Fusion-bonded plate heat exchangers, AlfaNova

From the extreme heat in our furnaces comes AlfaNova, the world's first 100% stainless-steel plate heat exchanger.

The AlfaNova can handle high temperatures and has good resistance to pressure fatigue compared to a conventional brazed plate heat exchanger.

The secret is AlfaFusion, a unique bonding technology patented by Alfa Laval. Resulting in the world's first fusion-bonded plate heat exchanger, AlfaFusion has stunned specialists in the brazing field.

AlfaNova is a new class of plate heat exchangers, available only from Alfa Laval.

AlfaNova takes heat-transfer technology to the extreme

100% stainless steel

AlfaNova consists of a number of corrugated stainless steel plates, a frame plate, a pressure plate and connections – all in stainless steel of type 316. All components are bonded together by AlfaFusion, a new technology patented by Alfa Laval.

The result is the fusion-bonded plate heat exchanger, a whole new class offering extremely high mechanical strength.

It is also hygienic, corrosion-resistant and fully recyclable.

Unbeatable reliability
Years of research and testing have confirmed AlfaNova's high mechanical strength and unbeatable reliability.

The AlfaFusion technology creates a plate heat exchanger with possibilities to go much higher in temperature than conventional brazed units.

Its 100% stainless-steel design allows AlfaNova to withstand temperatures of up to 550°C (1,020°F).

Corrosion-resistant
The AlfaNova's pure stainless-steel design also ensures high resistance to corrosion.

Thus, it represents a major breakthrough for refrigeration system builders using natural refrigerants such as ammonia.

It is also the perfect choice for district heating installations in areas with corrosive water or applications utilizing corrosive liquids.

Maximum purity
Purity is the subject of increasingly stringent legislation in many countries.

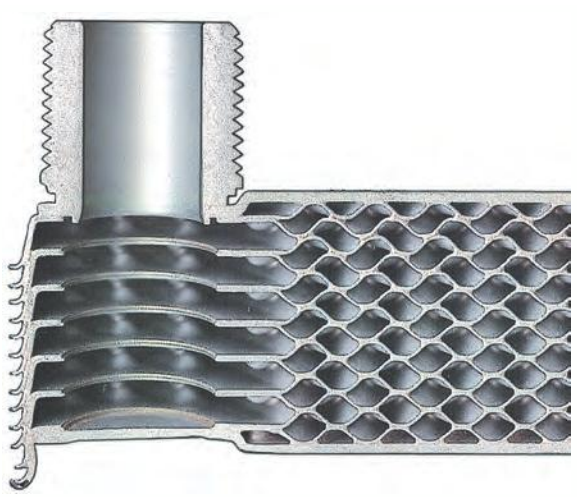
Applications affected are clean-water chillers in refrigeration systems, tap water heating systems, and a long list of other hygienic areas.

For these applications, the 100% stainless-steel AlfaNova, with its clean, hygienic heat-transfer channels and high mechanical strength, will be the heat exchanger of the future, challenging other types of heat exchangers.

Three different technologies...

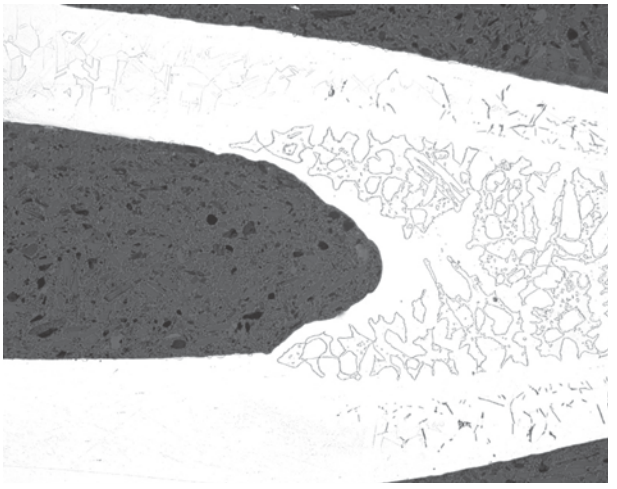
AlfaFusion

Patented by Alfa Laval, AlfaFusion™ is a peak-performance, one-material process that results in an all-stainless steel, fusion-bonded plate heat exchanger.



The result is closer to welding than brazing. It is based on Alfa Laval´s new, revolutionary technology, AlfaFusion, the art of joining stainless-steel components together. The two stainless-steel components melt in the contact points between the corrugated plates, and a fusion zone is created.

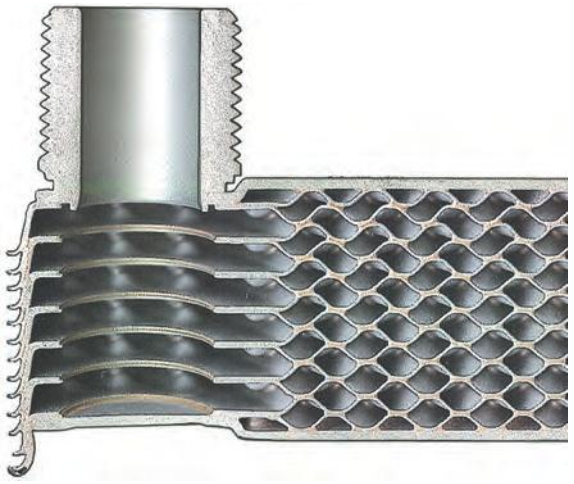
This zone is also stainless steel and has properties similar to the plates in terms of corrosion resistance and durability. Success lies in precise temperature control to achieve the correct melting depth and to avoid melting through the plates.



