

Description

XTube® Pharmagrade heat exchangers are shell and tube heat exchangers which use pharmaceutical quality inner tubes. Tube bundles can be fully welded or removable. The units incorporate high quality inner tubes specially manufactured for processes in the pharmaceutical and biotech industries, with a surface roughness adapted to the nature of the process. The internal tubes are corrugated in order to significantly increase the rate of heat transfer.

The fluid to be processed (product) flows through the inner tubes and the service fluid over the inner tubes through the shell. The fluids are completely isolated from one another, the heat being transferred through the inner tube walls. Double tubeplates are provided at each end, each with a separation air gap. The tubes are welded into the outer (sterile) tubeplate and roller expanded into the other non-sterile plate.

In the case of demountable versions (with removable tube-bundle) leakage of the service fluid to atmosphere is prevented by a pair of elastomeric O ring seals at each end of the tube. If hygiene and process conditions require it steam packing can be provided between the O ring seals at both ends of the units. The tubeplate assembly is fixed at one end to the outer tube assembly with the other end free to expand and contract with the changes in temperature occurring in service, thus avoiding the potentially damaging stresses that occur in other types of fully welded heat exchangers that use expansion bellows to absorb the differential expansion between the shell and the inner tubes.

The heat exchangers are designed to drain completely on the process fluid side and include eccentric reducers when two or more units are mounted in series.

The internal tube surfaces, weld areas and other product wetted surfaces are mechanically polished to the standard required by the application. Additional electro-polishing is available on request.

The units are designed and manufactured according to the provisions laid down by the US Food and Drug Administration for high purity water systems (Current Good Manufacturing Practices for High Purity Water Systems). In addition, all of our units are designed and manufactured according to the CE marking regulations contained in the European Pressure Directive (97/23/EC) and are CE marked when we are permitted to do so.

Applications

The principal uses for the XTube® Pharmagrade heat exchangers are the following:

- Heating and cooling of liquids, emulsions and gases.
- Heating and cooling of WFI (water for injection) and other high purity water.



Materials of construction

All wetted components are manufactured from AISI 316L stainless steel and the rest in AISI-316. Other stainless steels are also available on request.

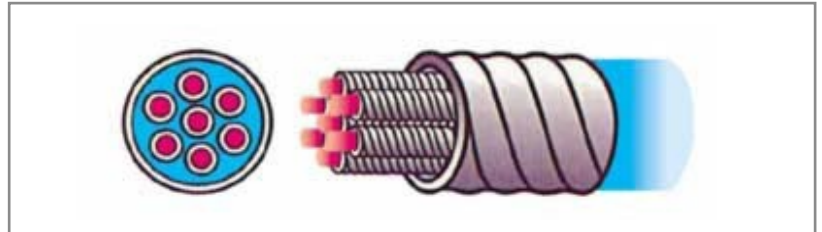
The internal tubes can be supplied as either welded or seamless tubes according to the requirements of the application and clients specifications. O ring seals and connection gaskets or seals are manufactured from US FDA approved materials according to the application.

The process fluid wetted surfaces are mechanically polished to give a surface roughness of $Ra < 0.4 \mu m$ with welded areas guaranteed to be $< 0.5 \mu m$. On request it is possible to provide higher quality and/or electro-polished surfaces. The exterior heat exchanger surfaces may be polished or matt finish as required by the client.

Connections

To allow rapid and flexible installation and easy inspection of the units the XTUBE® Pharmagrade heat exchangers use ASME BPE standard ferrule/clamp connections or sterile flanges based on DIN standards. Other international standard flanges can be used if required by the client.

If matching ferrules, clamps or gaskets are required by the client for installation purposes these can be supplied on request to allow connection to the clients' pipework system.



Design Conditions

These will depend on the specific process and system requirements of the application but when not specified the standard design conditions for the XTUBE® Pharmagrade heat exchangers are the following:

- Minimum and maximum allowable working temperatures: -40°C / +180°C
- Higher pressures and temperatures are possible on request.

Standard dimensions

XTUBE® Pharmagrade heat exchangers can be delivered in various lengths, the standard dimensions being approximately 1500 mm, 2000 mm, 3000 mm and 6000 mm.

The exterior tube diameters used are as follows: Ø 88.9 mm, 104.0 mm, 114.3 mm, 129.0 mm, 141.3 mm, 168.3 mm, 219.1 mm, 273.1 mm, 323.0 mm and 406.4 mm. The tube thickness used will depend on the design conditions for each application.

The diameters of the interior tube and its wall thickness will be chosen to meet the requirements of each application.

