

All-welded heat exchangers

When the duty gets tougher and you still need a compact solution, you should consider an all-welded heat exchanger from Alfa Laval. They come in different shapes and forms to satisfy even the most demanding pressure and temperature requirements.

The *AlfaDisc* provides the exceptional thermal efficiency and compactness of a plate-and-frame unit under conditions that would normally require a bulky, traditional shell-and-tube unit.

The *AlfaRex* has all the benefits of a plate heat exchanger including a compact and flexible design, excellent heat-transfer abilities and very limited need of maintenance.

The *Compabloc* is a breakthrough plate heat exchanger design that combines a whole range of technological advantages in one compact unit. The all-welded plate pack does away with all gaskets between plates, and makes it possible to operate with a wide range of media and at high temperatures and pressures.





All welded heat exchangers range

AlfaDisc	AlfaRex - TM20	Compabloc
Read all about it on page 13.3	Read all about it on page 13:5	Read all about it on page 13:7
 A blue, cylindrical AlfaDisc heat exchanger with a horizontal orientation. It features a top flange, a bottom flange, and two side ports. The Alfa Laval logo is visible on the side.	 A silver, vertical AlfaRex - TM20 heat exchanger. It has a rectangular body with multiple horizontal tubes and four large circular ports (two on top, two on bottom). The Alfa Laval logo is visible on the front.	 A blue, vertical Compabloc heat exchanger. It has a rectangular body with a textured surface and four large circular ports (two on top, two on bottom). The Alfa Laval logo is visible on the front.



AlfaDisc

All-welded Plate Heat Exchanger

Applications

AlfaDisc is suitable for most of the applications, such as general cooling and heating duties, condensation, evaporation, reboiling and stream heating.

Standard design

AlfaDisc is built on the Plate & Shell concept. It is able to withstand higher design pressure, is more compact, is better developed for fatigue applications, has the possibility for asymmetric flow and is cleanable on one side. These features in combination with an attractive price give us a range of competitive advantages over other welded concepts.

The AlfaDisc all-welded plate heat exchanger provides the thermal efficiency and compactness of a plate and frame unit under conditions that would normally call for a shell and tube unit.

Designed for use with liquids, gases and two-phase mixtures at pressure up to 100 bars (PED & ASME) and at temperatures up to 538°C, the Plate & Shell unit works well with aggressive media, such as organic solvents, steam heaters and interchangers that are beyond the capability of a gasketed unit. The unit is also available with removable core design.

Typical capacities

Liquid flow rate

Up to 157 kg/s (2355 gpm) depending on media, permitted pressure drop and temperature program.

Sizes

AlfaDisc 25	AlfaDisc 100
AlfaDisc 50	AlfaDisc 150
AlfaDisc 80	AlfaDisc 200

Working principle

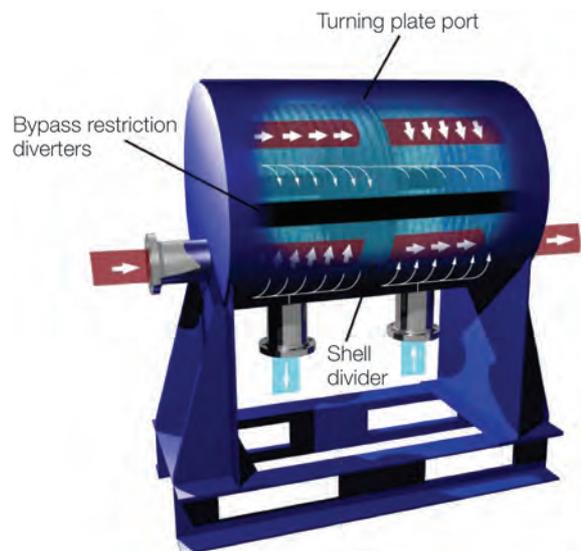
The unit features a plate side and a shell side, which offer high pressure ratings. It has alternating channels for hot and cold media, and can offer true counter-current or co-current flow. Number of passes could be up to 3 passes maximum on each side.

Nozzle sizes up to DN 700 can be accommodated on the shell side of the exchanger, offering higher steam and liquid flow rates. Nozzles on the plate side can be up to DN 200.

The AlfaDisc unit can be fabricated from dissimilar metals when only one side will be exposed to corrosive conditions.



AlfaDisc 50



Flow principle of a multi-pass AlfaDisc.

