

How It Works

Pressure loss

Pressure loss, also known as pressure drop, is the decrease in pressure measured between two points in a flowing fluid system. Pressure loss that occurs along the direction of flow in a pipe is caused by fluid friction—both internal in the fluid itself and with the piping surfaces—piping restrictions, or sudden changes in the geometry of the flow path. Thus, pressure loss is directly related to fluid velocity, specific gravity, viscosity, and the pipe interior's size, shape, and roughness.

Flow rate determines the pressure loss. Up to certain limits, the higher the flow rate, the greater the pressure loss and vice versa. Pressure loss across a valve is not created by the valve alone.

Potential pressure loss must be known by the engineer designing the system to ensure proper valve selection. The traditional way of determining potential valve pressure loss is to set up a flow loop. During a flow loop test, a pump is used to move 70-degF [21-degC] water through the valve and then return it back to the pump to repeat. This measures the pressure loss downstream of the valve or valves using a gauge and establishes the flow calculations to determine the pressure loss across various valves.

With the introduction of computers, pressure loss across a valve can now be calculated without a flow loop. Finite-element analysis enables an engineer to set up a simulation by entering the relevant data on the valve interior and then simulating flow through the valve. This analysis enables the same flow loop accuracy without requiring the pipe, fitting, and pumps for the various valve sizes to produce the system in real life.

Pressure loss is expressed in two ways—through a flow coefficient (C_v) value or an equivalent length of pipe. C_v expresses flow rate in galUS/min of water at 70 degF with a 1-psi pressure loss across the valve when it is in the full open position. Equivalent length of pipe converts the pressure loss to the equivalent pressure loss incurred in a length of pipe operating under the same volumetric and pressure conditions. Cameron offers low-pressure-drop valves, including the CAMERON T30 Series* fully welded ball valve, which opens and closes at a constant rate.

Pressure relief valves

Pressure relief valves (PRVs) are used to control or limit excessive pressure in a system. A PRV is designed to discharge and reduce pressure in the event that a pressurized system has a rise in pressure beyond preset design limits. The PRV serves as an outlet for dangerous pressure buildup. When the pressure in a system becomes too high, the pressurized fluid will vent from the PRV. The valve opens at a set pressure point; when the pressure in the system exceeds this point, the valve automatically opens to relieve a portion of the fluid pressure. As the fluid is discharged, the pressure inside the system stabilizes, and the valve closes.

Pressure regulators

A pressure regulator is a valve that automatically modulates the flow of fluid to maintain a certain pressure. Used in high-pressure situations, regulators and other equipment to enable the safer operation of supply lines or tanks in various applications.

Pressure regulators comprise restricting, loading, and measuring elements.

- The restricting element is any valve that can operate as a variable restriction to the flow, such as a globe or butterfly valve. Cameron NEWCO* gate, globe, and check valves are commonly selected for this application because they have a proven track record in the field.
- The loading element is the needed force for the restricting element—the way to operate the valve. It can be a weight, spring, or piston actuator.
- The measuring element determines when the pressure of the flow coming into the line requires modulation of the restricting element (cycling of the valve) to properly control the desired pressure.