Due to the properties of the fusion zone, AlfaFusion gives a homogenous plate heat exchanger with a high level of corrosion resistance and higher resistance to mechanical and thermal fatigue than other technologies.

Traditional copper brazing

A two-material process, copper brazing is an efficient, cost-effective method of manufacturing plate heat exchangers.



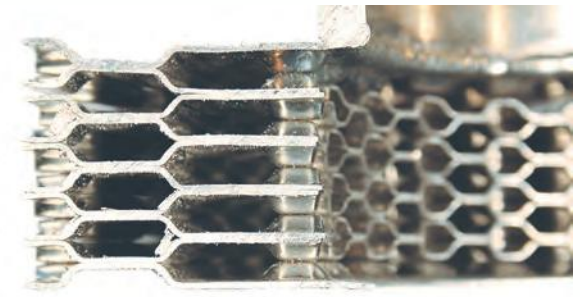
It involves using copper filler to join stainless steel plates together by brazing them in a furnace.
At the contact points between the corrugated plates, a thin layer of copper is melted at high temperature.
Since copper has good capillary action, i.e., good capability to wet the plate and fill crevices, the filler gathers where the plates have contact, thus sealing and strengthening the plate pack.
Although copper brazing causes adhesion between the copper and the stainless steel, there is no surface reaction between the materials.

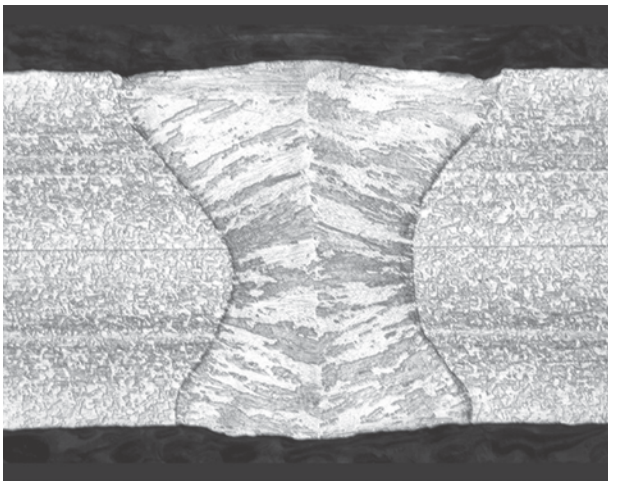
The combination of stainless steel and copper offers good ductility.

Under pressure, substantial material deformation can occur before splitting occurs.
The build-up of stress in the material causes it to change direction, thus relieving the mechanical load.
While copper brazing results in a high-quality plate heat exchanger, the brazing process must be carefully controlled, as copper may otherwise penetrate the stainless steel.
This results in liquid metal embrittlement, a known metallurgical phenomenon which reduces the strength of the heat exchanger.

Laser welding

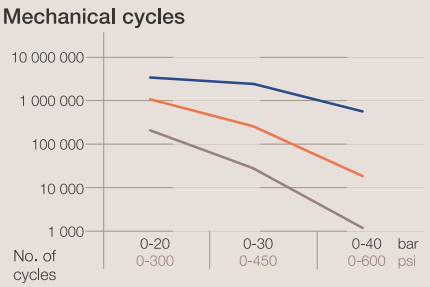
Laser welding is an effective method of joining stainless steel plates together in the manufacture of plate heat exchangers.

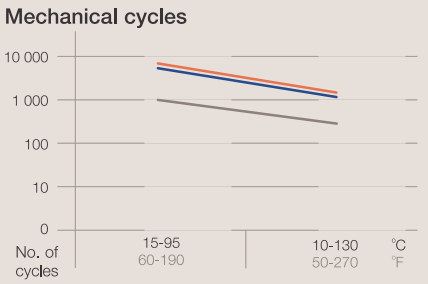




During the process, the corrugated stainless-steel plates are placed against each other and a laser is used to melt the material at the points of contact. As the stainless steel hardens there is diffusion of the metal on the plate surfaces. Since the stainless steel has gained a different micro-structure orientation during hardening, the resulting joints may be different in appearance. However, they possess the same properties as the rest of the plate material in terms of ductility and corrosion resistance.

A fully welded heat exchanger has good mechanical properties and can comfortably withstand high temperature, high pressure and aggressive media. A disadvantage is that it is sometimes necessary to adapt the design of the product to the limitations of the welding technique. It is also an expensive method. The process must take place in an inert atmosphere, otherwise it will react with the oxygen in the air, resulting in less successful welds. The equipment required for the process is also expensive.





Different types of plate heat exchangers were tested, according to Alfa Laval´s standard tests, to compare pressure fatigue resistance

