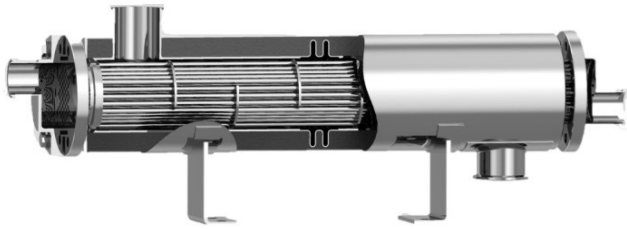


# Biozell



## For Pharmaceutical Manufacturing

### Double Tube Sheet Shell & Tube Heat Exchanger

The heat exchanger is a high quality double tube sheet shell & tube heat exchanger designed for use in the pharmaceutical and biotechnology industry. It is available in a number of standard sizes and meets the stringent hygiene standard imposed both by control authorities and industry.

#### Application

Double tube sheet shell & tube heat exchanger is used in pharmaceutical water system; Water For Injection (WFI) and Purified Water (PW) and for heating or cooling of pharmaceutical products.

#### Hygienic Design

Double tube sheet shell & tube heat exchanger has no dead legs and is fully drainable on the product side. All product wetted parts in the heat exchanger are either electropolished to  $Ra < 0.5 \mu\text{m}$ ,  $Ra < 0.4 \mu\text{m}$ ,  $Ra < 0.3 \mu\text{m}$  or mechanically polished to  $Ra < 0.8 \mu\text{m}$ . Heat exchange tubes are seamless and meet required in ASME BPE. The heat exchanger is easy to clean and can be steam sterilized. Gaskets are in compliance with FDA.

#### Working Principle

Double tube sheet shell & tube heat exchanger is designed in accordance with FDA guideline. In the double tube sheet shell & tube heat exchanger the risk of mixing between the product and the heating or cooling (service) medium is eliminated as a result of the double tube sheet design. The product flows in the tube while the service medium flows in a cross flow around the tube, inside the shell. The service medium is sealed in the shell by the first tube sheet and the second tube sheet seals the product. In the event of a leak, the leakage of both fluid are easily visually detected.

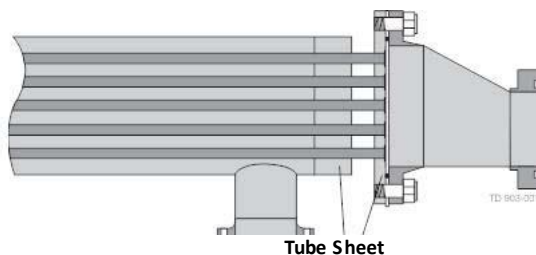


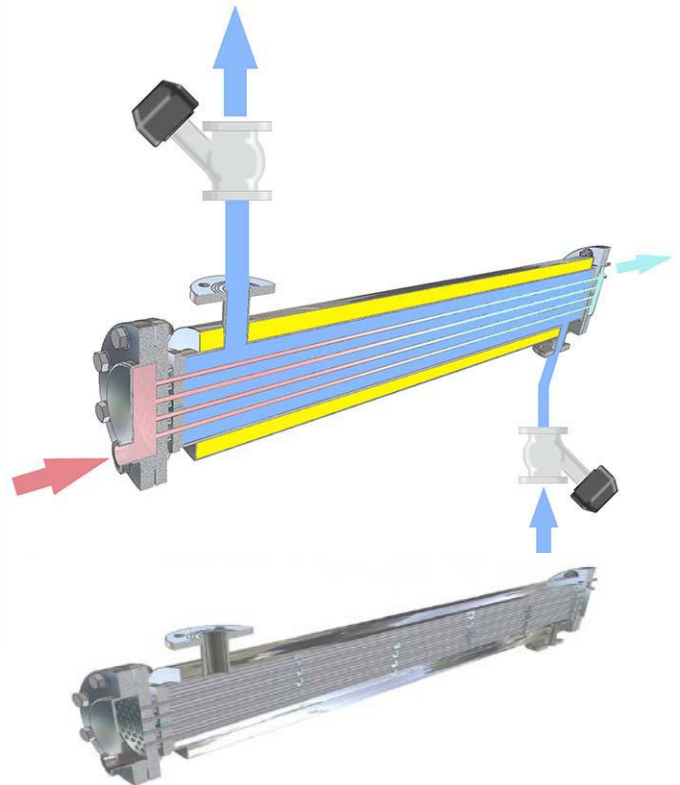
Fig. 1. Double tube sheet prevent cross contamination between the product and the heating/cooling medium.

