

FIRE FIGHTING SYSTEM DESIGNING BASICS



EXHIBIT 6.5 Sprinklers with K-factors of 2.8, 5.6, and 25.2.
(Courtesy of Tyco Fire Products LP)

STANDARDS

- NFPA – National Fire Protection Association.
- IFC – International Fire Code.
- IBC- International Building Code.
- FSAI- Fire & Security Association of India

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Listing & Approval

“UL” is short for **Underwriters Laboratories**, an organization which has been testing and approving products for consumer safety since 1894. Originally known as the Underwriters Electrical Bureau, UL was founded in Chicago by William Merrill, and has since expanded to include 182 service centers in more than 70 countries. Underwriters Laboratories performs safety testing on 18,750 categories of electrical, mechanical and chemical products!



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- **FM – FM Global.**

"FM Global" is the communicative name of the company, whereas the legal name is "Factory Mutual Insurance Company". **FM Global** has been named the "Best Property Insurer in the World" by Euromoney Magazine.



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The *International Building Code (IBC)* is the foundation of the complete Family of International Codes. It is an essential tool to preserve public health and safety that provides safeguards from hazards associated with the built environment. It addresses design and installation of innovative materials that meet or exceed public health and safety goals.



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CODES & STANDARDS

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- Authority Having Jurisdiction (**AHJ**) means the organization, office, or individual responsible for approving layout drawings, equipment, an installation or a procedure. Usually the **AHJ** is the building and/or fire official of the city or county in which the job site is located.



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NFPA MODULES

SYLLABUS

1. NFPA 10
2. NFPA 12
3. NFPA 13
4. NFPA 14
5. NFPA 20
6. NFPA 22
7. NFPA 24
8. NFPA 72
9. NFPA 92A
10. NFPA 2001

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TYPES OF FIRE PROTECTION SYSTEM

1. FIRE SUPPRESSION SYSTEM
2. FIRE DETECTION SYSTEM
3. FIRE INDICATION SYSTEM



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TOPICS

- Introduction
- Types of Fires
- Types of Fire Protection Systems
- Types of Fire Protection Equipments



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Fire Prevention Goals

- **Life Safety**
 - The primary goal of fire safety efforts is to protect building occupants from loss of life.
- **Property Protection**
 - The secondary goal of fire safety is to prevent property damage.
- **Protection of Operations**
 - By preventing fires and limiting damage we can assure that work operations will continue.



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FIRE PROTECTION CLASSIFICATION BASED ON TYPES OF SYSTEMS.

- "Fixed protection system" means a permanently installed system that either extinguishes or controls a fire at the location of the system.
- "Potable protection system" means a system in which fire extinguishing / controlling media is carried to the location of fire



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FIRE PROTECTION SYSTEM BASED ON OPERATION.

- Manual System – Type of a system where fire is attended personally. For Example use of fire extinguishers, hose reels, etc.
- Automatic System – Type of a system where fire is attended by permanently installed fire protection system. For Example sprinkler, CO₂, clean agent systems.

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TYPES OF FIRE PROTECTION SYSTEMS

- Fire Extinguishers
- Automatic Sprinkler system
 - Wet Pipe System
 - Dry Pipe System
 - Deluge Valve System
 - Pre Action System
- CO₂ System
- Clean Agent System (FM200)
- Wet Riser System
- Dry Riser System
- Hydrant System