Legend
AlfaNova
Copper brazed
Nickel brazed

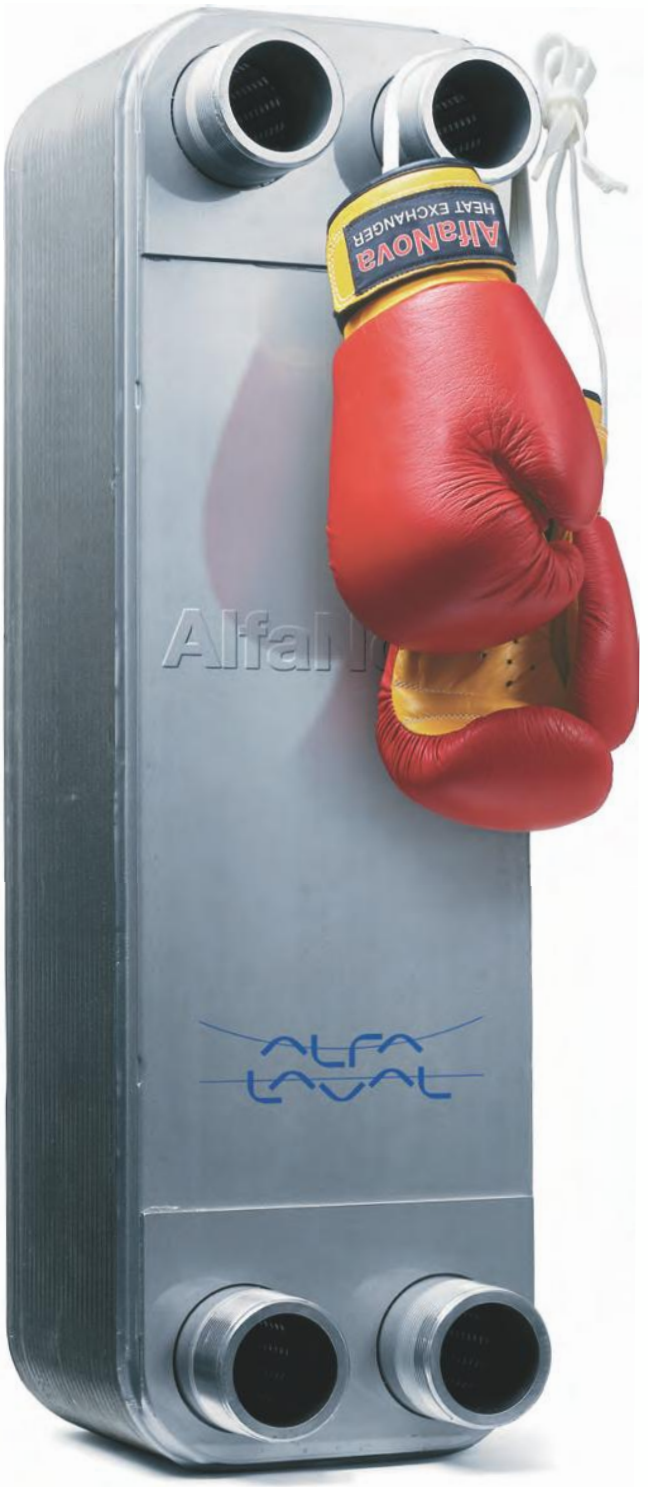
Applications

Rectifier and frequency converter cooling
The compact fusion-bonded AlfaNova in 100% stainless steel is particularly well suited for pure water when space is limited.

Paint temperature control
The AlfaNova will keep sensitive coatings at the right viscosity in order for perfect adhesion without copper contamination.

Compreesor cooling
The AlfaNova has outstanding pressure fatigue resistance and is an excellent product for compressed air cooling when space is limited.

Ultrapure water cooling for Semiconductor industry
Due to the high demands of cleanliness in the Semiconductor manufacturing process the 100% stainless steel AlfaNova is an excellent choice.



Technical specifications

Fusion-bonded plate heat exchangers, data and dimensions

	AlfaNova 14	AlfaNova 27	AlfaNova 52	AlfaNova 76	AlfaNova 400
Channel type	H	H, L	H, L	H, A, E, L	H, L
Max./min. design temperature (°C)	160/-175	160/-175	160/-175	160/-175	160/-175
Max. design pressure S3-S4/S1-S2 (bar) *)	21/21	27/22	27/22	27/22	17/17
Volume/channel (litres)	0.02	0.05	0.095	0.25[1]/0.25	0.74
Max. flowrate (m^3/h) **)	4.6	14	14	37	200
Height, a (mm)	207	310	526	618	990
Width, b (mm)	77	111	111	191	390
Vertical connection distance, c (mm)	172	250	466	519	825
Horizontal connection distance, d (mm)	42	50	50	92	225
Plate pack length, A (mm)	n x 2.48 + 8	(n x 2.42) + 11	(n x 2.48) + 11	(n x 2.85) + 11***	(n x 2.65) + 14
Weight empty (kg)	(n x 0,07) + 0.4	(n x 0.13) + 1	(n x 0.22) + 1.9	(n x 0.49) + 8	(n x 1.4) + 22
Standard connection, external thread (in)	3/4"	1 1/4"/1"	1 1/4"/1"	2"	4"
Plate material	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Connection material	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Bounding material	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Max. number of plates	50	100	150	150	270
Radiator heating, capacity (kW)[2]	90	400	500	1200	3300
Tap water heating, capacity (kW)[2]	60	180	380	700	2700

*) According to PED **) Water at 5 m/s (connection velocity) ***) H-channel n=number of plates

1) E channel 0.18/0.18; A channel 0.18/0.25

2) Varies from country to country depending on temperature duty. Given values are for typical district heating installations.

3) Valid for H-plate

AlfaNova plate heat exchangers range

AlfaNova 14	AlfaNova 27	AlfaNova 52	AlfaNova 76
Read all about it on page 8:9	Read all about it on page 8:11	Read all about it on page 8:13	Read all about it on page 8:15
			

AlfaNova 400
Read all about it on page 8:17


AlfaNova 14

Fusion-bonded plate heat exchanger

General information
AlfaNova is a plate heat exchanger made of 100% stainless steel. It is based on Alfa Laval's revolutionary technology, AlfaFusion, the art of joining stainless steel components together.

AlfaNova heat exchangers are well suited in applications which put high demand on cleanliness, applications where ammonia is used or applications where copper or nickel contamination is not accepted. Its high resistance to corrosion makes it both hygienic and environmental friendly.

