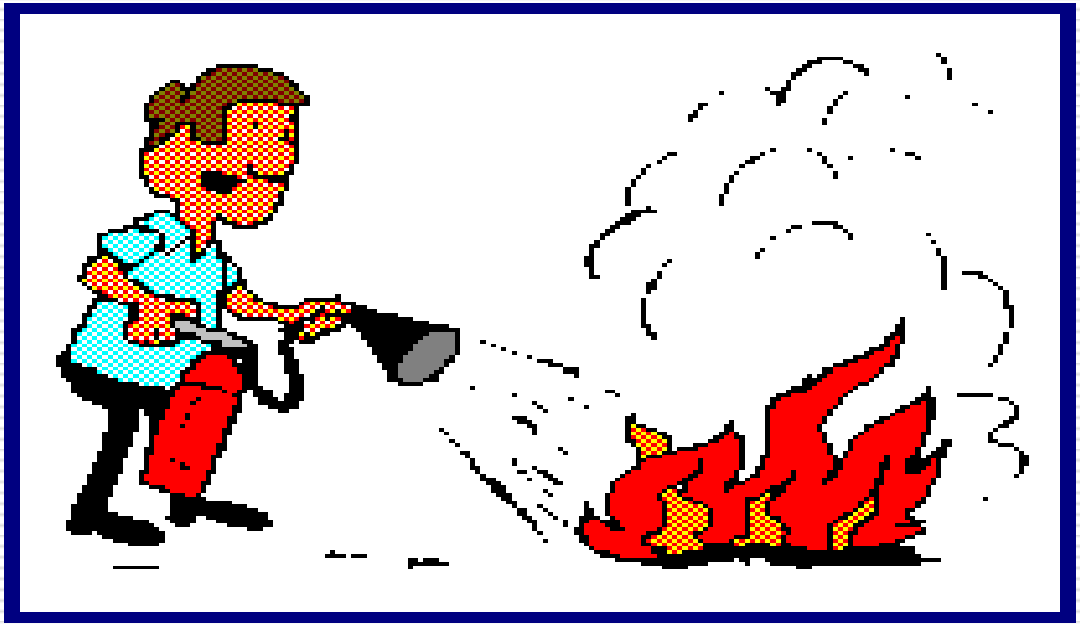
AMERICAN	EUROPEAN	AUSTRALIAN/ ASIAN	FUEL/HEAT SOURCES
CLASS A	CLASS A	CLASS A	ORDINARY COMBUSTIBLES
CLASS B	CLASS B	CLASS B	FLAMMABLE LIQUIDS
	CLASS C	CLASS C	FLAMMABLE LIQUIDS
CLASS C	Unclassified	CLASS E	ELECTRICAL EQUIPMENTS
CLASS D	CLASS D	CLASS D	COMBUSTIBLEMATERIALS
CLASS K	CLASS F	CLASS F	COOKING OIL OR FAT

DETECTION AND SUPPRESSION HARDWARE

Even the best fire-fighting agent is ineffective without the right detection package. FM-200 fast agent discharge, combined with early fire detection, provides maximum asset protection and limits the production of combustion and decomposition products.

Fire Alarm Control Panels, Digital / Analogue Addresable Panels	
Ionisation Smoke Detectors	Duct Mounting Kits
Rate of Heat Rise Detectors	Analogue Fire Sensors
Optical Smoke Detectors	Callpoints
Combustable Gas Detectors	Alarm Bells
Sirens and Strobes	Gas Extiguishant Systems

Fire Extinguisher



Different Kinds of Extinguishers

The 4 most common fire extinguishers:

- All Purpose Water
- Carbon Dioxide
- Multi-Purpose Dry Chemical
- Dry Powder

Each kind of extinguisher has a specific use

Extinguishing Agents

- Class A
  - Respond best to water or water type which lower the fuel below it's ignition point.
- Class B
  - Respond to Carbon Dioxide, Halogenated Hydrocarbons (Halons), and dry chemicals, all of which displace the Oxygen supply making combustion impossible.

Extinguishing Agents

- Class C
  - Respond best to Carbon Dioxide which displaces the Oxygen.
  - Must have a non-metallic horn to prevent static electricity and transmission of electricity to operator from the fire.

Extinguishing Agents

- Class C cont.
  - Halons or dry chemicals may be used but the disadvantage it the powder contamination which can lead to further damage of electrical components.
- Class D
  - Responds best to dry powder which prevents oxidation and and the resulting flame.

Fire Extinguishing Agents

- Agents work by two methods
  - Displacing the oxygen
  - Chemically combining with oxygen to prevent combustion
- Agents commonly used
  - Carbon dioxide (CO_2)
  - Freon (chlorinated hydrocarbon)
  - Halon 1301 (monobromotrifluoromethane – CF_3Br)
  - Nitrogen (N_2)

Fire Extinguishing Agents

- CO_2 is usually limited to to older, reciprocating engine powered aircraft.
- Freon is used in modern aircraft.
- Halon 1301 is used in modern aircraft.
- N_2 is typically used primarily in current systems as a propellant for the other chemicals.

Fire Extinguishing Agents

- Liquid Freon and Halon 1301 are stored under pressure in liquid form but when released are in gaseous form.
  - When released the gas can cause frostbite due to extreme low temperatures during evaporation.
- Dry chemical extinguishers are not used because of the damage caused by toxic and corrosive chemicals.
- Some gaseous agents may be considered toxic because of the rapid displacement of Oxygen when used.

Identification of Fire Extinguishers

- Class A
  - Triangle containing the letter A
  - Green
- Class B
  - Square containing the letter B
  - Red

Identification of Fire Extinguishers

- Class C
  - Circle containing the letter C
  - Blue
- Class D
  - Five point star containing the letter D
  - Yellow

EXTINGUISHING AGENTS

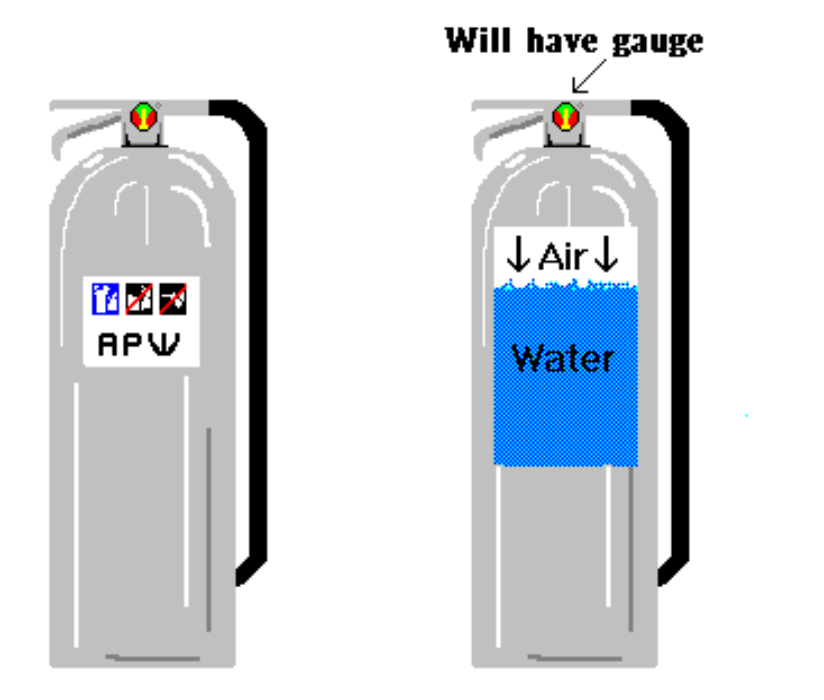
Extinguishing Agents are the gases used to put out fires. Specific agents will be required for specific hazards, and in order for it to be completely effective extinguishing agent must-

cause minimal or no damage to any equipment within the hazard area
not have any ill effects on personnel
put out the fire in a minimal amount of time (10 seconds)
The extinguishing agent depending on the following variables:

- **Volume of the room or area**
- **Cause/ Nature of the fire**
- **Contents of area (Flammable objects or materials)**
- **The number of occupants of area**

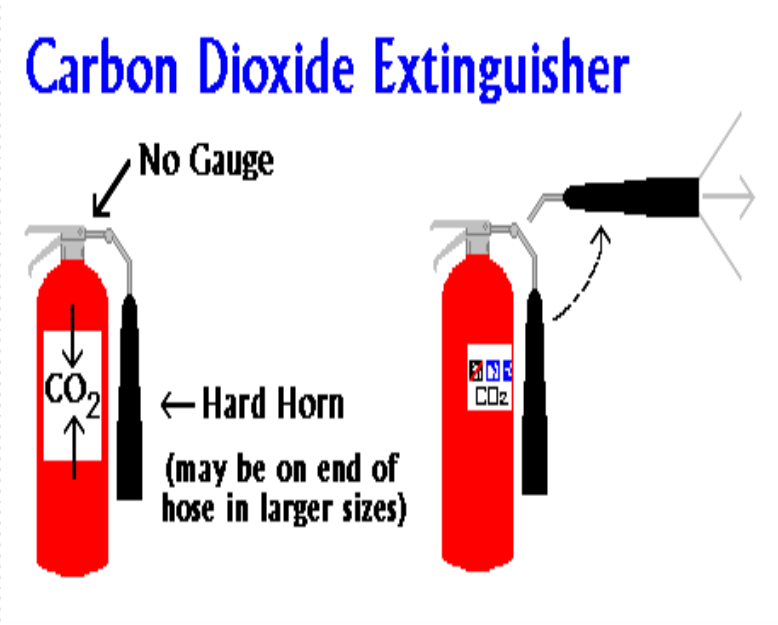
Some agents like Halon 1301 (banned in Montreal Protocol) are toxic to humans, have adverse effects on the Ozone layer and leave residues that are damaging to equipment and machinery. Also, conformity with international safety standards like the Montreal Protocol, NFPA 2001 and ISO 14520 have to be made, and taken into consideration before an appropriate agent can be chosen.

All Purpose Water



- Use on CLASS A fires
- Pressurized water
- Pressure gauge

Carbon Dioxide(CO_2)

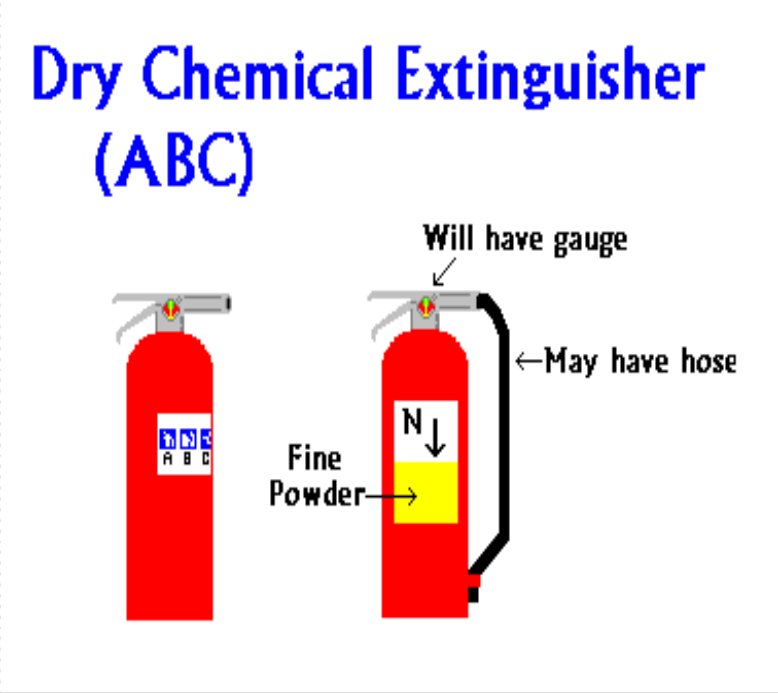


- Use on CLASS B and CLASS C fires
- Hard, plastic nozzle

Dry Chemical Extinguishing Systems

- Use the same types of finely powdered agents as dry chemical fire extinguishers
- Agent kept in self-pressurized tanks or in tanks with an external cartridge of carbon dioxide or nitrogen that provides pressure when the system is activated.

Multi-Purpose Dry Chemical



- Use on CLASS A, CLASS B, and CLASS C fires
- Fine powder under pressure
- Pressure gauge

Maintaining Portable Fire Extinguishers

- Must maintain in a fully charged and operable condition
- Must keep in their designated places at all times except during use
- Must conduct an annual maintenance check
- Must record the annual maintenance date and retain this record for one year after the last entry or the life of the shell, whichever is less

Portable Fire Extinguishers

- Extinguishers shall be distributed so that maximum travel distances apply:

- Class A 75 feet
- Class B 50 feet
- Class C Based on appropriate pattern
- Class D 75 feet

Emergency Procedures

Building Evacuation

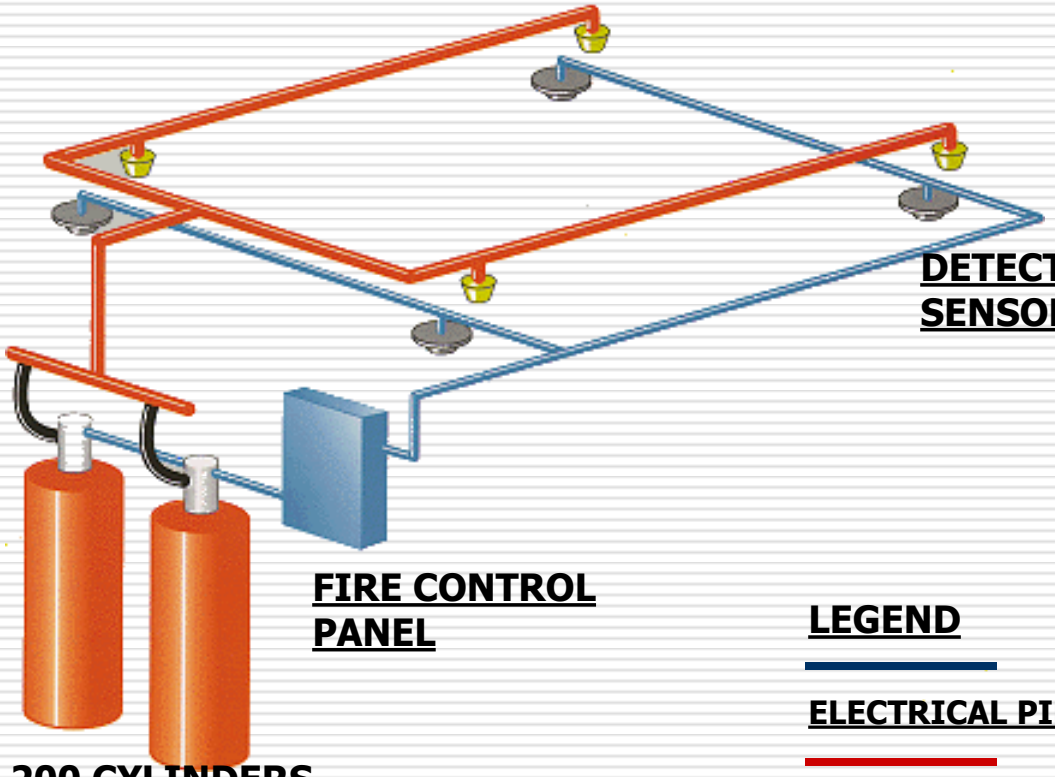
- Proceed to nearest exit in an orderly fashion
- Assemble at least 100 feet from building
- Provide emergency crews with information about people still in the building
- Provide information to emergency crews about the reason for evacuation
- Never re-enter a building until instructed to by the police department, fire department.