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FIRE EXTINGUISHER

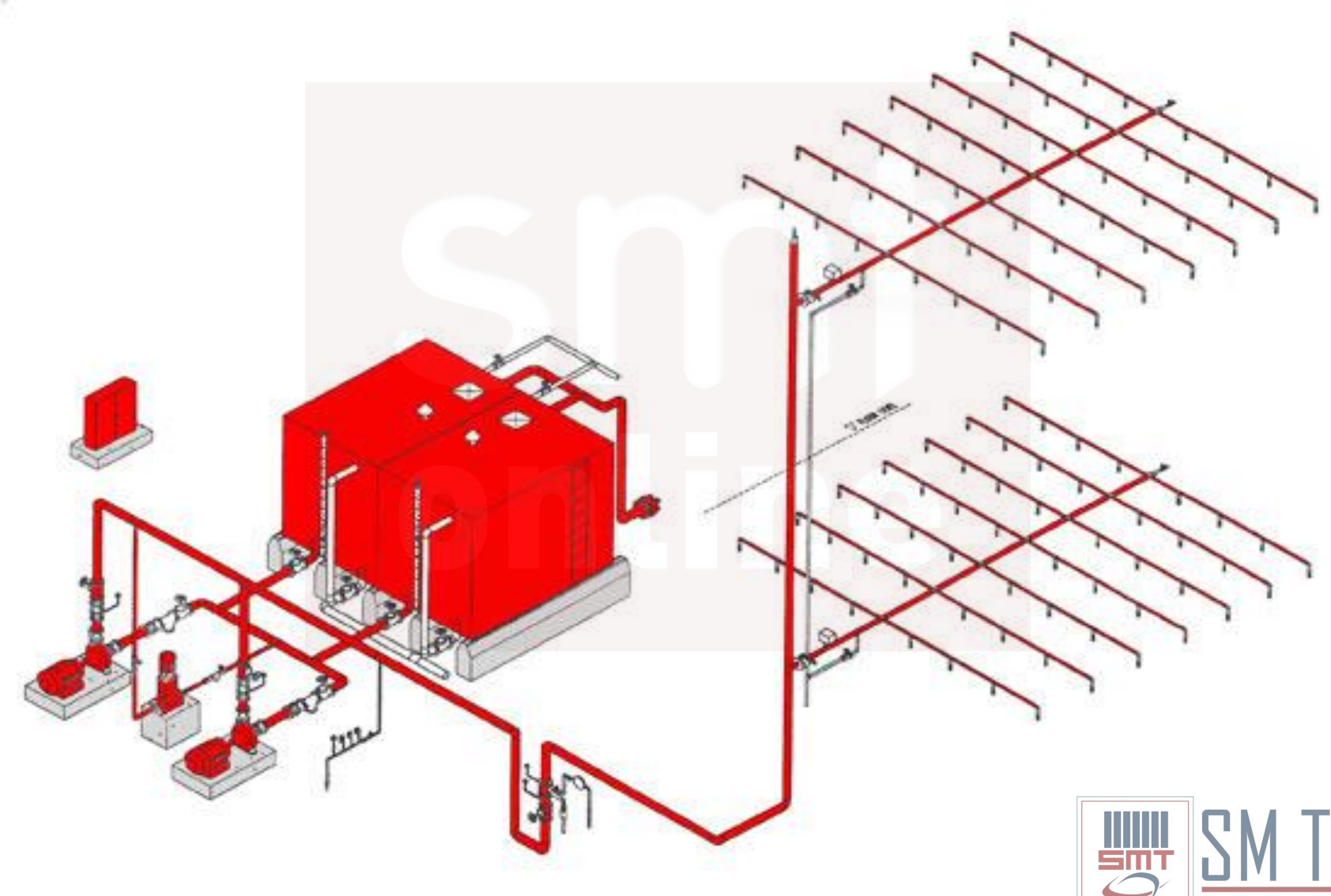


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AUTOMATIC SPRINKLER SYSTEM



CARBON DIOXIDE SYSTEM

- Carbon Dioxide gas is used.
- Purpose is to reduce Oxygen level from 21% to 14% by increasing CO₂ level to 34%
- Is stored in arrangement of cylinders called cylinder bank.
- Is cheap compared to other non water fire protection system but leaves residue.
- Used in less or no occupancy areas like electrical panel / control rooms, generator rooms, etc

CYLINDER BANK



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CLEAN AGENT SYSTEM (FM200)

- Combination of Inert gases mixed with dry nitrogen.
- Extinguishes the fire by quickly discharging the gas by that removes the heat.
- System is developed to discharge gas to reach 7% concentration in 10 sec.
- Preferred over CO₂ system as does not leave any residue.
- Mainly used to protect critical high value electronic equipments as in server rooms.

