VALVE FLOW CHARACTERISTICS

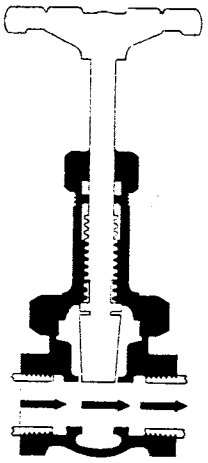
Valves are the controlling element in any piping system and have four primary functions:

1. Starting and stopping flow.
2. Regulating or throttling flow by change of direction or restriction.
3. Preventing backflow.
4. Relieving and reducing or regulating pressure.

STARTING & STOPPING

GATE VALVES

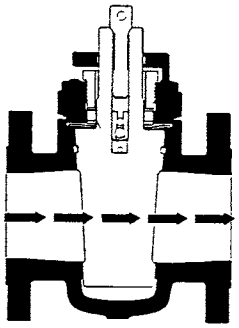
Gate valves are used when minimal pressure drop through the valve is required. They are designed to permit a straight, full and free flow, or no flow at all. Gate valves are normally wide open or completely closed.



Gate Valves

PLUG VALVES

Like gate valves, plug valves are used primarily for non-throttling, on-off service. They require minimum installation space and utilize a simple and quick "quarter-turn" design. The tapered plug, offers easy actuation and tight shutoff.



Plug Valves

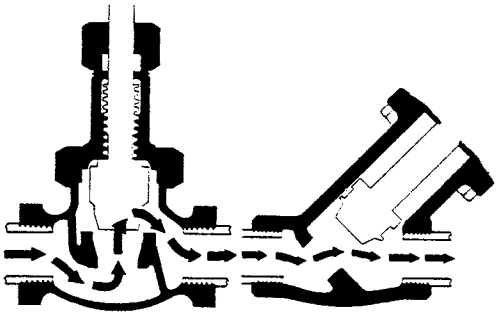
BALL VALVES

Ball valves offer a quick-operating, self-sealing design that is not dependent on torque for seating force. Tight shutoff is accomplished through the use of plastomer or elastomer seat rings. The most common of these seating materials are synthetic rubber, teflon, and nylon. Although maximum temperatures are limited by these materials, ball valves offer compact, inexpensive design and smooth flow through the port. Some pressure drop is experienced through conventional ball valves, which have reduced ports (full port designs are available).

THROTTLING

GLOBE VALVES

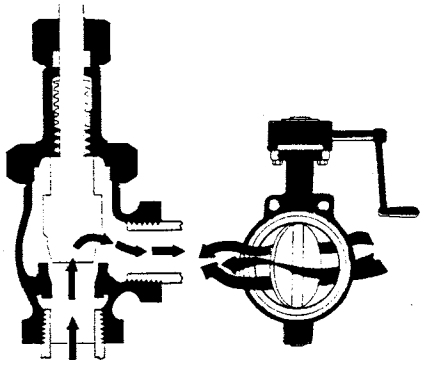
Globe valves are used for efficient throttling (modulating) control and regulation of flow between all-on and all-off position and for services requiring frequent operation or positive shutoff. Disc seating is parallel to the line of flow. The change in direction of fluid flow through a globe valve produces significant resistance and pressure drop.



Globe Valves Y Globe

ANGLE VALVES

Angle valves have the same basic features as globe valves. The fluid flow through the angle valve, however, makes a 90° turn. Angle valves offer less resistance than globe valves with elbows which they are intended to replace. The use of angle valves thus reduces the number of joints in a line and saves installation time.



Angle Valves Butterfly

BUTTERFLY VALVES

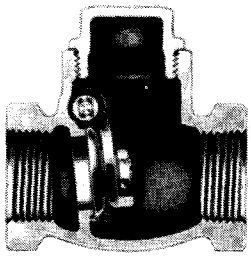
Butterfly valves utilize simple 90° disc-stem operation for larger throttling applications. They can also be used as shutoff valves, although some pressure drop is experienced through the valve opening. These valves offer initial low cost, simple installation and easy actuation. The usefulness of butterfly valves has increased with the development of elastomer liners and backup rings in the body which provide tight shutoff. Buna-N, the most common liner material, is not suitable for steam service. Body styles include wafer, lug wafer, and flanged designs.

VALVE FLOW CHARACTERISTICS

BACKFLOW PREVENTION

SWING CHECK VALVES

All check valves offer quick and automatic reactions to flow changes. The pressure of the fluid flow keeps the valve open, and any reversal of flow closes it. Swing check valves provide minimum resistance to normal flow. They are used for low velocity services with infrequent changes of direction. They are generally utilized inline with gate valves due to compatible flow characteristics.



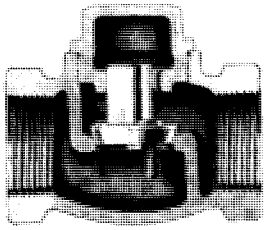
Swing Check

Y-PATTERN SWING CHECK VALVES

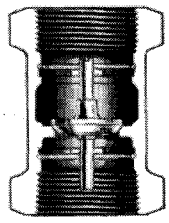
Y-Pattern swing check valves offer slightly more resistance to flow, but may be installed in both horizontal and vertical lines with upward flow. The 45° seat aids in backseating under low pressure conditions.

LIFT CHECK VALVES

Lift check valves are used for services with frequent changes of direction, and for increased flow resistance and positive backflow prevention. They are utilized inline with globe and angle valves due to compatible flow characteristics. Available for horizontal or vertical service.



Horizontal Lift Check



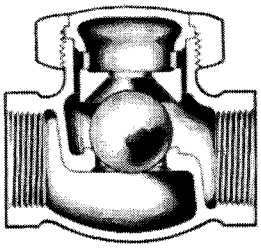
Vertical Lift Check

WAFER CHECK VALVES

Wafer check valves are generally light and easy to install. They are designed for quick closing at zero flow and are utilized with gate and butterfly valves. Wafer checks come in a variety of designs: swing type, tilt disc, lift type and double disc. Shown page 77.

BALL CHECK VALVES

This design is favored in handling highly viscous fluids.



Horizontal Ball Check

AIR COMPRESSOR CHECK VALVES

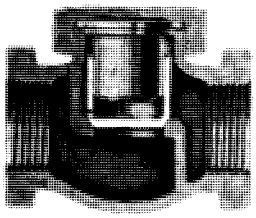
A special design for the slamming service inherent in air compressor systems. See page 12.

PUBLIC HEALTH VALVES

Describes valves for use in water systems, sanitary and drinking, where backflow into supply must be controlled. Shown page 86.

STOP CHECK, SCREW DOWN NON-RETURN VALVES

Feature in globes and angles allowing for backflow prevention.



Air Compressor Check

PRESSURE / TEMPERATURE RELATIONSHIP

Valves are rated for a variety of pressure levels. There is a dynamic and inverse relationship between pressure and temperature such that as temperatures elevate, pressure holding values diminish. Thus pressure as rated will be joined with a temperature in most valve ratings, and a valve will hold less pressure at higher temperature and will likely hold increased pressure at lower temperatures although this is not strictly defined.