

Gasketed plate heat exchangers

# SONDEX<sup>®</sup> Traditional Plate Heat Exchangers

Featuring basic knowledge and a description of the anatomy of SONDEX<sup>®</sup> Traditional plate heat exchangers.

**100%**

Customized solutions that provide reliable, unmatched heat transfer



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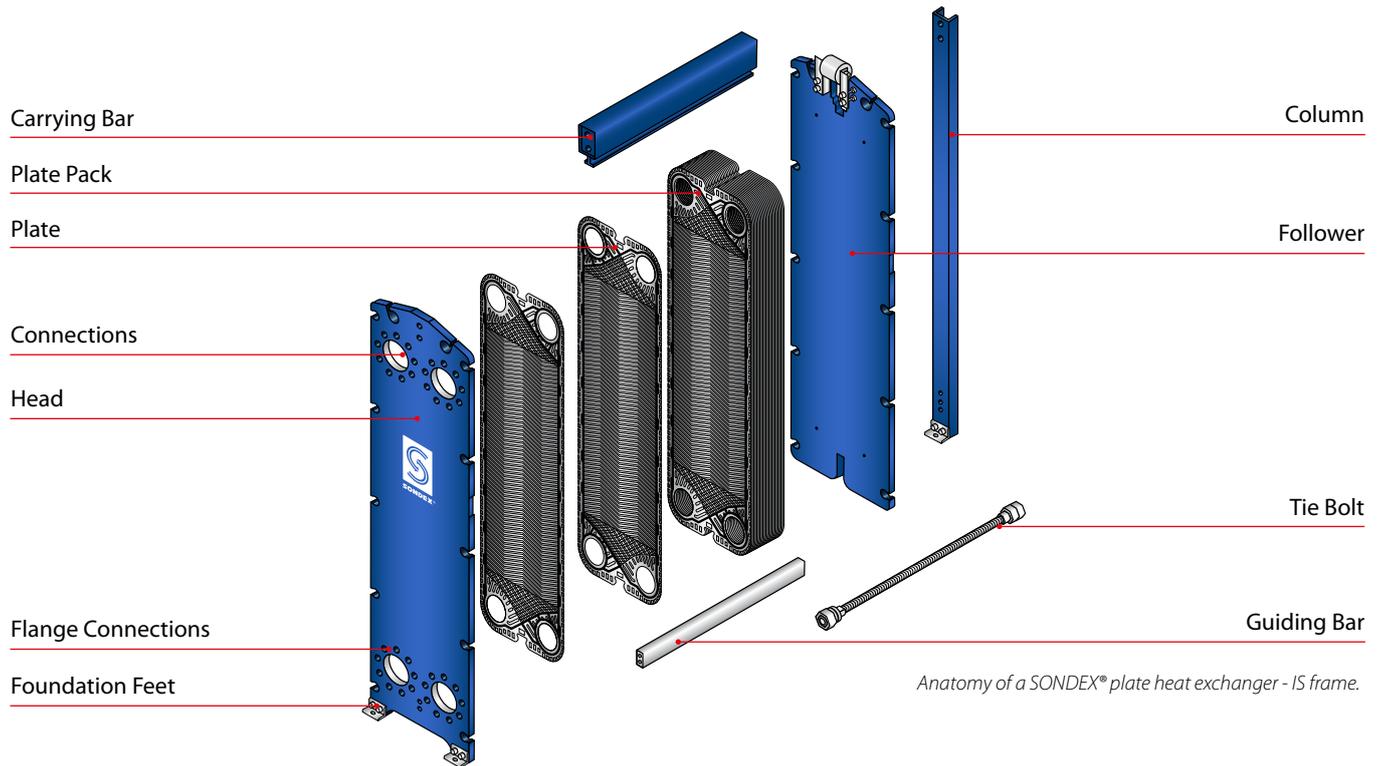
This compendium contains basic knowledge and a description of the anatomy of SONDEX® Traditional plate heat exchangers. It is meant to give you an overview of the composition and working principle of the plate heat exchangers, as well as some unique selling points and general benefits of choosing a SONDEX® plate heat exchanger.

Furthermore, you will find an outline of the application areas and an explanation of the importance of perfectly matching the thermal requirements of our customers' installations.

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# Anatomy of a Plate Heat Exchanger



Anatomy of a SONDEX® plate heat exchanger - IS frame.



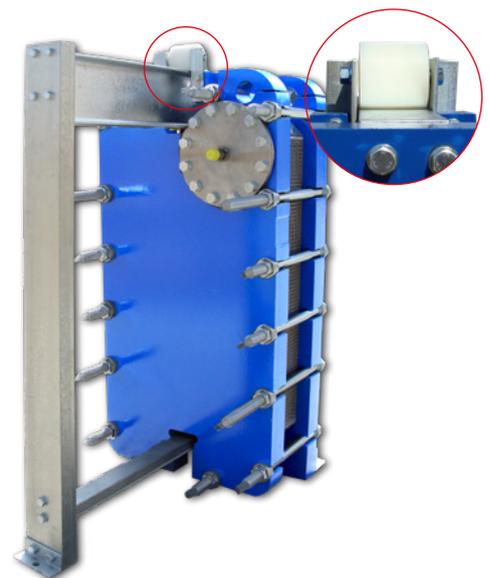
## Frame

It is important that the frame is strong, rigid, and durable, as it is the foundation of any plate heat exchanger.

SONDEX® frames are designed according to prevalent rules and legislations and comply with international standards. By default, our frame designs are developed according to the PED 2014/68/EU (EN13445) and ASME sec VIII, Div. 1 construction standards.

Our frames are painted with a durable RAL 5010 blue colour, with more colours available upon request. Several paint classifications are available according to your specifications. Different paint classifications are suitable for different conditions, such as the installation environment or the media itself.

Furthermore, our frames are designed to make assembly, and service and maintenance as easy as possible.



## Follower

The follower is equipped with a big roller, making it easy to slide the follower back and forth. This makes opening and closing the plate heat exchanger an easy task, when service and maintenance must be performed.

## Optional Features

It is possible to install inspection holes that allow for easy examination of the interior of the plate pack. This is particularly useful when treating media that contain pulp or fibres, which have a tendency to cause fouling in the heat exchanger.

Sea water filters can also be installed in the plate heat exchanger. This is particularly useful if the plate heat exchanger is going to be used in the marine/offshore industry, aboard vessels or platforms. The filter will catch smaller particles, resulting in longer intervals between service and maintenance.



## Head

By default, we design our plate heat exchangers as single-pass solutions with all connections on the head side.

