



## Plate Heat Exchangers Manual



Read and understand this manual prior to operating or servicing this product.

**Published by**

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**The original instructions are in English**

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## **1 Foreword**

The information presented in this instruction manual has been compiled to provide the operator with a thorough understanding of the capabilities and operation of the unit. It is strongly recommended that this manual will be read carefully with all cautions noted and observed before placing the equipment in service.

Should a malfunction occur, consult SonFlow representative.

## **2 Introduction**

This manual provides information and operating instructions as your personal guide explaining design, function, operation and carry out maintenance of gasketed plate and frame heat exchanger.

The plate heat exchanger performs heat exchanging by transferring heat between hot and cold fluids flowing alternately through heat transfer plates, which are thin metal sheets having fine corrugated patterns.

The heat exchanger shall be operated by persons who have knowledge of the process. Installation and maintenance shall be done by persons who have knowledge and authorization according to local regulations.

At the end of use, the equipment shall be disposed according to relevant, local regulations. Besides the equipment itself, any hazardous residues from the process liquid must be considered and dealt with in a proper manner.

Read this manual thoroughly and understand the precautions regarding the safety of the equipment and its functions before handling the equipment.

If you are in doubt and/or need advice, contact SonFlow representative.

## **3 Safety**

The heat exchanger shall be used and maintained in accordance with SonFlow's instructions in this service manual. Incorrect handling may result in serious consequences with injuries to persons or property damage.

The heat exchanger should be used in accordance with specified configuration of material, media types, temperatures and pressure.

## 4 General

### 4.1 Label for SonFlow heat exchanger

The label gives important information about the design of the heat exchanger. This information is related to the design and approval of the heat exchanger. The values on the label may not be exceeded.

SonFlow A/S

PLATE HEAT EXCHANGER TYPE:  YEAR

MANUFACTUR. NO.:  MARKING

NOMINEL CAPACITY KW  L

TRANSMISSION SURFACE  M<sup>2</sup>

ASSEMBLING MEASURE MIN;  MM

MAX. DIFFERENTIAL PRESSURE:  BARG

PS, MAX. WORKING-PRESSURE BARG  PRODUCT / MEDIUM PT, MAX. TEST-PRESSURE BARG  PRODUCT / MEDIUM

FLUIDA  V, VOLUME IN LTR,

TS, WORKING TEMP. MIN. ° C  TS, WORKING TEMP. MAX. ° C

**IMPORTANT:**

- 1) The plate heat exchanger must not be assembled under the stated minimum assembling measure, Please contact your SonFlow A/S distributor if the plate heat exchanger is leaking when tightened to the minimum measurement,
- 2) The starting up must be done without shocks and against closed valves.

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Figure 1: Example of CE metallic name plate

This plate is fitted on the plate heat exchanger and provides information about:

- Plate heat exchanger type
- Serial number
- Allowable pressures
- Allowable temperatures
- Test pressures
- Volume
- Net weight
- Year of construction
- Tensioning dimensions a max. and a min.
- Manufacturer

Each plate heat exchanger is delivered with a dimension drawing and a circuit diagram.

The dimension drawing includes the outer dimensions as well as type, size and position of the piping connections.

The circuit diagram shows the specific arrangement of the plates, their type, alloyed steel, thickness and gasket material.

## **4.2 Correct operation**

This instructional manual provides the necessary information for correct and safe operation to avoid accidents or incorrect use. Always follow the instructions and safety regulations.

If a problem occurs with your SonFlow Heat Exchanger, please contact us – all indistinctions must be solved to avoid injuries and damages. SonFlow will not accept responsibility for any damage or injury resulting from not following the instructions in this manual.

SonFlow plate heat exchangers are specifically designed and built for the operating conditions, therefore sudden changes should be prevented, as it can severely damage the heat exchanger. Your heat exchanger should be used in accordance with the specified configuration of material, media types, temperatures and pressure for your specific customized heat exchanger.

If you wish to modify the design conditions, please contact us – an inspection and written approval are necessary by SonFlow, because your SonFlow heat exchangers are customized to your exact specifications for the ultimate solutions. Always consult with SonFlow representatives for advice on:

- New plate pack dimensions if you intend to change the thermal tasks
- Selection of gasket material if operating temperatures and pressures are permanently changed, or if another medium is to be processed in the heat exchanger

## **4.3 Precautions**

Bodily harm:

- Burning as a result of touching the heat exchanger
- Release of pressurized media application
- Contact with chemicals
- Sharp edges

Damage to equipment:

- External forces
- Corrosion
- Chemical action
- Erosion
- Material exhaustion
- Water hammer (it can appear during the start-up/shut down of a system or an off/on valve)
- Thermal/mechanical shock
- Freezing
- Transportation/lifting

The heat exchanger may only be used with the fluids specified on the label and design sheets.

During the start-up, check the bolts if they are tight enough as they can loosen during transport. Check that there are no visible leakages from the plate pack, valves or piping system. Demountable plate heat exchangers can always leak, please take this into account when installing – install a drip tray underneath the heat exchanger. A heat exchanger can also leak due to condensation.