Carbon Dioxide (CO_2) Extinguishing Systems

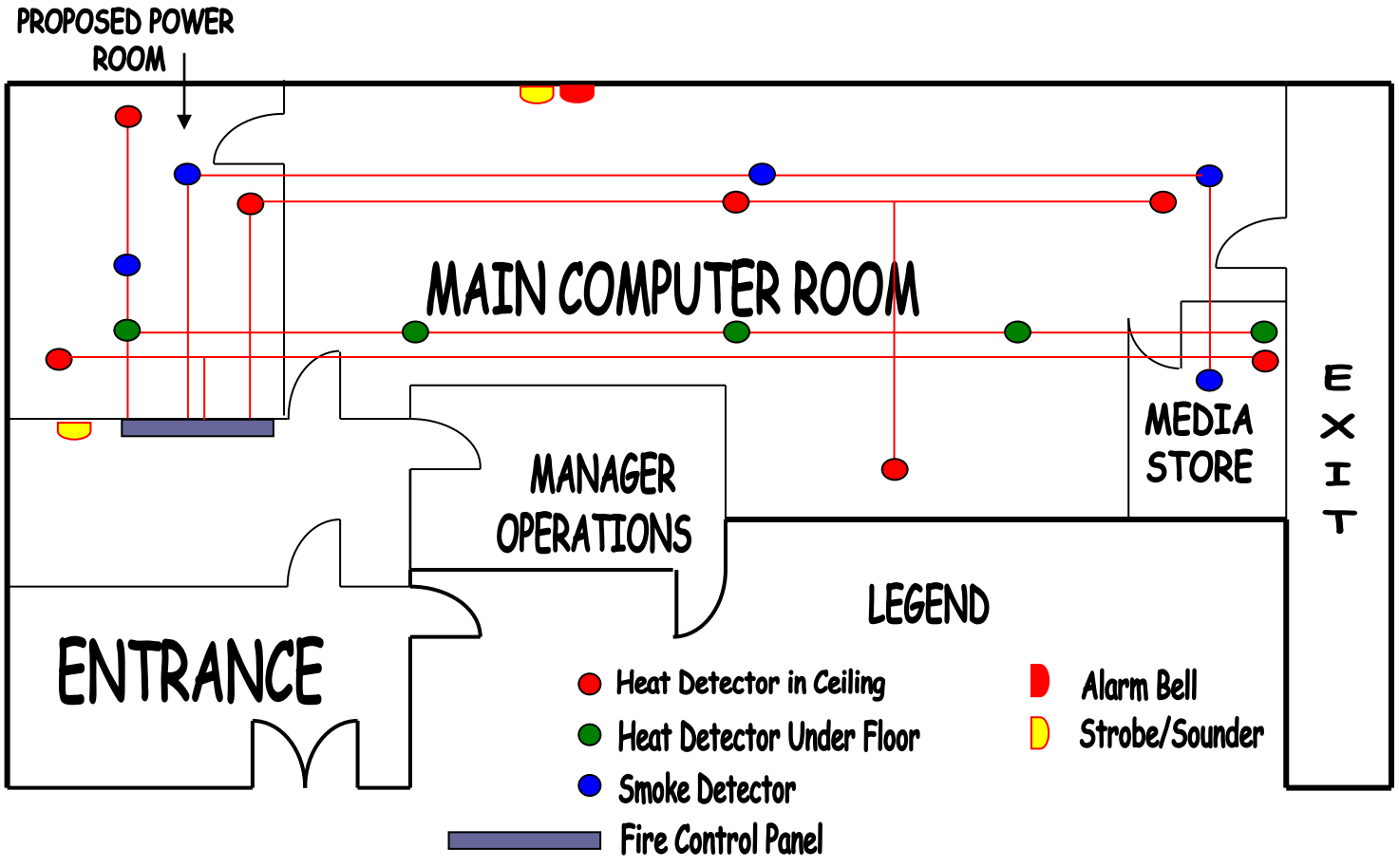
- Designed to protect a single room or a series of rooms
- Should be connected to the building's fire alarm system

Several fire extinguishing cylinders work as extinguisher tank under pressure

BASIC FM 200 INSTALLATION



A TYPICAL FIRE DETECTION SYSTEM



Introduction

- Fire protection systems have fairly standardized design requirements across North America.
  - Most areas follow the applicable **NFPA** standards.
  - Local fire prevention and building codes may require different types of systems for different buildings. In Bangladesh **BNBC** is followed.

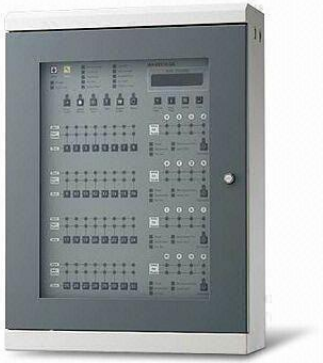
Fire Alarm and Detection Systems (1 of 2)

- A fire detection system recognizes when a fire is occurring and activates the fire alarm system.
  - Alerts occupants
  - May alert the fire department
  - May automatically activate fire suppression systems

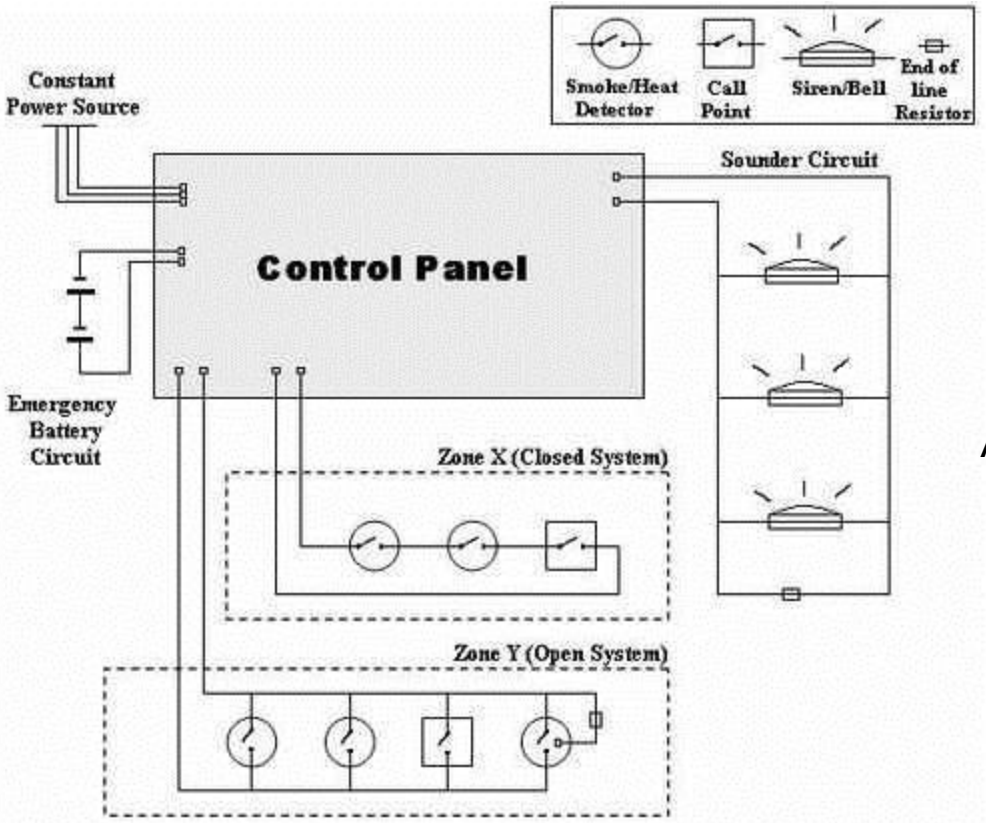
Fire Alarm and Detection Systems (2 of 2)

- Fire alarm and detection systems can be very simple or very complex.
  - These systems generally have the same basic components.

