

Navodila za vgradnjo AlfaNova prenosnikov toplote

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How to contact Alfa Laval:

Contact details for all countries are continually updated on our website.

Please visit www.alfalaval.com and contact your local Alfa Laval Representative.

Except for this Instruction Manual, the following document is also included in this shipment:

- Declaration of Conformity.



Description

Definitions

AlfaFusion™	One-material process that results in an all-stainless steel fusion-bonded plate heat exchanger, gives joints superior to welded joints
Connection plate	Plate used to separate two or more services in one plate heat exchanger. The plate pack performing such a service is called a section.
Fusion plate heat exchanger	A number of corrugated plates and its frame bonded to a plate pack at high temperature. Figure 1 shows typical components of a fusion plate heat exchanger.
Heat transfer area	The area of the plate, which is in contact with both fluids.
Plate	A sheet of 100 % stainless steel plate pressed into a corrugated pattern and equipped with port holes for media inlet and outlet.
Plate pack	An assembly of plates bonded together to an unit having internal channels in which two or more fluids can be handled.
Port	Inlet or outlet opening in the plates and in the cover plates. Most plates have four ports.
Total heat transfer area	The total surface area of all the bonded plates, which are in contact with both fluids.

Main components

Bear in mind that the AlfaNova Fusion Plate Heat Exchanger cannot be opened!

See figure 1.

Name plates



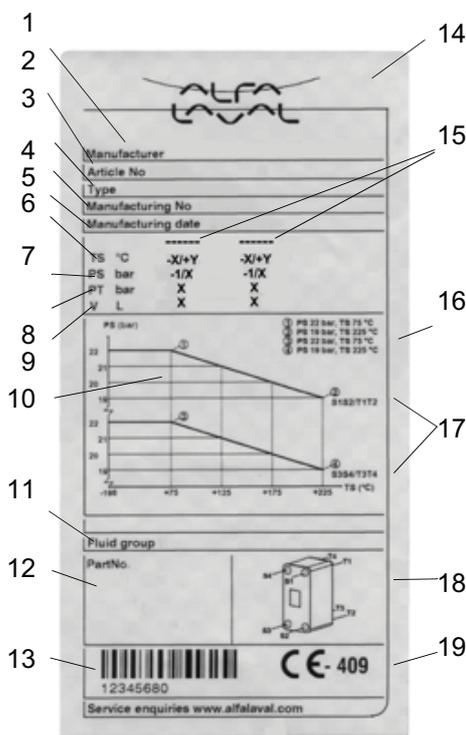
WARNING! For each unit, the mechanical design pressures and temperatures are marked on the name plate. These must not be exceeded.

On the name plate type of unit, manufacturing number and manufacturing year can be found. Pressure vessel details in accordance with the applicable pressure vessel code are also stated. The name plate is fixed to the frame plate, most common, or the pressure plate.

Four name plates exist depending on the type of pressure vessel approval.

Name plate type 1, PED Standard

1. Manufacturer's name.
2. Article number.
3. Type.
4. Manufacturing number.
5. Date of manufacture.
6. Max. allowed operating temperatures.
7. Max. allowed operating pressures.
8. Test pressure.
9. Volume of each space.
10. Operating area.
11. Fluid group.
12. Information unique to the customer.
13. Bar code information.
14. Space for logotype.
15. Locations of connections for each fluid.
16. Allowed operating temperatures and pressures.
17. Description of each space.
18. *) Possible locations of connections.
19. Space for mark of approval.



- CE-409 BHE Manufacturing, Ronneby, Sweden
- CE-036 Alfa Laval (Jiangyin) Manufacturing Co., Ltd, Jiangyin City, PRC
- CE-0948 Alfa Laval S.p.A. Alonte, Italy.

Name plate type 2, PED Stainless steel, optional

1. Space for logotype.
2. Manufacturer's name.
3. Type.
4. Serial number.
5. Manufacturing year.
6. Fluid group.
7. Locations of connections for each fluid.
8. Volume
9. Max. allowed operating pressures.
10. Max. allowed operating temperatures.
11. Test pressure.
12. Max. operating temperatures and pressures.
13. Date of test pressure.
14. Information unique to the customer.
15. Space for mark of approval.
16. *) Possible locations of connections.

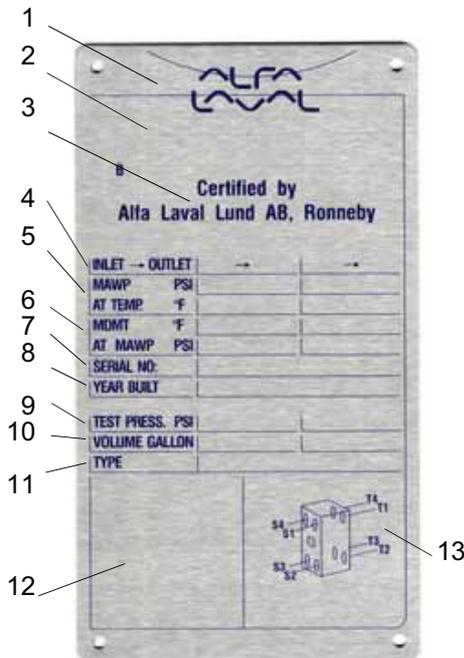


*) Sketch on nameplate showing possible locations of connections depending on heat exchanger execution.



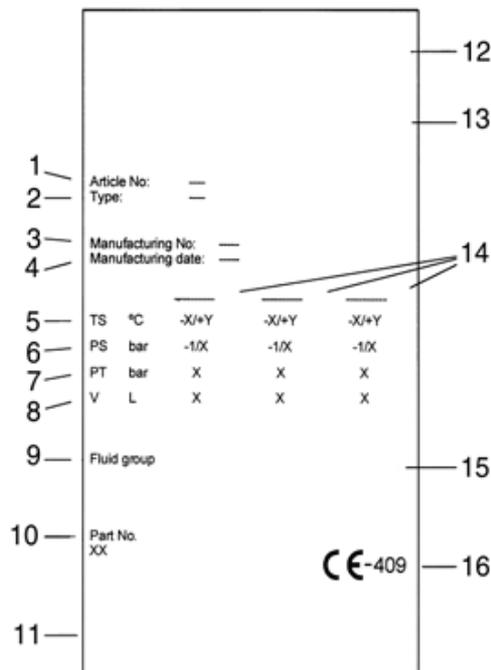
Name plate type 3, ASME

1. Space for logotype.
2. Space for National Board stamp and serial number.
3. Manufacturer's name:
 - CE-409 BHE Manufacturing, Ronneby, Sweden
 - CE-036 Alfa Laval (Jiangyin) Manufacturing Co., Ltd, Jiangyin City, PRC
 - CE-0948 Alfa Laval S.p.A. Alonte, Italy.
4. Locations of connections for each fluid.
5. Max. allowed working pressures at temperature.
6. Max. allowed medium temperature at max. allowed working pressure.
7. Serial number.
8. Manufacturing year.
9. Test pressure.
10. Volume of each space.
11. Type.
12. Information unique to the customer.
13. *) Possible locations of connections.