If the temperature of the heat exchanger is below the minimum temperature for the gaskets prior to the installation and service, it is recommended to heat the heat exchanger above this limit to avoid cold leakage and the plates can become deformed. Before pressurizing the heat exchanger, it is important to ensure that the temperature of the heat exchanger is within the temperature range as stated in the plate heat exchanger drawing.

If the heat exchanger is shut down for several days or longer, it should be drained. Draining should also be done if the process is shut down and the ambient temperature is below the freezing temperature of the media. Depending on the media processed, it is recommended to rinse and dry the heat exchanger plates and connections (described in section 7.2).

#### **4.4 Thermal design**

SonFlow plate heat exchangers are designed and calculated according to the newest technology. In the design sheet the nominal capacity and pressure losses are mentioned.

If a performance test must be carried out, the exchanger must be totally clean.

## 5 Construction

The basic structure of a plate heat exchanger is shown below. The specific execution depends on the application.

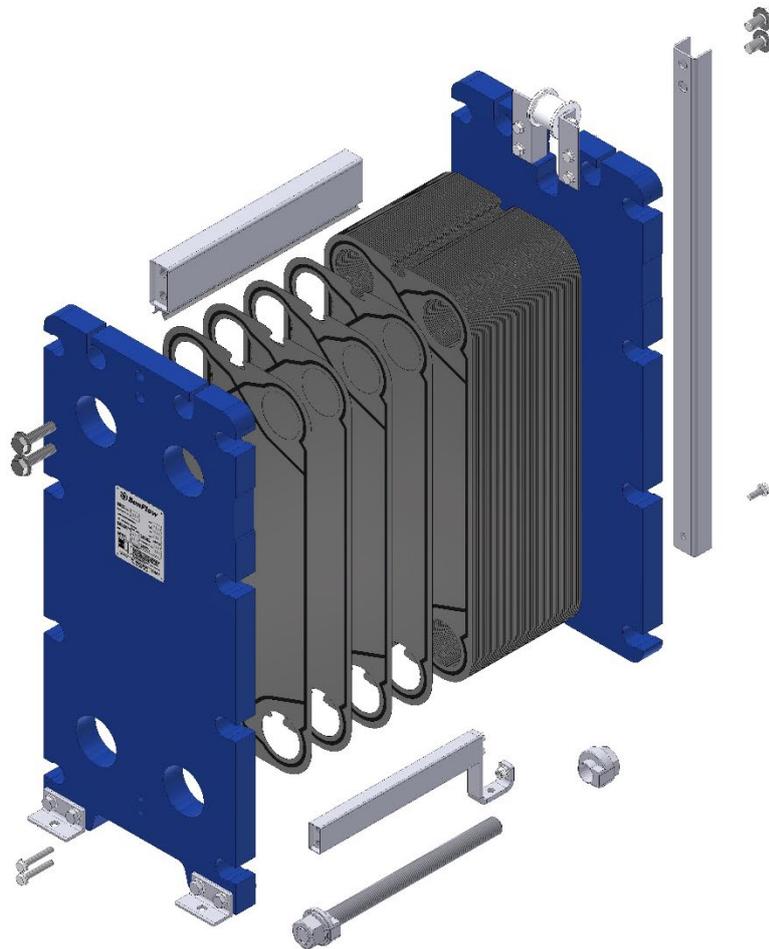


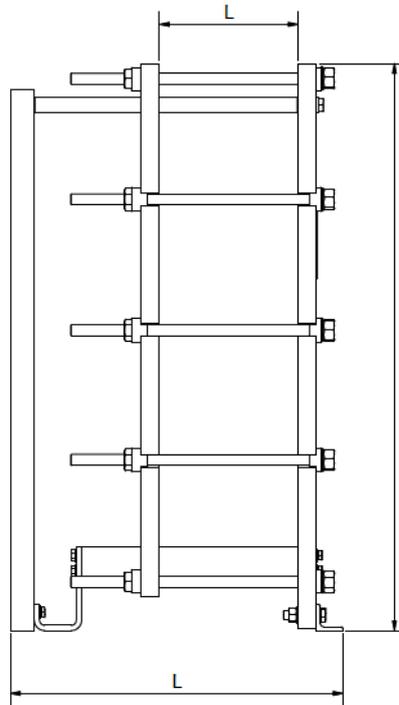
Figure 2: Main components of a gasketed plate heat exchanger, industrial design.

### Main components

- Frame plate
- Pressure plate
- Carrying bar
- Guiding bar
- Support column
- Plate pack
- Tightening bolts

## 5.1 Frame

The heat exchanger consists of a frame plate (head), a pressure plate (moveable), a carrying bar, a guiding bar and a column. The clamping bolts are used to press the plate package together. The size and number depend on the type of heat exchanger. There are different designs of the frame depending on the design pressure and the application of the heat exchanger.



**Figure 3: Basic version of SonFlow frames, which are available in various application specific versions.**

## 5.2 Plates

The number of plates is, as well as size and dimension, dependent on the thermal output required. The type of material depends on the media and their temperatures, therefore, check the design sheet when ordering spare parts.