Having all connections on the head makes service and maintenance work very easy, as you do not need to dismantle the pipe installation in order to access the interior of the heat exchanger.

The head and the column can be equipped with strong foundation feet that make it easy to fixate the heat exchanger to the rest of the installation.

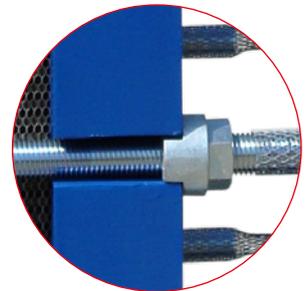
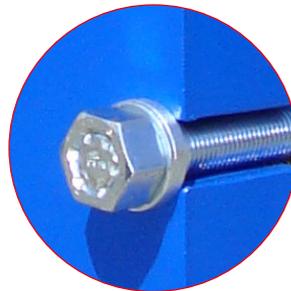
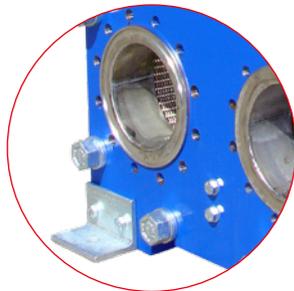


## Plate Pack

The heart of the plate heat exchanger is the plate pack, where the heat transfer takes place. The plate pack consists of a number of plates that feature state-of-the-art plate pattern design.

The combination of plate type and pattern determines the efficiency of the heat exchanger, and is calculated to match the thermal requirement of the duty.

Each plate is fitted with a high-quality gasket, that seals the heat exchanger, guides the flow, and aligns the plates.



## Connections

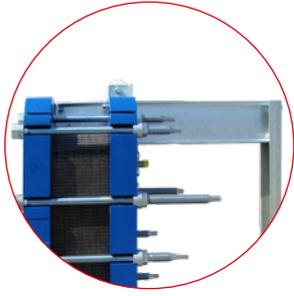
Our Traditional plate heat exchangers have connections that range from DN25 to DN650 (1" to 26"), with threaded pipes and flange connections designed according to all standards available, thus eliminating the need for reducers in the piping system.

Our flange connections can be lined with rubber, or clad in the same material the plates are made from, such as AISI 316 or titanium, to protect against corrosion damages.

Our connection sizes match any duty, which means that there is no change in the velocity of the flow during operation. This reduces the wear and tear of the pipe installation, and means lower maintenance costs and better, more stable installations.

## Tie Bolts

SONDEX® tie bolts are designed to be tightened from the head side of the plate heat exchanger. This makes opening, closing, and tightening of the heat exchanger easier, as the ratchet spanner does not need to be manoeuvred along the entire length of each tie bolt, which significantly reduces labour effort and assembly time.

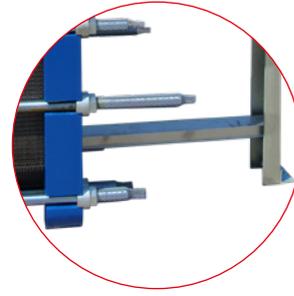


## Carrying Bar

Our carrying bars are designed to be strong enough to prevent distortion or slumping from the weight of the plate pack - even after many years of operation.

Furthermore, the carrying bar is designed to allow the plates to easily slide along the bar. The length of the bar is designed to provide enough room for cleaning the plates without having to remove them from the frame. This saves time and money during service of the heat exchanger.

Additionally, the carrying bar on our IS frames is designed to allow extraction of a single plate, without having to remove all the other plates.



## Guiding Bar

The guiding bar is a very important part of the frame that is often overlooked when designing the frame. The bar helps prevent misalignment, or "snaking" of the plate pack by supporting the plates during assembly, or when opening the heat exchanger for service.

The bar must be designed to be strong enough to withstand the side load of the powerful tightening forces when assembling the heat exchanger.

# Plates

## Hanging System

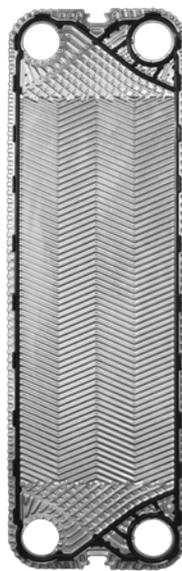
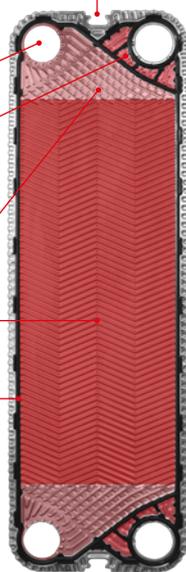
Inlets

Drain Zone

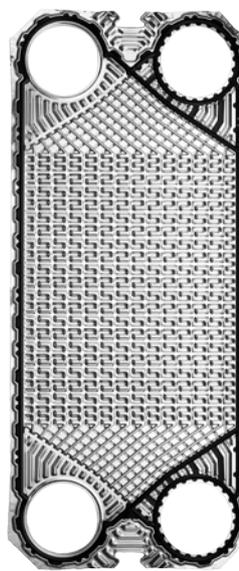
Distribution Area

Heat Transmission Area  
and Main Pattern Area

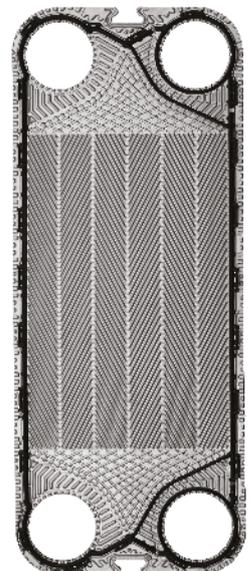
Gasket



Traditional Plate



Free Flow Plate



Semi-Welded Plate

The plates are commonly made of AISI 304/316 or titanium, but can also be made from other pressable and exotic materials. The type of material depends on the treated media and their temperatures.

The plates form the plate pack, which is held firmly between the head and the follower of the frame. The corrugated pattern on the plates ensures a turbulent flow in the entire heat transmission area, and is designed to eliminate "dead zones".

The choice of plate pattern depends on the type of media that is treated in the heat exchanger. We offer a large variety of different plate patterns, from fishbone patterns in varying pressing depths and angles, to Free Flow patterns that allow media containing particles and fibres to pass through the heat exchanger unimpeded.



## Heat Transmission Area

The heat transmission area is the “main” part of the plate, and this is where the primary heat transfer takes place. Our many years of experience with thermal design and plate pressing techniques is our greatest strength, and our plate design is based on this knowledge.

Through our expertise we have maximized the heat transmission area of each plate. This improves the thermal efficiency of the entire plate pack in SONDEX® plate heat exchangers.

