

Pumps

- * Fire pumps are a part of fire fighting systems like hydrants, sprinklers, foam pumpers.
- * It is powered by electric, diesel or steam and intake is either connected to the public underground water supply piping or a static water source (tank, reservoir, lake)
- * IS code for fire fighting pumps: - IS 15301 : 2003
- * Fire pumps driven by electric motor, diesel engine or steam turbine.
- * If the local building code requires an installation of extra power source, the electric pump can be connected to generator.
- * Fire pumps starts when the pressure drops below the threshold. Like in sprinkler system, when one or more sprinklers are exposed to heat, the valve opens releasing water. Similar is the case with fire hoses.
- * ^{Fire pump.} ~~Fire~~ systems are required when →
 - 1) In high Rise Buildings. -
 - 2) Requirement of High terminal pressure.
 - 3) Storage volume.
- * Also needed in case of wet riser systems.

(2)

TYPES OF FIRE PUMPS USED

① HYDRANT PUMP :-

As the name suggests, are high pressure pumps designed to increase the fire fighting capacity by boosting the water pressure.

② SPRINKLER PUMPS :-

Both fire fighting pump and Jockey pump are used.

Jockey pump:- A jockey pump is a small pump connected to fire sprinkler pump.

FUNCTIONS:-

- * It is designed to keep the pressure in the water supply mains to a specific level so that main pump ~~will~~ will have not to run all the time.
- * It protects the system from damage which can happen if the water suddenly rushes into the pipes.
- * If ~~there~~ due to leakage, there is a pressure drop the jockey pump starts and fills the pipes.

Diesel Standby pump:-

- * It is used to supply water in case of power failure.

MULTI STAGE MULTI OUTLET PUMP

- * This can run at various speed, has multiple outlets to supply water.
- * This can help in saving space in multistory Building.

VERTICAL TURBINE PUMP

- * Used when there is space constraint, the horizontal pumps cannot be installed.
- * Can be powered by electric, diesel, steam.

VERTICAL IN LINE PUMP

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PRIMERS

"Priming means getting something ready for operation"
The device used to exhaust air from the suction and the casing is known as priming.

* For efficient operation of primers, the air or gases must be expelled from the impeller or the suction pipe. Otherwise the pump may not work properly.

* Primers are of two types

→ Reciprocating pump

→ Rotary pump (Centrifugal pump)
→ very essential.

(1) RECIPROCATING PUMPS :-

PRIMING OF A CENTRIFUGAL PUMP :-

* Priming is required only when the elevation of the liquid in the suction tank is less than elevation of the tank.

* ~~Centrifugal~~ Centrifugal too pump only pump push the liquid.

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METHODS OF PRIMING

- ① manually
- ② with vacuum pump
- ③ with jet pump
- ④ with separator
- ⑤ Installing foot valve.

① manual priming :-

- * The liquid is poured in the pump suction pipe directly.
- * When priming is complete, the air escapes through the valve.

② PRIMING WITH VACUUM PUMP :-

- * Small size vacuum pump is connected to discharge as well as the suction line of the main Centrifugal pump.

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PRIMING WITH JET PUMP:-

- * In this a water inlet is connected to the suction pipe through the overhead tank.

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PRIMING WITH SEPARATOR:- EJECTOR:-

- * Ejector is provided at the suction side of the pump.
- * These ejectors operate by creating a vacuum inside the suction line of the pump.
- * Ejectors require a supply of compressed air or an energy input.

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PRIMING WITH FOOT VALVE:-

- * This is a type of Non-Return valve installed at the end of suction pipe.
- * They allow water to flow in one direction only.
- * This will ensure that water will not drain from the pump casing after the pump is closed.
- * Leakage can be a problem.

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PRIMING WITH SEPARATOR

- * Air water separation chamber is provided at the delivery side and vent suction is provided at the inlet.
- * Air is separated as it is lighter than water.

FIRE BREAKS / FIRE LINES / CADDERS.

