

What is Steam Quality?

Steam quality can be simply defined as clean dry steam. It is an important factor to consider when designing your steam injection heating system. The efficiency of the steam injection heater, temperature control loop, process stability, and overall equipment life can all be impacted by steam quality.

Steam Quality Factors

Saturated Steam – The ProSonix (PSX) heater is designed for use with saturated steam. Saturated steam is steam that is in equilibrium with heated water at the same pressure and has not been heated past the boiling point for that pressure. Saturated steam is completely gaseous and contains no liquid water.

Dry steam - One aspect of steam quality is the proportion of steam (vapor) relative to the condensate liquid that exists in the steam mixture. While 100% dry steam (no liquid condensate) may not always be possible, designing to remove and eliminate liquid condensate and provide dry steam to the PSX Heater is an important factor. The presence of water or condensate in steam can lead to the following issues:

- Erosion and accelerated wear of internal heater parts
- Rough operation and temperature control issues
- Flashing or steam hammer which can damage heater components

Superheated Steam – Superheat is the difference between the actual steam temperature and the temperature at which the steam begins to condense at the existing steam pressure. The PSX Heater can handle up to 75°F of superheat without modification. Applications that have > 75°F of superheat can be considered; however, heater design changes modifications to accommodate the potential higher temperature and pressure conditions. Always advise if you have superheated steam as it can impact equipment design and may lead to delayed steam condensation.

Steam Contaminants – The removal of solid particles such as rust, scale, and so forth from the incoming steam supply will also reduce premature wear of steam components. Steam piping should be blown down after any extended shutdown or new construction to insure removal of particulates. A steam strainer should also be installed in the incoming piping to the PSX heater.

Recommended Steam Line Components to Improve Steam Quality

The following are some of the minimal recommended steam line components. Selection & sizing of these components should be done to reduce pressure drop and maintain steam flow as shown in the PSX Heater sizing worksheet. Check valves to prevent liquid back flow into steam line.

- Steam trap & drip legs to remove condensate
- Steam strainer to remove solid particulate (see Fig. 1 below)
- Steam isolation valve for tight shut-off of steam supply upon shut down of heater.

Other steam components may be required depending on your steam system, code requirements, and steam line or instrumentation needs.

Fig. 1 - Steam Strainer Recommended Sizing Chart

Heater Steam Inlet	Max. Opening (in.)	Heater Steam Inlet	Max. Opening (in.)
1.0"	0.020	4.0"	0.030
1.5"	0.020	6.0"	0.050
2.0"	0.020	8.0"	0.063
3.0"	0.030	10.0"	0.125

Additional PSX Heater installation and operation recommendations can be found in the heater Owners Manual. Contact ProSonix at 800-849-1130 or e-mail info@pro-sonix.com with questions.