A heat exchanger plate is a thin sheet of metal without a hanger (normally between 0.4mm and 0.8mm), molded when cold in suitable presses.

Each plate contains flow directors at the top and bottom of the port holes, which evenly distributes the fluids over the heat transfer surface. Channels are formed between the plates. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.

The material used:

- Stainless steel
- Titanium
- Nickel
- C276
- SMO254
- Other materials on request

The plates can be made of a variety of materials compatible with your process original materials are noted on assembly drawings.

### **5.3 Gaskets**

The gaskets are to prevent intermixing of the media which can be supplied in different materials such as NBR, EPDM and Viton. The gasket material is selected for compatibility with the fluids being processed. The click-on gasket is a glue less system for sealing – the gaskets are single piece, molded construction, which fits into the continuous gasket groove in each plate. The glue less system is an easy and fast click-on installation without glue or tools, as well as simple removal.

Replacement of old gaskets:

- Remove the plate from the frame.
- Slowly pull away the gasket
- Clean the gasket groove, then dry the groove
- Position the new gasket on the plate for a proper groove fit
- Make sure that the tabs of the gasket are lined up with the slots
- Insert each tab inside its corresponding slot and push firmly until the tab locks into the slot

### **5.4 Plate types:**

The plate material is selected accordingly to customer's requirements (e.g. pressure, temperature, media, operating mode).

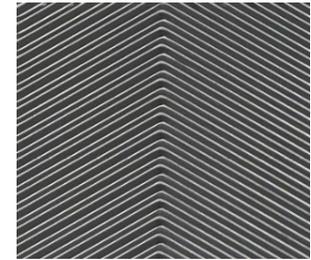
Plate pattern is herringbone pattern, which is ideally suited for handling aqueous solutions. Note that the plate patterns can differ on various models. The herringbone pattern comes in two variations to optimize performance, however it can also be mixed into a third variation.

Both types of plates are designed to create the optimum turbulence "self-cleaning" effect – and thereby the best possible heat transfer:

- Thermal short plate: short wide chevrons  
Provides a lower heat transfer and a lower pressure drop

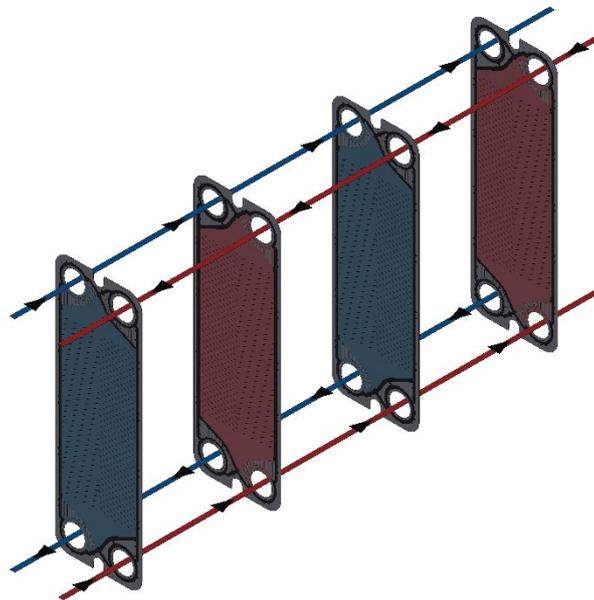


- Thermal long plate: tall skinny chevrons  
Provides a higher heat transfer and a higher pressure drop