It is extremely compact compared to its capacity to withstand great strains in demanding heat transfer applications.

Applications
Within refrigeration:
- Oil cooling
- Condensing
- Economizing
- Desuperheating
- Absorption systems

Other main applications:
- Domestic hot water
- Process cooling
- Hydraulic oil cooling
- Laser cooling
- Hygienic/sanitary application
- Water/water cooling & heating

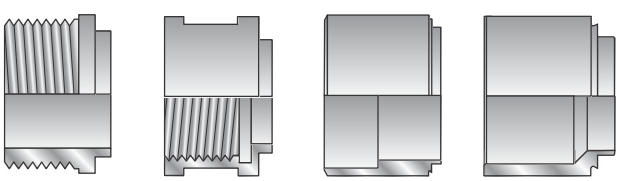
Working principles
The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, always in countercurrent flow. The media are kept in the unit by a bonded seal around the edge of the plates. The contact points of the plates are also bonded to withstand the pressure of the media handled.

Standard design
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. The channel plates are corrugated to improve heat transfer design.

Particulars required for quotation
To enable Alfa Laval's representative to make a specific quotation, enquiries should be accompanied by the following particulars:

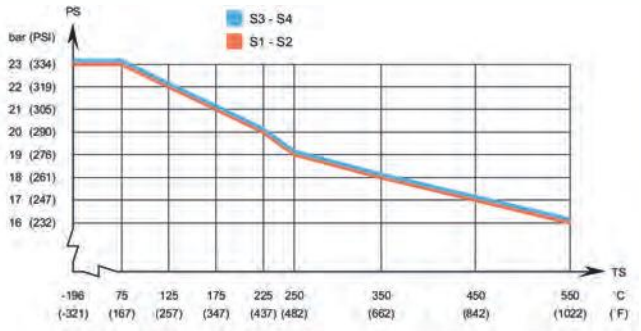
- Flow rates or heat load required
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

Examples of connections

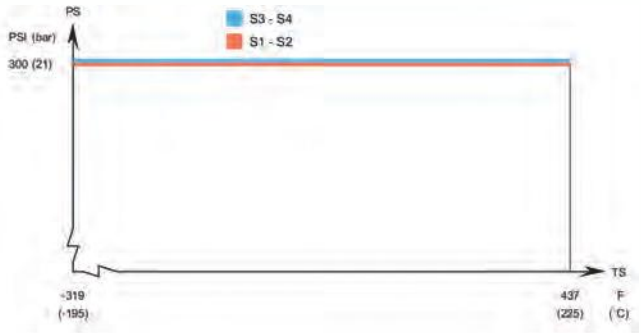


External threaded | Internal threaded | Soldering | Welding

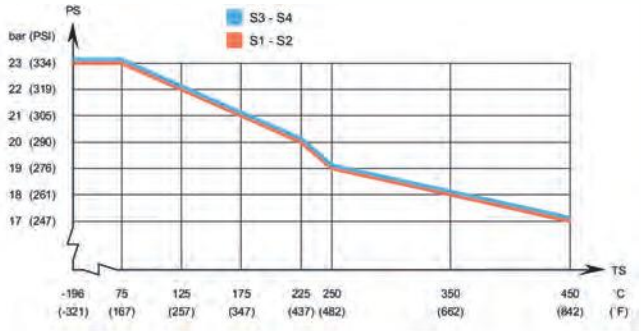
AlfaNova 14 - PED approval pressure/temperature graph



AlfaNova 14 - UL approved pressure/temperature graph



AlfaNova 14 - CRN approved pressure/temperature graph



Standard dimensions

A measure mm	=	8 + (2.48 * n) (+/-3 mm)
A measure inch	=	0.31 + (0.1 * n) (+/-0.12 inch)
Weight kg	=	0.4 + (0.07 * n)
Weight lb	=	0.88 + (0.15 * n)

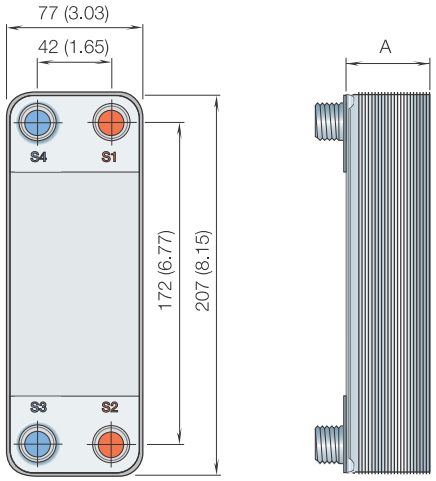
(n = number of plates)

Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel, litres (ga)	0.02 (0.0052)
Max. particle size mm (inch)	1.2 (0.05)
Max. flowrate* m^3/h (gpm)	4.6 (20.2)
Min. nbr of plates	4
Max. nbr of plates	50

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
AlfaFusion filler	Stainless steel



For exact values please contact your local Alfa Laval representatives.

How to contact Alfa Laval
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AlfaNova 27

Fusion-bonded plate heat exchangers

General information
AlfaNova is a plate heat exchanger made of 100% stainless steel. It is based on Alfa Laval's revolutionary technology, AlfaFusion, the art of joining stainless steel components together.

AlfaNova heat exchangers are well suited in applications which put high demand on cleanliness, applications where ammonia is used or applications where copper or nickel contamination is no accepted. Its high resistance to corrosion makes it both hygienic and environmental friendly.