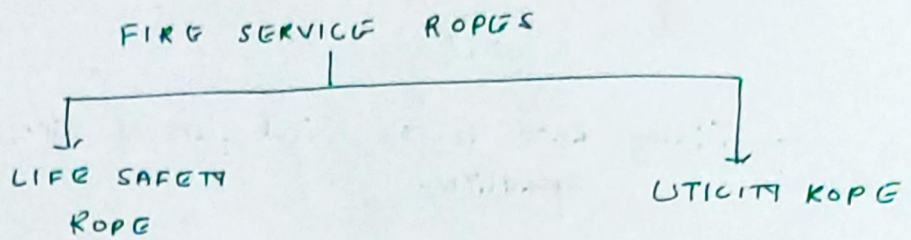
⇒ * Incorporated in the ppt.

Firebreaks usually define the perimeter of a prescribed fire and help in containment of fire.

⇒ * The appropriate firebreak width varies on several factors such as fuel loads, fuel height, fuel types, fire fighting equipments available.

FIRE TENDERS

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- Life safety Rope is used to support rescues/victims.
- Only rope constructed of continuous filament fibre is suitable.
- Once it receives shock load, the Life Safety Rope can be used as a Utility Rope.

1) Life Safety Rope:-

It is divided in two types Static / dynamic.

Static is used for rescue purpose. Designed for low stretch without breaking.

Dynamic:- stretch more than ~~dynamic~~ static and can take more shock load.

2) Utility Rope:-

- hoist equipments, secure unstable objects, cordon off an Area.
- Can be made up of natural / synthetic materials
- type of Utility Ropes used are
 - Hydrant Jumper Rope
 - Suction Rope
 - officer's Rope.

KNOTS

- Tying knots is the vital part of fire/rescue operations.
- Good knots must be easy to tie, easy to identify, easy to determine if knot is tied correctly, easy to untie, minimal impact on rope strength, free from working loose on their own.
- the turns and the friction generated by them weakens the knot.

KNOT TERMINOLOGY

- Running end
- Working end
- Standing part.

Rest of the knot (Rope can be taken from side (soft curve))

FIRE HOSES:-

- ① Fire hose is used to carry water or foam to a fire to extinguish it.
- ② It either attaches to fire hydrant / or fire Brigade while indoors it can attach to standpipe.
- ③ Working pressure varies between 8 to 20 bar (800 to 2000 KPa ; 116 to 290 psi).
- ④ It is one of the most important and basic equipment for fire fighting.
- ⑤ Hoses are divided into two categories suction hose / delivery hose.
- ⑥ After use, the hose is hung for drying, because standing water can damage the material.
- ⑦ Materials used for manufacturing of hoses are Synthetic fibers / elastomers.
- ⑧ Fire hose vacuums are used to remove air from the inside of the hoses.

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① Suction Hose:-

- ① It is placed at the inlet side of the pump where pressure can be above or below atmosphere.
- ② It is designed to Resist internal or external pressure.
- ③ Strong enough to Resist hydrostatic pressure.
- ④ 75 mm, 100 mm, and 140 mm are used
- ⑤ total 10m Length cut short in either 3m or 2.5m.

② (a) Partially Embedded Suction Hose:-

- 1) made up of durable rubber lining completely embedded in the form of a spiral with tempered galvanized steel wire. This provides a smooth surface.

b) Fully Embedded (Smooth bore) Suction Hose:-

- * Has internal lining of Rubber.
- * It is fully embedded with spiral of wire.
- * Can withstand a pressure of 10.5 bar.

② DELIVERY HOSES:-

- ① Laid at the delivery side of the pump / outlet.
- ② Water is thrown at a pressure greater than atmospheric.
- ③ Delivery hose is divided into two categories
percolating / non-percolating hoses.

2(a) Percolating hoses:-

- * Used mainly in forest fires.
- * The seepage of water through the hose protects it from heat.

2(b) Non percolating hoses

- * Reinforced jacket made from polyester or nylon yarns.
- * hose has internal lining of vulcanised rubber fixed to jacket by adhesive.

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