

Valves in Gas Applications - 7 Things to Keep in Mind

Valves are fluid control devices that control and regulate the flow of fluids. They are used in numerous applications across various industries. However, their primary purpose is fluid control. In this context, fluid refers to both liquids and gases. Valves used in the control and regulation of gases are sometimes referred to as gas valves.

Gas valves are employed in numerous industries, including petroleum, pharmaceutical, chemical, manufacturing, power, HVAC, and food. They are also used in small-scale applications such as the domestic supply of cooking gas and the control of oxygen in medical gas tanks. Similarly, there are various types of gas valves that vary by build, material, configuration, ratings, size, and many other factors.

To ensure the proper functioning of a valve and the successful execution of its application, there are several factors that must be considered. This article explores seven things to keep in mind concerning the use of valves in gas applications.

Size matters

Valve sizing to achieve the desired flow rate is as crucial for gas applications as it is complex. Wrong valve sizing may lead to detrimental flow rates and valve deterioration. In the basic flow rate calculation formula for liquids, density is constant. Unlike liquids, gases are compressible fluids. This compressibility leads to variations in pressure and changes in gases' densities. Formulas for sizing gas valves vary slightly depending on conditions of the gas, such as pressure and flow velocity. Sizing gas valves requires calculations that involve various variables, charts, and tables. However, modern valve manufacturers provide critical valve data that can be applied to easily carry out valve sizing using dedicated software programs.

Media and valve material must be compatible

Gas valves are applied in the control of different types of gases and vapors. These include steam, chlorine, inert gases, oxygen, etc. To prevent damage to the valve and the contamination of the flowing media, the gas must be compatible with the valve material (body and seating). For example, steam will corrode steel valves but is highly compatible with stainless steel. Similarly, PVC valves that react severely with chlorine gas have excellent compatibility with nitrous oxide. For extremely corrosive environments, monel and alloy-20 offer high corrosion resistance. Careful consideration must be given to valve material in gas applications.

Different applications require different valves

Valves perform the broadly defined function of controlling gases. However, this function in different types of valves can be further divided into different functions such as regulation, modulation, restriction, directional control, and confinement. Therefore, it is imperative to know the exact function of the gas valve prior to selection. For example, check valves are the most suitable valves for backflow prevention and low negative or positive pressure relief, while [ball valves](#) and globe valves are suitable for high-pressure applications. They also provide leakproof shut-off. There are numerous other types of valves that are best suited for different applications. Other factors to consider when selecting a gas valve type are flow direction, required flow velocity, valve mounting, and valve speed of operation.

Gas applications may require valve accessories

Gas valves often require accompanying devices that enable them to carry out certain functions. Some of these devices include actuators - automation devices for remotely controlling valves without human intervention; positioners - actuator accessory for achieving high-precision modulation; indicators - actuator accessories that indicate the real-time position of a valve; and regulators that ensure that valves do not supply gas at pressures higher or lower than the stipulated pressure.

Gas valves must comply with standards

Not just any valve can be used for gas applications. For a valve to be deemed fit for gas applications, it must conform to certain standards. Standards are formal documents that precisely specify requirements and guidelines for devices and operations. Standards are usually extremely specific, so there are scores of standards that may apply to a gas valve, depending on the application. For example, the [ASME B16.33](#) standard covers requirements for manually operated metallic has valves applied in gas piping systems up to 175 psi. There are also approvals and certifications that valves in gas applications may require to be suitable for a particular application. For example, the gas valves used in medical oxygen tanks may require FDA approval.

Operating conditions affect valve performance

The operating conditions, both internal and external, of a valve significantly affect its performance. High temperatures will cause the valve to expand, leading to slight variations in the flow pressure. However, these variations are taken into account by the manufacturer, so provided a valve's rated temperatures are not exceeded, the variations will have no significant effect. Operating pressure is also a vital consideration, and valves also have pressure ratings. Exceeding the rated operating pressure of a valve may damage the valve or result in leakages. Operating conditions play a vital role in material selection. Brass and carbon steel have good heat and pressure resistance, while titanium and inconel offer excellent resistance to heat and pressure.

Valves may require maintenance

Gas valves, like other devices, may require regular maintenance. Provisions should be made for this during planning and installation. For example, shut-off valves need to be installed upstream to allow for gas shut off during midstream and downstream valves maintenance. Also, safety precautions must be taken when maintaining valves in dangerous gases applications as these valves may contain residual gases even after the flow is shut off. Note that some valves are built to be extremely rugged and may not require maintenance for very long periods. These valves should be used whenever possible, especially upstream.

Conclusion

Valves are of many types with varying characteristics. Several factors have to be considered when selecting a valve for gas applications and during the valve's operation to ensure optimal performance and extended lifespan. Always keep all the things explored above in mind when considering valves for gas applications.

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