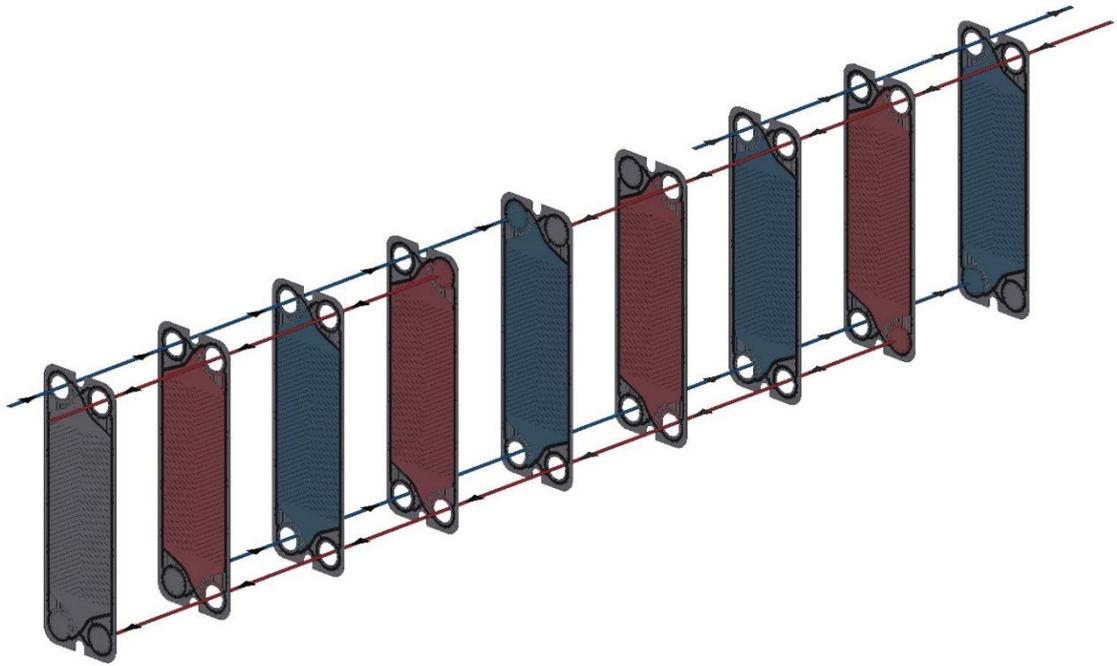
### 5.5 Plate function

The heat exchanger consists of a pack of corrugated metal plates with port holes for the input and output of the two separate fluids. The heat transfer takes place through the plates. The plates are fitted with a gasket which seals the channel and directs the fluids into alternate channels. The plate corrugation promotes fluid turbulence and support the plates against differential pressure.



**Figure 4: Example of a single-pass set up.**

The plate heat exchanger is designed with either single-pass or multi-pass flow, depending on the duty. For most duties single-pass are normally used and often the preferred solution as it keeps all connections on the head part, which makes installation cheaper and service easier.



**Figure 5: Example of a multi-pass set up**

Multi-pass is required when there are small temperature differences between the flow media. In this case, the connecting piping is on the fixed and on the moveable plate.

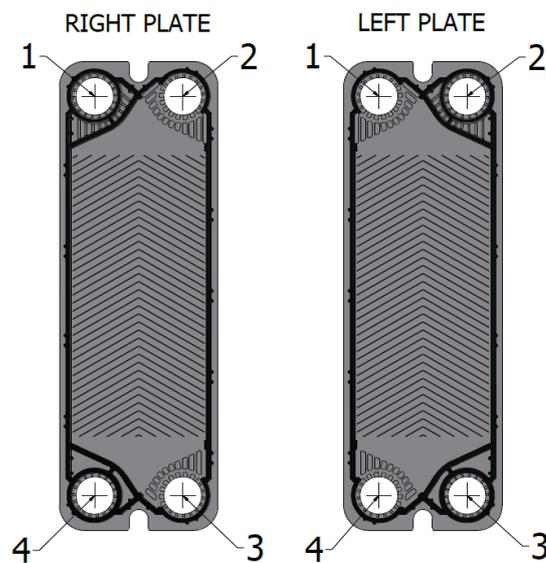
**Advantages of SonFlow plate heat exchangers:**

- Easy to remove and clean – remove the tie bolts and slide back the moveable frame part. Then the plate pack can be inspected and cleaned
- Expandable – saves time and money
- High efficiency – due to pressed patterns in the plates and the relative narrow gaps, very high turbulence is achieved at relative low fluid velocity
- Compact size
- Close approach temperature – possible to reach close approach temperatures
- Multiple duties in a single unit – can be built in sections, separated with divider plates or more complicated divider frames
- Less fouling – smooth plate surface reduces fouling
- Lower costs

Note: The SonFlow plates are designed in such a way that they can be used both as right and as left plates, however every other plate must be rotated 180° in order to create fluid flow passages.

### 5.6 Flow arrangement

The heat transfer plates with gaskets are arranged in an alternating pattern of left-hand flow and right-hand flow to direct the fluids in an opposing direction within the heat exchanger.



**Figure 6: Right/left plates**

The SonFlow plates are designed so they can be used both as right and as left plates by rotating the plates by 180°. Every plate can be recognized by the plate charge number and thermal short or thermal long execution.

When a package of plates is pressed together, the holes at the corners form continuous tunnels, leading the media from the inlets into the plate package, where they are distributed into the narrow passages between the plates.

Due to gasket arrangement on the plates, the two liquids enter alternate passages separated by a thin metal wall.

## 5.7 Pressure drop

Some pressure drop is unavoidable, however it should be kept as close as possible to the designed value. Therefore, more energy is needed to get the desired flow through the equipment.

A reduced ability to hold the desired temperatures, in combination with an increased pressure on the media, indicates fouling or clogging.

Measure the flow rate if possible, and compare it with the specified for the actual flow rate:

- If the pressure drop is higher than the specified, the temperature program should be checked.
- If the thermometer readings correspond to those specified, then the inlet to the heat exchanger may be clogged → open the equipment.
- If the thermometer is **not** corresponding to the specified, because passages become narrower → Cleaning in place (CIP) is necessary.

For corrective action study maintenance and cleaning.

## 5.8 Heat transfer problems

Measure flow rates and temperatures on both media, then check if the amount of heat energy corresponds to the specifications. If the capacity of equipment has dropped below specified values, then use the cleaning in place or open the heat exchanger for visual inspection and manual cleaning.