CLEAN AGENT SYSTEM – IN ACTION



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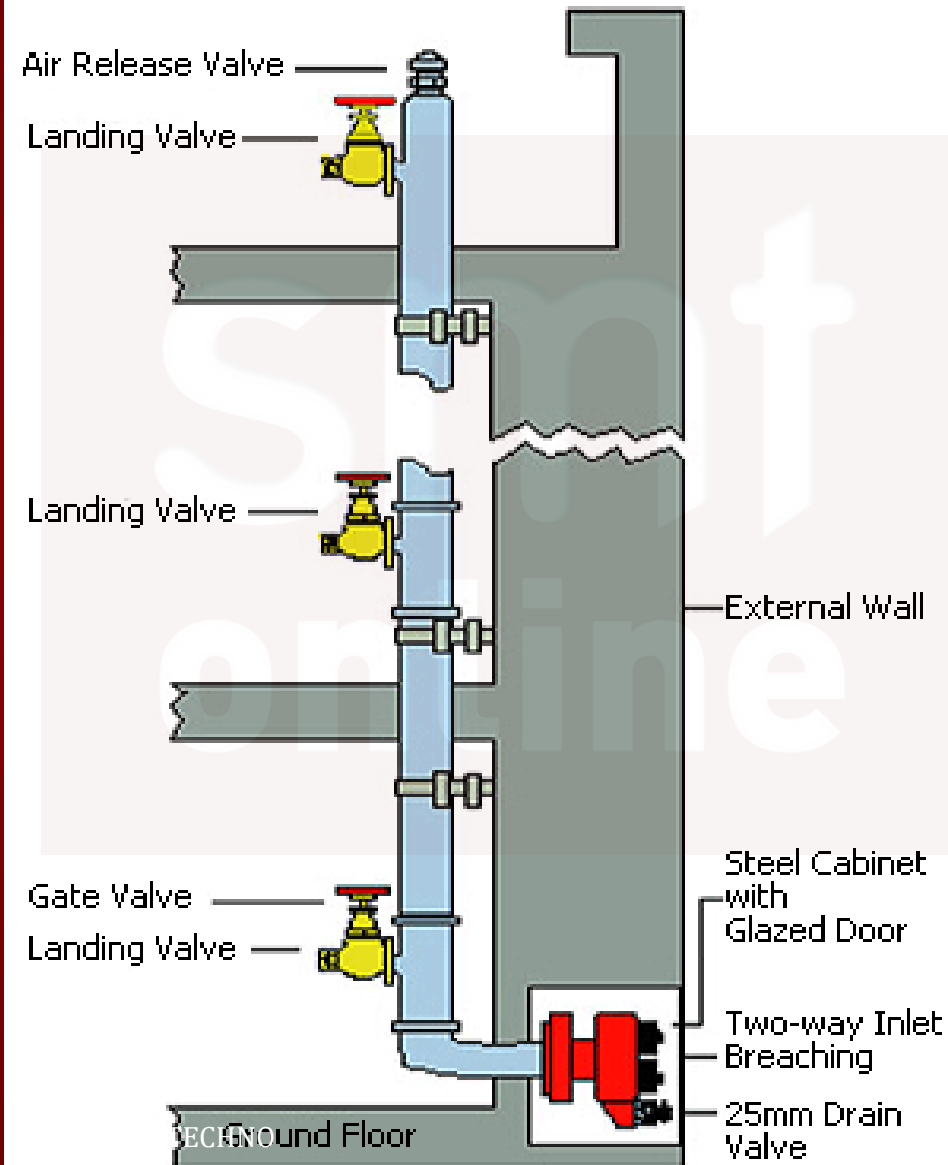


DRY RISER SYSTEM

- A **dry riser** is a main vertical pipe intended to distribute water to multiple levels of a building or structure.
- Contains air at atmospheric pressure.
- Has fire engine access to pump in water called as breeching inlet.
- Outlets are in form of landing valves.