Name plate type 4, PED Customer designed, optional

1. Article number.
2. Type.
3. Manufacturing number.
4. Date of manufacture.
5. Max. allowed operating temperatures.
6. Max. allowed operating pressures.
7. Test pressure.
8. Volume of each space.
9. Fluid group.
10. Customer unique information.
11. Customer unique information.
12. Space for logotype.
13. Manufacturer's name.
14. Locations of connections for each fluid.
15. Customer unique information.
16. Space for mark of approval
 - CE-409 BHE Manufacturing, Ronneby, Sweden
 - CE-036 Alfa Laval (Jiangyin) Manufacturing Co., Ltd, Jiangyin City, PRC
 - CE-0948 Alfa Laval S.p.A. Alonte, Italy.



*) Sketch on nameplate showing possible locations of connections depending on heat exchanger execution.

Function

The fusion plate heat exchangers consist of a pack of bonded corrugated metal plates with ports for the passage of the two fluids between which heat transfer will take place.

The media in the heat transfer are led into the bonded plate pack through portholes at the corners and are distributed into the passages between the bonded, corrugated plates.

The heating surface consists of thin corrugated plates stacked on top of each other. In the fusion process at high temperature channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, always in counter-current flow. The contact points are also bonded to withstand the pressure of the media handled. Also see figure 2.

Installation

Requirements



WARNING! The heat exchanger must be installed and operated in such a manner that no risk of injury to personnel and damage to property will be incurred.

Note! Unless otherwise specified, product data for normal refrigerants, i.e. HFC and HCFC, are applicable to refrigeration applications. The manufacturer must be specifically consulted before the heat exchanger is used for flammable, toxic or dangerous liquids (e.g. hydrocarbons). The use must follow the relevant safety rules for handling such liquids. For further information, please refer to the Internet site of the supplier. Also see figure 4.

Installation in general



WARNING! Safety valves should be installed according to pressure vessel regulations.

Note! Before connecting any piping, make sure all foreign objects have been flushed out of the system.

The installation must be provided with equipment that protects the heat exchanger against pressures and temperatures outside the approved minimum and maximum values shown on the name plate.

For best possible heat transfer performance, the heat exchanger should be connected so that the media flow through the heat exchanger in opposite directions (in counter-flow). Take into account the risk of fire during the installation work, i.e. bear in mind the distance to flammable substances. Also see figure 4.

Installation as evaporator

Note! To avoid damage due to freezing, the medium used must include an anti-freeze agent at operating conditions below 5 °C/41 °F and/or when the evaporating temperature is below 1 °C/34 °F.

Note! In evaporator applications and in applications in which a phase change of the media occurs, the heat exchanger should be installed vertically.



For refrigeration applications – figure 5A shows the installation of an evaporator, for which the connections may be either on the front or on the rear. Figure 5B shows a condenser.

- Use an anti-freeze thermostat and flow monitor to ensure a constant water flow before, during and after the compressor has been running.
- Avoid “pump-down”, i.e. emptying the evaporator by running the compressor after shut-down until a preset refrigerant pressure is reached. The temperature could then drop below the brine freezing point, which could damage the evaporator.
- Use a flow switch and a low-pressure switch.

Installation, welding aspects

Note! Protect the heat exchanger by using a heat-sink (welding paste or tape) around the connection.

For installation of AlfaNova equipped with welding connections, TIG or MIG welding method must be used for installation of the heat exchanger to minimize heat impact of the heat exchanger.

Lifting



WARNING! Never lift by the connections or the studs around them. Straps should be used when lifting. Place straps according to figure 3, Lifting.

Operation

Start-up

Note! If several pumps are included in the system, make sure you know which one should be activated first.

Note! Adjustments of flow rates should be made slowly in order to avoid the risk of **water hammer**.

Water hammer is a short-lasting pressure peak that can appear during start-up or shut-down of a system, causing liquids to travel along a pipe as a wave at the speed of sound. This can cause considerable damage to the equipment.

1. Check that the valve is closed between the pump and the unit controlling the system flowrate.
2. If there is a valve at the exit make sure that it is fully open.
3. Open the vent and start the pump.
4. Open the valve slowly.
5. When all air is expelled, close the vent.
6. Repeat steps 1–5 for the second media. See figure 6.

Unit in operation

Note! Adjustments of flow rates should be made slowly in order to protect the system against sudden and extreme variations of temperature and pressure.

During operation, check that

- media temperatures and pressures are within the limits stated on the name plate
- no leakages appear due to faulty tightening of the connections.

Protection against freezing

Bear in mind the risk of freezing at low temperatures. Heat exchangers that are not in operation should be emptied and blown dry whenever there is risk of freezing.

Note! To avoid damage due to freezing, the medium used must include an anti-freeze agent at operating conditions below 5 °C/41 °F and/or when the evaporating temperature is below 1 °C/34 °F.

Protection against clogging

Use a filter as protection against the possible occurrence of foreign particles. If you have any doubt concerning the maximum particle size, consult your nearest representative of the supplier or look under Product information at the supplier's Internet site.

Protection against thermal or/and pressure fatigue

Sudden temperature and pressure changes could cause fatigue damage to the heat exchanger. Therefore, following must be taken into consideration to ensure that the heat exchanger operates without swinging pressures/temperatures.

- Locate the temperature sensor as close as possible to the outlet from the heat exchanger.
- Choose valves and regulation equipment which give stable temperatures/pressures for the heat exchanger.
- To avoid water hammer, quick-closing valves must not be used, e.g. on/off valves.
- In automated installations, the stopping and starting of pumps and actuation of valves should be programmed so that the resulting amplitude and frequency of the pressure variation will be as low as possible.

Protection against corrosion

All components in contact with media are manufactured in stainless steel grade AISI 316. Media causing corrosion to AISI 316 must not be exposed to the heat exchanger.

Insulation

Heating and cooling insulations are available as accessories.

Shut-down

Note! If several pumps are included in the system, make sure you know which one should be stopped first.

1. Slowly reduce the flow rate in order to avoid water hammer.
2. When the valve is closed, stop the pump.
3. Repeat steps 1–2 for the other medium/media.
4. If the fusion plate heat exchanger is shut down for a longer period, it should be drained.

Draining should also be done if the process is shut down and the ambient temperature is below freezing temperature of the media.

Depending on the media processed, it is also recommended to rinse and dry the heat exchanger and its connections.



Maintenance

General guidelines regarding maintenance

Plate Sheet material

Also stainless steel can corrode. Chlorine ions are hazardous.

Avoid cooling brines containing chloride salts as NaCl and, most harmful, CaCl₂.

Note! Rinse well!

Note! Under no circumstances should Hydrochloric acid be used with stainless steel plates.

Water of more than 300 ppm Cl ions may not be used for preparation of cleaning solutions.

Chlorine as a growth inhibitor

Note! Chlorine, commonly used as growth inhibitor in cooling water systems, reduces the corrosion resistance of stainless steels.

Chlorine weakens the protection layer of these steels making them more susceptible to corrosion attacks than they otherwise should be. It is a matter of time of exposure and concentration.

In every case where chlorination of AlfaNova heat exchanger cannot be avoided, your local representative must be consulted.

Cleaning-In-Place

The Cleaning-In-Place (CIP) equipment permits cleaning of the plate heat exchanger.