## 5.9 Removal of plates

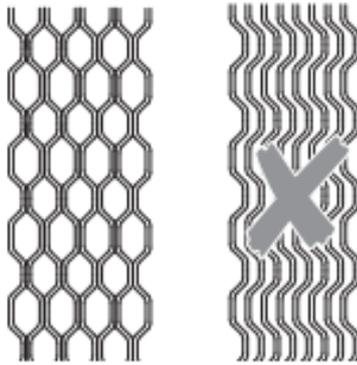
Exercise care when handling plates and use protective gloves.



1. Remove the plates one by one from the frame
2. Clean and/or inspect the plates hanging in the frame by removing them one at a time.
3. Remove the follower then tilt the plate for removal

## 5.10 Replacing plates

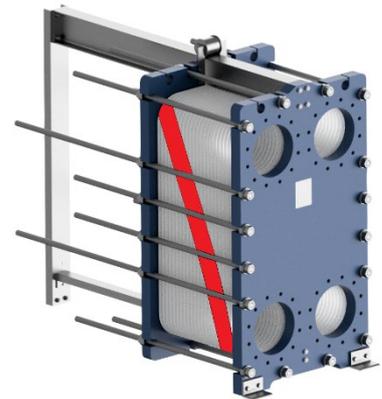
A plate can easily be removed and replaced by a spare plate. When the plates are properly assembled, the edges form a "honeycomb" configuration.



**Figure 7: Plate assembly**

Opening procedure:

- Shut down the heat exchanger
- Close the valves
- Drain the heat exchanger
- Dismantle pipes from the pressure plate
- Inspect the sliding surfaces of the carrying bar
- Mark the plate assembly on the outside by a diagonal line
- Measure and note the dimension
- Remove the locking bolts
- Use the tightening bolts to open the heat exchanger



As a starting point, when plates are removed and placed back in the heat exchanger, then always use the same tightening dimensions.

### 5.11 Cleaning of plates

The SonFlow plates are designed for both manual cleaning and cleaning-in-place operations. Before disassembly the user must assure that the unit has been locked out, de-pressurized, ambient temperature and drained.

Manual cleaning is normally accomplished by washing the plates with a soft non metal brush, water and cleaning solution. It is recommended to lay the plate on a flat surface during brush cleaning to avoid the risk of bending the plate.

If the heat exchanger is heavily fouled, care must be taken to remove all debris from the gasket sealing surfaces when the heat exchanger is reassembled.

#### Manual cleaning of plates:

1. Open the unit
2. Clean each plate separately.
3. **Never use a steel brush or steel wool**
4. Do not scratch the gasket surfaces
5. Rinse each plate with clean water (free from salt, Sulphur, chlorine or high iron concentration)
6. Use high pressure rinse
7. Always wipe the gaskets clean
8. Wipe off the mating surface
9. Inspection and installation of each plate, then the unit may be closed

A CIP system allows cleaning of the unit without disassembling, which is quick, cost-effective and easy cleaning – chemicals used for cleaning must be compatible with materials of construction. The cleaning is accomplished by circulating a suitable cleaning solution through the plate heat exchanger instead of opening it. The cleaning solution must be able to dissolve the fouling on the plates.

#### Cleaning-in-place (CIP):

1. Drain both sides of the unit.
2. Flush the unit on both sides with warm water
3. Drain the flush water from the unit and connect CIP pump
4. Rinse with warm water or warm water with softener at maximum flow rate - the cleaning works best in the reverse direction of normal flow.
5. Flush thoroughly with clean water after CIP cleaning

**Caution: Do not use chlorine or chlorinated water to clean stainless steel. Do not use phosphoric or sulfamic acid for cleaning titanium plates.**

#### Qualified cleaning chemicals:

- Oil and grease is removed with a water emulsifying oil solvent
- Organic and grease cover is removed with sodium hydroxide (NaOH) maximum concentration 1.5% - maximum temperature 85°C. concentration = 5.00 ltr. 30% NaOH per 100 ltr. water.
- Stone and limestone is removed with nitric acid (HNO<sub>3</sub>) - maximum concentration 1.5% - maximum temperature 65°C. 1.5% concentration = 2.4 ltr. 62% (HNO<sub>3</sub>) per 100 ltr. water.

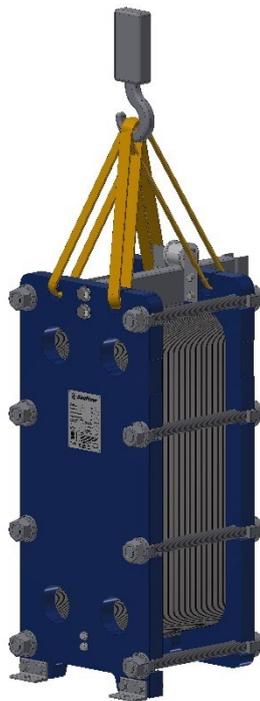
- Nitric acid also has an effective build up effect on the passivation film of stainless steel

## 6 Installation

The SonFlow plate heat exchanger should always be placed on a solid foundation floor. According to space requirements, 1.5 m from the walls, then ensure enough space around the plate heat exchanger, which is very important when servicing the unit – renewal of plates or tightening of the plate package. The amount of free space required is stated on the assembly drawing.



