



HOW TO DEAL WITH WATER IN YOUR SYSTEM

Water in any high temperature heat transfer system is not only a nuisance, it can also be very dangerous. Care must always be taken to ensure water is not introduced into your system.

Precautions

Water should never be used to pressure test a system. Heat exchangers utilizing a water-side should be inspected regularly and monitored for leaks.

Proper storage of both full and partial drums of heat transfer fluid is very important. Drums should be sheltered or covered with bungs in place. If they must be kept outdoors, they should be stored on their sides to keep water (rain or snow) from collecting on the tops of the drums. It is also good practice to use dedicated pumps and transfer hoses for your heat transfer fluid to avoid any cross contamination of fluids, including water.

Moisture can also be drawn into your system when operating in a humid environment. It should also be noted that if the tank fluid temperature is below the dew point, condensation can form within the expansion tank resulting in a build-up of water over time.

Detection Before Start-Up

Fortunately, most common heat transfer fluids are not water soluble and will, if significant amounts of water are present, form a distinct layer that can be clearly seen if a sample is drawn from a low point while the system is not circulating. Although larger amounts of water will be visible to the naked eye, smaller amounts of water in the range of a few hundred ppm will not easily be seen but will still have the potential to cause operational issues.

Detection During Start-Up

If during the start-up process everything is fine until the fluid temperature reaches about 104°C (220°F), it is most likely that water, trapped within the system, is the cause of any problems at this point. As you heat up your system, the fluid thins out and it's normal to see a decrease in the pump discharge pressure. However, if at around 93°C (200°F) the pressure drops suddenly and the pump starts to shake from cavitation, you've most likely got water in your system. In some cases though, it's important to note that this may happen at much higher temperature if water is trapped deep down in a system.

Detection During Operation

Oftentimes trace amounts of water (a few hundred ppm) can show up as fluctuations in pump pressure or as small disruptions or cavitations of the pump. Do not ignore these warning signs. Although your system might be running above 100°C (212°F) – the boiling point of water – it is still possible to have water trapped in low lying areas or dead legs that will break free at random times. A leaky heat exchanger could also be introducing small amounts of water into the system over a period of time.

Safety

Caution should always be used when dealing with unintended water in your system. Water expands over 1000 times when turned to steam; if water is suddenly introduced to hot fluid, it will quickly vaporize into steam. The resulting steam expansion will displace an equivalent amount of fluid from the operating loop. This displacement can in turn force hot fluid from the loop, through the expansion tank or reservoir and out through the vent.

Removing Water

Larger amounts of water should be removed through system low points whenever possible. During startup however, it is possible to slowly heat the system toward 93°C – 104°C (200°F – 220°F) and coax small amounts of water out of the system as it turns to steam. If water evacuation persists, the temperature of the fluid in the expansion tank or reservoir can be elevated above 104°C (220°F) to keep the escaping steam from condensing back into water.