CIP performs

- cleaning of fouling and descaling of lime deposits
- passivation of cleaned surfaces to reduce susceptibility to corrosion
- neutralization of cleaning liquids before draining.

Follow the instructions of the CIP equipment.

The following CIP models can be used: CIP200L, CIP400L and CIP800L.

Cleaning liquid	Description
AlfaCaus	A strong alkaline liquid, for removing paint, fat, oil and biological deposits.
AlfaPhos	An acid cleaning liquid for removing metallic oxides, rust, lime and other inorganic scale. Includes an inhibitor for passivation.
AlfaNeutra	A strong alkaline liquid for neutralization of AlfaPhos before drainage.
Kalklöser P	An acidic cleaning powder with a corrosion inhibitor particularly effective for removing of calcium carbonate and other inorganic scale.
Neutra P	An alkaline powder for neutralization of used Kalklöser P prior to disposal.

Cleaning liquid	Description
AlfaAdd	A neutral cleaning strengthener to be used with AlfaPhos, AlfaCaus and Kalklöser P. Provides better cleaning results on oily, fatty surfaces and where biological growth occurs. AlfaAdd also reduces any foaming.
Alpacon Descalant	An acidic, water based, non-hazardous cleaning agent designed for removal of scale, magnetite, algae, humus, mussels, shellfish, lime and rust. Containing BIOGEN ACTIVE, a biological mixture made from renewable materials, as an active ingredient.
Alpacon Degreaser	A neutral degreaser to be used with Alpacon Descalant. Effectively removes oil, fat or grease layers, but also reduces foaming. Containing BIOGEN ACTIVE, a biological mixture made from renewable materials, as an active ingredient.

Fault tracing

Pressure drop problems

Action	Result	Correction
1 Check that all valves are open including non-return valves. <ul style="list-style-type: none"> • Measure the pressure just before and just after the heat exchanger, and the flow rate. For viscous media a membrane manometer with a diameter of at least 30 mm should be used. • Measure or estimate the flow rate if possible. A bucket and a watch showing seconds may be sufficient for small flow rates. For larger flow rates, some type of flowmeter is required. 	—	—



2 Compare the pressure drop observed with the one specified for the actual flow rate (see data print-out). Is the pressure drop higher than specified?	YES	Check the temperature program, see step 3.
	NO	If the pressure drop is corresponding to the specifications, there is no need for action. If the pressure drop is lower than specified, the pump capacity is probably too small or the observation may be wrong. See pump instruction manual.
3 Check the thermometer readings. Do the readings correspond to those specified?	YES	The heat transfer surface is probably clean enough, but the inlet to the heat exchanger may be clogged by some objects. Check the port area.
	NO	Heat transfer is obviously dropping below specifications, because of deposits on the heat transfer surface, which at the same time also increases the pressure drop, since the passage becomes narrower. If a Cleaning-In-Place (CIP) system is available, follow the instructions and use it to wash out the deposits.

Heat transfer problems

The heat transfer capacity is dropping.

Action	Result	Correction
Measure temperatures at inlets and outlets. Also measure flow rates on both media, if possible. At least on one of the media, both temperatures and the flow rate must be measured. <ul style="list-style-type: none"> • Check to see if the transferred amount of heat energy corresponds to the specifications. • If great precision is important, it will be necessary to use laboratory thermometers with an accuracy of 0.1 °C, and also to use the best equipment available for flow measurement. Has the heat transfer capacity of the unit dropped below specified values?	YES	Clean the heat transfer surface. Use the Cleaning-In-Place (CIP) system.
	NO	–



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Instruction Manual Fusion Plate Heat Exchangers

AlfaNova 76 AlfaNova 400

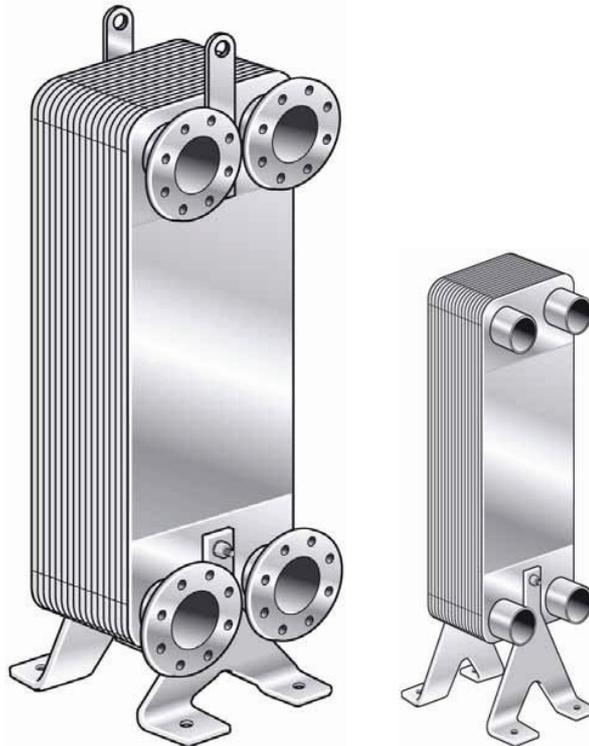




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Environmental compliance

AlfaLaval endeavours to perform its own operations as cleanly and efficiently as possible, and to take environmental aspects into consideration when developing, designing, manufacturing, servicing and marketing its products.

Unpacking

Packing material consists of wood, plastics, cardboard boxes and in some cases metal straps.

- Wood and cardboard boxes can be reused, recycled or used for energy recovery.
- Plastics should be recycled or burnt at a licensed waste incineration plant.
- Metal straps should be sent for material recycling.

Maintenance

During maintenance oil and wear parts in the machine are replaced.

- All metal parts should be sent for material recycling.
- Worn out or defective electronic parts should be sent to a licensed handler for material recycling.
- Oil and all non metal wear parts must be taken care of in agreement with local regulations.

Scrapping

At end of use, the equipment shall be recycled according to relevant, local regulations. Beside the equipment itself, any hazardous residues from the process liquid must be considered and dealt with in a proper manner. When in doubt, or in absence of local regulations, please contact the local Alfa Laval sales company.



Description

Definitions

EN

AlfaFusion™	One-material process that results in an all-stainless steel fusion-bonded plate heat exchanger, gives joints superior to welded joints.
Connection plate	Plate used to separate two or more services in one plate heat exchanger. The plate pack performing such a service is called a section.
Fusion plate heat exchanger	A number of corrugated plates and its frame bonded to a plate pack at high temperature. Figure on page 2 shows typical components of a fusion plate heat exchanger.
Heat transfer area	The area of the plate, which is in contact with both fluids.
Plate	A sheet of 100 % stainless steel plate pressed into a corrugated pattern and equipped with port holes for media inlet and outlet.
Plate pack	An assembly of plates bonded together to an unit having internal channels in which two or more fluids can be handled.
Port	Inlet or outlet opening in the plates and in the cover plates. Most plates have four ports.
Total heat transfer area	The total surface area of all the bonded plates, which are in contact with both fluids.

Main components



Lifting device

For correct and safe lifts during transportation and installation

Connections

Equipped with carbon steel or stainless steel fittings, permitting the media to enter into the heat exchanger.

