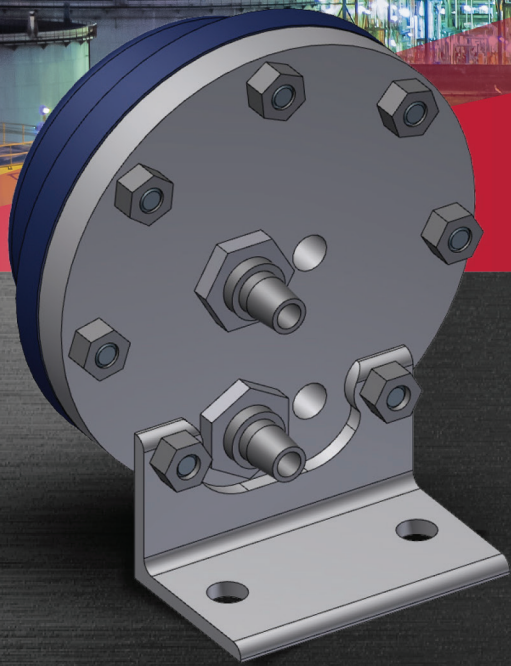




Heliflow Heat Exchanger Applications

Pump Seal Cooler

What is a Pump Seal Cooler?

Mechanical seals installed on pumps handling medium and high temperature fluids require cooling of the seal fluid to ensure proper seal operation. Reliable pumping system performance, extended mechanical seal life, and the prevention of unplanned outages depends upon efficient, dependable mechanical seal cooler performance.

Heliflow heat exchangers are proven, efficient, and cost-effective seal coolers.

Graham Heliflow Overview

The Heliflow heat exchanger is a compact, helically coiled shell and tube heat exchanger. The spiral, countercurrent flow path enhances thermal efficiency, reduces fouling, and delivers exceptional mechanical seal cooling in a fraction of the surface area of standard shell and tube exchangers. Large temperature gradients and close approach temperatures are possible due to the 100% countercurrent flow configuration.

Seal Systems

Proper system design is extremely important for ensuring the long operational life of mechanical seals and bearings in pumps. A properly designed system provides a fluid flush to lubricate, cool, and clean the mechanical seals. To facilitate this process, the high temperature flush fluid, either the process fluid or a separate barrier fluid, is routed to the seal cooler, where its stored heat is transferred to a secondary fluid—typically, water or a glycol/water mix. The cooled flush liquid is then piped back to the mechanical seal chamber.

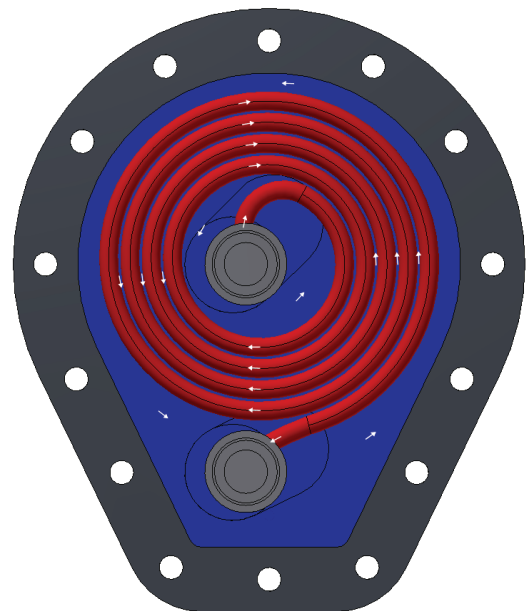


Figure 1. Spiral Flow Path

API 682 Requirements

Graham Heliflow Seal Coolers are regularly utilized in API 682 flush plans, primarily plans 21, 22, 23, and 41, as specified in Annex G of the standard. API 682 outlines critical construction and design features for demanding applications. Specifically, a seal cooling system should be fully drainable and able to maintain fluid flow via thermosiphon circulation to ensure continued cooling of the seals even if the pumping ring is lost. Heliflow heat exchangers provide superb performance when API 682 standards are specified.