**WARNING:** To prevent personal injury especially if you are to lift the heat exchanger itself, then straps should be used. See the picture picture below.



**Figure 8: Lifting of the plate heat exchanger**

The authorized personnel are always responsible for the safety, correct selection of lifting equipment and execution of the lifting.

## 6.1 Lifting:

The heat exchanger is supplied horizontally on a pallet, where the back side of the head is tightened, then it can be transported by the means of a forklift truck, however a forklift truck may damage the plate heat exchanger in critical areas. Only use straps approved for the weight of the heat exchanger. SonFlow heat exchangers are provided with holes for safe lifting and transportation of the equipment. Always observe proper procedures for lifting and/or moving equipment.

When lifting an assembled heat exchanger frame, ensure that the lifting point is above the center of gravity of the equipment. The angle should not exceed 120° at any time.

If the weight of the plate heat exchanger exceeds 3000 kg this option is not available.



Follow carefully instructions bellow:

- Remove all tightening elements from the pallet
- Place straps around one bolt on each side (never use steel cables or chains!)
- Lift the heat exchanger
- Lower the heat exchanger slowly to vertical
- Remove the straps and tighten it to the floor

### Attention:

Remember:

- Use the lifting eyes (when lifted)
- Lift the top side
- Attach the straps to the bolts by the head

Never:

- Lift by the connections
- Lift the moveable plate
- Lift with a strap attached to the moveable plate

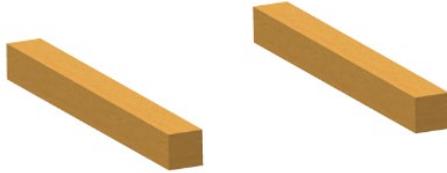


## 6.2 Raising

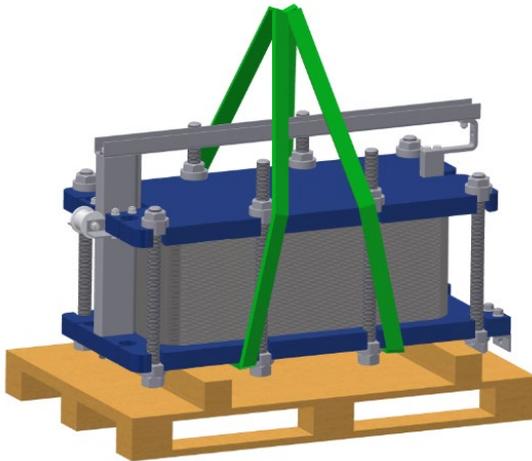
This instruction is valid when raising the heat exchanger after delivery from SonFlow. Only use straps approved for the weight of the heat exchanger. The straps shall be long enough to be able to rotate the heat exchanger.

Follow the principles:

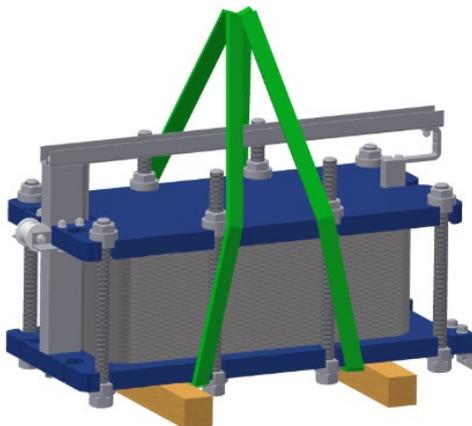
1. Remove the support feet and place two timber beams on the floor



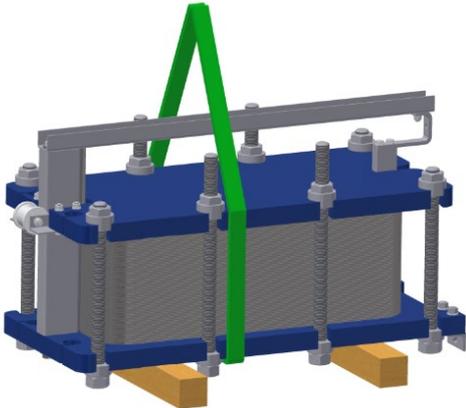
2. Lift the heat exchanger off the pallet by using straps



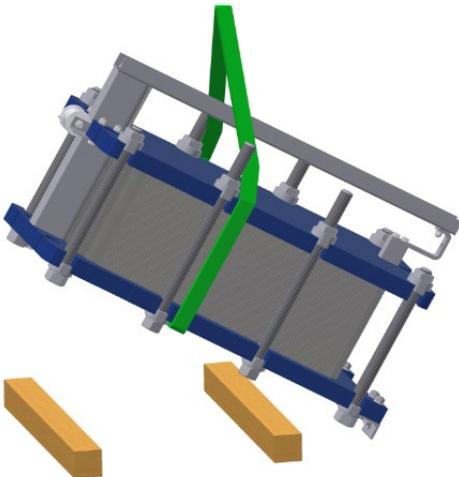
3. Place the heat exchanger on timber beams