It is extremely compact compared to its capacity to withstand great strains in demanding heat transfer applications.

Applications
Within refrigeration:
- Oil cooling
- Condensing
- Evaporating
- Economizing
- Desuperheating
- Absorption systems

Other main applications:
- Domestic hot water heating
- Process cooling
- Hydraulic oil cooling
- Laser cooling
- Hygienic/sanitary application
- Water/water cooling & heating

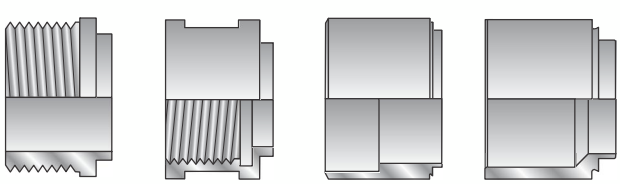
Working principles
The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, always in countercurrent flow. The media are kept in the unit by a bonded seal around the edge of the plates. The contact points of the plates are also bonded to withstand the pressure of the media handled.

Standard design
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. The channel plates are corrugated to improve heat transfer design.

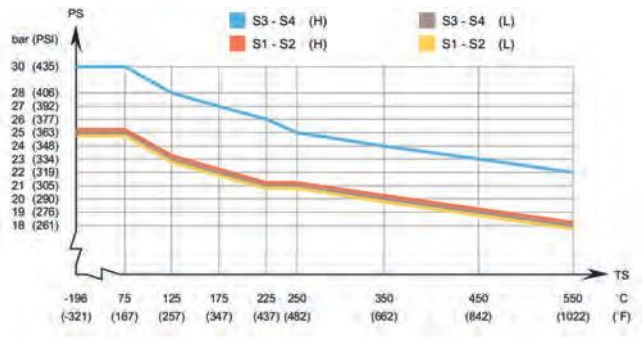
Particulars required for quotation
To enable Alfa Laval's representative to make a specific quotation, enquiries should be accompanied by the following particulars:

- Flow rates or heat load required
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

Examples of connections

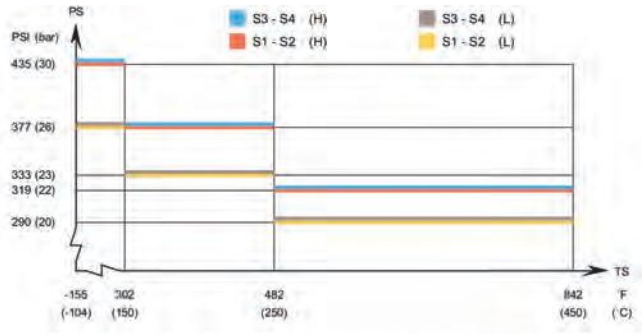


AlfaNova 27 – PED approval pressure/temperature graph [1)]

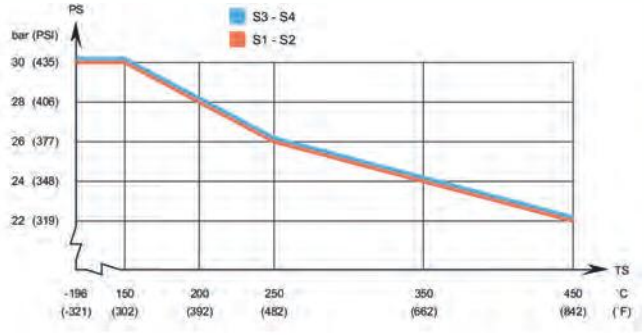


[1)] Min. temperature -10°C (14°F) with connection tube made of carbon steel.

AlfaNova 27 – ASME approval pressure/temperature graph [2)]



AlfaNova 27 – CRN approval pressure/temperature graph [2)]



[2)] Min temperature -49 °F (-45 °C) with connection tube made of carbon steel.

Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel, litres (ga)	0.05 (0.013)
Max. particle size mm (inch)	1.2 (0.05)
Max. flowrate* m^3/h (gpm)	14 (61.6)
Min. nbr of plates	6
Max. nbr of plates	100

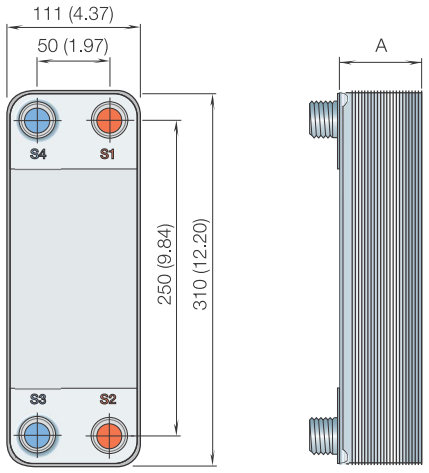
*) Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard dimensions *

A measure mm	=	11 + (2.42 * n) ±4.5 mm
A measure inch	=	0.43 + (0.1 * n) ±0.18 inch
Weight kg	=	1 + (0.13 * n)
Weight lb	=	2.2 + (0.29 * n)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
AlfaFusion filler	Stainless steel



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How to contact Alfa Laval
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AlfaNova 52

Fusion-bonded plate heat exchanger

General information
AlfaNova is a plate heat exchanger made of 100% stainless steel. It is based on Alfa Laval's revolutionary technology, AlfaFusion, the art of joining stainless steel components together.

AlfaNova heat exchangers are well suited in applications which put high demand on cleanliness, applications where ammonia is used or applications where copper or nickel contamination is not accepted. Its high resistance to corrosion makes it both hygienic and environmental friendly.

It is extremely compact compared to its capacity to withstand great strains in demanding heat transfer applications.