#### TUBE SHAFT

Made of seamless AISI 316L tubes having an internal finish of  $Ra < 0.5 \mu\text{m}$ . All tubes are pickled and passivated after manufacture. Tubes are fixed in place using double appropriation mechanical expansion on the tube sheets using a triangular pitch. The number of passes (tube side) is established according to the speed and load loss and may vary from 1 to 8 by changing the number of outward and inward chambers. The IN/OUT connection clamps for the primary fluid (WFI distilled water, DW demiwater, PS pure steam) are located on the chamber.

#### SHELL

Also made of AISI 316L, the shell is designed according to the diameter and working pressure of the welded or calendered sheet or electro-joined tube, which, if required, can be supplied with an axial expansion compensator to absorb the various linear expansions of the tube shaft and the shell itself. Supports for the insulation, generally in fibreglass, are bonded onto the shell with the protecting sheet in riveted AISI 304, together with support brackets, the flanged IN/OUT connectors for the secondary fluid (cooling water or heating steam) as well as the rating plate.



## DTS Heat Exchanger

#### DESCRIPTION

As this product is made-to-order we aim to satisfy our clients' needs more effectively by ensuring each exchanger is designed for each project based on data supplied by clients. This ensures our technical office works under optimum conditions to make the size and temperature calculations to input into our exclusive and purpose-designed software. When functioning in an inclined/sloped position or in a vertical position, both single and multiple paths are completely self-draining and can be used for either heating or cooling or indeed both by using the dual-control. The standard exchanger includes insulation, support bracket and o-ring.



## Standard Range

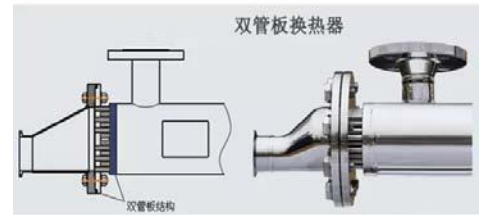
Standard range of tubular designs that suit most applications are readily available. Custom design units are available on request.

## Documentation

Double tube sheet shell & tube heat exchanger is delivered along with a complete documentation package including:

- Approved drawings
- Welder qualification
- Material certificates
- FDA compliance and gaskets
- Liquid penetrant test report
- Surface roughness certificate
- Product wetted steel parts report
- Pressure test certificate
- Identification (technical sign)
- Quality system certificate
- Documents

Other documentations/procedures on request.



## Installation

Double tube sheet shell & tube heat exchanger can be installed either horizontally or vertically, depending on the specific demands. For an easy installation, lifting lugs and mounting plates are welded on the unit.

## Technical Data

Heat Transfer Area:	0.5 m <sup>2</sup> – 15.0 m <sup>2</sup> (standard range)
Design Temperature:	150aC (available up to 200aC)
Design Pressure:	FV/10 barg, higher pressures available
Product Wetted Steel Part:	316L (seamless tubes)
Gasket:	PTFE (FDA compliance & USP class VI certified)
Connection:	Tri-clamp on tube side and flange on service side (other options available)
Welding:	According to ASME IX and EN-288-3, EN 287-1
Surface Finish Product Wetted Part:	Electropolished with Ra<0.3 μm, Ra<0.4 μm or Ra<0.5 μm or Mechanically polished with Ra<0.8 μm.

### Options:

- Passivation according to procedure
- Insulation mineral wool (ASTM C795) with stainless steel 304 cladding



## Custom Made

Other design and documentation are available on request.

# Pharmaceutical Water System