Fire alarm system control panel



Control Panel
With auto dialer



A simple control Panel

Control Panel
With Suppression
System

An integrated control panel

Control Panel type: Conventional

Conventional panels have been around ever since electronics became small enough to make them viable. They are no longer used frequently in large buildings, but are still used on smaller sites such as small schools, stores, restaurants, and apartments.

A conventional system employs one or more initiating circuits, connected to sensors (initiating devices) wired in parallel. These sensors are devised to decrease the circuits resistance when the environmental influence on any sensor exceeds a predetermined threshold. In a conventional system the information density is limited to the number of such circuits used. A small map of the building is often placed near the main entrance with the defined zones drawn up, and LEDs indicating whether a particular circuit/zone has been activated. Another common method is to have the different zones listed in a column, with an LED to the left of each zone name, or to use an LCD interface to display information.

The main drawback with conventional panels is that one cannot tell *which* device has been activated within a circuit. The fire may be in one small room, but as far as emergency responders can tell, a fire could exist anywhere within a zone

Control Panel type: Multiplex

Multiplex systems, a sort of transition between conventional and modern addressable systems, were often used in large buildings and complexes from the mid to late 1970s into the late 1980s. Early on, these systems were programmed to function as large conventional systems. Gradually, later installations began to feature components and features of modern addressable systems. These systems were often capable of controlling more than a building's fire alarm system (i.e. HVAC, security, electronic door locks...) without any type of alarm or trouble condition present. While the main panel was the brains of the system and could be used to access certain functions, fire alarm controls were usually accessed through transponders. These were smaller conventional panels programmed to 'communicate' the status of part of the system to the main panel and also could be used to access basic fire alarm control functions

ALARM SYSTEMS

- Alarm systems can be divided into four groups: local, auxiliary, central station, and proprietary.

- All types of alarm systems should be equipped with a signal system that clearly communicates to all persons in the building, plant, or laboratory.

- Whenever an alarm is sounded in any portion of the building or area, all employees must know what the sound means.

Local Alarm Systems

- A local alarm consists simply of bells, horns, lights, sirens, or other warning devices right in the building.
- Local alarms are generally used for life protection – that is, to evacuate everyone and thus limit injury or loss of life from the fire.
- A local alarm can be tied in with another system to call the fire department.
- Local alarm systems are inexpensive, available from a wide range of suppliers, and easy to install.

Auxiliary Alarm Systems (supplementary)

- Auxiliary alarm systems are even less expensive than local alarm systems.
- Such a system simply ties a fire detector to a nearby fire call box. In effect, it becomes a transmit station triggered by fire detectors inside the building.

Central Station Systems

- Central station systems are available in most major cities around the country.
- Operated by trained personnel, a central station continually monitors a number of establishments and, in case of an alarm, calls a nearby fire station and alerts the building's personnel.
- Central station devices are almost always leased.

Proprietary Alarm Systems

- Proprietary alarm systems feed alarms to the building's maintenance force, and, optionally, to the fire department as well.
- One reason for their acceptance is that insurance regulations generally require security officers.

Residential Fire Alarm Systems

(1 of 2)

- Single-station smoke alarm most common type of residential fire alarm system.
- Includes both a smoke detection device and an audible alarm within a single unit
- Millions installed in private dwellings and apartments

Residential Fire Alarm Systems
(2 of 2)

- Smoke alarms can be battery-powered or hard-wired to a 220/110-volt electrical system.
- Up-to-date codes require new homes to have a smoke alarm in every bedroom and on every floor level.
- Many home fire alarm systems are part of security systems.

Fire Alarm System Components

- Three basic components in a fire alarm system:
  - Alarm initiation device
  - Alarm notification device
  - Control panel

Fire Alarm System Control Panels
(1 of 3)

- Serves as the "brain" of the system
- Manages and monitors the proper operation of the system
- Can indicate the source of an alarm
- Also manages primary power supply and provides backup power supply for the system

Fire Alarm System Control Panels
(2 of 3)

- May perform additional functions, and may interface with other systems and facilities
- Vary greatly depending on age of system and manufacturer

Fire Alarm System Control Panels
(3 of 3)

- Used to silence the alarm and reset the system
- Many buildings have an additional display panel, called a remote annunciator in a separate location.
- In some systems, a battery in the fire alarm control panel will automatically activate when the external power is interrupted.

Manual Initiation Devices

- Designed so that building occupants can activate the fire alarm system
- Primary manual initiation device is the manual fire alarm box, or manual pull-station.
- Once activated, should stay in the "activated" position until it is reset.

Double-Action Pull Stations

- Variation on the double-action pull-station, designed to prevent malicious false alarms, is covered with a piece of clear plastic
- Often used in areas where malicious false alarms frequently occur

Smoke Detectors

- Designed to sense the presence of smoke
- Commonly found in school, hospital, business, and commercial occupancies with fire alarm systems
- Most common are ionization and photoelectric detectors.

Heat Detectors

- Can provide property protection, but cannot provide reliable life safety protection
- Generally used in situations where smoke alarms cannot be used
- Often installed in unheated areas
- Generally very reliable and less prone to false alarms than smoke alarms

Fixed Temperature Heat Detectors

- Designed to operate at a preset temperature
- Usually use a metal alloy that will melt at the preset temperature

Flame Detectors

- Specialized devices that detect the electromagnetic light waves produced by a flame
- Typically found in places where early detection and rapid reaction to a fire is critical
- Complicated and expensive

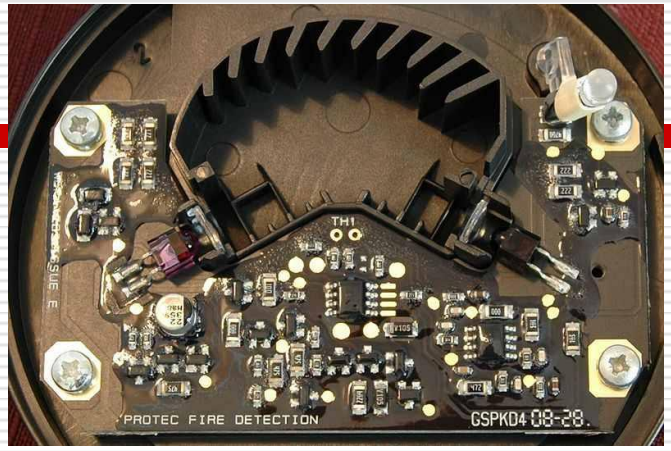
Gas Detectors

- Calibrated to detect the presence of a specific gas
- Need regular calibration
- Usually found only in specific commercial or industrial applications

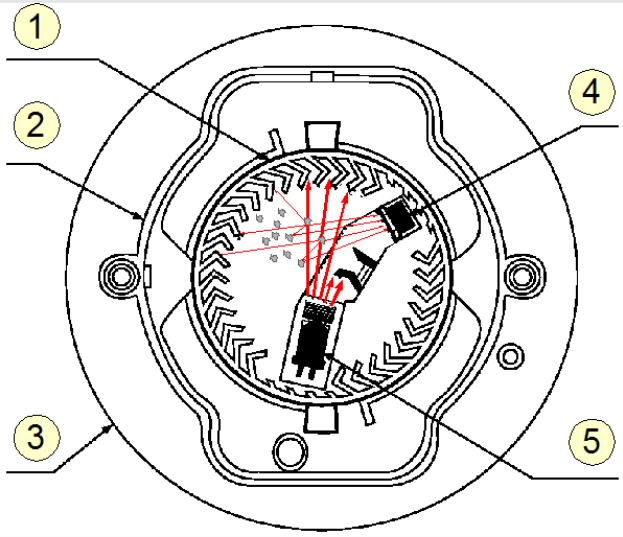
Air Sampling Detectors

- Continuously capture air samples and measure the concentrations of specific gases or products of combustion