Applications
Within refrigeration:
- Oil cooling
- Condensing
- Evaporating
- Economizing
- Desuperheating
- Absorption systems

Other main applications:
- Domestic hot water
- Process cooling
- Hydraulic oil cooling
- Laser cooling
- Hygienic/sanitary
- Water/water cooling & heating

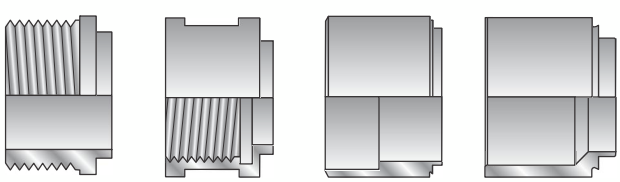
Working principles
The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, always in countercurrent flow. The media are kept in the unit by a bonded seal around the edge of the plates. The contact points of the plates are also bonded to withstand the pressure of the media handled.

Standard design
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. The channel plates are corrugated to improve heat transfer design.

Particulars required for quotation
To enable Alfa Laval's representative to make a specific quotation, enquiries should be accompanied by the following particulars:

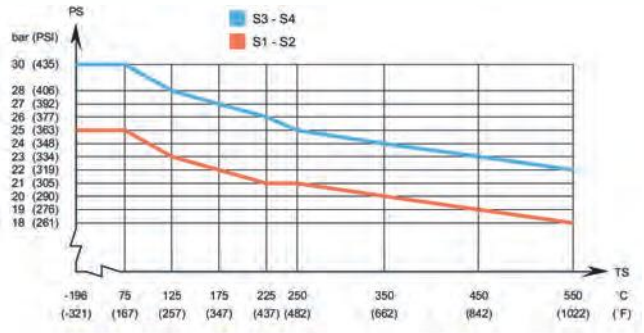
- Flow rates or heat load required
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

Examples of connections



External threaded | Internal threaded | Soldering | Welding

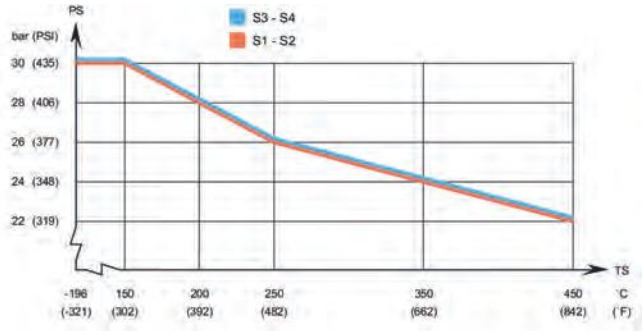
AlfaNova 52 – PED approval pressure/temperature graph [1)]



[1)] Min. temperature -10°C (14°F) with connection tube made of carbon steel.

AlfaNova 52 – ASME approval pressure/temperature graph [2)]

AlfaNova 52 – CRN approval pressure/temperature graph [2)]



[2)] Min. temperature -49°F (45°C) with connection tube made of carbon steel.

Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel, litres (ga)	0.095 (0.025)
Max. particle size mm (inch)	1.2 (0.05)
Max. flowrate* m^3/h (gpm)	14 (61.6)
Min. nbr of plates	6
Max. nbr of plates	150

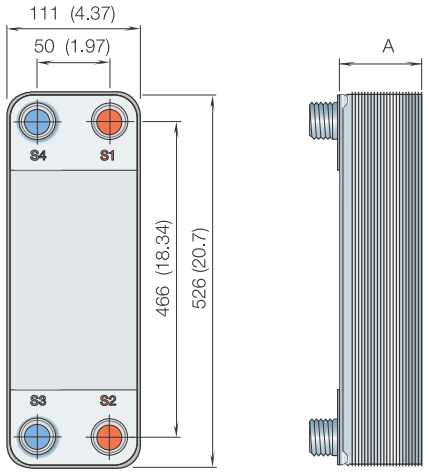
*) Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard dimensions *

A measure mm	=	11 + (2.48 * n) ±4.5 mm
A measure inch	=	0.43 + (0.1 * n) ±0.18 inch
Weight kg	=	1.9 + (0.22 * n)
Weight lb	=	4.19 + (0.49 * n)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
AlfaFusion filler	Stainless steel



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AlfaNova 76

Fusion-bonded plate heat exchanger

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Standard design
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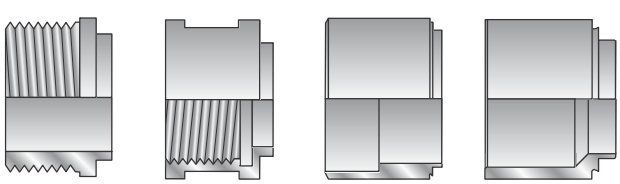
Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
AlfaFusion filler	Stainless steel

Particulars required for quotation
To enable Alfa Laval's representative to make a specific quotation, enquiries should be accompanied by the following particulars

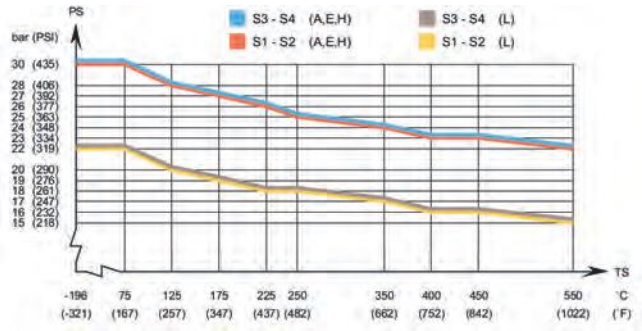
- Flow rates or heat load required
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