STANDARD MATERIALS

Shell material

Mild steel, Epoxy painted or stainless steel

Cover material

Mild steel, Epoxy painted or stainless steel

Nozzles

Stainless steel, Titanium and 254 SMO Could be combined with carbon steel flanges

Plate material

316L, Titanium and 254 SMO

TECHNICAL DATA

Design pressure

CE/PED Vacuum to 100 bars
ASME Vacuum to 100 bars

Design temperature

Carbon steel Shell -45 - 538°C
Stainless steel Shell -160 - 538°C

Maximum heat transfer surface

AlfaDisc 25	4.5 m ²	(48.5 ft ²)
AlfaDisc 50	35 m ²	(377 ft ²)
AlfaDisc 80	62 m ²	(667 ft ²)
AlfaDisc 100	125 m ²	(1345.5 ft ²)
AlfaDisc 150	220 m ²	(2368 ft ²)
AlfaDisc 200	380 m ²	(4090 ft ²)

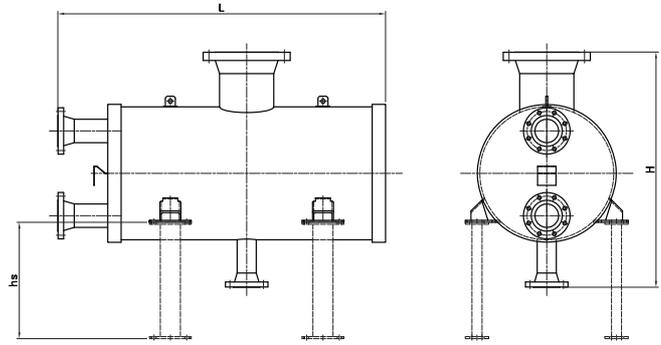
STANDARD CONNECTIONS

Sizes mm (inch)

Model range	Plate side	Shell side
AlfaDisc25	25 (1)	20 - 100 (1 - 4)
AlfaDisc50	50 (2)	20 - 150 (1 - 6)
AlfaDisc80	80 (3)	25 - 250 (1 - 10)
AlfaDisc100	100 (4)	25 - 350 (1 - 14)
AlfaDisc150	150 (6)	25 - 500 (1 - 20)
AlfaDisc200	200 (8)	25 - 700 (1 - 28)

Pressure ratings

CE/PED PN16, 25&40, PN63 and PN100
ASME ASME cl. 150, 300 & 600 and Class 900



Dimensions (mm)

Model	H2 min/max		L min/max		hs1 min/max	
AD25	370	850	275	1945	260	740
AD50	630	1050	290	2010	450	790
AD80	790	1270	310	2070	540	1040
AD100	930	1450	340	2125	640	1220
AD150	1130	1700	380	2205	760	1530
AD200	1450	2400	430	2325	1000	1980

Dimensions (in)

Model	H2 min/max		L min/max		hs1 min/max	
AD25	15	33	11	77	10	29
AD50	25	41	11	79	18	31
AD80	31	50	12	81	21	41
AD100	37	57	13	84	25	48
AD150	44	67	15	87	30	60
AD200	57	94	17	92	39	78

¹ Dimensions vary with support type

² Dimensions vary with connection sizes and supports

Particulars required for quotation

- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

How to contact Alfa Laval

Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com



AlfaRex - TM20

All-welded Plate Heat Exchanger

Totally gasket free, the TM20 is well suited for applications involving high temperature and/or high pressure with relatively clean media. The media can also be very corrosive (acids, NaOH, etc.).

The TM20 is particularly recommended for the following applications:

- Solvent recovery processes
- Gas dehydration plants
- Batch reactors
- Refrigeration duties

AlfaRex design

The TM20 consists of a laser welded pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer takes place. The design has been achieved by laser welding the plates together one by one in alternate grooves to form a plate pack. The plate pack is installed in a frame consisting of a frame plate and a pressure plate compressed by tightening bolts. Extended connectors are located in the frame plate with bellow linings welded to the plate pack. The plate corrugations create high turbulence which results in very high thermal efficiency. This in turn leads to compactness and cost efficiency. The corrugations also support the plates against differential pressure and allow utilization of more expensive corrosion resistant materials.

Laser welding and fatigue resistance

The welding is performed using laser welding techniques. This means low heat input and a small heat affected zone. The highest quality is assured through a completely automated machine and welding control combined with a helium leakage test.

The construction only utilizes welding in the plane of the plate i.e. in two directions thereby avoiding welds in a third direction. This design ensures retained flexibility of the plate pack allowing for thermal and hydraulic expansions and contractions which will reduce the risk for fatigue cracks.