Bonded seal

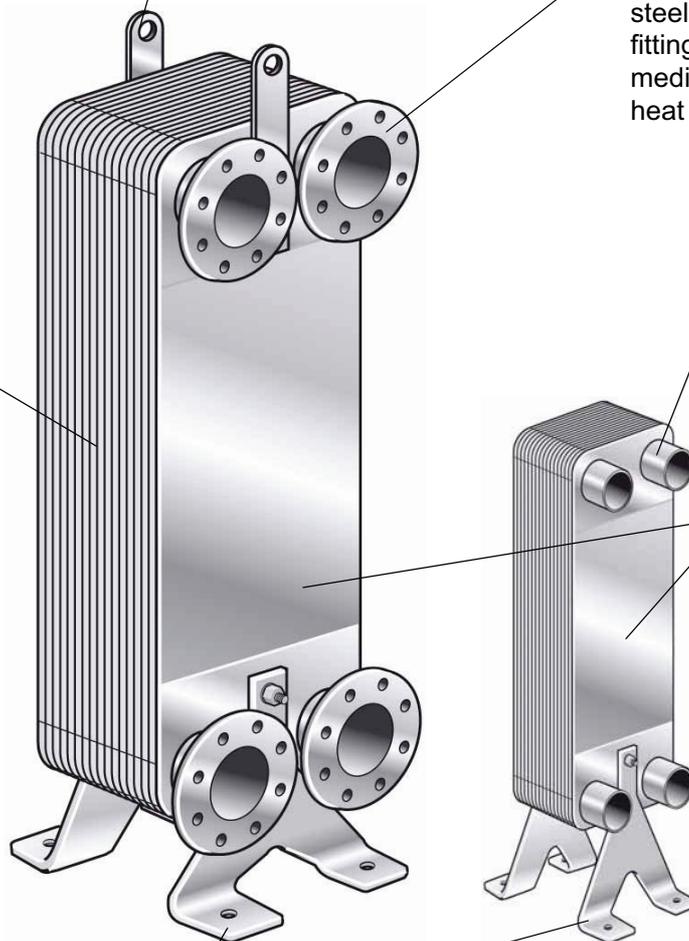
Keeping the media within the unit

Cover plates

Front and rear cover plates to protect the channel plates and increase the design pressure.

Support

Can as an option be equipped with earthing lugs.



Name plate

On the name plate the type of unit, manufacturing number and manufacturing year can be found. Pressure vessel details in accordance with the applicable pressure vessel code are also stated. The name plate is fixed to the frame plate, most common, or the pressure plate.



Warning!

For each unit, the mechanical design pressures and temperatures are marked on the name plate. These must not be exceeded.

Four nameplates, type 1–4, exist depending on the type of pressure vessel approval.

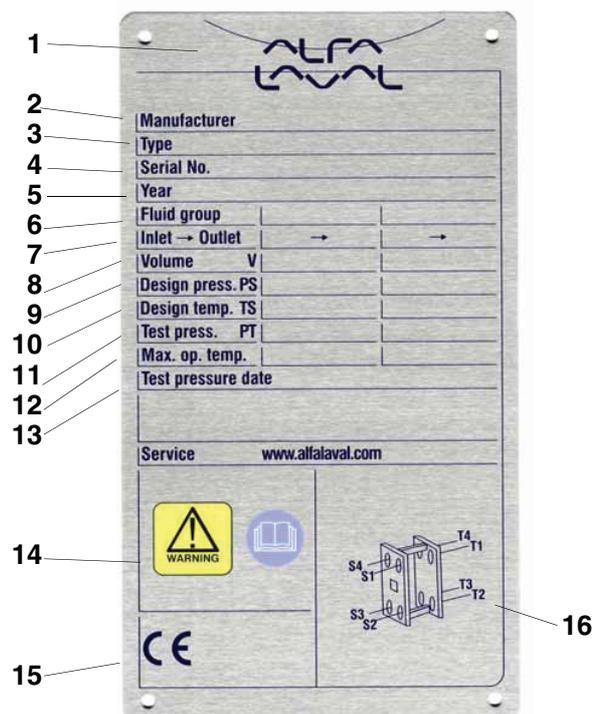
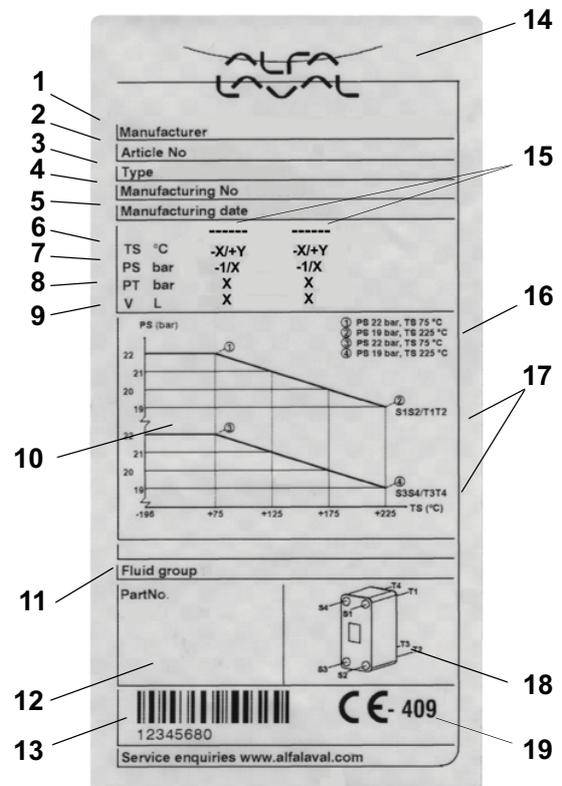
Nameplate type 1, PED Standard

1. Manufacturer's name.
2. Article number.
3. Type.
4. Manufacturing number.
5. Date of manufacture.
6. Max. allowed operating temperatures.
7. Max. allowed operating pressures.
8. Test pressure.
9. Volume of each space.
10. Operating area.
11. Fluid group.
12. Customer unique information.
13. Bar code information.
14. Space for logotype.
15. Locations of connections for each fluid.
16. Allowed operating temperatures and pressures.
17. Description of each space.
18. *)Possible locations of connections.
19. Space for mark of approval.

Nameplate type 2, PED Stainless steel, optional

1. Space for logotype.
2. Manufacturer's name.
3. Type.
4. Serial number.
5. Manufacturing year.
6. Fluid group.
7. Locations of connections for each fluid.
8. Volume of each space.
9. Max. allowed operating pressures.
10. Max. allowed operating temperatures.
11. Test pressure.
12. Max. operating temperatures and pressures.
13. Date of test pressure.
14. Information unique to the customer.
15. Space for mark of approval.
 - CE-409 BHE Manufacturing, Ronneby, Sweden
 - CE-036 Alfa Laval (Jiangyin) Manufacturing Co., Ltd., Jiangyin City, PRC
 - CE-0948 Alfa Laval S.p.A. Alonte, Italy.
16. *) Possible locations of connections.

*) Sketch on nameplate showing possible locations of connections depending on heat exchanger performance.

