السلام عليكم ورحمة الله

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Flow-Network Design

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Control valves

Piping net work design

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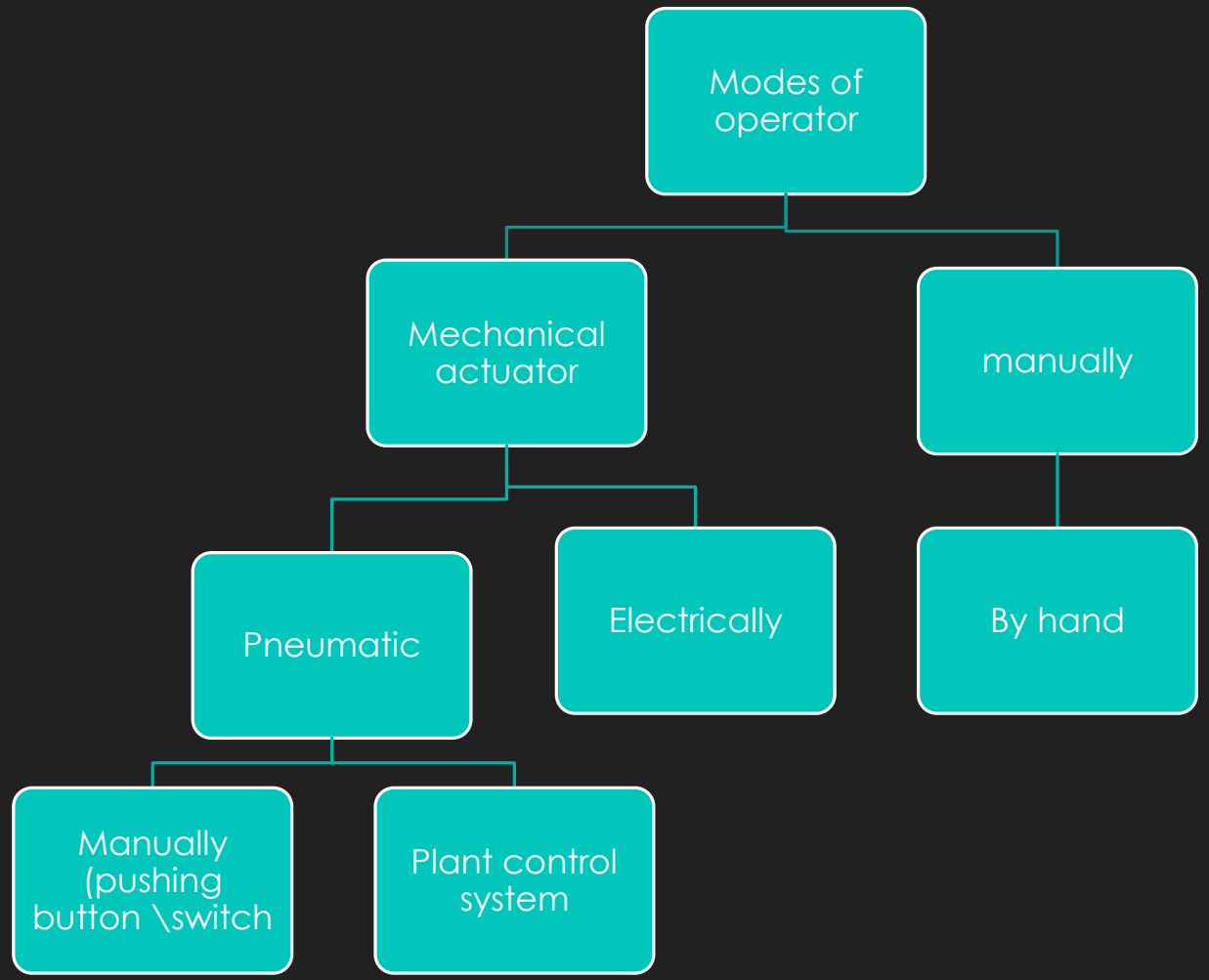
Introduction

1.1 Definition :

A valve is a device for isolating or regulating the flow rate of gases, liquids and slurries through pipework systems.

