

How To Properly Operate And Maintain Steam Sparged Water Bath Vaporizers



Compact Configuration with Process and Pressure-Building Bundles

Steam sparged water bath vaporizers are an extremely effective way to provide vaporization for a diverse range of applications and offer a high level of reliability where steam is available as a heat source. Cryoquip designs steam sparged units to meet a variety of needs, but their best features include a compact configuration, high reliability, cost effectiveness, and versatility.

Overview

The vaporizers are designed in various sizes and in both vertical and horizontal configurations, to meet a wide range of flow rates. Typically, vertical units are used for smaller applications or when there is a small footprint limitation, and horizontal units are used for larger applications or extended ballast requirements. Because of their relatively small footprint, these are very convenient for large back up systems. For additional space savings, multiple bundles can be arranged in a single tank, to allow for several process and pressure building flows.

The units feature an atmospheric water bath tank, process bundle or coil, and internal steam sparger manifold with spargers. The tank water temperature is monitored so when the process flows through the bundle, which causes the water temperature to drop, the steam valve opens to inject heat through spargers. The system typically operates on a 10°F dead band with the control valves operating with an 'on-off' action (i.e. to open at 140°F and close at 150°F). This type of operation offers significant cost savings as steam will only be injected when there is a load on the system or as needed to make up for heat losses to the environment.



Vertical Insulated Unit

The hot water in the tank acts as heat storage (commonly referred to as ballast) which provides vaporization for a specified period of time after steam flow is lost, without damaging the equipment and with acceptable process outlet temperatures.

To ensure the life of this equipment it is important to use properly treated, saturated steam at the designated pressure, correct valve operation, perform regular maintenance checks, and installation on an adequate foundation. When properly cared for, steam sparged water bath vaporizers can be a valuable asset to a facility for many, many years.

Quality of the Steam

The condition of the steam is essential for proper operation as well as longevity of the unit. There are several factors to keep in mind:

Saturated – The steam needs to be injected at saturation temperature so the heat can be absorbed by the water in the tank.

Super-Heated Steam – Super-heated steam requires a special design to ensure that the heat of the steam is absorbed by the water. In a standard saturated steam design the bubbles created by super-heated steam are too hot, so they cannot transfer all of the heat to the water. This results in a very loud banging noise, vibration, and damage to the unit as the steam bubbles pop at the top of the tank, instead of injecting smoothly into the water.

Free of Condensate – It is critical to install a condensate trap upstream of the unit to remove condensate formed in the piping to the unit to prevent damage. If condensate is in the steam, it can cause the control valves to leak and the spargers will not be able to inject the steam appropriately.

Steam Treatment – Steam needs to be properly treated under the direction of a water quality specialist to minimize corrosion and maximize the life of your equipment. An imbalance in the composition and certain chemicals such as chlorides, can corrode through several of the components including the steam train, control valves, internal steam piping, process piping, and the water tank itself.

High-Pressure Steam – The standard steam pressure for this equipment is between 100 psi and 150 psi. Higher pressure steam will have similar issues as super-heated steam, due to the higher saturation temperature in a standard unit. A high pressure steam design is available utilizing components including control valves and spargers to meet the high pressure requirement.



Multiple Process Bundles

Installation, Operation and Maintenance of a Steam Sparged Unit

The installation, operation and maintenance of steam sparged water bath vaporizers is critical to the performance of the unit. Below are some of the key concerns:

Strainer – Before the steam gets to the control valve, all of the particulates from upstream piping need to be filtered out with a strainer. Both the strainer upstream and the strainer that is included with the unit need to be cleaned out on a regular basis so the flow of the steam is not inhibited.

Valves – A RTD (Resistance Temperature Detector) water temperature sensor is included on the water bath to allow the customer to monitor the water tank temperature. Typically the customer will wire up to the RTD sensor to operate the steam control valve in an ‘on-off’ type action. This results in the smoothest operation. If the actuator is not properly positioned or the seat is damaged, it is possible for the steam valves to leak. Leaking valves will allow the tank temperature to rise above the set point, possibly up to boiling.

Overflow Piping – The overflow connection must be piped to a drain where it can be recycled to avoid the hot water from flowing out the top of the unit. The injected steam adds mass to the tank which needs to be removed safely, especially when the unit is operating frequently.

Foundation/Civil Design – Due to the energy contained within the steam that is being absorbed by the water, it is usual to have some noise and vibration associated with this type of equipment. It is very important that the foundation be sufficient enough to both support the unit and not magnify the vibration which could cause damage to the vaporizer.



Extended Ballast

Special Features / Options

- Removable process bundles and coils, for ease of maintenance
- Multiple bundles in the same unit for multiple streams, including pressure builders
- Steam control valves using pneumatic or electric signals
- Top-mounted removable spargers – simplifies maintenance by eliminating the need to drain the tank in order to service the sparger
- Single 100% control valve or dual 100% steam control valves, which provide redundancy for higher reliability
- Water circulation pump option
- Insulated tank
- Extended ballast
- Stainless steel water bath tank and steam manifolds
- Low-pressure steam design and superheated steam design
- Local water temperature controller
- Low water level switch and alarm
- Low discharge gas temperature switch and process shut down valve
- Low water temperature switch and alarm
- Can be used for trim heating

When installed and operated with these points in mind, steam sparged water bath units are an extremely reliable and cost-effective form of vaporization that can be designed to meet a wide range of needs.

For more information, visit www.Cryoquip.com.



Dual Steam Control Valves



Top Mounted Steam Spargers

UPCOMING EVENTS

Natural Gas for Off-Road Applications

Houston, TX
June 2-3
Exhibiting

Global Petroleum Show

Calgary, Canada
June 9-10, 2015
Exhibiting

LNG Fuelled Tugs & Barges Conference

New Orleans, LA
July 14-15, 2015
Attending

HHP Summit

Dallas, TX
October 26-29, 2015
Exhibiting

LAGCOE

Lafayette, Louisiana
October 27-29, 2015
Exhibiting

Gastech

Singapore
October 27-30, 2015
Exhibiting