Inside configuration of Smoke detector



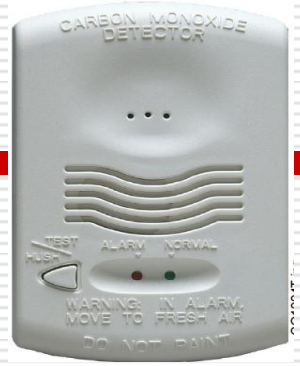
Photoelectric smoke detector



1: Optical chamber
2: Cover
3: Case moulding
4: Photodiode (detector)
5: Infrared LED

Ionization smoke detector

Alarm initiating device types



CO2 Gas detector

Smoke detector

Heat detector
Fixed temperature

Infrared Flame detector

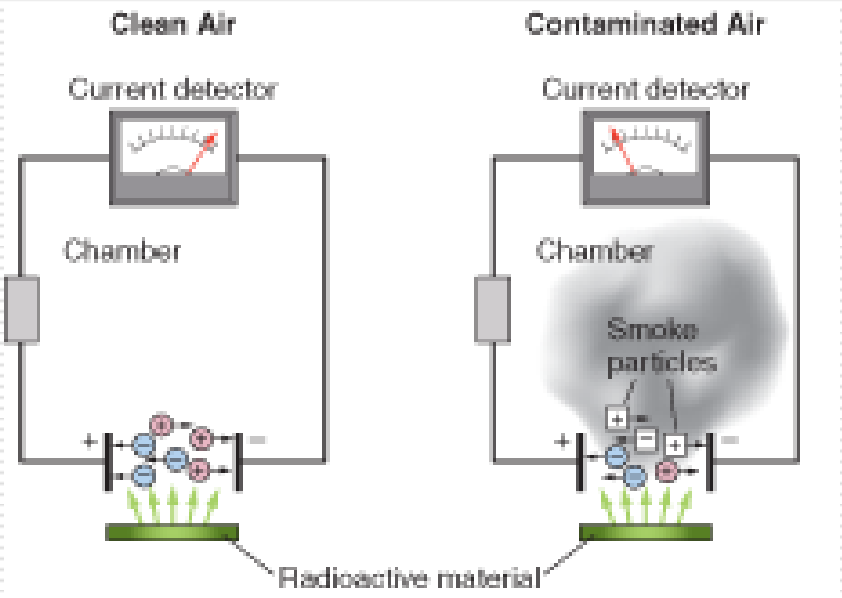
Heat detector
Rate of rise

Manual Call point
Or Hand Operated
Initiating Device

Ionization versus Photoelectric Smoke Detectors (1 of 2)

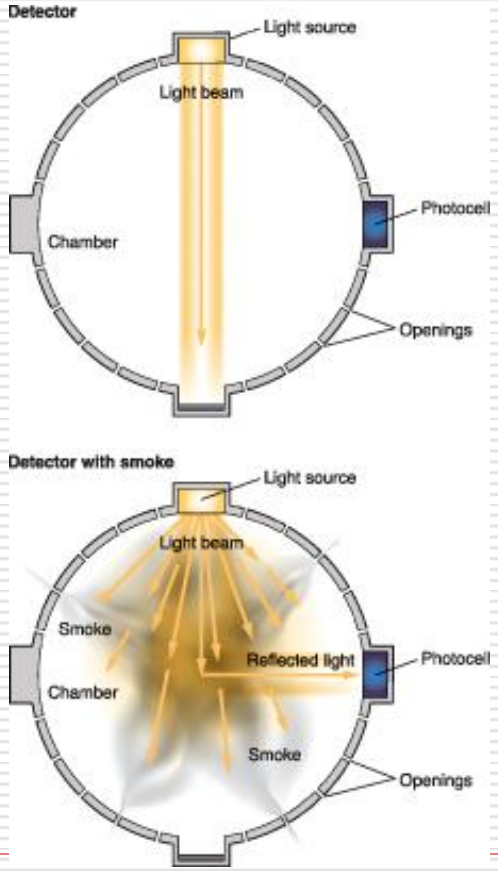
- Ionization detectors are triggered by the invisible products of combustion.
- Photoelectric detectors are triggered by the visible products of combustion.

Ionization versus Photoelectric Smoke Detectors (2 of 2)



The radioactive material releases charged particles into the chamber, and a small electric current flows between two plates.

When smoke particles enter the chamber, they neutralize the charged particles and interrupt the current flow. The detector senses the interruption and activates the alarm.



Thermo-switch System

- A circuit in which one or more thermal switches are connected to an electrical circuit with a warning horn and an aural alarm to alert the flight crew that an over-heat condition is present.
- If more than one thermal switch is used they are connected in parallel, so closing of any one switch will provide warning.

Thermo-switch System

- The thermal switch, sometimes called a spot detector, works by expansion of the outer casing in the unit.
- When exposed to heat the casing becomes longer, causing the two contacts inside to meet, thus closing the circuit.
- Closing the circuit activated the warning system on the flight deck.

Thermocouple System

- Also called a “rate of rise” detection system.
- A circuit where one or more thermocouples are connected in series to activate an alarm when there is a sufficient temperature increase at the sensor.
- Thermocouples are made of two dissimilar metals which are twisted together inside an open frame.

Thermocouple System

- The frame allows air to flow over the wires without exposing the wires to damage.
- The exposed wires make a hot junction.
- The cold junction is located under the insulating material in the sensor unit.

Thermocouple System

- When there is a difference in temperature a current is created.
  - About 4 mA
- The current created sets off a sensitive relay activating the alarm.
- If the temperature rise is slow so that the cold junction heats up along with the hot junction then the relay will not be activated.

False, Unwanted, and Nuisance Alarms

- Malicious False Alarms
  - Caused by individuals who deliberately activate a fire alarm when there is no fire
- Unwanted Alarms
  - Occur when an alarm system is activated by a condition that is not really an emergency
- Nuisance Alarms
  - Caused by improper functioning of an alarm system or one of its components

Alarm Notification Appliances

- Produce an audible signal when fire alarm is activated
- Some signals play a recorded announcement in conjunction with the temporal-3 pattern.
- Many new systems incorporate visual notification devices.

