Regulator Problem Troubleshooting

When problems occur in a gas train the most often blamed culprit is the regulator. More often than not, the actual problem lies elsewhere, usually in the regulator installation. Problems with regulators most often manifest as a pulsation or unsteady pressure control. This pulsation has been known as hunting, seeking, searching and bouncing along with a host of other descriptions. What is actually happening is that the regulator is opening and closing in reaction to its installation.

Many things can cause this pulsation but by far the most common problem is improper venting. To diagnose a vent issue simply loosen the spring cap on the regulator. If the pulsing stops it's time to re-plumb the vent. There are no strict rules for venting from any manufacturer but a common rule of thumb is to increase the pipe one diameter for every length of pipe run. Try to minimize use of elbows and keep the vent pipe as short and straight as possible. If possible, run the vent pipe with the application running. If pulsation occurs with the installation of a piece of pipe, replace that pipe with one of a larger diameter. Most importantly, there is only one regulator per vent line.

Another cause of pulsation is the location of the regulator in the pipe line. If it is too close to a change in flow conditions, such as an elbows, tees or change in pipe diameter the turbulence in the gas flow may be picked up by the regulator resulting in unsteady pressure control. Make sure the regulator is placed in an area of smooth flow, away from tees, elbows and changes in pipe diameters. Any turbulence in the gas flow will be picked up by the regulator.

The wrong regulator for the job could also be to blame. Size the regulator so that the capacity requirement of the application is no more than 80% of the capacity of the regulator. Both regulators and appliances have working ranges, known as the turndown ratio. Turndown is the high flow divided by the low flow, yielding a ratio. For example: if a boiler has a high fire rate of 5000 SCFH and a low fire rate of 500 SCFH, the turndown would be 10:1. Regulators also have turndown ratios that should be listed by the manufacturer. Verify the capacity and turndown of the regulator is larger than the requirements of the application. If the regulator is too large or too small pulsation could result.

A commonly overlooked source of problems is the gas supplier. Are they supplying a steady supply of gas to the regulator? Problems occurring upstream can travel great distances and be amplified by the regulator in question. Along with delivered gas pulsation investigate if there are other regulators in the gas train. If those regulators are set too closely together they will compete and cause pulsation. Many times the gas supplier will meter the gas with a Rotary meter. These meters measure the gas by segmenting the flows into known volumetric portions and count those segments. The meter operation creates pulses of gas that travel to the regulator, and sometime, but not always, cause poor regulator performance.

In the realm of pulsation there are more avenues of investigation, the application itself. If the appliance chops the flow into pulses, such as pulsation boilers, this intermittent flow will cause the regulator to pick up that pulse and start pulsing. Appliances that start and stop suddenly should also be investigated. Increasing the distance between the regulator and the appliance may be a cure for poor regulator performance. Also, determine if the equipment is performing properly. Are all the burners firing at the correct rate and the gas / air mixture correct? Are all parts of the burner installed properly? Misplaced baffle plates will cause fluctuation in the burn that will cause unsteadiness in gas flow.

Finally, having eliminated the installation and equipment review the regulator. This requires examining the regulator's moving parts. The stem and linkages in the regulator should move smoothly. Any binds or tight spots in the movement will result in poor performance.

Other problems blamed on regulators are high lock up, flame out and low flame. As mentioned before, appliances have working ranges, both flow rate and pressure. High lock up is when the regulator closes too slowly, resulting in a static pressure that is higher than the working range of the appliance. This could be the result of the regulator either being too small or too far away from the application. It also could be dirt in the regulator that is between the seat and the orifice or, if the regulator was pressurized too quickly, a bent diaphragm pan. Review the size of the regulator and if that's ok, inspect the regulator for dirt and damage. Flameout and low flame are the direct result of either the regulator being improperly sized or the inlet pressure is too low. Verify both the size and the inlet pressure to make corrections.