1.2 Mode of Operation

The force required to operate a valve can be carried out:



2- Types of Control valves and their Application

The three basic functions of valves are:

1. To stop flow
2. To keep a constant direction of flow,
3. To regulate the flow rate and pressure.

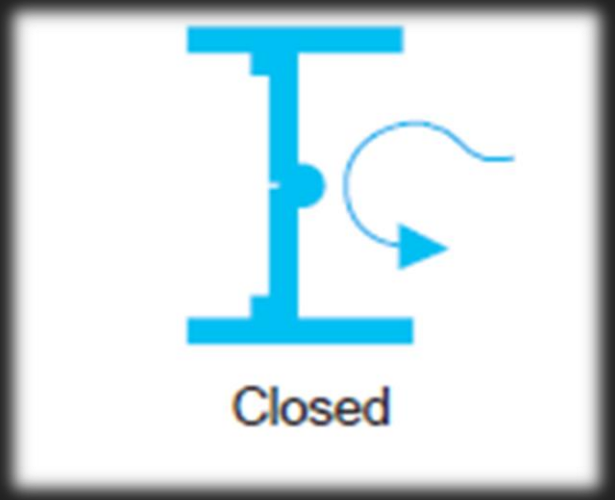
2.1 Directional control valve

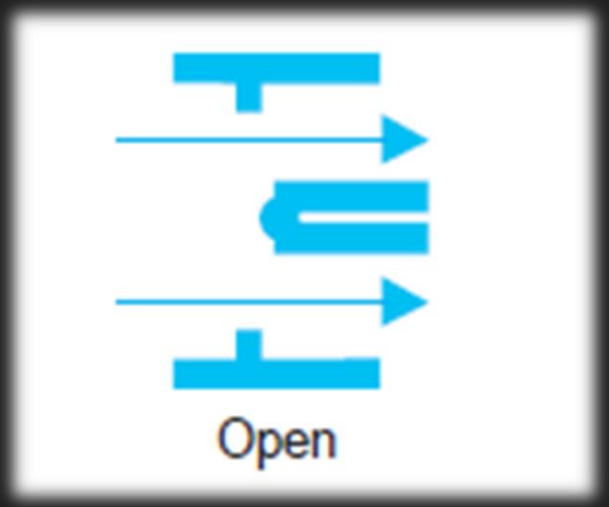
Functions:

- Stop or block fluid flow.
- Allow fluid flow.
- Change direction of fluid flow.

2.1.1 check valve.

- For use when flow is only in one direction.
- Lightweight disc allows vertical installation.
- High operating speed prevents water hammer.





2.2 Flow control valve

Function

Flow control valves are used to control the rate of flow

2.2.1 Butterfly valve.

- Valve shaped like a Butterfly.

-Tight shut-off and can be used as a control valve.

-Little resistance to flow (allows smooth flow).

-Optimal for automated operation with a low

-Operating torque and 90 degrees operating angle.

-Lightweight and compact (large diameter models are also available).

2.2.2 Globe valve.

The globe-shaped body controls the fluid into a -shaped flow.

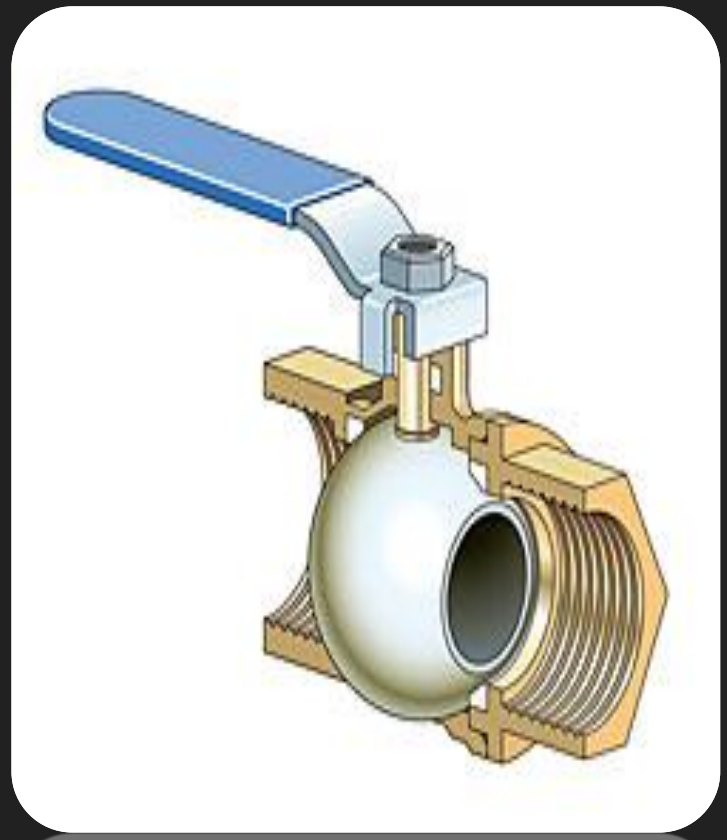
Tight shut-off and can be used as a control -valve.

