

## Alfa Laval Pharma-line P

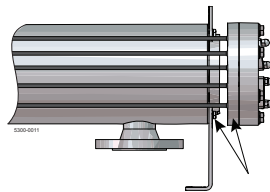
### Alfa Laval Pharma-line P double tube sheet shell & tube heat exchanger

#### Applications

The Pharma-line P 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 P is designed in accordance with FDA, USP and cGMP requirements. In the Pharma-line P 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

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.

The Pharma-line P is available in 27 standard models, all with U-tube designs that suit most applications are readily available. Custom design units are available on request.

Within the product range Pharma-line there are 2 series available:  
 Pharma-line S - Standard design  
 Pharma-line P - Standard design and a custom design available on request

#### Custom made

Other design S and documentation are available on request.

#### TECHNICAL DATA

Heat transfer area: . . . 0.1 m<sup>2</sup> – 8.5 m<sup>2</sup>, other areas available upon request  
 Design temperature: . . -15°C to 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 TSG and manufacturing license available  
 Welding: . . . . . according to SS-EN ISO 15614-1, SS-EN287-1, SS-EN1418, ASME IX  
 Surface finish product wetted parts: . . . . . Electropolished down to Ra<0.3µm. Mechanically polished with Ra<0.8 µm or Ra<0.5 µm.

**Options:**

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

**Hygienic design**

The Pharma-line P has no dead legs and is fully drainable on the product side. All product wetted parts in the Pharma-line P are either electropolished to Ra<0.4 µm or mechanically polished to Ra<0.8 µm, Ra<0.5 µm. The Pharma-line P tubes are seamless and U-tubes are bent to a larger radius than required in ASME BPE. The Pharma-line P 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 P is delivered along with Alfa Laval Q-Doc including:

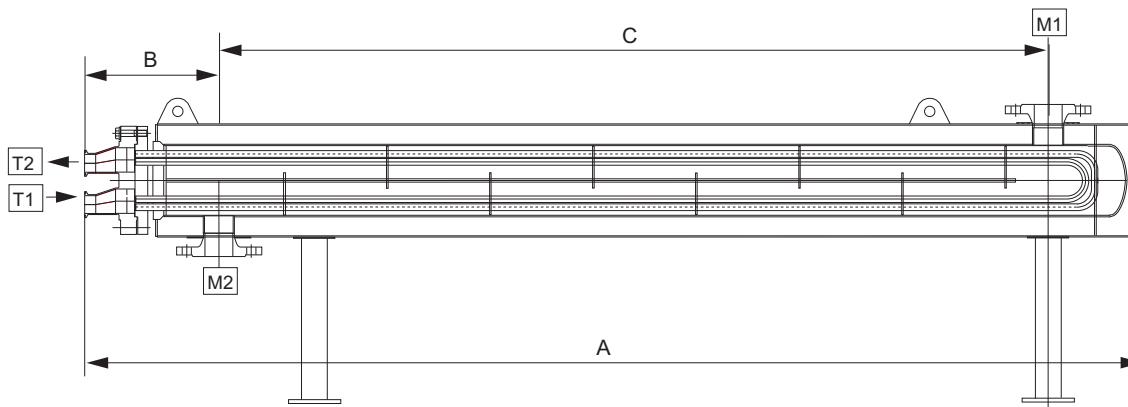
- Approved drawings and calculations signed by Notified body
- List of welders, welding procedure and welder qualification
- 3.1 Material certificates, pressure and product wetted steel parts
- FDA compliance and USP class VI certificates, gaskets
- Liquid penetrant test report and procedure
- Surface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

**Installation**

The Pharma-line P can be installed either horizontally or vertically depending on the specific demands. For an easy installation, 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



7.4

**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