Fire Department Notification

- Fire alarm systems can be broken down into five categories, based on how the fire department is notified of an alarm:
  - Local alarm system
  - Remote station system
  - Auxiliary system
  - Proprietary system
  - Central station

Fire Department Notification

- Local Alarm System
  - Does not notify the fire department
  - The alarm sounds only in the building to notify the occupants.
- Remote Station System
  - Sends signal directly to fire department or to another monitoring location via a telephone line or a radio signal

Fire Suppression Systems

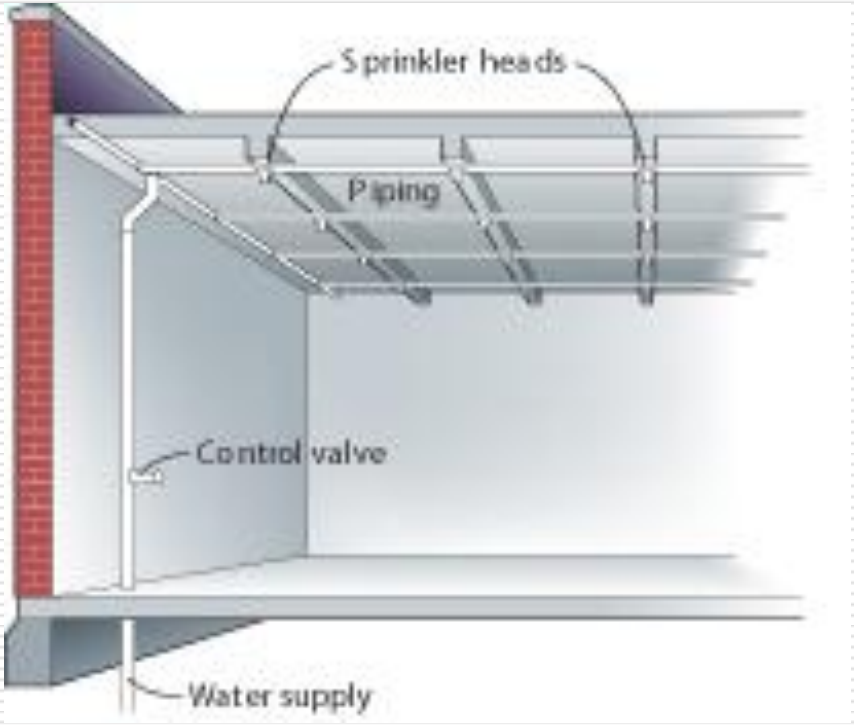
- Include automatic sprinkler systems, standpipe systems, and specialized extinguishing systems such as dry chemical systems
- Understanding how these systems work is important because they can affect fire behavior

Automatic Sprinkler Systems

- In most automatic sprinkler systems, the sprinkler heads open one at a time as they are heated to their operating temperature.
- One of the major advantages of a sprinkler system is that it can function as both a fire detection system and a fire suppression system.

Automatic Sprinkler System Components [36]

- Four major components:
  - Automatic sprinkler heads
  - Piping
  - Control valves
  - A water supply, which may or may not include a fire pump



Automatic Sprinkler Heads

- The working ends of a sprinkler system
- Composed of:
  - A body, which includes the orifice (opening)
  - A release mechanism that holds a cap in place over the orifice
  - A deflector that directs the water in a spray pattern

Fusible Link Sprinkler Heads

- Use a metal alloy, such as solder that melts at a specific temperature
  - Alloy links two other pieces of metal that keep the cap in place.
  - When designated operating temperature is reached, solder melts and the link breaks, releasing the cap.

Frangible Bulb Sprinkler Heads

- Use a glass bulb filled with glycerin or alcohol to hold the cap in place
  - As bulb is heated, liquid absorbs the air bubble and expands until it breaks the glass, releasing the cap.

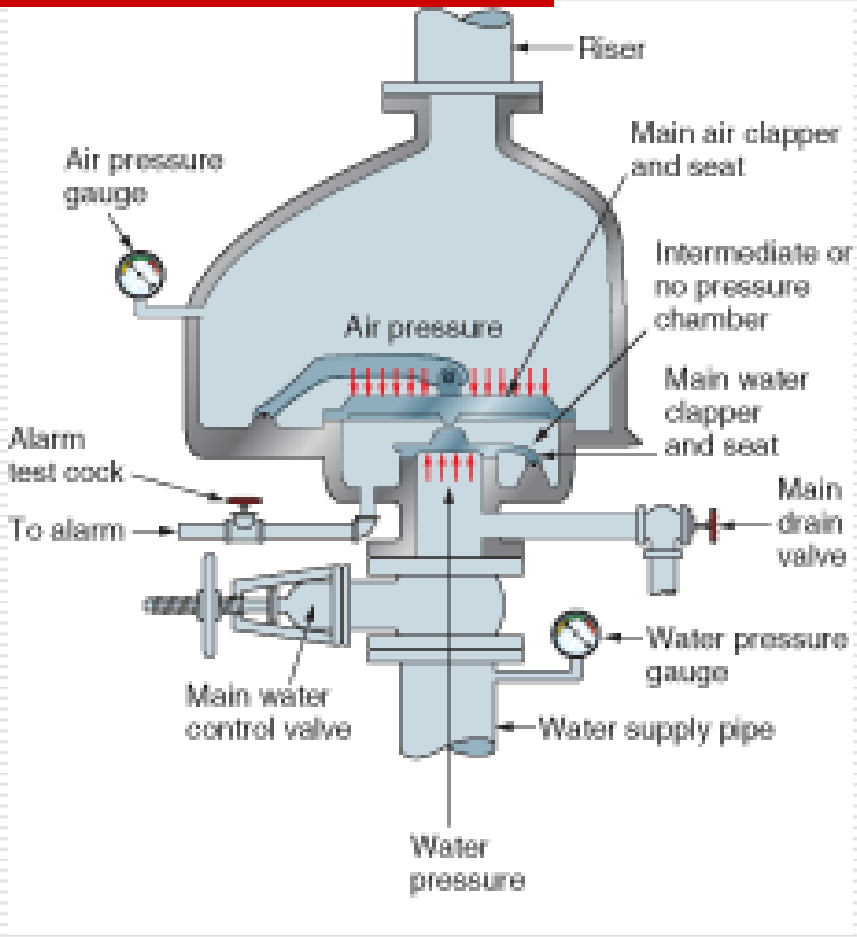
Chemical-Pellet Sprinkler Heads

- Use a plunger mechanism and a small chemical pellet to hold the cap in place
  - Pellet will liquefy at a preset temperature.
  - When pellet melts, liquid compresses the plunger, releasing the cap and allowing water to flow.

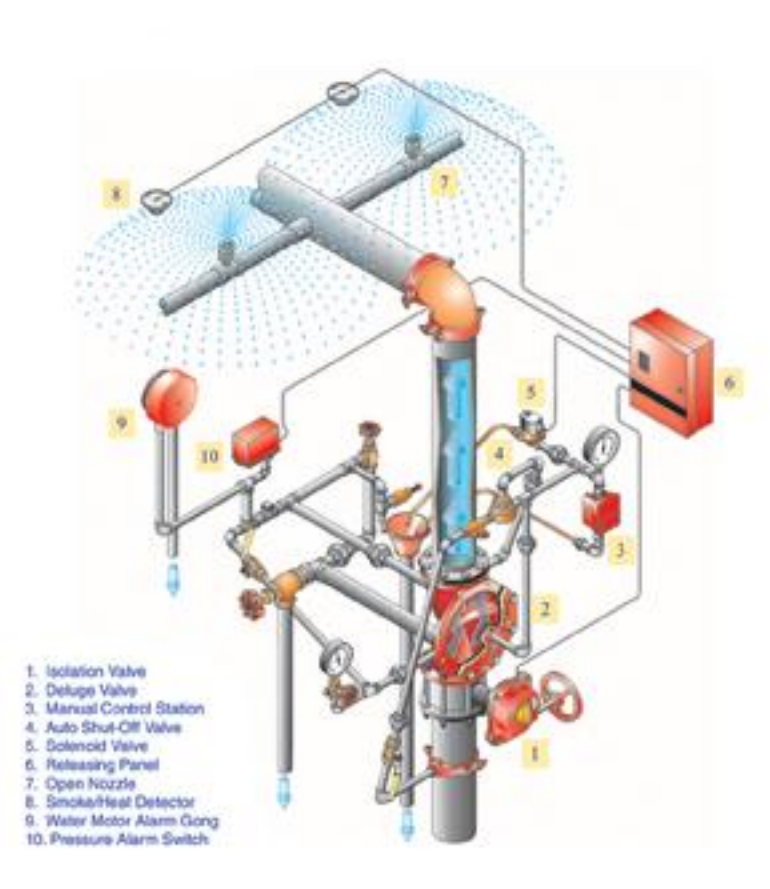
Types of Automatic Sprinkler Systems

- Divided into four categories:
  - Wet sprinkler systems
  - Dry sprinkler systems
  - Preaction sprinkler systems
  - Deluge sprinkler systems

Dry Sprinkler Systems (2 of 2)



Deluge Sprinkler Systems (2 of 2)



Shutting Down Sprinkler Systems

- Order to shut down sprinkler system should come only from the IC.
- In most cases, system can be shutdown by closing main control valve

Residential Sprinkler Systems

- Relatively new, but many homes now being built include them
- Typically use smaller piping and sprinkler heads with smaller orifices and less water discharge

Temperature Ratings

- Typical rating for sprinkler heads in a light hazard occupancy would be 165ºF (74ºC).
- Rating should be stamped on the body of the sprinkler head.
- Temperature rating must match the anticipated ambient air temperatures.
- Spare heads that match those used in the system should always be available on-site.

