



# Pharma-line

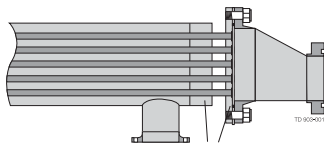
## Pharma-line Double Tube Sheet Shell & Tube Heat Exchanger

### 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)

### Standard range

A standard range of U-tube designs that suit most applications are readily available. Custom design units are available on request.

### Custom made

Other design and documentation are available on request.

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

### Options:

- Passivation according to procedure
- Insulation Mineral wool (ASTM C795) with stainless steel 304 cladding
- Removable tube bundle

### 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 Mechanically polished with Ra<0.8 µm or Ra<0.5 µm.

### Hygienic design

The Pharma-line has no dead legs and is fully drainable on the product side. All product wetted parts in the Pharma-line are either electropolished to Ra<0.4 µm or mechanically polished to Ra<0.8 µm, Ra<0.5 µm. The Pharma-line tubes are seamless and U-tubes are bent to a larger radius than required in ASME BPE. The Pharma-line is easy to clean and can be steam sterilized. Gaskets come with a USP class VI certificate and are in compliance with FDA.

### Documentation

The Pharma-line is delivered along with a complete documentation package including:

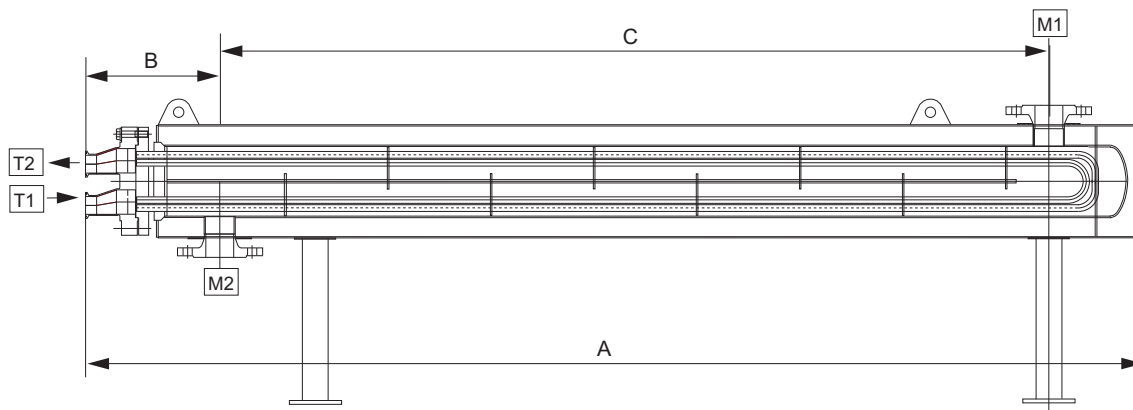
- Approved drawings and calculations signed by Notified body
- List of welders, welding procedure and welder qualification
- 3.1 Material certificates, pressure and product wetted steel parts
- FDA compliance and USP class VI certificates, gaskets
- Liquid penetrant test report and procedure
- Surface roughness certificate
- Dimension control report
- Pressure test certificate, signed by Notified body
- Identification (technical sign)
- Quality system certificate
- CE-Documents

### Installation

The Pharma-line 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.

### Standard units, measurements (approximate) [mm]

| Type                      | Shell OD | A    | B   | C    |
|---------------------------|----------|------|-----|------|
| <b>Pharma-line 1 [mm]</b> |          |      |     |      |
| Pharma-line 1 - 0.1       | 73       | 1200 | 180 | 860  |
| Pharma-line 1 - 0.3       | 89       | 1200 | 190 | 860  |
| Pharma-line 1 - 0.4       | 102      | 1200 | 190 | 860  |
| Pharma-line 1 - 0.6       | 114      | 1200 | 200 | 860  |
| Pharma-line 1 - 0.7       | 140      | 1200 | 210 | 860  |
| Pharma-line 1 - 0.8       | 114      | 1200 | 200 | 860  |
| Pharma-line 1 - 1.1       | 140      | 1200 | 210 | 860  |
| Pharma-line 1 - 1.2       | 168      | 1200 | 220 | 860  |
| Pharma-line 1 - 2.5       | 219      | 1200 | 253 | 860  |
| <b>Pharma-line 2 [mm]</b> |          |      |     |      |
| Pharma-line 2 - 0.3       | 73       | 2200 | 180 | 1860 |
| Pharma-line 2 - 0.6       | 89       | 2200 | 190 | 1860 |
| Pharma-line 2 - 1.0       | 102      | 2200 | 190 | 1860 |
| Pharma-line 2 - 1.3       | 114      | 2200 | 200 | 1860 |
| Pharma-line 2 - 1.4       | 140      | 2200 | 210 | 1860 |
| Pharma-line 2 - 1.7       | 114      | 2200 | 200 | 1860 |
| Pharma-line 2 - 2.4       | 140      | 2200 | 210 | 1860 |
| Pharma-line 2 - 2.6       | 168      | 2200 | 220 | 1860 |
| Pharma-line 2 - 5.5       | 219      | 2200 | 253 | 1860 |
| <b>Pharma-line 3 [mm]</b> |          |      |     |      |
| Pharma-line 3 - 0.4       | 73       | 3200 | 180 | 2860 |
| Pharma-line 3 - 1.0       | 89       | 3200 | 190 | 2860 |
| Pharma-line 3 - 1.6       | 102      | 3200 | 190 | 2860 |
| Pharma-line 3 - 2.0       | 114      | 3200 | 200 | 2860 |
| Pharma-line 3 - 2.2       | 140      | 3200 | 210 | 2860 |
| Pharma-line 3 - 2.7       | 114      | 3200 | 200 | 2860 |
| Pharma-line 3 - 3.7       | 140      | 3200 | 210 | 2860 |
| Pharma-line 3 - 4.0       | 168      | 3200 | 220 | 2860 |
| Pharma-line 3 - 8.5       | 219      | 3200 | 253 | 2860 |



### Standard nozzle schedule

| Clamps product side |
|---------------------|
| ASME BPE/OD         |
| DIN32676            |
| DIN11864-3 form A   |
| DIN 32676 (1127)    |
| ISO2852             |

### Flanges utility side

|                    |
|--------------------|
| ANSI B16.5 (150lb) |
| DIN2635/EN1092-1   |

### Nozzle schedule

| Item | Service      | Facing           | Standard & Dimension |
|------|--------------|------------------|----------------------|
| T1   | Tube inlet   | Tri-Clamp        | Free                 |
| T2   | Tube outlet  | Tri-Clamp        | Free                 |
| M1   | Shell inlet  | Weld neck flange | Free                 |
| M2   | Shell outlet | Weld neck flange | Free                 |



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