The size of the heat transmission area depends, of course, on the size of the plate.

We have the process knowledge that enables us to develop heat transmission areas that perfectly match the requirements of your duty, and deliver a plate size that is optimized for maximum efficiency in your installation.



## Hanging System

SONDEX® plates feature a unique, reinforced hanging system. The plate is securely suspended from the carrying bar on the heat exchanger and is perfectly aligned by the guiding bar.

Furthermore, the reinforced hanging system is very important during assembly or service of the plate pack, as it helps the plates withstand the powerful tightening forces, and prevents misalignment, or “snaking” of the plates.

If the hanging system is not reinforced, there is great risk of the plate corners collapsing, which will cause the plate pack to leak. The faulty plate would then have to be replaced.

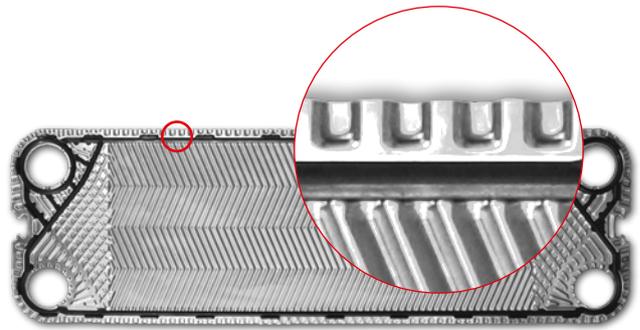
This makes SONDEX® plates a solid investment, as the lifetime of the plates is increased and service intervals are reduced.



## Distribution Area

The distribution area on SONDEX® plates is designed to prevent “dead zones”, and features angled guiding channels that ensure an even distribution of the media across the entire plate.

Furthermore, the pressure drop in the distribution area is minimal and is used on the heat transmission area instead, which results in better heat transmission efficiency.



## Edge Reinforcement

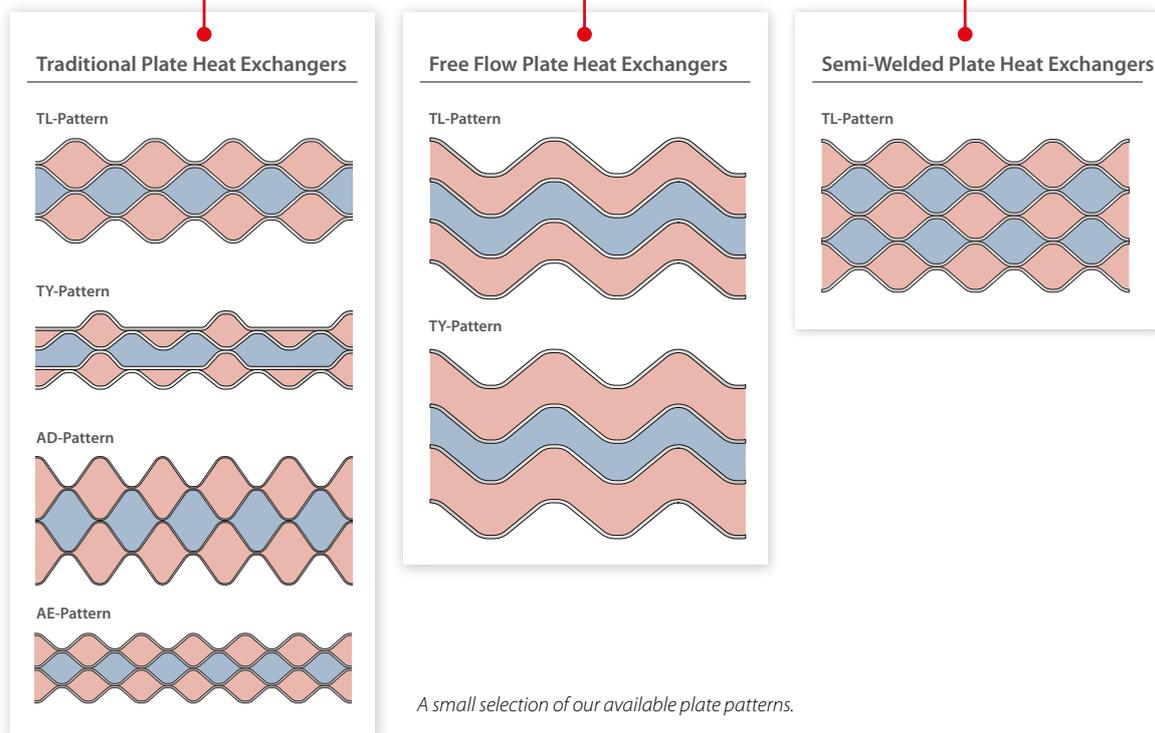
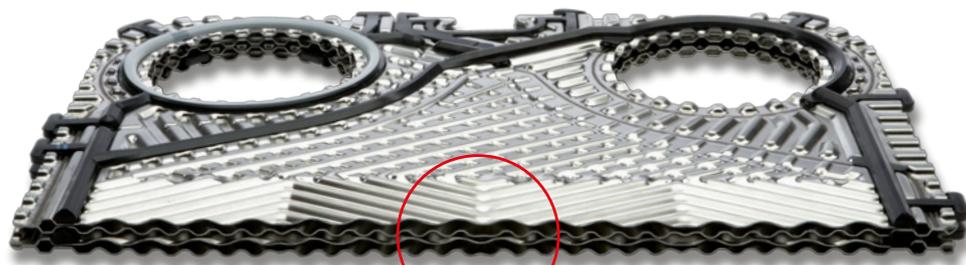
SONDEX® plates feature reinforced edges in order to strengthen the gasket groove and provide optimal support for the plates. The reinforcement is made by pressing the plates on both sides of the gasket groove, which fixes the gasket securely in place. Furthermore, this provides a solid foundation for the adjacent plates to rest upon.



## Gasket Safety

SONDEX® plates and gaskets are designed with a special “drain zone” to prevent damage in the unlikely event of a leakage. The two media cannot mix, as this safety feature forces the media to leak externally in case of gasket defects, or if the gasket has been misaligned due to the impact of pressure surges.

# Main Plate Pattern



## Pattern Properties

Each pattern has different properties, and is developed to handle specific duties, as well as meet individual requirements. The allowed pressure drop for the media being treated in the heat exchanger correlates with the size of the heat exchanger. The sized of the needed heat transmission area can be reduced if a higher amount of the pressure drop is used. This makes it important to use the allowed pressure drop to the fullest.

