Technical Information

Operational pressures for Atkomatic valves

Operational pressures are sometimes referred to as differential pressures, maximum differential pressure, or maximum operational pressure differential (MOPD). All of these terms can be used interchangeably on the Atkomatic product line. Operational pressures are given for several categories of fluids. These are divided up by viscosity as follows:

a Gas – this includes all types of fluids that remain in the gaseous state during flow through the valve. Typical examples include air, nitrogen, natural gas, helium, argon, hydrogen, helium, etc.

b Low viscosity liquid – all liquid fluids up to a viscosity of 40 SUS (4.3 Centistokes) such as water, mineral oil, gasoline, kerosene, Diesel and fuel oil #2, JP-4 and other light oils depending on their temperature

c High viscosity liquid – all liquid fluids from a viscosity of 41 SUS to 150 SUS (32 Centistokes) [200 SUS for some valves (42 Centistokes)] such as light to medium weight oils depending on their temperature (hydraulic fluids such as MIL-5606, Diesel and fuel oil #3, 4, & 5, S.A.E #10 weight oil).

d Steam. These are broken out separately due to the temperature limitations of the valves rather than their ability to open against a particular pressure.

e Cryogenic fluids – includes all fluids that can be in either a liquid or gaseous state such as liquid nitrogen, liquid oxygen, liquid hydrogen, liquid argon, CO2, etc. When looking up a pull-off value for a cryogenic fluid, use the value given for a liquid up to 40 SUS.

Note: In cases where the fluid can exist at either a liquid or gaseous state, select a cryogenic make-up regardless of the temperatures involves. An example of this would be butane, which can be a gas or liquid depending on pressure at temperatures at or near room temperature.

All of the operational pressures for normally closed valves given are for valves that have been energized continuously, i.e., have coils which have stabilized at a high (above ambient) temperature. Since the resistance of the copper windings increase with temperature, the current is less at elevated temperatures and the strength of the magnetic field is less resulting in lower operational pressures. This effect is especially pronounced in many of the DC coils. The result of this method of rating the valves operational pressures is that the values are conservative for applications where the coils are only intermittently energized and all other operating conditions are nominal.

These pressure rating do not consider factors such as variations of the voltage applied to the coil or ambient temperatures. The limits of application conditions given in the literature should not be construed to imply that the valves would function under all combinations of adverse conditions. For instance, if after the coil energized continuously, the ambient temperature is at 100° F, and the voltage is dropped to 90% of nominal the valve may not function at is maximum rated pressure. Other combinations of adverse conditions may cause similar effects.

Fluid Filtration Requirements

Contamination in fluid systems is the largest single cause of operational problems. Frequently contamination is present in new systems from sources such as pipe sealant, pipe scale, weld slag, and metallic particles from the assembly of pipe fittings. Flushing of new systems is important to reduce the occurrence of problems, however often even through flushing will not eliminate all contaminants that will break loose during the initial operation of a new system. Filters are an essential component in many systems to prevent valve problems. It is important to locate filters immediately upstream of the valves and to size the filter rating correctly. A maximum micron rating to provide adequate protection is 40 microns. Note that strainers or screens are generally not capable of providing this degree of filtration and a filter with a depth type of element is necessary.

Ambient Air Temperature Requirements

All the Atkomatic valve series are designed to operate with ambient temperatures up to 40° C (104° F) with class H coils. Ambient temperatures above this will adversely affect coil life. Note that for this ambient temperature to be maintained around the coils, it may be necessary to provide insulation, shielding, and/or air motion to prevent the valve bodies and associated piping from heating the air surrounding the coil above these limits when fluid temperatures are elevated. This heating effect in more pronounced in larger valves. Class B coils are not recommended for applications where the ambient air will be above 25° C (77° F).

None of the solenoid valves are designed to operate with an external vacuum. The coils rely on convection for cooling and this cooling effect is not present in a vacuum.

Installation and General Information

Most Atkomatic valves are designed to be mounted in a horizontal stationary line with the coil on top (within ±10 degrees). The exceptions are: 12,000, 13,000, and 14,000, series which may be mounted in any orientation and the 40,000 and 50,000 series valve which are designed to be installed in a horizontal stationary line with the coil on the bottom (within ±10 degrees).

All Atkomatic valves are designed to hold pressure in one direction only. Under a reverse delta pressure all valves will exhibit reverse flow. With pilot operated and semi-direct lift valves, a reverse pressure will push the pilot valve open and pressurize the cavity above the piston. This will prevent the piston from opening and the valve from flowing freely in the reverse direction. Reverse pilot flow will always be present and the volume of flow will depend on the reverse pressure and the diameter of the pilot orifice. It is possible to modify the valve such that full flow is allowed in the reverse direction (see the Cv feature option on page 107). A direct lift valve will always produce a back flow under a negative or reverse delta pressure condition. It is not possible to prevent all reverse flow without the installation of a check valve in the line.

All direct acting and semi-direct lift valves are suitable for vacuum service. The valves will function normally with any level of vacuum at the outlet port. However, globe style valves, cast components, brass material, and some elastomers are often not appropriate for use with extremely low vacuums.

Atkomatic valves must be mounted with the valve in the line such that the arrow cast into the valve body is in the direction of flow (or with the ports connected as marked for barstock body valves).

To prevent system instability, do not locate valves immediately downstream of pressure or flow control components such as regulators. Pilot operated and semi-direct lift valves should be the same size as the system plumbing. Use of inlet plumbing smaller than the valve size (or other system restrictions) can result in unreliable valve operation including instability (valve oscillation).

For more detailed instructions see the Installation, operating, & troubleshooting instructions for the specific valve series. These are available from the factory, authorized distributors, and on the Internet at http://www.circle-seal.com/atkomatic.html.