

# Pharma-line

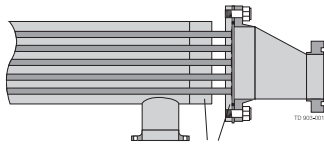
## Pharma-line Double Tube Sheet Shell & Tube Heat Exchanger

**Applications**

The Pharma-line is used in pharmaceutical water systems; Water For Injection (WFI) and Purified Water (PW) and for heating or cooling of pharmaceutical products.

**Working principles**

The Pharma-line is designed in accordance with FDA guidelines. In the Pharma-line 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 tubes while the service medium flows in a cross flow around the tubes, 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 either fluid is easily visually detected.



**Tube sheets**

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



**PHYSICAL DATA**

- Product wetted steel parts: . . . 316L (seamless tubes)
- Gaskets: . . . . . PTFE (FDA compliance & USP class VI certified)
- Connections: . . . . . Tri-clamp on tube side and flanges on service side (other options available)

**TECHNICAL DATA**

- Heat transfer area: . . . 0.1 m<sup>2</sup> – 8.5 m<sup>2</sup>
- Design temperature: . . . 150°C (available up to 200°C)
- Design pressure: . . . . . FV/10 barg, higher pressures available
- Pressure vessel codes: PED and ASME VIII (U-stamp as option), Chinese grade A2
- Welding: . . . . . according to ASME IX and EN-288-3, EN 287-1
- Surface finish product wetted parts: . . . . . Electropolished with Ra<0.4 µm or Ra<0.5 µm or Mechanically polished with Ra<0.8 µm.