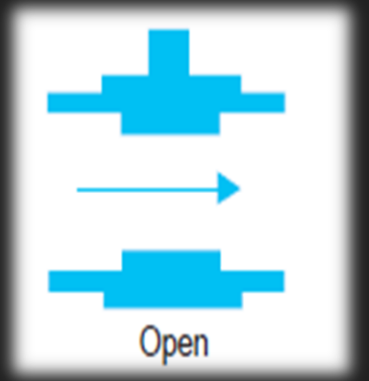
Large resistance to flow (does not allow smooth -flow).

Much power is required to open and close the -valve (not suitable for large sizes).

2.2.3 Ball valve.

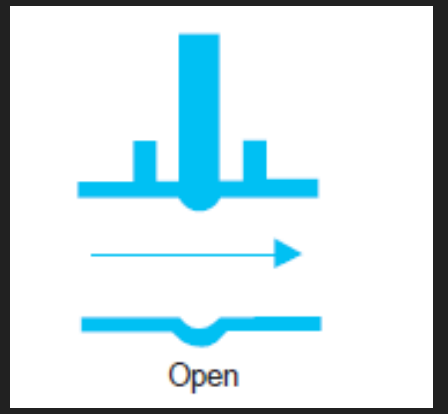
- Valve stopper is ball shaped.
- For use as an on/off valve (not suitable as a control valve).
- Little resistance to flow when fully open (allows smooth flow).
- Optimal for automated operation with a 90 degrees operating angle.
- Advanced technology is required to manufacture ball.

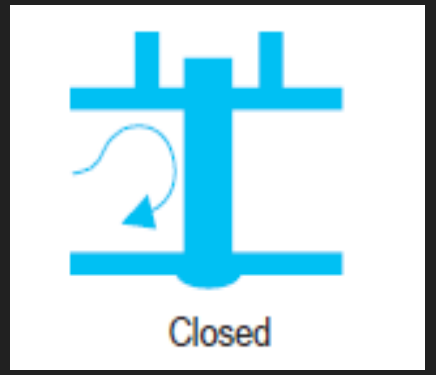




2.2.4 Gate valve.

- Like its name implies, the gate is lowered to cut off the path of flow.-
- -For use as an on/off valve (not suitable as a control valve).
- Little resistance to flow when fully open (allows smooth flow).-
- -Long stroke requires time to open and close; not suitable for quick operation.





2.3 Pressure control valve

- **functions:**

- Limiting maximum system pressure at a safe level.

- Regulating/reducing pressure in certain portions of the circuit.

- - Assisting sequential operation of actuators in a circuit with pressure control.

- Any other pressure-related function by virtue of pressure control.

- Reducing or stepping down pressure levels from the main circuit to a lower pressure in a sub-circuit.

2.3.1 Pressure relive valve.

Pressure-relief valves limit the maximum pressure in a hydraulic circuit by providing an alternate path for fluid flow when the pressure reaches a preset level. All fixed-volume pump circuits require a relief valve to protect the system from excess pressure. Fixed-volume pumps must move fluid when they turn. When a pump unloads through an open-center circuit or actuators are in motion, fluid movement is not a problem. A relief valve is essential when the actuators stall with the directional valve still in shifted position.

