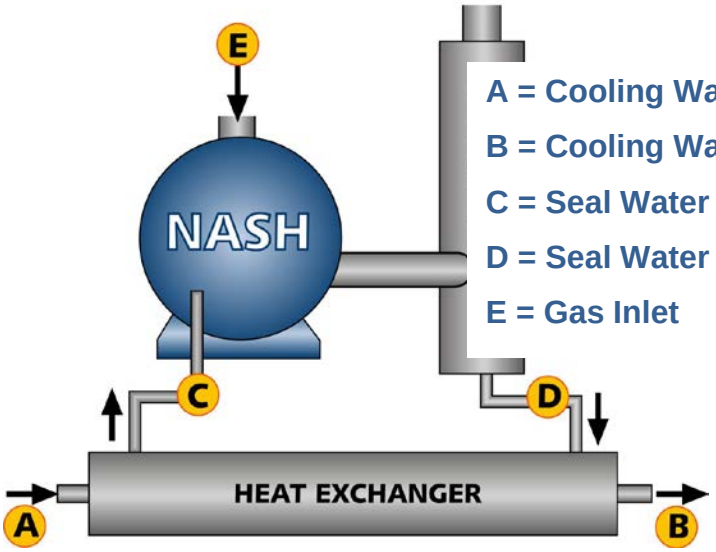
Nash Water Temperature Check Sheet

Date: _____ Pump Model: _____

Equipment #: _____ Test #: _____



A = _____ °F _____ °C

B = _____ °F _____ °C

C = _____ °F _____ °C

D = _____ °F _____ °C

E = _____ °F _____ °C

Approach temperature = A _____ - C _____ = _____ degrees °F or °C

Maintenance Tip: Heat Exchanger Temperature Checks

A heat exchanger is a device in which two fluids flow along opposite sides of a solid boundary wall, which keeps the fluids separate while permitting heat to pass from the hot fluid to the cold. Both Shell and Tube and Plate and Frame heat exchangers are used with Nash products. The shell and tube version does this heat transfer through tubes and the plate and frame transfers the heat via plates, which are similar to a car radiator.

Whenever I am contacted by someone with performance issues, and they have a heat exchanger, I start working with the "Temperature Check Sheet".

The “check sheet” is based on the following temperature points:

A Cooling Water To Exchanger
B Cooling Water Out of Exchanger
C Seal Water To Pump
D Seal Water Out of Separator
E Air or Gas Inlet of Pump/Compressor
A – C = the approach temperature in °F or °C

There are three basic “approaches” for our customers: 2.5°F, 5°F and 10°F. This means that when all is working correctly, the "C" reading of the seal water temperature going to the pump has a 2.5, 5 or 10 degrees difference to the cooling water supply coming in at "A". A single stage pump will have a 5°F or 10°F “approach” heat exchanger, whereas a two stage vacuum pump will have a 2.5°F or 5°F “approach” so that the pump can run as cool as possible. This is especially important in hot weather. Compressors generally have 10°F “approach” heat exchangers, because the water temperature isn't affected as much as it is with vacuum pressure. High water temperature will affect the vapor pressure and prevent good vacuum.

All of the temperatures should be recorded on the check sheet whenever testing occurs. Always record the date, as we all know that the temperatures change with the seasons and you don't want to compare January and August readings without being aware of the time frame. Almost all heat exchangers run hotter in the summer because the cooling water supply is warmer. There are exceptions, such as when a customer uses chilled water.

Here is an example of a good reading on a 2.5°F “approach” Shell and Tube heat exchanger:

A 70 °F
B 72-73 °F
C 73 °F
D 85-87 °F
E 80-95 °F

One difference between a 2.5°F and a 10°F “approach” is the heat exchanger size and cooling water flow, especially on the Shell and Tube exchangers. Note that on a 10°F “approach” exchanger, the “B” reading is 10°F higher and thus gives us the higher “approach” at “C”. Thus, in this example, “C” would be 10°F higher than “A”.

- If you have full water flow from “A” to “B”, it will be taking the heat out with the cooling water and not have much differential. If there is a low cooling water flow, “B” will have a higher temperature and the lower the water flow, the higher the temperature. This will raise the reading at “C”, the seal water temperature.
- If there isn't any difference between “A”, “B” and “C”, but “D” is hot, the problem is most likely a lack of heat transfer due to calcium or scale build up on the tubes. A .010 -.015 buildup of calcium is a good insulator for heat transfer, as are rust and scale. The cleanest water should be going through the shell and the dirtier water through the tubes, because the tubes are easier to clean.
- If you have a high temperature change from “C” to “D”, the strainer or orifice may be plugging up. Be suspicious of this whenever you see a temperature difference between “C” and “D” that is 20°F or more.
- Temperature "E" should be recorded in case the suction temperature is hot enough to affect pump performance or the other readings.

These are our “rules of thumb”, but if you want to have 100% peace of mind, it’s always a smart idea to check with your supplier. Nash maintains a full-time aftermarket staff of NASH Certified ™ Service technicians who can troubleshoot any question or concern. Contact us around the clock and across the world at GDNash.com.