DRY RISER SYSTEM

Typical dry riser installation



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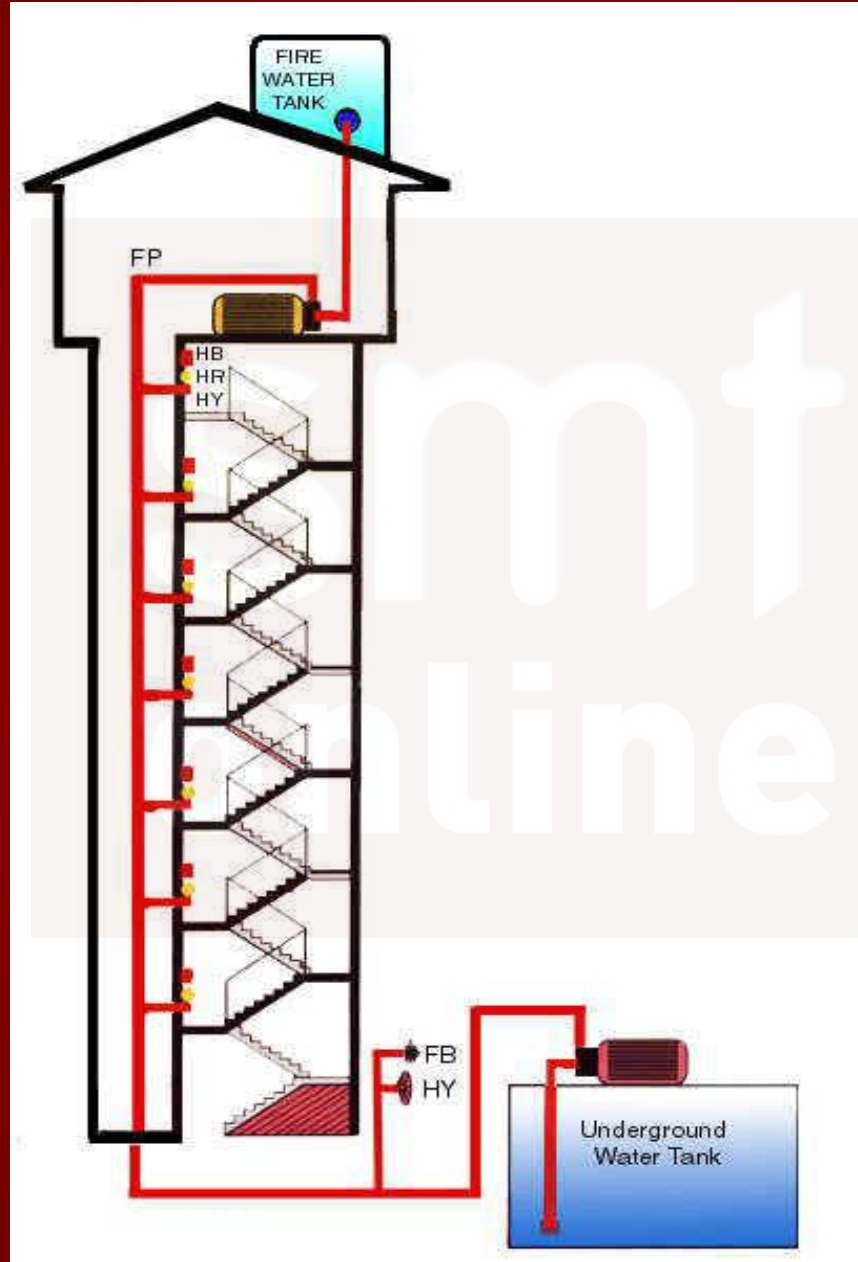
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WET RISER SYSTEM

- A **wet riser** is a main vertical pipe intended to distribute water to multiple levels of a building or structure.
- Contains water under pressure.
- Is connected to fire fighting pumps.
- Outlets are in form of sprinklers / hoses.