Working principle

The media in the heat transfer are led into the plate pack through portholes at the corners and are distributed into the passages between the plates by the arrangement of sealing welds.

The two media flow in alternate channels in full countercurrent flow, thereby making the exchanger equally suited for liquids as well as gas and two phase duties. Cleaning is done with CIP (Cleaning in Place).



AlfaRex TM20 - All welded plate heat exchanger

STANDARD MATERIALS

Frame Plates

Mild steel. High temperature painted

Extended Nozzles

Metal bellow linings in channel plate material

Channel Plates

Stainless steel AISI 316, AISI 316L, Titanium gr. 1, Nickel 200/201

TECHNICAL DATA (Maximum design performance*)

FB	up to 10 barg
FC	up to 16 barg
FF	up to 25 barg
FK	up to 40 barg
FN	up to 40 barg

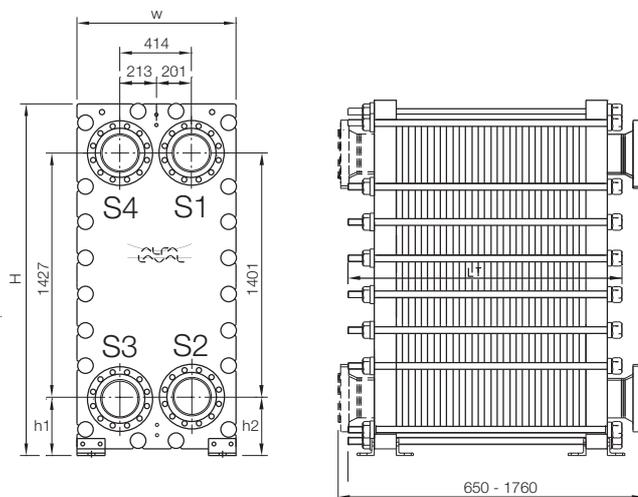
Design temperature range	-50° to + 350°C
Maximum flow rate	700 m ³ /h
Maximum heat transfer surface	250 m ²

* Depending on design temperature and pressure vessel code

CONNECTIONS

FB – DN200/8"	DIN PN10 or ANSI 150
FC – DN200/8"	DIN PN10, PN16 or ANSI 150, ANSI 300
FF – DN200/8"	DIN PN16, PN25 or ANSI 150, ANSI 300
FK – DN200/8"	DIN PN25, PN40 or ANSI 300, ANSI 400
FN – DN200/8"	DIN PN40 or ANSI 300, ANSI 400

Dimensions



Type	H	W	h1	h2
TM20-BFB, -BFC	1990	865	301	314
TM20-BFF, -BFK, -BFN	2040	915	327	340

Measures are in millimeters

Particulars required for quotation

To enable Alfa Laval's representative to make a specific quotation, please make sure your enquiry includes the following particulars:

- Flow rates required
- Temperature program
- Physical properties of media in question
- Desired working pressure
- Maximum permitted pressure drop
- Design pressure and temperature
- Pressure vessel code
- Data on cyclic variations in temperature and pressure

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COMPABLOC Compact Heat Exchanger Range

High-performance Fully Welded Heat Exchanger for Process Industries

Application

The Alfa Laval Compabloc is a fully welded compact heat exchanger designed for the complete range of process and utility duties. The Compabloc range provides the most efficient, cost-effective, compact and cleanable heat exchanger solution available today. After 20 years on the market, the Compabloc has shown itself to be the market leader in terms of life-cycle costs and energy savings.

Design

Alfa Laval designed the Compabloc range of welded heat exchangers with a focus on performance, compactness, and serviceability.

The heart of the Compabloc is a stack of corrugated heat transfer plates in 316L stainless steel, or other high-grade material. The plates are laser welded (models CP30 and above) and form a compact core. This core is then enclosed and supported by four corner girders, top and bottom heads and four side panels (see Sectional view of Compabloc). These components are bolted together and can be quickly taken apart for inspection, service and cleaning.

The design can be configured in single or multi-pass arrangements in either co-current or counter-current operation, for liquid-to-liquid or two-phase duties.

Operating Principles

The two media in the Compabloc heat exchanger flow in alternately welded channels between the corrugated plates. These corrugated plates promote high turbulence which provides high heat transfer efficiency and help minimize fouling. The media flows in a cross-flow arrangement within each pass (see figure below) while the overall flow arrangement is counter-current for a multi-pass unit (if required the unit can also be designed with overall co-current operation). Each pass is separated from the adjacent passes by a pressed baffle which forces the fluid to turn between the plate pack and the panel.