Some patterns only use a low pressure drop, but offer a lower level of turbulence, while others offer high turbulence in exchange for a high pressure drop. Other patterns have very deep channels, making them suitable for high-viscosity media and media that cause fouling. Some patterns combine multiple channel depths in a single plate to handle the flow rate and thermal requirements for different media in a single heat exchanger.

Having a large variety of patterns for each plate size, as well as an extensive plate range, guarantees the best possible technical solution for your specific application of the heat exchanger.

## Pattern Development and Innovation

We constantly improve our plate patterns and develop new technical solutions, as we are determined to provide our customers with quality installations, tailored to individual thermal duties, across all market segments.

We have many years of experience with pressing tool design, which allows for greater, uniform plate deformation.

Our plates feature state-of-the-art plate pattern design and are developed using the latest pressing technology. This technology allows us to increase the heat transmission area, making better use of the plate sheet, meaning that SONDEX® plates are very efficient, while maintaining their strength.

# Gaskets



## In-House Gasket Production

We are proud to have our own in-house gasket production and testing facilities around the world to ensure an uncompromising quality of our gaskets.

The gasket is a very essential part of the plate heat exchangers. Without a proper, high-quality gasket that fits the plate perfectly and provides tight sealing, the performance and lifetime of the plate heat exchanger is significantly reduced.

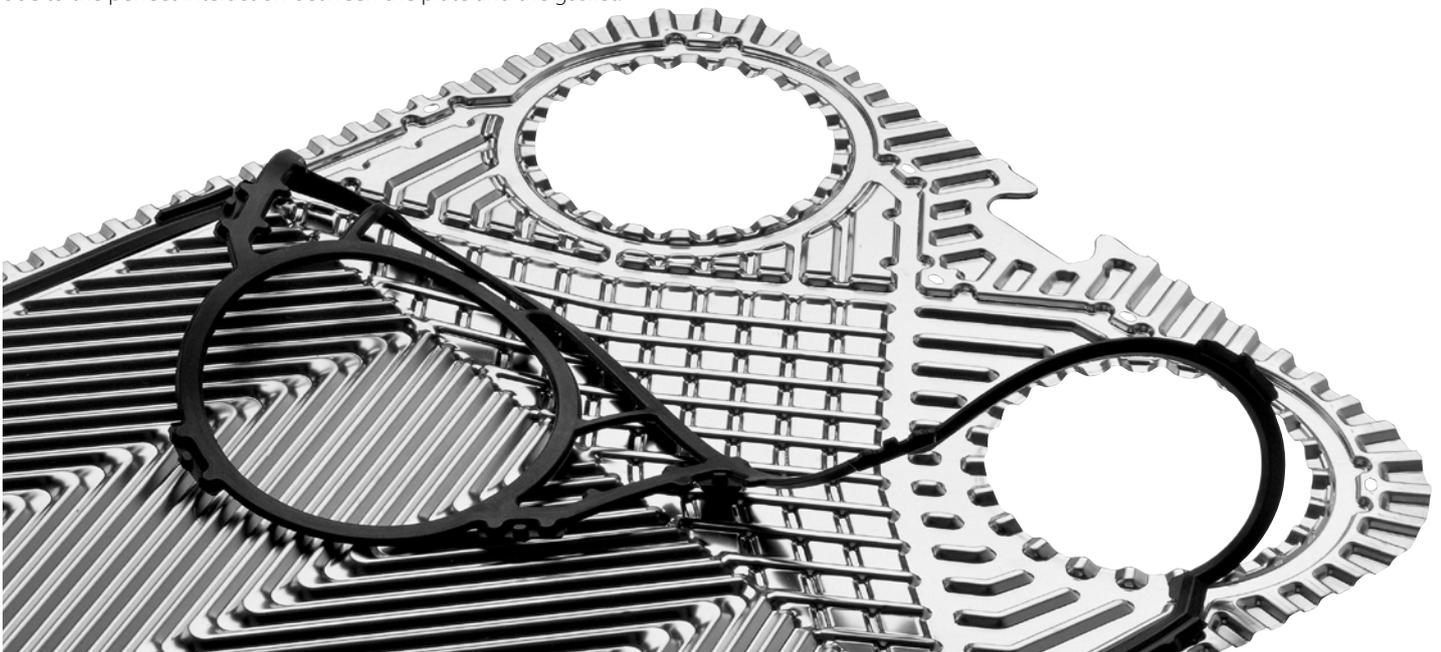
SONDEX® gaskets are designed and developed according to the latest standards in rubber technology and gasket design. We provide our customers with gaskets that meet all requirements of the thermal duty, and are well-suited for the media that are being treated in the heat exchangers.

The result is superior heat exchangers that perform exceedingly well due to the perfect interaction between the plate and the gasket.

## Materials

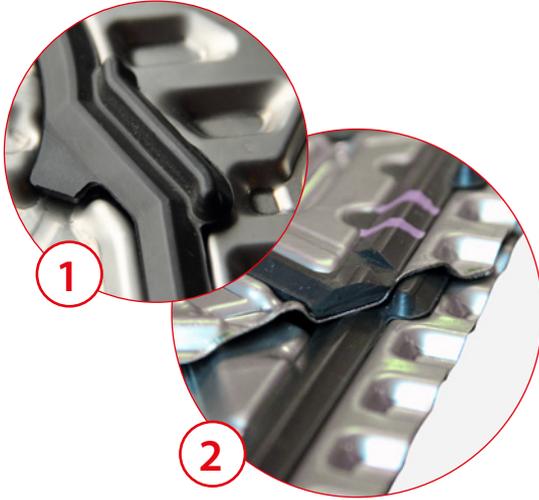
The quality of a gasket is directly tied to the gasket design and the materials used in its production. The composition of the rubber compound not only determines the lifetime of the gasket and its ability to maintain elasticity, but also its areas of application. Some gaskets are better suited for aggressive media than others, so it is important to choose the right gasket for the right duty.

Furthermore, the unique design and low compression gives the gasket a long lifetime. We use an assortment of rubber compounds from nitrile, EPDM, and Viton, to chloroprene, Hypalon, and butyl to cover all possible duties.