Mounting Position

Sprinkler Piping

- Network of pipes that delivers water to sprinkler heads
- Includes main water supply lines, risers, feeder lines, and branch lines
- Usually made of steel
- Plastic pipe sometimes used in residential systems

Water Supplies

- Water may come from municipal water system, on-site storage tanks, or static water sources.
- Water supply must be able to handle demand of the sprinkler system, as well as the needs of the fire department.
- Preferred water source for a sprinkler system is a municipal water supply.

Fire Pumps

- Used when the water comes from a static source
- May also be used to boost the pressure in some sprinkler systems, particularly for tall buildings

Fire Department Connection (FDC)

- Allows the department's engine to pump water into the sprinkler system
- Used as either a supplement or the main source of water

Class I Standpipes

- Designed for use by fire department personnel only
- Each outlet has a 2 1/2" male coupling and a valve to open the water supply after the hose is connected.

Class II Standpipes

- Outlets generally equipped with a length of 1 1/2" single-jacket hose preconnected to the system.
- Intended to enable occupants to attack a fire before the fire department arrives, but safety and effectiveness is questionable.

(For Fire Detection & Protection)

Table-32
Smoke and Heat Vent Size and Spacing

Use group	Hazard Condition	Vent Area to Floor Area Ratio	Max Spacing of Vent Centres
Occupancy G1	Low Hazard	1:100	30 m
Occupancy G2	Moderate hazard	1:75	20 m
Occupancy H1	Low Hazard	1:100	30 m
Occupancy H2	Moderate Hazard	1:75	20 m
Occupancy J1	High Hazard	1:30	15 m
Occupancy J2	High Hazard	1:30	15 m
Occupancy K1	Low Hazard	1:100	30 m

Table-33
Fire Protection Flow Requirements

Building Type	Sprinkler System (l/min.)*	Standpipe and hose System (l/min.)*	Duration** (minute, min.)
Light hazard- I	1000	1000	30
Light hazard- II	1900	1900	50
Ordinary hazard- I	2650	1900	75
Ordinary hazard - II	3200	1900	75
Ordinary hazard - III	4800	1900	75

Notes:

* Values will be for one riser serving floor area of 1000 m^2.

* * These durations shall be for a building up to the height of 51 m. For greater height of 51-102 m and above 102 m, the duration will be 1.25 times and 1.5 times of the specified values respectively.

Light hazard - I : Occupancy groups, A1, A2, A4
Light hazard - II : Occupancy groups, A3, A6, A7, A8, B, C, D, E2, E4, E7, F1 & F2
Ordinary hazard - I : Occupancy groups, E1, E3, E5, F3, F4, F5, F6, F7, G1 & G4
Ordinary hazard- II : Occupancy groups, G2 & H1
Ordinary hazard- III : Occupancy groups, G3 & H2
Extra hazard : Occupancy group, j - pressure and flow requirement for this group shall be determined by Fire Department but shall not be less than required value for Ordinary hazard-III

Note The standpipe shall be located in noncombustible enclosure such that it will be able to provide hose stream to the most remote area of the floor served.

Table-34
Standpipe Sizes

No. of Storeys	Building Height (m)	Size of Standpipe (mm)
Up to 5	Up to 17	75*
Up to 10	Up to 33	100
10 to 20	33 to 63	150
20 to 54	63 to 165	200
* This size may be used only for occupancy groups A1, A2 and A4		

Note The hose shall be connected to the standpipe within 1.5 m from the floor. Hose stations shall be easily accessible for inspection and testing.

Water Supplies

- Wet standpipe systems in modern buildings are connected to a public water supply with an electric or diesel fire pump to provide additional pressure.
- Most dry standpipe systems do not have a permanent connection to a water supply, so the FDC must be used to pump water into the system.

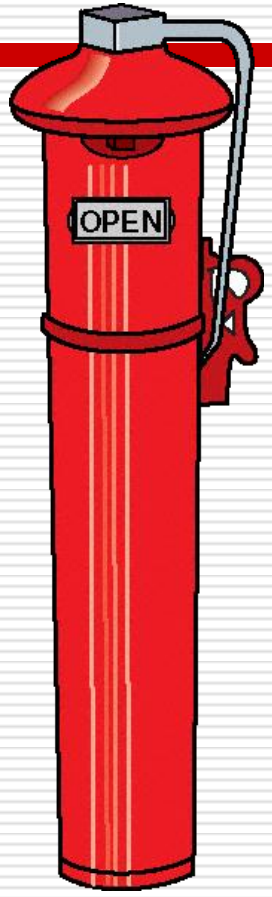
PILLER HYDRANTS

Valves

- A sprinkler system includes several different valves such as:
  - Main water supply control valve
  - Alarm valve
  - Other, smaller valves used for testing and service
- All of the valves play a critical role in the design and function of the system.