Examples of connections



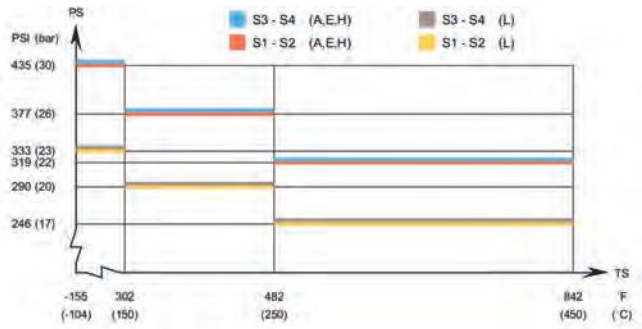
External threaded | Internal threaded | Soldering | Welding

AlfaNova 76 – PED approval pressure/temperature graph [1)]



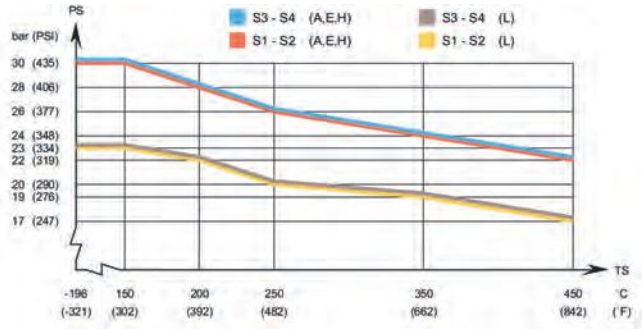
[1)] Min. temperature -10°C (14°F) with connection tube made of carbon steel.

AlfaNova 76 – ASME approval pressure/temperature graph [2)]

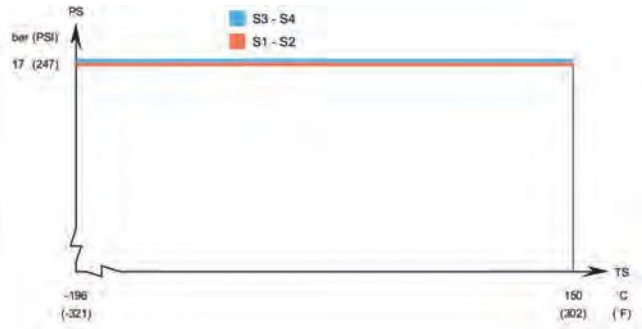


[2)] Min. temperature -49°F (14-45°C) with connection tube made of carbon steel.

AlfaNova 76 – CRN approval pressure/temperature graph



AlfaNova 76 – KHK approval pressure/temperature graph



Standard data

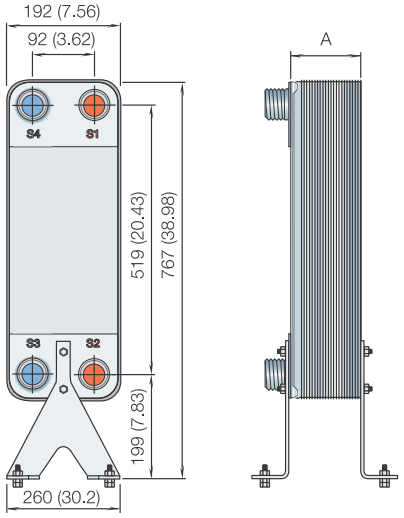
Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel A, litres (ga)	0.25 (0.065) 0.18 (0.046)
Volume per channel H, L, litres (ga)	0.25 (0.065)
Volume per channel E, litres (ga)	0.18 (0.046)
Max. particle size mm (inch)	1.2 (0.047)
Max. flowrate* m^3/h (gpm)	37 (163)
Min. nbr of plates	10
Max. nbr of plates	150

*) Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard dimensions

L channel	A measure mm	=	13 + (2.85 * n) ±5 mm
	A measure inch	=	0.51 + (0.11 * n) ±0.2 inch
H channel	A measure mm	=	11 + (2.85 * n) ±5 mm
	A measure inch	=	0.43 + (0.11 * n) ±0.2 inch
A channel	A measure mm	=	11 + (2.56 * n) ±5 mm
	A measure inch	=	0.43 + (0.1 * n) ±0.2 inch
E channel	A measure mm	=	11 + (2.29 * n) ±5 mm
	A measure inch	=	0.43 + (0.09 * n) ±0.2 inch
H, A, E channels	Weight** kg	=	8 + (0.49 * n)
	Weight** lb	=	17.64 + (1.08 * n)
L channel	Weight** kg	=	8 + (0.42 * n)
	Weight** lb	=	17.64 + (0.93 * n)

(n = number of plates)
** Excluding connections



For exact values please contact your local Alfa Laval representative.

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

AlfaNova 400

Fusion-bonded plate heat exchanger

General information
AlfaNova is a plate heat exchanger made of 100% stainless steel. It is based on Alfa Laval's revolutionary technology, AlfaFusion, the art of joining stainless steel components together.

AlfaNova heat exchangers are well suited in applications which put high demand on cleanliness, applications where ammonia is used or applications where copper or nickel contamination is not accepted. Its high resistance to corrosion makes it both hygienic and environmental friendly.

It is extremely compact compared to its capacity to withstand great strains in demanding heat transfer applications.