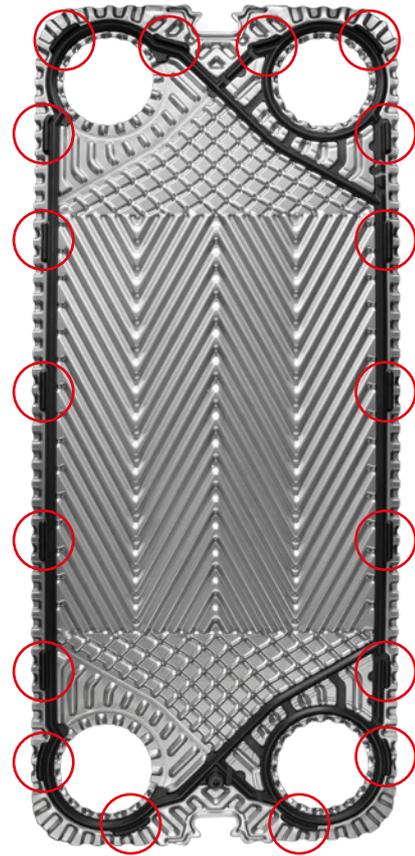


## Sonder Lock Gaskets

SONDEX® Traditional plate heat exchangers are fitted with the unique Sonder Lock system, which “locks” the plates together and perfectly aligns the plate packs. The alignment of the plates is possible due to the strong rubber buttons on the Sonder Lock gaskets that fit perfectly into the back of the adjacent plate. This keeps the plates in place and prevents misalignment, or “snaking” of the plate pack.



- 1: A Sonder Lock rubber button.
- 2: The buttons lock the plates together.

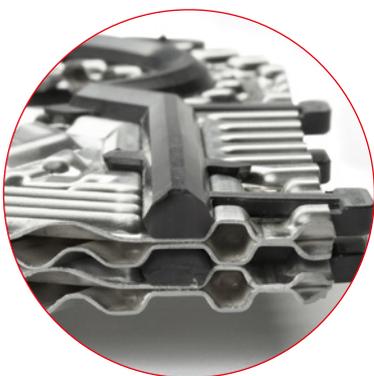


Sonder Lock rubber buttons are evenly spread out across the gasket, ensuring easy assembly and maintenance.

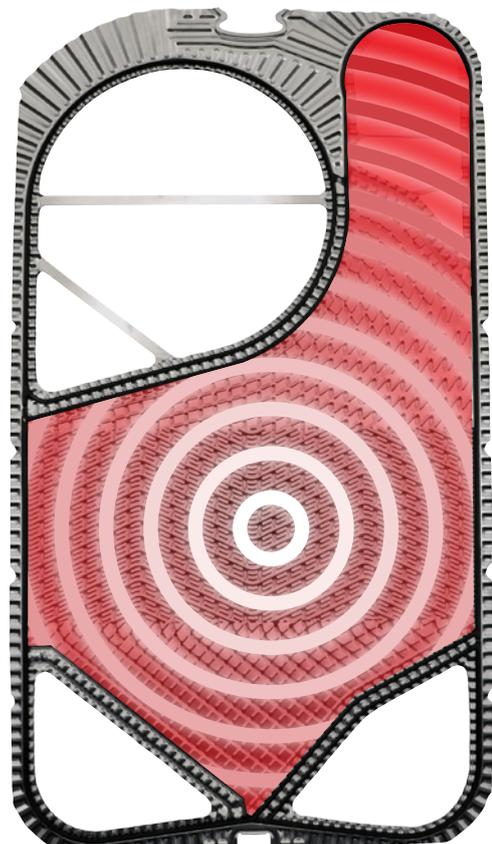
## Sonder Guide Gaskets

SONDEX® Semi-Welded plate heat exchangers are fitted with the unique Sonder Guide system that guides the plates together using a closed gasket groove. This keeps the plates in place and prevents “snaking” of the plate pack when assembling the heat exchanger.

Furthermore, this gasket design is particularly well-suited for high working pressures and vacuum applications, as the pressure inside the gasketed area helps keep the gasket in place. The Sonder Guide system is used in all our semi-welded plate heat exchangers, as well as in our condensers and evaporators.



The gaskets guide the plates during assembly.  
The gaskets fit perfectly into the empty gasket groove on the back of each plate, making the process easy and problem free.



The pressure from the flow area of the plate keeps the gasket in place. This makes this type of gasket well-suited for high-pressure installations.

# Traditional Plate Heat Exchangers

## Customized Solutions

The SONDEX® Traditional series is a top-of-the-line, single-pass plate heat exchanger range that can be fully customized to meet your requirements. We perfectly match the individual thermal requirements of any duty, and we have developed a plate programme that is second-to-none.

By upgrading to a SONDEX® product you will receive a service-friendly, easy-to-install solution that is designed specifically for your thermal duty, and provides reliable, unmatched performance while lowering your energy consumption.

PLATE LENGTHS:  
25cm - 5m

CONNECTIONS:  
DN25 - DN650

FLOW VOLUME:  
50 l/h -  
7,200 m<sup>3</sup>/h



## Benefits



### Customized Solutions That Match Your Requirements

Our large selection of plates, plate patterns, and pressing depths enables us to cover all thermal duties with solutions that match the requirements perfectly compared to other plate heat exchanger designs.

The efficiency of an installation depends on how well the heat exchangers match the thermal requirements of the duty. We have specialized in developing a plate range that covers all duties and is second to none!

SONDEX® design engineers are always in direct contact with our customers to ensure that our products match the requirements and remain state-of-the-art.

The single-pass solution of SONDEX® heat exchangers is very easy to further customize and upgrade. During an upgrade, no changes need to be made to the pipe installation due to the accessible design of our single-pass plate heat exchangers.

### Single-Pass Solutions With All Connections on the Head

By default, we design all of our plate heat exchangers as single-pass solutions that have all connections on the head.

Our designs are superior to multi-pass solutions, as we require fewer plates to perform the thermal duty efficiently. The increased efficiency equals a greatly reduced footprint, and also means a lower purchase price, as fewer materials are needed to construct the heat exchanger.

With all connections on the head, maintenance and cleaning of single-pass solutions is also much easier, as opening the plate heat exchangers do not interfere with the pipe installation.

Our heat exchangers are designed to be efficient enough to reduce the media volumes needed for operation. This greatly diminishes the dangers associated with accidents when operating with chemical substances.



### Lower Purchase and Operational Costs

The plate technology used in SONDEX® plate heat exchangers results in a much higher heat transfer coefficient compared to tubular heat exchangers and other plate heat exchanger designs.

Consequently, the required heat transmission area is reduced, which results in less material needed for each plate, thus making the heat exchanger less expensive.

Additionally, the savings on material costs are even greater when using exotic material types, such as SMO Steel, Hastelloy C-276, titanium or other materials that are required when treating aggressive media in the heat exchanger.

Furthermore, high-efficiency plate heat exchangers equal less energy consumption, which means that the operational costs are reduced in the long run.



### Localized Service and Maintenance Available Near You

SONDEX® Traditional single-pass plate heat exchangers are designed to have all connections on the head of the heat exchanger, which is very advantageous during service work, or if the capacity needs an upgrade.