The multiple tube configuration of a Heliflow heat exchanger minimizes hydraulic losses, thus eliminating requirements for thermally inefficient large diameter heat transfer tubing.

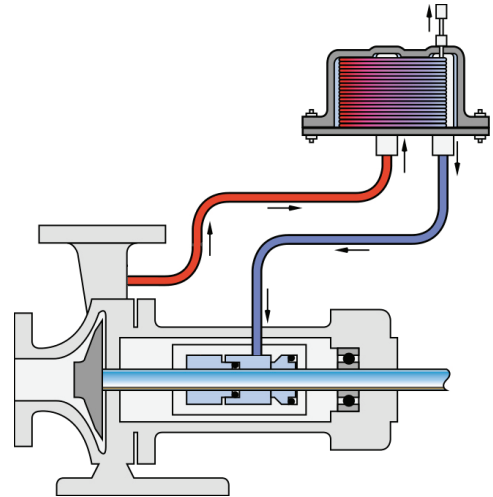
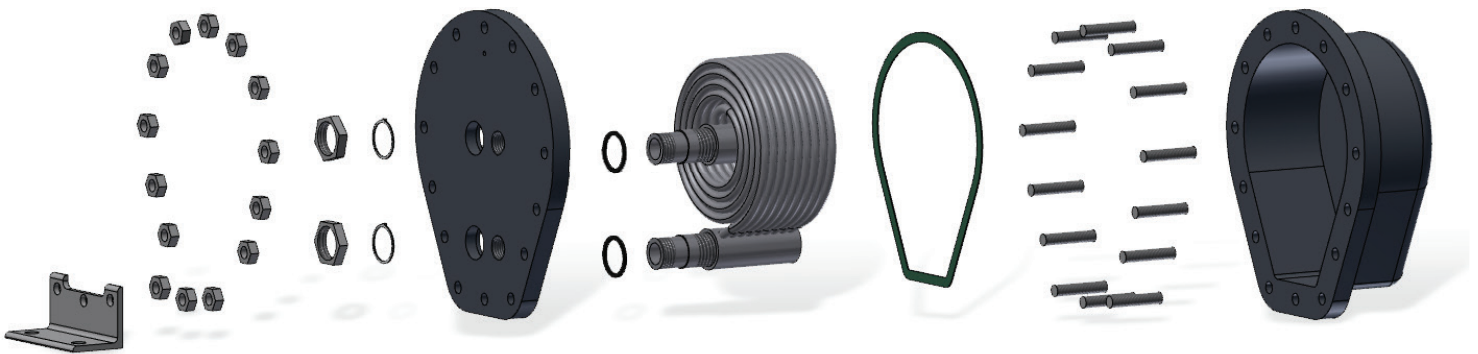


Figure 2. Typical seal cooling arrangement

Heliflow Seal Cooler

Heliflow Seal Coolers are produced in several standard sizes, and customized solutions are also available. The seal or process fluid is typically handled on the tube side, while the cooling medium is on the shell side. The tube side can easily be rated for pressures above 1,000 psig. Standard construction materials include stainless steel for the tube bundle and carbon steel or cast iron for the casing. Copper-nickel and high alloy options, such as duplex stainless steel, are also commonly specified for Heliflow Seal Coolers. Available codes of construction include ASME Section VIII, Div 1, PED and CRN.



Reliability

Heliflow Seal Coolers offer outstanding operating reliability. The effects of fouling are minimized by the turbulent flow and mixing induced by the spiral fluid passages. The casing of the unit can easily be unbolted and removed, which allows for the thorough cleaning of the coolant side. The removable casing also allows for quick and easy replacement of the tube bundle, if necessary. The spiral tube bundle eliminates the thermal expansion problems that plague shell and tube seal coolers as the bundle is allowed to expand and contract without stressing the tube to tubesheet joints.

Potential Applications

An effective seal cooler will prolong the life of a pump's mechanical seals—leading to greater system reliability, lower maintenance costs, and less process downtime. With this in mind, Heliflow Seal Coolers are specified by pump suppliers, mechanical seal manufacturers, maintenance engineers, and system engineers whenever the ideal seal cooling solution is required.