WET RISER SYSTEM



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HYDRANT SYSTEM

- External network of pipes connected to main water supply source such municipal water supply lines.
- Used as a water source when building fire protection system runs out of water or in case of fire where both needs to be used.
- Types of Hydrants – Upright or concealed.

FIRE HYDRANT AND HOSE HOUSE



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FIRE PROTECTION EQUIPMENTS

- Sprinklers
- Fire Hoses
- Fire Hose Reels
- Fire Hose Reel Cabinets
- Alarm check valve
- Equipments
- Pressure Switch
- Fire Hydrants
- Breeching Inlets
- Hydrant / Landing Valves
- Pumps.
- Fire Blankets
- Extinguishers
- Water Storage Tanks
- Fire Detection



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SPRINKLER HEADS



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SPRINKLER HEADS

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<p>EC-8 View PDF 76kb Quick & Standard Response Pendent & Recessed Pendent K=8.0</p> 	<p>EC-5 View PDF 99kb Summary Quick & Standard Response Pendent & Recessed Pendent K=5.6</p> 	<p>ELO SW-20 & SW-24 ECOH View PDF 101kb Summary Sidewall K=11.2</p> 
<p>EC-5 View PDF 101kb Summary QR-EC Horizontal Sidewall & Rec. Horizontal Sidewall K=5.6</p> 	<p>TY-FRB View PDF 107kb 3mm Bulb, Quick Response, Extended Coverage Horizontal & Recessed Horizontal Sidewall K=5.6 & K=8.0</p> <p>Translated Versions [PDF]: CS, DE, EN, ES, FR, HU, IT, NL, NO, PL, PT, RU, SV</p> 	<p>TY-FRL View PDF 289kb Extended Coverage, Quick Response Horizontal Sidewall K=5.6 & K=8.0</p> 

FIRE HOSE WITH NOZZLE.

- Percolating type – Water Bleeds through holes which keeps it wet. Used where the hoses are to be carried in hot ground such as in case of wildfires.
- Non – Percolating type - Does not bleed water. Most commonly used.
- Reinforced Rubber hoses - Used in Fire Hose Reels.
- Standard lengths of 15m , 25m and 30m.
- Nozzles usually made of brass

FIRE HOSE



TYPE 3

TYPE 1



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FIRE HOSE REELS

- Reinforced Rubber hose of 25m length.
- Further Classified into
- Manual Type – Hose reel should be opened manually.
- Automatic Type – Hose reel valve opens automatically with 3 revolutions of hose reel disc.
- Both manual and automatic type hose reels are available in two variants : -

Fixed and Swinging Type.

FIRE HOSE REEL



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FIRE HOSE REEL CABINETS

- To house fire hose reels, fire hose and hydrants.
- Different types of cabinets are
 - Only hose reel cabinets
 - Hose reel with fire extinguisher
 - Hose reel and fire hose cabinet
 - Self standing hose reel cabinet
 - Fire hose cabinets
 - Fire hose rack cabinet
 - Fire hydrant cabinet (With space for hose and Axe)
 - Fire Extinguisher cabinet.

SWING TYPE FIRE HOSE REEL WITH SELF STANDING CABINET



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FIRE HOSE RACK



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ALARM CHECK VALVE

- Installed in main header.
- It actuates electric and/or hydraulic alarms when there is steady flow of water into the system due to activation of sprinklers.
- Entire assembly contains Check valve, main drain valve, bypass check valve, alarm test valve, retard chamber, pressure switch, pressure gauges and gong.

ALARM CHECK VALVE



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ZONE CONTROL VALVE ASSEMBLY



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PRESSURE SWITCH



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OS & Y VALVE



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FIRE HYDRANTS / LANDING VALVES

- Fire Hydrants
- Classified as : -
 - Wet Type – Always filled with water under pressure – Urban Areas
 - Dry Type – Connected to water tank or pool and water is pumped when required – Rural Areas.
 - Landing Valves – Used to connect fire hoses inside the building. Installed at every floor.