We offer service work across the globe from our local SONDEX® subsidiaries or through our local, well-educated agents and partners.

We provide on-site service work on all brands of plate heat exchangers, including repairs, leak detection, as well as gasket and plate replacement.



### Premium Protection Against Leaks

Sonder Safe plate heat exchangers offer important measures to minimize damage caused by leaks by preventing the media from mixing.

In the unlikely event of a leakage, the Sonder Safe plate design makes the leaks visible from outside the plate heat exchanger.

The single-pass heat exchanger can quickly be disabled for service and resume operation within a short time frame.



### Maximum Turbulence, Less Fouling

The right velocity and turbulence greatly reduces the risk of fouling. This is achieved with the specially designed corrugated fishbone pattern and the right choice of plate heat exchanger from our extensive range.

The result is longer intervals between service, more reliable operation, and reduced maintenance costs.

# Applications

## Our Solutions are Optimized for Your Thermal Duties!

Our Industry Matrix provides you with a quick overview of the applications of our entire product portfolio, as well as the industries we cover.

All of our products are developed in close cooperation with our customers to ensure that we can perfectly match their requirements.

### Deep Process Knowledge

Having deep process knowledge of the different market segments is essential for choosing the right plate heat exchanger. SONDEX® design engineers are always in direct contact with our customers to ensure that the requirements of the media are taken into account when designing the heat exchanger.

We have many years of experience across numerous market segments, affording us great knowledge and insight into the industrial processes and their thermal requirements.

Armed with this knowledge, we provide customized heat exchangers that perfectly handle each individual thermal duty, across all segments.

### Extensive Plate Portfolio

SONDEX® plate heat exchangers can be used in a large number of applications, as our product range covers all thinkable flow rates, from the lowest to the highest. We are able to cover all thermal requirements with our extensive plate range that includes short plates for low thermal requirements and long, slim plates for high thermal requirements. All of our plates are available with different patterns and pressing depths for each plate size.

	Food Industry	Marine/Offshore Industry	Dairy/Food/Beverage Industry	Textile Industry	Pulp Industry	Wastewater Industry	Refining Industry	Pulp & Paper Industry	Pharmaceutical Industry	Chemical Industry
Traditional Plate Heat Exchangers	●	●	●	●	●	●	●	●	●	●
Sanitary Plate Heat Exchangers		●								
Semi-Welded Plate Heat Exchangers	●	●	●	●	●	●	●	●	●	●
Free Flow Plate Heat Exchangers		●	●	●	●	●	●	●	●	●
Condensers		●	●	●	●	●	●	●	●	●
Evaporators		●	●	●	●	●	●	●	●	●
All-Welded Plate Heat Exchangers	●				●	●	●	●	●	●
SandBlock Heat Exchangers	●									
Plate & Shell Heat Exchangers	●	●	●	●	●	●	●	●	●	●
Spiral Heat Exchangers		●	●	●	●	●	●	●	●	●
Brazed Heat Exchangers	●	●	●	●	●	●	●	●	●	●
Freshwater Distillers	●									
Unit Solutions	●	●	●	●	●	●	●	●	●	●

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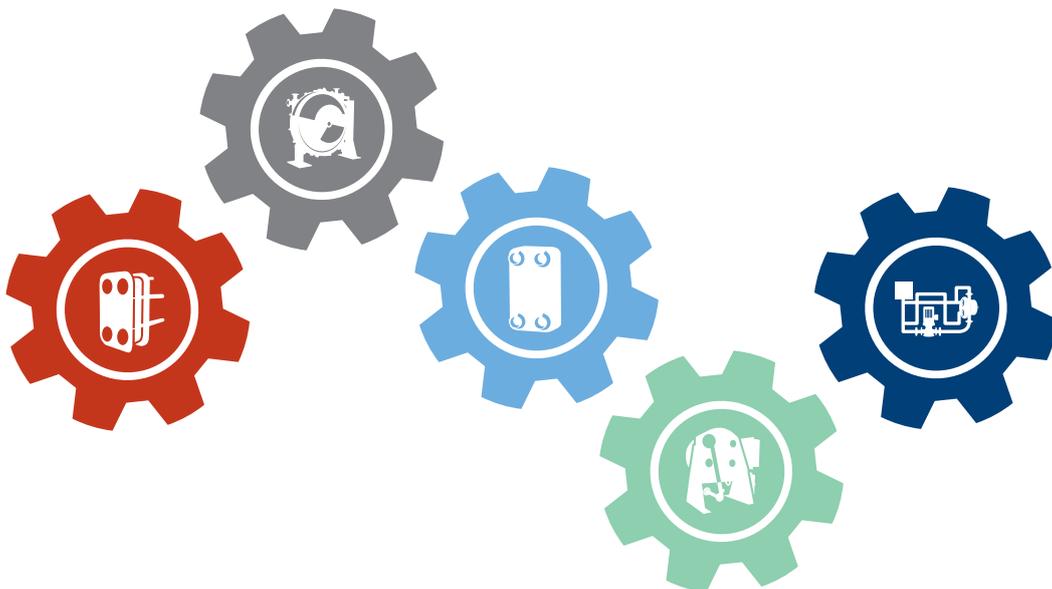
### High-Quality Materials

The right choice of plate and gasket material is extremely important for the life time of the entire installation. We offer many high-quality options for plate and gasket materials depending on the requirements of the thermal duty to ensure an efficient, lasting solution.

### Products for All Applications and Thermal Duties

If our Traditional plate heat exchangers are unable to handle a given application or thermal duty, the right solution might be one of our other products – each one is specially developed to handle different thermal and process specifications.

Use our Industry Matrix to get an overview of all our products, as well as the industries they are suited for.



	HVAC Industry	Marine/Offshore Industry	Dairy/Food/Beverage Industry	Sugar Industry	Biogas Industry	Wastewater Industry	Refrigeration Industry	Pulp & Paper Industry	Heavy Industry	Mining Industry	Petrochemical Industry	Chemical Industry
Traditional Plate Heat Exchangers	●	●	●	●	●		●	●	●	●	●	●
Sanitary Plate Heat Exchangers			●									
Semi-Welded Plate Heat Exchangers	●	●	●	●			●	●	●	●	●	●
Free Flow Plate Heat Exchangers			●	●	●	●		●		●		
Condensers			●	●	●			●	●	●	●	●
Evaporators			●	●	●			●		●		●
All-Welded Plate Heat Exchangers	●						●	●	●	●	●	●
SondBlock Heat Exchangers	●						●	●	●	●	●	●
Plate & Shell Heat Exchangers	●	●	●	●	●		●	●	●	●	●	●
Spiral Heat Exchangers			●		●	●		●	●		●	●
Brazed Heat Exchangers	●		●				●					
Freshwater Distillers		●										
Unit Solutions	●	●	●	●			●					

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# Technical Specifications



## Frame

Painted frame, colour RAL 5010.