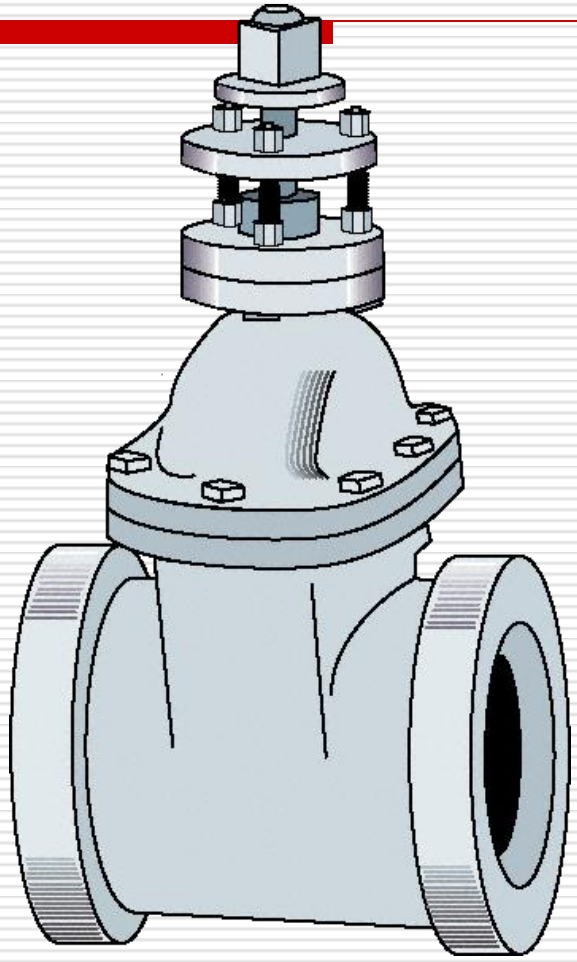
Types of Valves

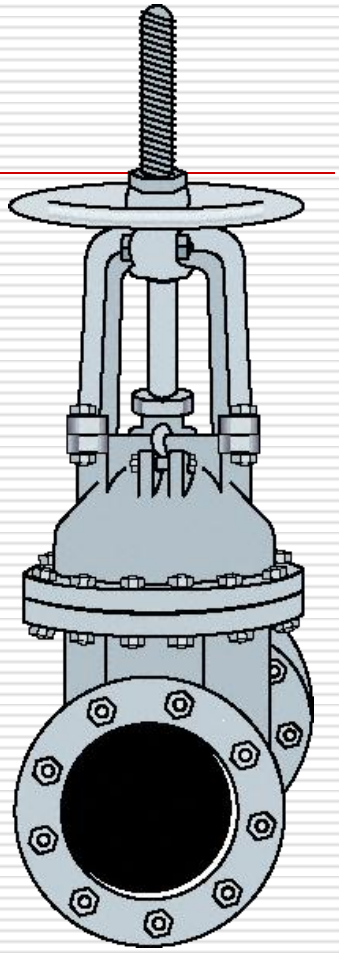
Butterfly



Post Indicator

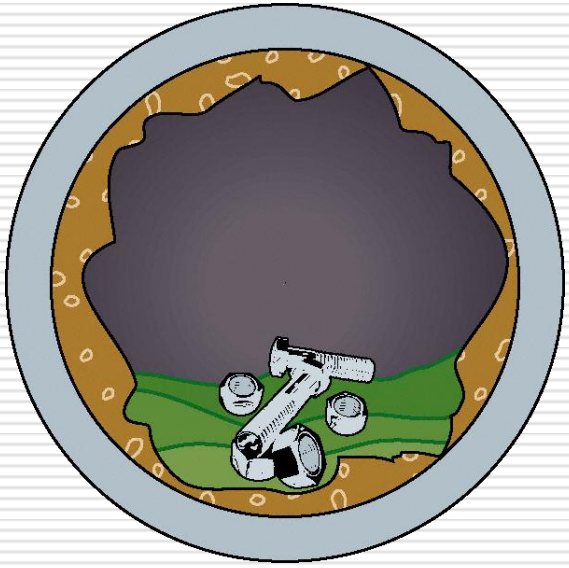
Gate Valve (Non-indicating)

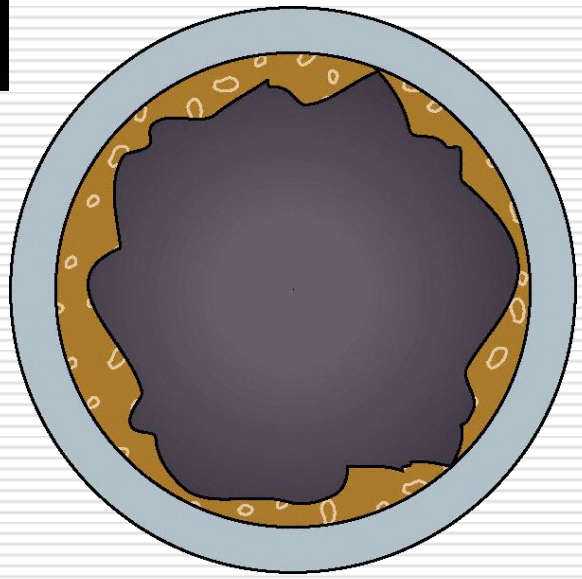




Outside Screw And Yoke (OS&Y)

Increased Friction Loss





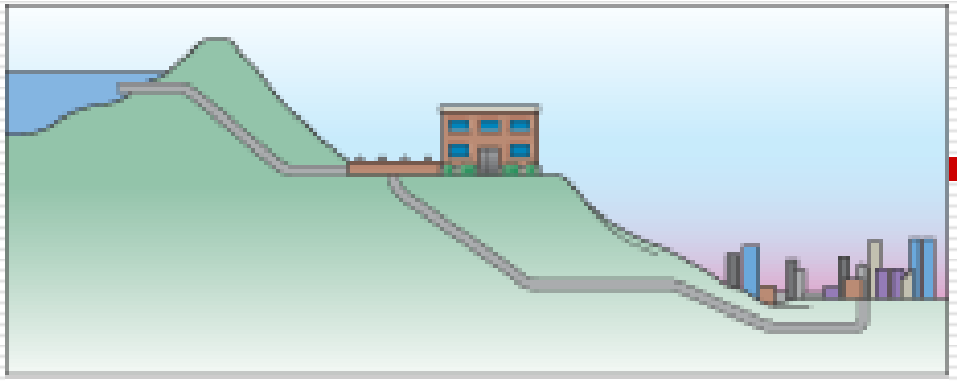
Sediment and Debris

Incrustation from Mineral Deposits

Initiation Devices

- **Fusible links are placed above the target hazard to activate extinguishing systems.**
- **Manual discharge button also provided so that workers can activate the system if they discover a fire.**

Hydrant water and pressure source



Gravitational water pressure

Water tank pressure

Hydrant Pump

Hydrant Operation

Hydrant Components

What's A Fire Door?

- **Fire doors are designed to withstand fire, heat and smoke for a period of 20-minutes to 3 hours.**
- **Did you know that corridor office doors are fire doors and should have a 20 minute rating?**
- **Corridor laboratory doors should have a 60 minute rating.**
- **Fire Doors are required to:**
  - **Be Self Closing: fire doors should have a door closure that pulls doors completely shut after the door has been opened**
  - **Have Positive latching: a positive latch locks a door in place so can open swing open freely.**

Fire Safety-Electrical Issues

- Electrical hazards are the cause of numerous workplace fires each year. Faulty electrical equipment or misuse of equipment produces heat and sparks that serve as ignition sources in the presence of flammable and combustible materials.
- Examples of common ignition hazards:
  - Overloading circuits
  - Use of unapproved electrical devices
  - Damaged or worn wiring

Electrical Fire Safety

Extension cords

- Extension cords are only approved for temporary use. They may only be used for a period of three days or less. Instead of using extension cords contact FP&M to install permanent wiring.
- When using extension cords check for defaults such as frays, brittleness, or broken wires.
- Never place extension cords in high traffic areas where they can be damaged by being stepped on or run over by equipment.

Electrical Fire Safety

- Multi-plug strips
  - Should only be used for office equipment such as computers, printers, and fax machines.
  - Other common items such as microwaves, refrigerators, and copy machines must be plugged directly into wall outlets. This is a requirement of the State Fire Marshal.
  - Multi-plug strips should have a fuse or circuit breaker and be UL approved.

Electrical Fire Safety

- Avoid the following improper and hazardous practices:
  - Never use three prong adapters that allow a three pronged plug to plug into a two prong outlet.
  - Never use any item with a damaged or frayed electrical cord.
  - Space Heaters are not allowed in campus buildings.

- Never daisy chain or piggy back multi-plug strips and electrical cords (plugging strips and cords into each other).

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Fire Drills

- **Fire drills, conducted at frequent intervals, demonstrate management's concern and sincere interest in all fire prevention activities. The drills should serve as a reminder to employees and supervisors that all fire prevention practices are important.**

- **Prepare an emergency manual to outline procedures and drills and to assign responsibilities to each individual involved. Make prevention of personal injury and lost of life the main objective of emergency planning.**

- **Carefully plan and periodically carry out fire drills. Conduct them in a serious manner under rigid discipline. To eliminate panic in the event of an emergency and guarantee the smooth functioning of the emergency plan, carefully develop the plan.**

- **Post up to date instruction sheets, including evacuation routes, and distribute them to all employees. In addition, when going through fire drills, from time to time, block off an exit to see how employees would react to this situation in a real fire.**

QUESTION & ANSWER

THANK U

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See Again