2.3.1 Pressure relive valve.

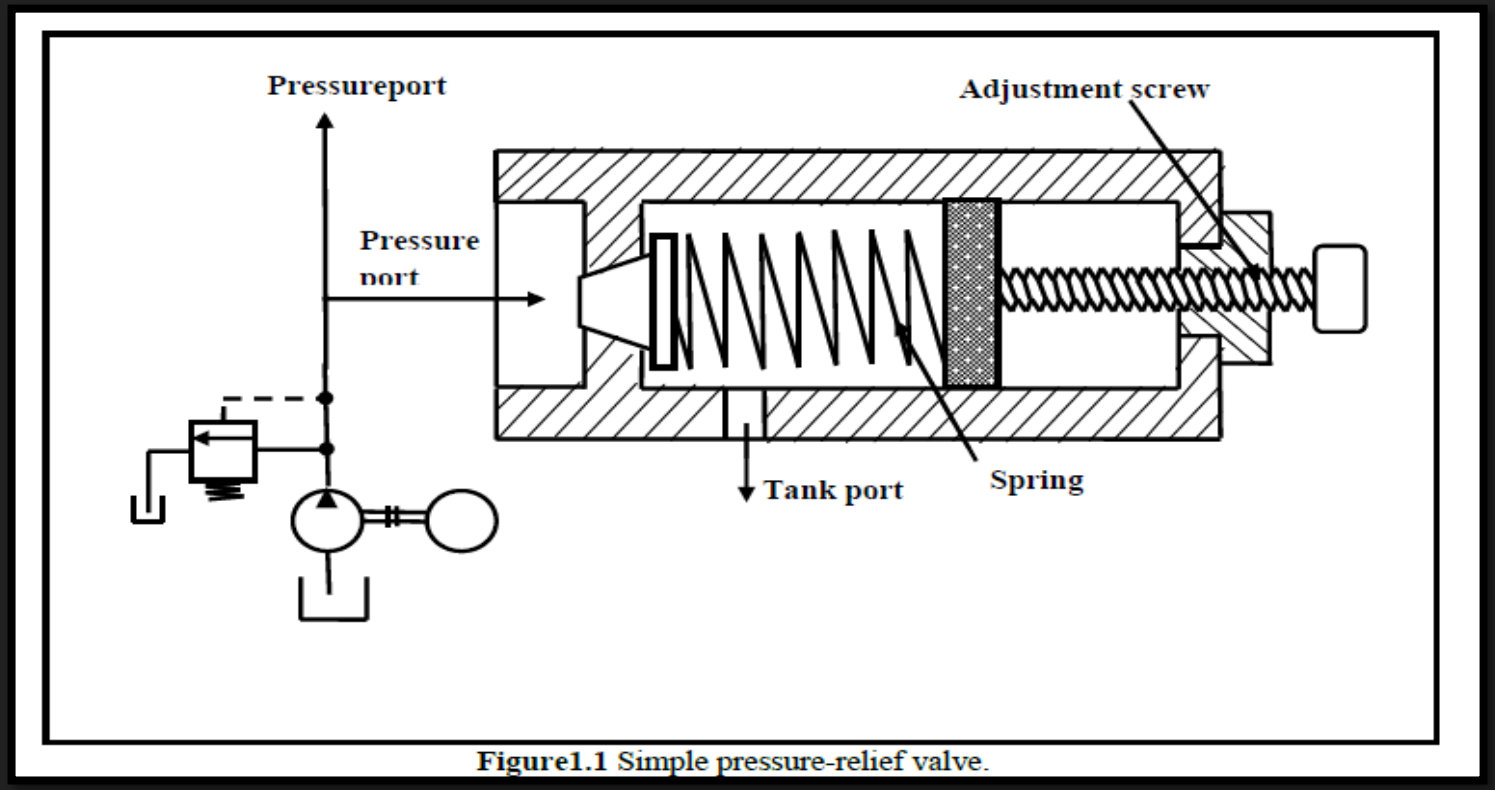


Figure1.1 Simple pressure-relief valve.

2.3.2 Unloading valve.

Unloading valves are pressure-control devices that are used to dump excess fluid to the tank at little or no pressure. A common application is in high-low pump circuits where two pumps move an actuator at a high speed and low pressure. The circuit then shifts to a single pump providing a high pressure to perform work.

Another application is sending excess flow from the cap end of an oversize-rod cylinder to the tank as the cylinder retracts. This makes it possible to use a smaller, less-expensive directional control valve while keeping pressure drop low.

2.3.2 Unloading valve.

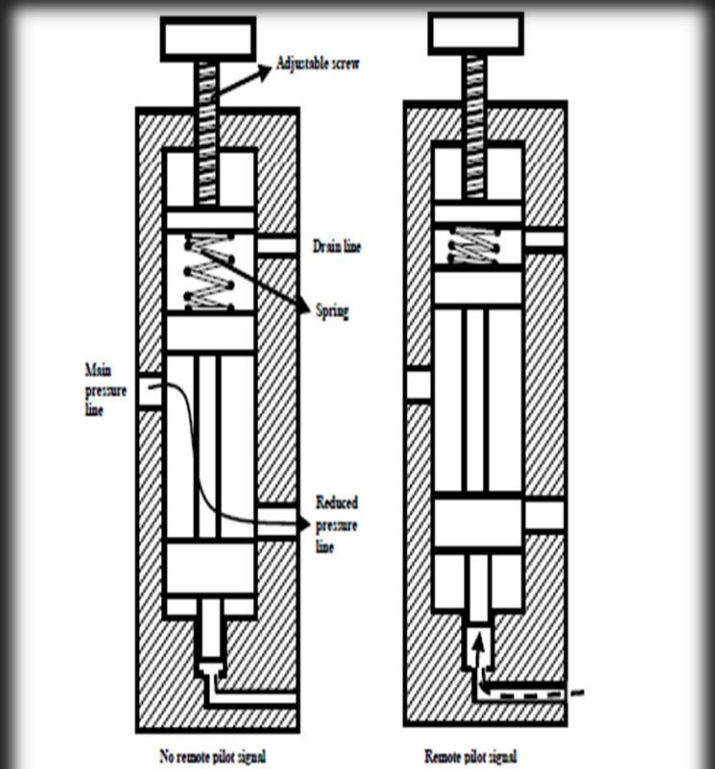


Figure 1.10Unloading valve.

Thank you