(Also available in other colours).

The frame is equipped with tie bolts placed around the edge of the frame.

## Design Pressure

0.6/1.0/1.6/2.5/3.0 MPa

(87/145/232/363/435 psi).

Other design pressures are available on request.

## Design Temperature

-20 °C to 180 °C

(-4 °F to 356 °F).

Other design temperatures are available on request.

## Connections

From DN25 up to DN650 (1" up to 26") flanges in carbon steel, rubber lined, or clad with AISI 316 or titanium. According to all known standards.

## Plate Material

AISI 304/316 and titanium.

Other materials are available on request.

## Gaskets

The plates are fitted with the unique Sonder Lock system, which "locks" the plates together and perfectly aligns the plate pack. The alignment of the plates is possible due to the strong rubber buttons on the Sonder Lock gasket, that fit perfectly into the back of the

adjacent plate.

## Gasket Materials

NBR, EPDM and Viton.

Other materials are available on request.

## Performance Certificates

AHRI (LLHE)

## Construction Standard

PED 2014/68/EU (EN13445).

ASME sec VIII, Div. 1.

## Classification Societies

ABS / BV / CCS

DNV-GL / LRS / NKK

RINA / RMRS / CR

CSC BPV

## Extra Equipment

Safety cover in stainless steel.

Insulating jacket.

Assembling spanner.

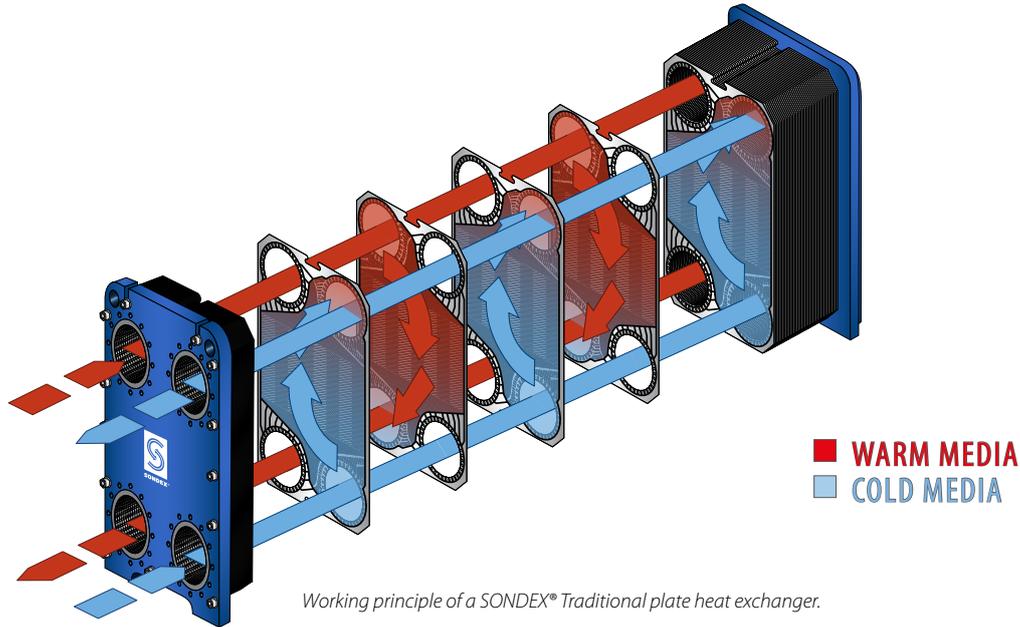
Foundation feet.

Instrument flange.

Thermometer and manometer.

# Working Principle

## Behind the Scenes of Plate Heat Exchangers



### Heat Transfer

Passing energy from one media to another in order to either heat up or cool down the media, is the basis of heat transfer. This can be done by treating the media in a heat exchanger.

SONDEX® plate heat exchangers use highly efficient flow plates to achieve the heat transfer, and are superior to tubular heat exchangers and other plate heat exchanger designs in terms of heat transfer efficiency, space requirements and ease of maintenance.

### Distribution of the Media

The media are circulated in a counter-current flow within the plate heat exchanger and are introduced into the system via the inlets. From the inlets, the media cascade through the distribution area which is specially designed to eliminate “dead zones” and ensure an optimal, even distribution of the media across the heat transmission area of the plates.

### Heat Transmission Area

The heat transmission area is the most important part of the plate when it comes to the heat transfer itself. The warm media transfers its energy through the plate, to cold media on the opposing side of the plate. The plates act as “separators” that prevent the media from mixing.

### Plate Pattern

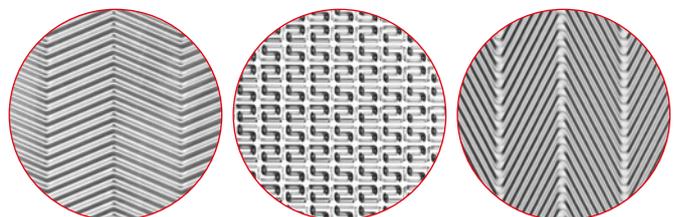
The media flow through the channels of the pattern that is pressed into the heat transmission area of each plate. The patterns are available in numerous types, each with its own unique properties and purpose. As such, the patterns have great impact on the heat transfer efficiency of the heat exchanger and must be carefully chosen to accommodate the specific requirements of each thermal duty.



Distribution area of a plate.