Compabloc's flexible pass arrangements make it suitable for liquid-to-liquid duties with dissimilar flow rates, or two phase condensation or reboiler applications.

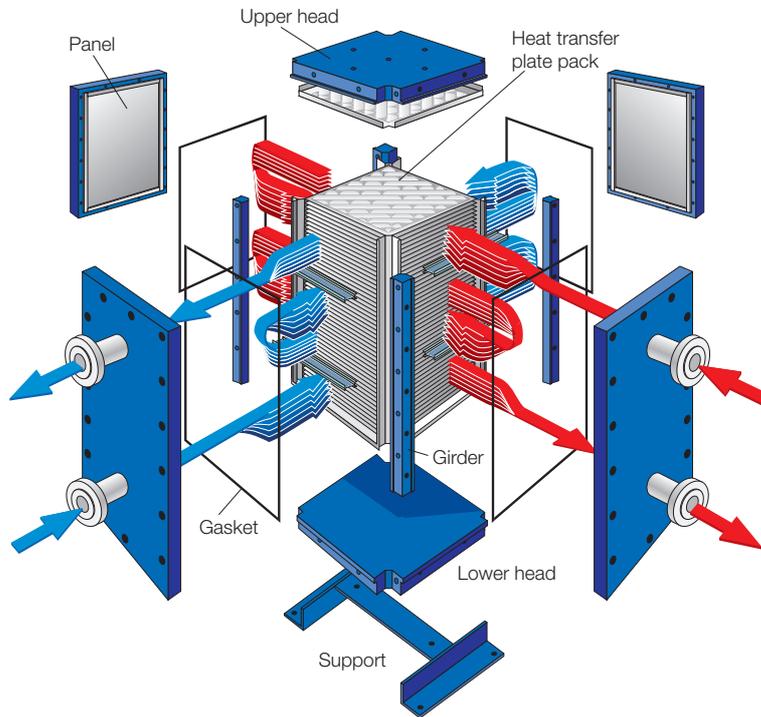


Options

The Compabloc is available in virtually any material that can be pressed and welded, including:

- 316L SST
- 254 SMO
- Titanium
- Alloy C-276
- 904L SST (UB6)
- Alloy B-2
- Alloy C-22
- Incoloy 825
- Inconel 600
- Tantalum

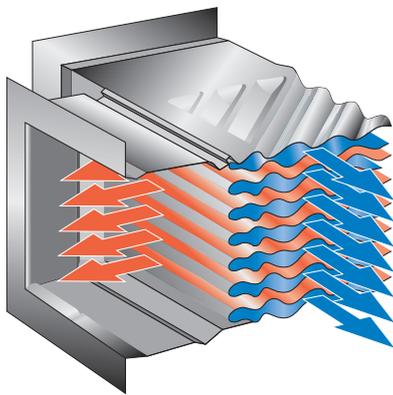
The panels and nozzles can be un-lined or lined using the same materials as the plate pack. The nozzle size is variable and can be selected independently for each side.



Sectional view of Compabloc

Process Optimization

Because of the Compabloc's unique design concept the possibilities for process optimization and flexibility are limitless. The Compabloc can be designed with both single-pass or multi-pass configurations. For condensation, reboiling and liquid-to-liquid duties without temperature cross, the singlepass configuration is suitable with its total cross-flow. The large cross flow area and short flow path fit low-pressure condensing duties and allow very low pressure drops. A multi-pass configuration is suitable for duties with temperature cross and close temperature approaches.



The two media flow in cross-flow in alternately welded channels.

The design concept allows a different number of passes on the two circuits thereby enabling large differences in flow rates between the hot side and the cold side. The baffling can easily be re-arranged to suit a new duty should the flow rates or temperatures change. Close temperature approaches down to 3°C (5.4°F) can be achieved.

The Compabloc can be mounted vertically, for normal liquid-to-liquid duties, condensation with sub-cooling and gas cooling duties, or horizontally, for most condensation duties, reboiling or liquid-to-liquid duties where height is restricted.

There are currently seven plate family models with heat transfer areas ranging from 0.7 to 840 m² per unit and each model is modularized with different numbers of plates to allow the best fits for any duty.

Special applications



Special applications

For special applications, the Compabloc 2 cooling medium range is available which offers a two-section condenser with two different cooling medias.