UPRIGHT FIRE HYDRANTS



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CONCEALED TYPE FIRE HYDRANT



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LANDING VALVE



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TWO WAY LANDING VALVE

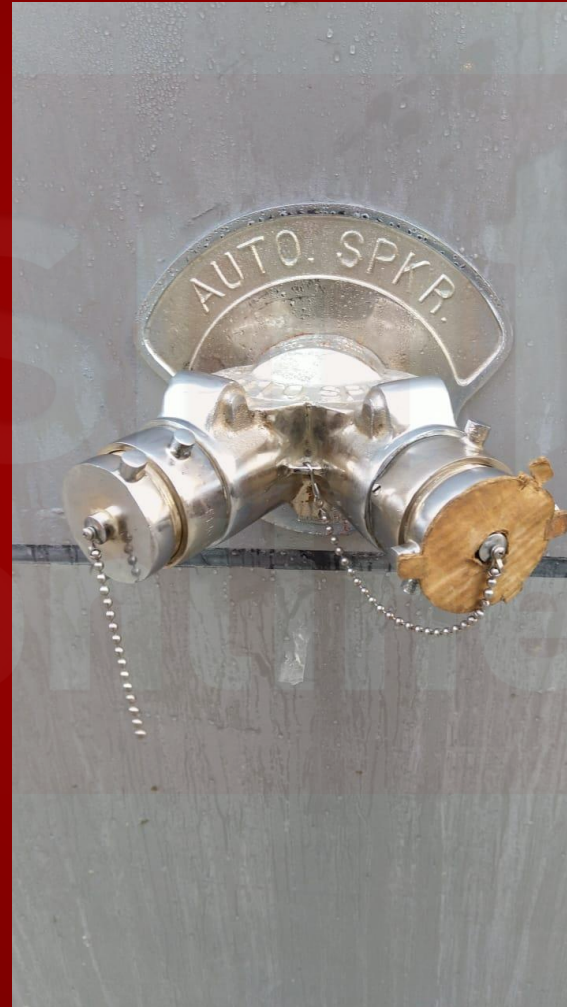


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FIRE BRIGADE CONNECTION- 2 WAY



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FIRE BRIGADE CONNECTION- 4 WAY



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FOUR WAY BREECHING INLET



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FIRE FIGHTING PUMPS

- Discharges with same pressure at any given head.
- System always has two fire fighting pump 1 Duty + 1 Standby.
- Should be always monitored.
- System may or may not have a jockey pump – Jockey helps to maintain pressure.
- Generally electrically driven pumps are used as duty and diesel driven pumps as standby.

FIRE FIGHTING PUMP



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FIRE BLANKETS

- A fire blanket is a safety device designed to extinguish small incipient fires. It consists of a sheet of fire retardant material which is placed over a fire in order to smother it
- Small Blankets – Used in kitchen usually made of fiberglass.
- Large Blankets – Used in laboratories or industries are made of wool.

FIRE BLANKET - DEMO



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FIRE BLANKET



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WATER STORAGE TANKS

- Classified into two types – Above ground and Under ground.
- Constructed in various materials such as metals, concrete or reinforced fiberglass.
- Can be combined with water supply system but minimum required capacity of water for fire is protection should be always maintained.

WATER STORAGE TANK – ABOVE GROUND



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FIRE DETECTION EQUIPMENTS

- Mainly two types – Heat and Smoke Detectors.
- Heat Detectors are further classified into
 - Rate of Rise – Sudden change or rise in ambient temperature from normal temp. Activates on sudden rise in temperature or at set temperature, whichever is earlier.
 - Fixed Temperature – Activates at a fixed temperature.
- Smoke Detectors are further classified into
 - Optical – Photoelectric process
 - Physical – Ionization process.
- Detection is also done by Air Sampling – Suction of air through network of pipes and the passing it through detectors. Helps in early warning.

HEAT DETECTOR



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SMOKE DETECTOR



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THANK YOU