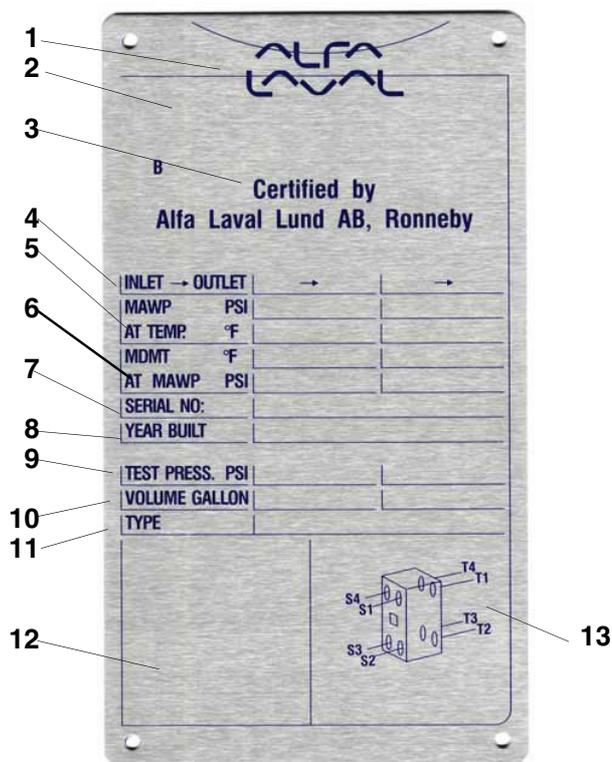




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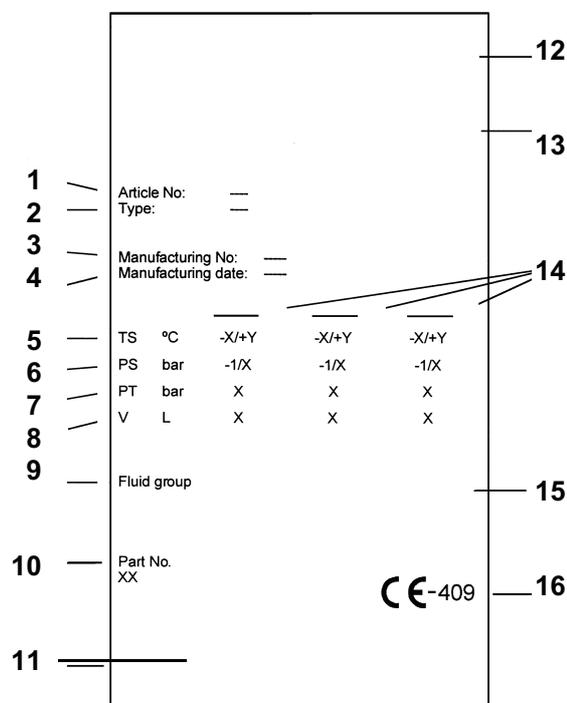
Nameplate type 3, ASME

1. Space for logotype.
2. Space for National Board stamp and serial number
3. Space for manufacturer's name:
 - CE-409 BHE Manufacturing, Ronneby, Sweden
 - CE-036 Alfa Laval (Jiangyin) Manufacturing Co., Ltd., Jiangyin City, PRC
 - CE-0948 Alfa Laval S.p.A. Alonte, Italy.
4. Locations of connections for each fluid.
5. Max. allowed working pressures at temperature.
6. Max. allowed medium temperature at max. allowed working pressure.
7. Serial number.
8. Manufacturing year.
9. Test pressure.
10. Volume of each space.
11. Type.
12. Information unique to the customer.
13. *) Possible locations of connections.



Nameplate type 4, PED Customer designed, optional

1. Article number.
2. Type.
3. Manufacturing number.
4. Date of manufacture.
5. Max. allowed operating temperatures.
6. Max. allowed operating pressures.
7. Test pressure.
8. Volume of each space.
9. Fluid group.
10. Customer unique information.
11. Customer unique information.
12. Space for logotype.
13. Manufacturer's name.
14. Locations of connections for each fluid.
15. Customer unique information.
16. Space for mark of approval.



*) Sketch on nameplate showing possible locations of connections depending on heat exchanger execution.

Function

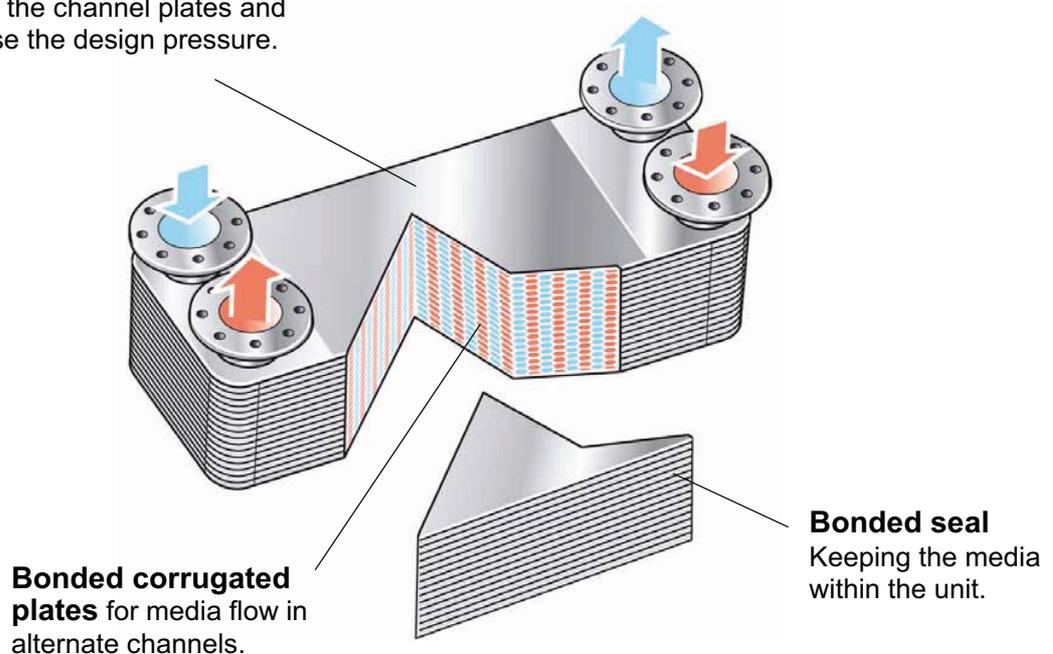
The fusion plate heat exchangers consist of a pack of bonded corrugated metal plates with ports for the passage of the two fluids between which heat transfer will take place.

The media in the heat transfer are led into the bonded plate pack through portholes at the corners and are distributed into the passages between the bonded, corrugated plates.

The heating surface consists of thin corrugated plates stacked on top of each other. In the fusion process at high temperature channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, always in counter-current flow. The contact points are also bonded to withstand the pressure of the media handled.

Cover plates

Front and rear cover plates to protect the channel plates and increase the design pressure.



Bonded corrugated plates for media flow in alternate channels.

Bonded seal
Keeping the media within the unit.

The fusion plate heat exchanger is typically used for heating or cooling media with low to medium viscosity. A specific fusion plate heat exchanger is dimensioned for a specific duty, set out in the product documentation, and should not be used in any other way without consulting the supplier.