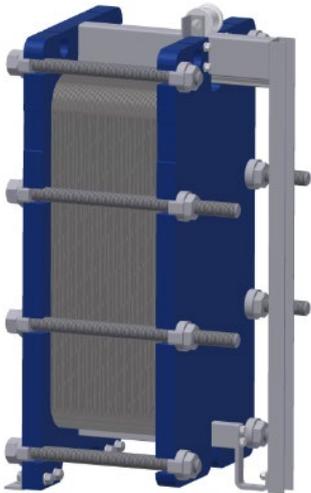
4. Place straps around the heat exchanger



5. Lift the heat exchanger from the timber beams



6. Lower the heat exchanger to horizontal and place on the floor



### 6.3 Connections

If the plate heat exchanger has connections on the moveable plate, it is important that the compressed dimension is checked against the drawing before the pipes are connected. It is necessary to leave free space around the equipment to give access and make future service possible. The dimensions suggested are 1,5 m to provide reasonably good working conditions during installation as well as maintenance and service.

### 6.4 Installing the pipe connections

Flanges, couplings, threaded pipes etc. will be equipped accordingly to the type of SonFlow plate heat exchanger.

#### Our advice:

- Support heavy pipe work, which will prevent heavy forces on the heat exchanger.
- To prevent vibrations always install flexible connections on the moveable plate, which also will prevent expansion of the pipe work caused by temperature influence – must be fitted in a longitudinal direction to the plate package.
- Before connecting to the heat exchanger, always remember to thoroughly clean the pipe work.
- Vents must be installed on both sides of the heat exchanger.

**Note:** Vents should be fitted on the highest point in the direction of the flow of the medium. Shut off valves in all connections when opening the heat exchanger.

#### Threaded pipe connections:

If a threaded pipe connection is provided, connections may not rotate when fitting to the pipe work, as it could damage the gasket on the start plate.

#### Flange connections:

If the connection is rubber lined, the liner will act as the flange gasket. The connecting flange must be bolted directly to the endplate by using the drilled and tapped holes. Bolts must be tightened evenly (do not over-tighten!).

Unless otherwise stated, the liquid circuits should be connected to flow in reverse directions through the exchanger (counter-current).

## 6.5 Storage:

Certain precautions are necessary when storing the heat exchanger for a longer period (1 month or more). The heat exchanger should be stored inside a room with a temperature of 15 to 20°C and a humidity of max. 70%.

The heat exchanger can also be stored in a wooden box provided with a lining on the side against penetration of moisture. It must be protected from water, debris and sunlight, while also allowing for air circulation.

Ozone producing equipment in the room is **prohibited** due to the destruction of rubber materials, such as operating electric motors or welding equipment. Do not store organic solvents or acids in the room and avoid heat or ultraviolet radiation.

All connections must be closed to prevent water or debris to enter the heat exchanger. Plugs or covers may be used.

## 6.6 Start-up

Before start-up, check that all the tightening bolts are firmly tightened and that the plate pack has correct measurements.

Start-up of the heat exchanger must be undertaken slowly and smoothly to avoid any pressure shocks/water hammering which might damage the equipment or cause leakage:

- Make sure that the plate pack is compressed to the right measurements.
- Avoid extreme variations of temperature and pressure to avoid damages.
- Before starting any pump, check instructions and check the valve between the pump and the equipment controlling the flow rate of the system.
- The valve at the exit should be fully open – if there is one.
- Open the vent
- Start the pump
- Open the valve slowly
- When all air is out, close the vent
- Repeat the procedure for the other media
- Design pressures and temperatures for each model are marked on the name plate, which shall not be exceeded.

Take protective actions to avoid risk for personnel injuries. Always ensure that the required actions are according to local regulations.

## 7 Commissioning

Commissioning may only be done by trained staff or by SonFlow commissioning engineers.

Maintenance, repair and control of the installation may only be done by authorized and trained staff.

Maintenance and cleaning may only be done when the temperature of the heat exchanger is below 40°C and shut down.

If you use hazardous flow media (e.g. explosive, flammable, caustic, toxic, under high pressure, very hot or very cold, persons can get in contact with the flow medium and become injured, if the plate heat exchanger is leaky.



**Before starting the plate heat exchanger commissioning, follow the conditions below:**

- That all components have been completely installed
- All piping connections are firmly connected
- Tensioning dimension of the plate heat exchanger pack is within permitted value range
- That no residues are present inside the plate heat exchanger

**Operating conditions:**

- Avoid liquid hammers
- Make sure that the plate heat exchanger is not operated with unpermitted flow media, pressure or temperature levels
- Ensure that the plate heat exchanger is vented

**Filtration:**

Filtration prevents foreign particles with potential risk of disrupting the performance of the system. The filter prevents particles flowing through the heat exchanger and cause clogging of the heat exchanger.