Applications
- Evaporating
- Economizing
- Absorption systems
- Process cooling/heating
- Oil cooling

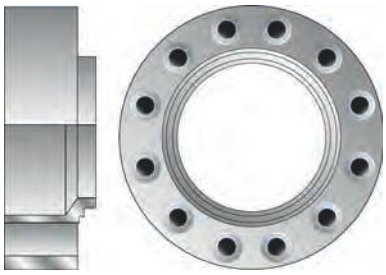
Working principles
The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, always in countercurrent flow. The media are kept in the unit by a bonded seal around the edge of the plates. The contact points of the plates are also bonded to withstand the pressure of the media handled.

Standard design
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. The channel plates are corrugated to improve heat transfer design.

Particulars required for quotation
To enable Alfa Laval's representative to make a specific quotation, enquiries should be accompanied by the following particulars:

- Flow rates or heat load required
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

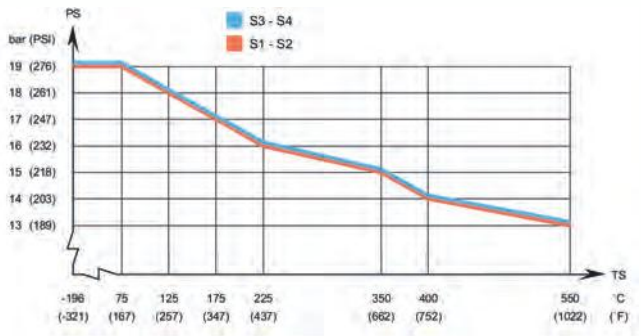
Examples of connections



Compact flanges

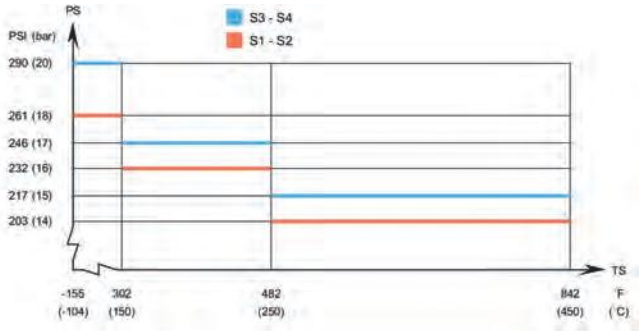
Welding | Clamp | Soldering | Outside threaded

AlfaNova 400 – PED approval pressure/temperature graph [1)]



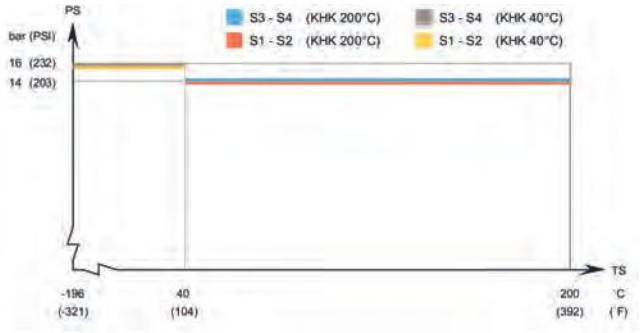
[1)] Min temperature -50 °C (-58 °F) with connection tubes made of carbon steel.

AlfaNova 400 – ASME approval pressure/temperature graph [2)]

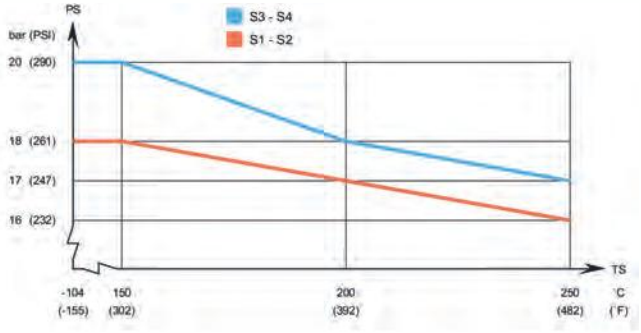


[2)] Min temperature -49 °F (-45 °C) with connection tubes made of carbon steel.

AlfaNova 400 – KHK approval pressure/temperature graph



AlfaNova 400 – CRN approval pressure/temperature graph



Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel, litres (ga)	0.74 (0.19)
Max. particle size mm (inch)	1.8 (0.07)
Max. flowrate* m^3/h (gpm)	200 (880)
Min. nbr of plates	10
Max. nbr of plates	270

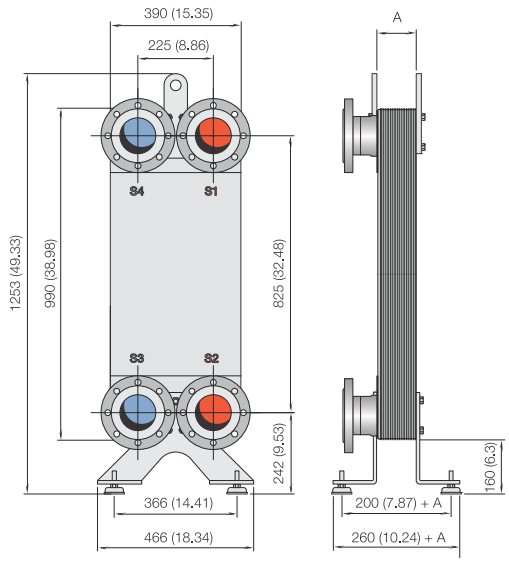
*) Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
AlfaFusion filler	Stainless steel

Standard dimensions *

A measure mm	=	14 + (2.65 * n) ±10 mm
A measure inch	=	0.55 + (0.1 * n) ±0.39 inch
Weight kg	=	22 + (1.4 * n)
Weight lb	=	48.5 + (3.09 * n)



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