AlfaFusion technology

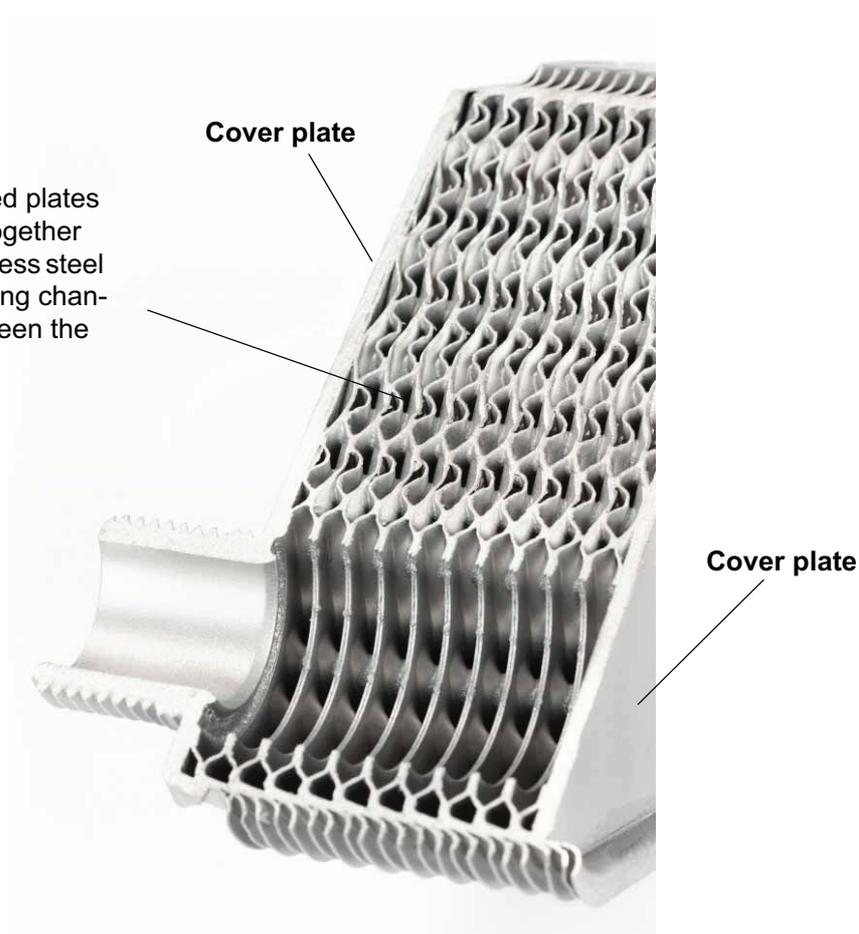
Fusion-bonded plate heat exchangers represent a new class of plate heat exchangers made of 100 % stainless steel.

AlfaNova comprises a number of thin corrugated stainless steel plates. The process uses a stainless steel filler as activator to bond the plates together in a high temperature furnace. At contact points between the corrugated plates the filler reacts with the plate surface. The filler has a very good capability to wet surfaces and fill crevices.

It has almost full interaction with the plates and a fusion zone is created. This zone is in consequence also of stainless steel and has similar properties to the plates in terms of corrosion resistance and durability.

AlfaFusion technology enables the production of reliable heat plate exchangers with higher mechanical and thermal resistance than those of conventional technology.

Corrugated plates bonded together with stainless steel filler forming channels between the plates.



Installation

Requirements

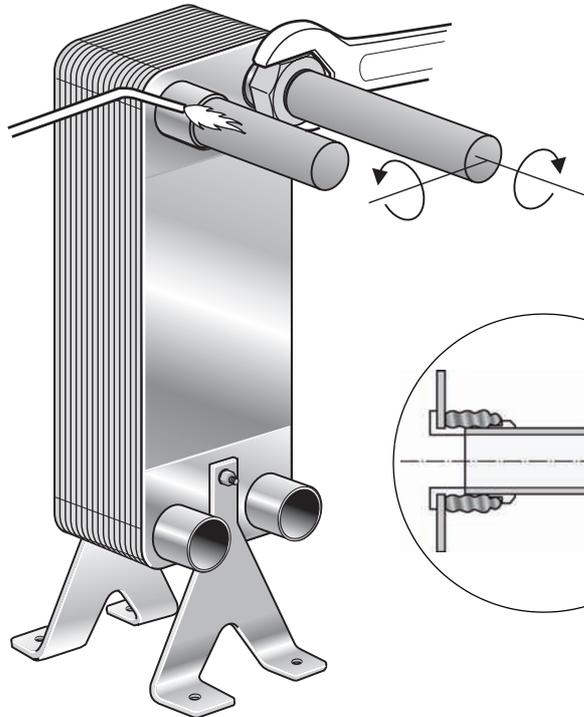


Protection against pipe forces

Fit the pipes so that no tension is transferred to the heat exchanger.

Foundation

Install on a flat foundation giving enough support to the unit.



Protection against overheating

Protect the heat exchanger by using a heat-sink (welding paste or tape) around the connection before welding operation.

Installation in general



Warning!

The heat exchanger must be installed and operated in such a manner that no risk of injury to personnel and damage to property will be incurred.



Warning!

Safety valves should be installed according to pressure vessel regulations.



Note!

Unless otherwise specified, product data for normal refrigerants, i.e. HFC and HCFC, are applicable to refrigeration applications. The manufacturer must be specifically consulted before the heat exchanger is used for flammable, toxic or dangerous liquids (e.g. hydrocarbons). The use must follow the relevant safety rules for handling such liquids. For further information, please refer to the Internet site of the supplier.



Note!

Before connecting any piping, make sure all foreign objects have been flushed out of the system.

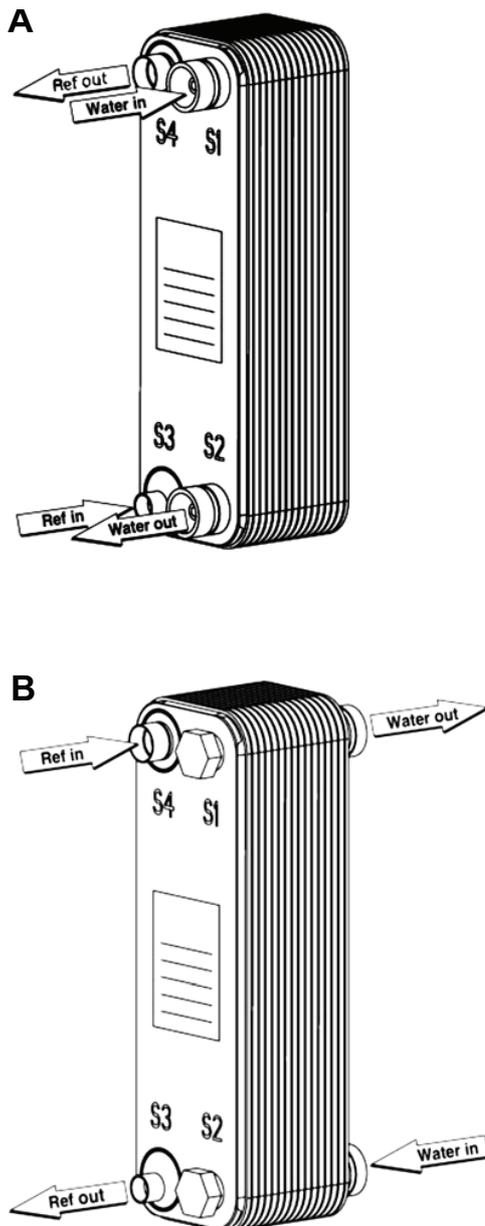
The installation must be provided with equipment that protects the heat exchanger against pressures and temperatures outside the approved minimum and maximum values shown on the nameplate.