### 7.1 Operation

Always start with the cold circuit, then the hot circuit.

Fully vent the system:

- Close and shut off the valve fitted between the pump and exchanger
- Fully open the valve fitted into return line from the exchanger

- Start the circulation of pump normally when placed by the inlet
- Gradually open the closed and shut off valve between the pump and exchanger
- Vent system again if necessary

Repeat the above for secondary circuit.

### **Steam as the media:**

Slowly use acting steam control valves and slowly open the shut off valves.

Before starting:

- Ensure that the steam control valve is fully closed
- Ensure that the heat exchanger is fully drained of condensate
- Start cold circuit first, then the steam
- Slowly open the steam control valve – prevents thermal shock to the exchanger
- Ensure that the steam trap is correctly sized to allow condensate discharge, which prevents water clogging

### **Check for proper operation:**

- Check for pressure pulses in the system caused by the pumps or control valves. Stop operation and rectify if found
- Check the unit for leakages
- Check that all the vents are closed to prevent air being sucked inside.

## **7.2 Shut down for a short period**

Follow the following procedure:

- Close the control valve in the hot circuit and maintain the full flow in the cold circuit
- Turn off the hot circuit pump
- The heat exchanger must cool down
- Close the control valve in the cold circuit
- Turn off the cold circuit pump
- Close all remaining shut off valves

### 7.3 Shut down for a long period

If the unit must be disconnected, follow the following procedures:

- Never open a heat exchanger unit when it is hot – the heat exchanger must cool down
- Decrease the pressure of both fluids
- Completely drain fluids from the unit
- Lubricate all bolts
- Loosen the clamping bolts until the plate pack is loosened
- Do not remove tie bolts
- Cover the plate pack to avoid sunlight

## 8 Maintenance

Never open the SonFlow plate heat exchanger until the unit has cooled below 40 °C.

Never open a SonFlow heat exchanger, which is under pressure from any source.

Never open a SonFlow plate heat exchanger without dismantling the piping first.

SonFlow recommends maintenance once a year as a minimum to keep the heat exchanger in good condition.

The plates must be cleaned on a regular basis depending on the type of media and temperature. After a long period of use, it can be required to regasket the heat exchanger.

What should be performed regularly:

- Lubricate the carrying bar and guiding bar
- Lubricate bolts
- Check temperatures and flows
- Check general condition
- Look for signs of leakage
- Look for signs of damage
- Check bolts and bars for rust

For large units, block the moveable plate into position by tying it to the end support, to provide extra safety against accidental rolling of the moveable plate during maintenance.

Always wear protective gloves when handling plates.

Remove the plates by lifting them backwards and then sideways off the top bar and then sliding out of the frame.



## 8.1 Frame maintenance

Carry out simple maintenance work of the frame:

- Clean the outside of the plate heat exchanger frame, especially the beams, rails and bars.
- Grease the guide rails
- Rework paint damage

## 8.2 Pressure test after maintenance

These processes are only allowed to be performed by a person authorized according to local laws and regulations and following applicable standards.

It is recommended to perform a pressure test to confirm the internal and external sealing function of the plate heat exchanger.

Test pressure is stated on the name plate, therefore the pressure testing shall be performed at an equal pressure, never above the design pressure.

In a multi-section set up, all sections of the same side must be tested simultaneously.

Test time: 10 minutes

If the unit is leaking, it may be tightened step by step according to the dimensions, which are mentioned on the name plate.

Rebuilding or modification of the heat exchanger is the responsibility of the end user.

Please consult SonFlow's representative for advice on the pressure testing procedure, if there is any uncertainty.



## 8.3 Problem solving

In most cases, problems can be solved by your own personnel when it comes to:

Leakage:

- At the connections – check the rubber liners, check the flange gasket, check the O-ring and fit the pipes tension-free
- Mixing of primary and secondary circuit – check the plates for holes and cracks
- Plate package – check the assembly, check the condition of the gaskets, check the proper position of the gasket
- The operating conditions – adjust the operating conditions

Insufficient capacity:

- Air in the system – de-aerate the pipe system and check the pipe work for possible air traps
- Conditions deviate from the specification – adjust the operating conditions
- A dirty heat exchanger – clean the heat exchanger
- Connections have been interchanged – do the pipe work again

Too high pressure drops:

- Flow larger than the design flow – adjust the flow
- Channels blocked in the plates – flush/clean
- Incorrect measurements – check the pressure indicator
- Medium deviating from the design – anti-freeze will increase the pressure drop
- Air in the system – de-aerate the pipe system and check the pipe work for possible air traps

## **9 After-sales & service**

When ordering parts, the following should be quoted:

- Project and order number
- Exchanger type and manufacturing number
- Required parts
- Plate types
- Gasket material

We are globally active therefore, not far away to support you and obtain the maximum availability of your systems. Our aim is to ensure high-quality spare parts for trouble-free operation of your plate heat exchanger. We are always happy to answer any questions you may have and meet your requirements. We look forward to hearing from you.

[www.sonflow.dk](http://www.sonflow.dk)