

Pressure

Most systems operate at some sort of “constant” pressure, however, if system upsets occur, it is important to factor that into the selection process, as well as make operational corrections to try to prevent those upsets from occurring. Here are a few examples of system pressure upsets:

Surging

Surging is when system pressures are drastically increased over a short period of time. In many cases, these surges are due to valves being opened too quickly or pumps that are “dead headed”.

Hammering

Hammering can actually be created in a system in a few different ways. One of the most common ways hammering is created is when valves are shut too quickly; when fluid travels through a pipe, the product has forward-moving inertia, and the rate at which it moves is called velocity. A system can have high velocity at very low pressure, therefore, if a valve is closed quickly, the system must absorb the inertia of the media. The result can be similar to a car hitting a brick wall; something has to absorb the energy. In most cases, the sealing device is the weakest point in the assembly, and therefore takes the impact. The systems most commonly subjected to sealing device failure due to hammering are steam systems, and the phenomenon is usually a result of process condensate not being properly removed or drained from the system.

Thermal Expansion

Unlike gases, liquids do not compress. Therefore, when a liquid is heated in an enclosed space, with no air space for expansion, the internal pressure that is generated can be catastrophic to the system, equipment, and/or sealing devices in the system. For example, for every 1°F you increase to the temperature of water, it will in turn generate approximately 20-30psig of internal pressure. That means that a 10°F swing in operating temperature could generate 200-300psig of internal pressure if the water was fully contained.