For best possible heat transfer performance, the heat exchanger should be connected so that the media flow through the heat exchanger in opposite directions (in counter-flow). Take into account the risk of fire during the installation work, i.e. bear in mind the distance to flammable substances.



Installation as evaporator

For refrigeration applications – figure A below shows the installation of an evaporator, for which the connections may be either on the front or on the rear. In evaporator applications and in applications in which a phase change of media occurs, the heat exchanger should be installed vertically. Figure B shows a condenser.



- Use an anti-freeze thermostat and flow monitor to ensure a constant water flow before, during and after the compressor has been running.
- Avoid “pump-down”, i.e. emptying the evaporator by running the compressor after shut-down until a preset refrigerant pressure is reached. The temperature could then drop below the brine freezing point, which could damage the evaporator.
- Use a flow switch and a low-pressure switch.

Note!

To avoid damage due to freezing, the medium used must include an anti-freeze agent at operating conditions below 5 °C/41 °F and/or when the evaporating temperature is below 1 °C/34 °F.

Installation, welding aspects

For installation of AlfaNova equipped with welding connections, TIG or MIG welding method must be used for installation of the heat exchanger to minimize heat impact of the heat exchanger.

Note!

Protect the heat exchanger by using a heat-sink (welding paste or tape) around the connection before welding operation.

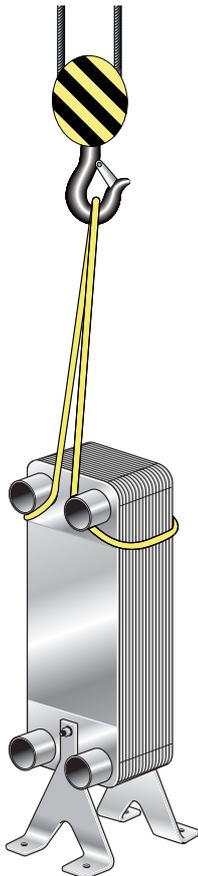
Lifting

EN

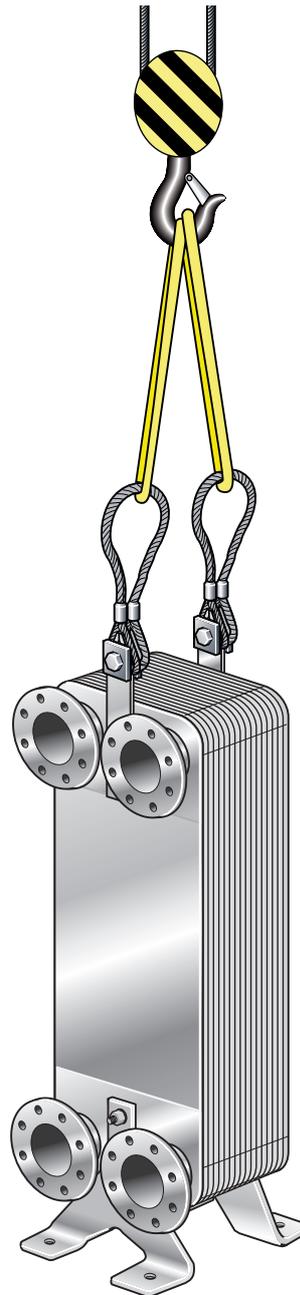


Warning!

Never lift by the connections or the studs around them. Straps should be used when lifting. Place straps according to picture.



AlfaNova 76



AlfaNova 400



Operation

Start-up

Note!

If several pumps are included in the system, make sure you know which one should be activated first.

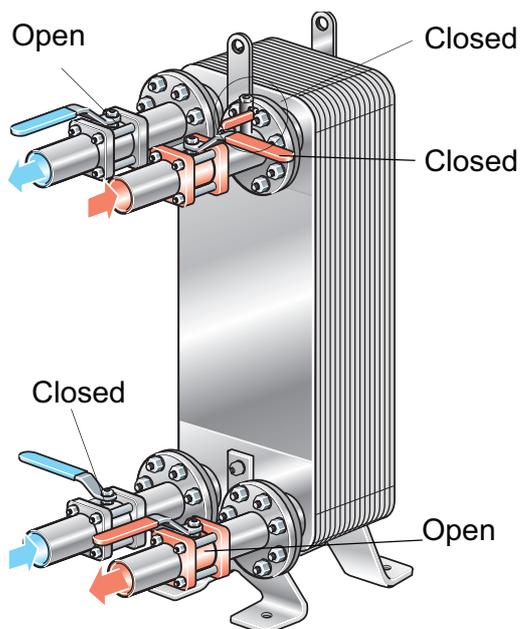
Note!

Adjustments of flow rates should be made slowly in order to avoid the risk of **water hammer**.

Water hammer is a short-lasting pressure peak that can appear during start-up or shut-down of a system, causing liquids to travel along a pipe as a wave at the speed of sound. This can cause considerable damage to the equipment.

1

Check that the valve is closed between the pump and the unit controlling the system flow rate.

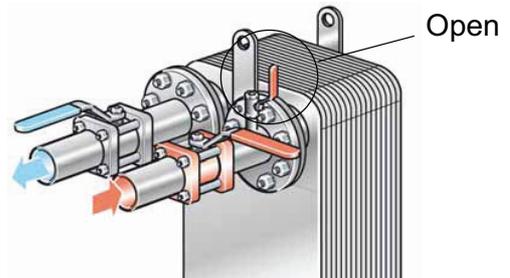


2

If there is a valve at the exit make sure that it is fully open.

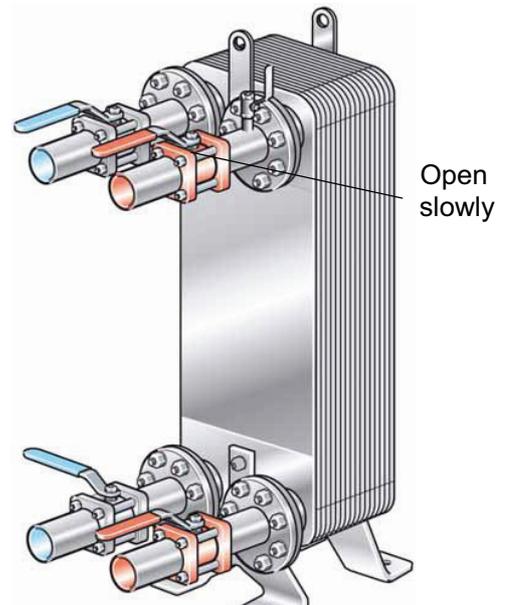
3

Open the vent and start the pump.



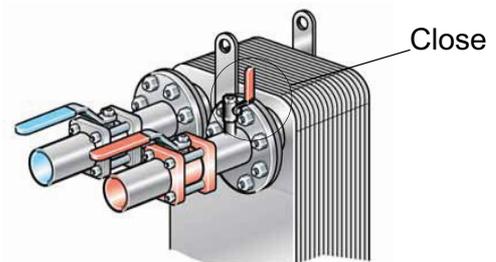
4

Open the valve slowly.



5

When all air is expelled, close the vent.



6

Repeat steps 1–5 for the second medium.

Unit in operation

Note!

Adjustments of flow rates should be made slowly in order to protect the system against sudden and extreme variations of temperature and pressure.

During operation, check that



media temperatures and pressures are within the limits stated on the name plate



no leakages appear due to faulty tightening of the connections.

Protection against freezing

Bear in mind the risk of freezing at low temperatures. Heat exchangers that are not in operation should be emptied and blown dry whenever there is risk of freezing.

Note!

To avoid damage due to freezing, the medium used must include an anti-freeze agent at operating conditions below 5 °C/41 °F and/or when the evaporating temperature is below 1 °C/34 °F.

Protection against clogging

Use a filter as protection against the possible occurrence of foreign particles. If you have any doubt concerning the maximum particle size, consult your nearest representative of the supplier or look under Product information at the supplier's Internet site.

Protection against thermal or/and pressure fatigue

Sudden temperature and pressure changes could cause fatigue damage to the heat exchanger. Therefore, following must be taken into consideration to ensure that the heat exchanger operates without swinging pressures/temperatures.

- Locate the temperature sensor as close as possible to the outlet from the heat exchanger.
- Choose valves and regulation equipment which give stable temperatures/pressures for the heat exchanger.
- To avoid water hammer, quick-closing valves must not be used, e.g. on/off valves.
- In automated installations, the stopping and starting of pumps and actuation of valves should be programmed so that the resulting amplitude and frequency of the pressure variation will be as low as possible.

Protection against corrosion

All components in contact with media are manufactured in stainless steel grade AISI 316.

Media causing corrosion to AISI 316 must not be exposed to the heat exchanger.

Insulation

Heating and cooling insulations are available as accessories.



Shut-down

Note!

If several pumps are included in the system, make sure you know which one should be stopped first.

- 1 Slowly reduce the flow rate in order to avoid water hammer.
- 2 When the valve is closed, stop the pump.
- 3 Repeat steps 1–2 for the other medium/media.
- 4 If the fusion plate heat exchanger is shut down for a longer period, it should be drained.

Draining should also be done if the process is shut down and the ambient temperature is below freezing temperature of the media.

Depending on the media processed, it is also recommended to rinse and dry the heat exchanger and its connections.

Maintenance

General guidelines regarding maintenance

Plate Sheet material

Also stainless steel can corrode. Chlorine ions are hazardous.

Avoid cooling brines containing chloride salts as NaCl and, most harmful, CaCl₂.

Note!

Rinse well!

Note!

Under no circumstances should Hydrochloric acid be used with stainless steel plates.

Water of more than 300 ppm Cl ions may not be used for preparation of cleaning solutions.

Chlorine as a growth inhibitor

Note!

Chlorine, commonly used as growth inhibitor in cooling water systems, reduces the corrosion resistance of stainless steels.

Chlorine weakens the protection layer of these steels making them more susceptible to corrosion attacks than they otherwise should be. It is a matter of time of exposure and concentration.

In every case where chlorination of AlfaNova heat exchanger cannot be avoided, your local representative must be consulted.



Cleaning-In-Place (CIP)

The Cleaning-In-Place (CIP) equipment permits cleaning of the plate heat exchanger.

CIP performs

- cleaning of fouling and descaling of lime deposits
- passivation of cleaned surfaces to reduce susceptibility to corrosion
- neutralization of cleaning liquids before draining.

Follow the instructions of the CIP equipment.

The following CIP models can be used: CIP200L, CIP400L and CIP800L.



Cleaning liquid	Description
AlfaCaus	A strong alkaline liquid, for removing paint, fat, oil and biological deposits.
AlfaPhos	An acid cleaning liquid for removing metallic oxides, rust, lime and other inorganic scale. Includes an inhibitor for passivation.
AlfaNeutra	A strong alkaline liquid for neutralization of AlfaPhos before drainage.
Kalklöser P	An acidic cleaning powder with a corrosion inhibitor particularly effective for removing of calcium carbonate and other inorganic scale.
Neutra P	An alkaline powder for neutralization of used Kalklöser P prior to disposal.
AlfaAdd	A neutral cleaning strengthener to be used with AlfaPhos, AlfaCaus and Kalklöser P. Provides better cleaning results on oily, fatty surfaces and where biological growth occurs. AlfaAdd also reduces any foaming.
Alpacon Descalant	An acidic, water based, non-hazardous cleaning agent designed for removal of scale, magnetite, algae, humus, mussels, shellfish, lime and rust. Containing BIOGEN ACTIVE, a biological mixture made from renewable materials, as an active ingredient.
Alpacon Degreaser	A neutral degreaser to be used with Alpacon Descalant. Effectively removes oil, fat or grease layers, but also reduces foaming. Containing BIOGEN ACTIVE, a biological mixture made from renewable materials, as an active ingredient.

Fault-tracing

Pressure drop problems

The pressure drop has increased.

Action	Result	Correction
<p>1 Check that all valves are open including non-return valves.</p> <ul style="list-style-type: none"> • Measure the pressure just before and just after the heat exchanger, and the flow rate. For viscous media a membrane manometer with a diameter of at least 30 mm should be used. • Measure or estimate the flow rate if possible. A bucket and a watch showing seconds may be sufficient for small flow rates. For larger flow rates, some type of flowmeter is required. 	–	–
<p>2 Compare the pressure drop observed with the one specified for the actual flow rate (see data printout). Is the pressure drop higher than specified?</p>	YES	Check the temperature program, see step 3.
	NO	<p>If the pressure drop is corresponding to the specifications, there is no need for action.</p> <p>If the pressure drop is lower than specified, the pump capacity is probably too small or the observation may be wrong. See pump instruction manual.</p>
<p>3 Check the thermometer readings. Do the readings correspond to those specified?</p>	YES	The heat transfer surface is probably clean enough, but the inlet to the heat exchanger may be clogged by some objects. Check the port area.
	NO	<p>Heat transfer is obviously dropping below specifications, because of deposits on the heat transfer surface, which at the same time also increases the pressure drop, since the passage becomes narrower.</p> <p>If a Cleaning-In-Place (CIP) system is available, follow the instructions and use it to wash out the deposits.</p>



Heat transfer problems

The heat transfer capacity is dropping.

Action	Result	Correction
Measure temperatures at inlets and outlets. Also measure flow rates on both media, if possible. At least on one of the media, both temperatures and the flow rate must be measured. <ul style="list-style-type: none"> • Check to see if the transferred amount of heat energy corresponds to the specifications. • If great precision is important, it will be necessary to use laboratory thermometers with an accuracy of 0.1 °C, and also to use the best equipment available for flow measurement. Has the heat transfer capacity of the unit dropped below specified values?	YES	Clean the heat transfer surface. Use the Cleaning-In-Place (CIP) system.
	NO	–

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