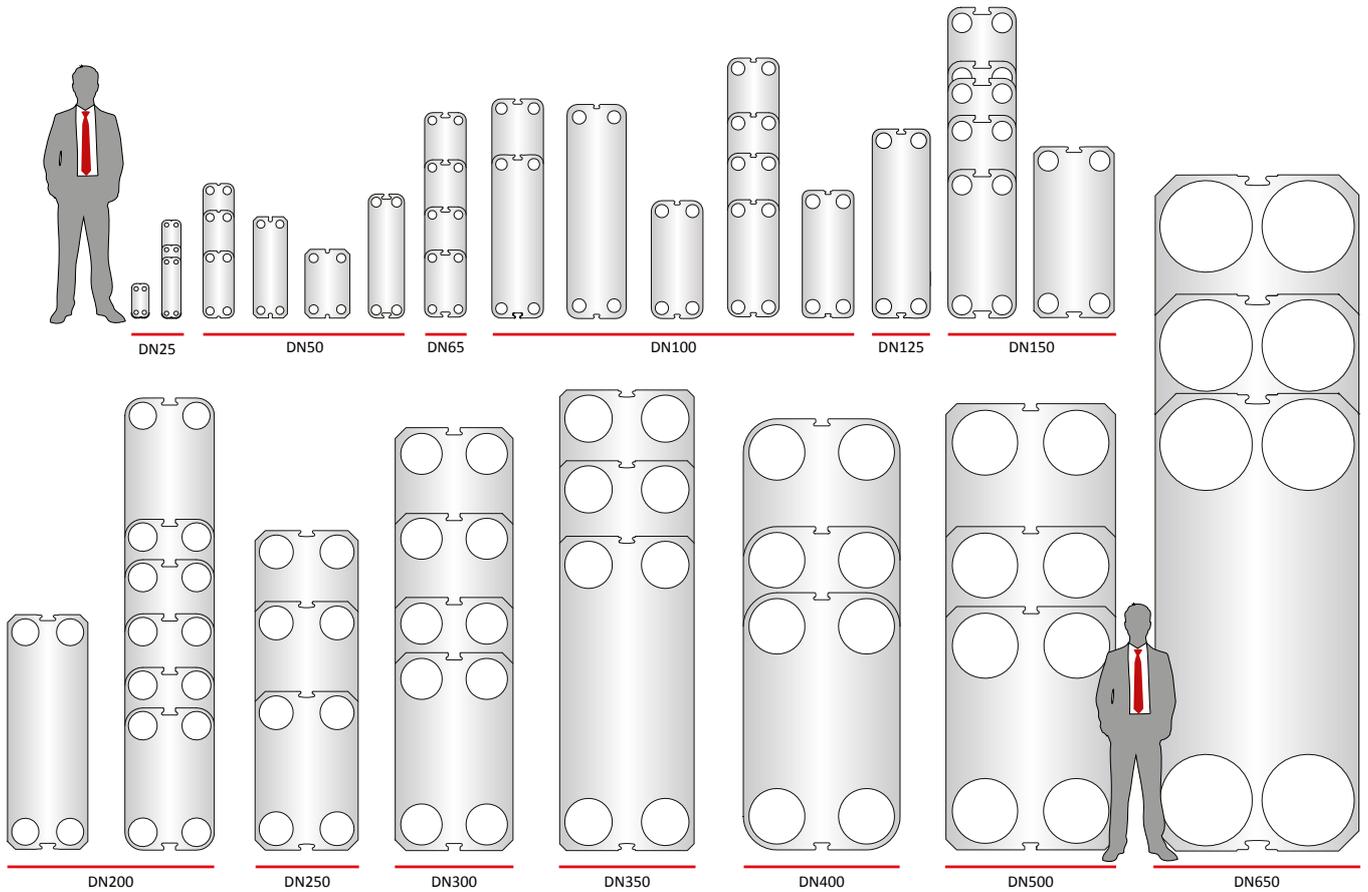
Heat transmission area of a plate.



A small selection of plate patterns.

# Plate Range That Covers All Duties

## Plates in All Sizes



SONDEX® offers the largest selection of traditional plate heat exchangers in the world. We have specialized in developing plate heat exchangers in close cooperation with our customers. We can perfectly match your individual requirements because we understand the process behind your applications.

Using the right plate for each individual duty is very important, as it greatly impacts the efficiency of the entire installation. Several aspects define what plate is right, such as the plate pattern, plate and connection sizes, and plate material.

### Plates in All Sizes

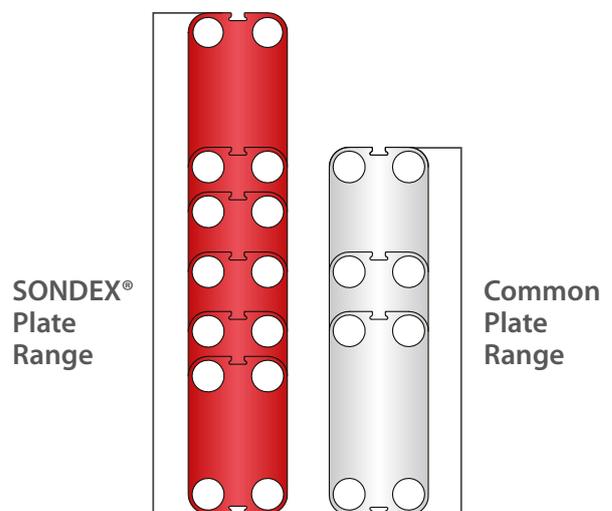
We feature plates with lengths up to 5 m (16.4 ft) and a large number of different patterns for each heat exchanger type. It is important to match the length of the plates and the type of pattern to the individual thermal duty - some installations might require small plates, while others require long plates.

### Covering Most Duties

We cover most duties up to 7,200 m<sup>3</sup>/h (31,700 gpm) in a single-pass solution. It is beneficial to reduce the number of passes in a plate heat exchanger to a single pass, as it improves the efficiency of the heat transfer, and reduces the footprint of the heat exchanger. However, in order to do this, it is necessary to use plates and connections that match the size defined by the thermal requirements.

### Optimal Solutions

Our extensive plate programme ensures that we can provide the perfect plate and connection size for any duty. No application is too small or too big for us - we provide the optimal technical solution every time.



*We cover all thermal duties with plates of all sizes - including plates that lie outside the commonly manufactured plate sizes, to ensure that we can perfectly match any thermal requirements.*

# Choosing the Right Heat Exchanger

## Why So Many Plates

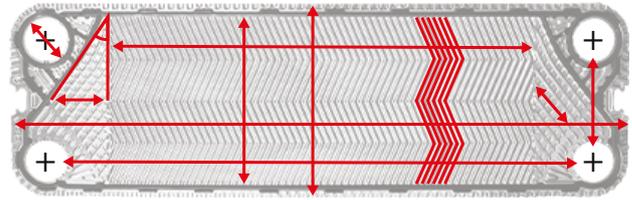
Our customers span a large number of market segments that all have different process and application requirements. The one thing they all have in common is the need for highly efficient heat exchangers that match these requirements perfectly.

There are several key aspects that decide what plate size and what pattern is the right choice for the duty. One of the most deciding factors is the temperature profile that the plate heat exchanger is designed for. For this reason the design of the plates is very important.

### Thermal Requirement

The NTU value (Number of Heat Transfer Units) describes the thermal requirement of the duty. Generally speaking, the desire to reach a closer temperature approach results in higher thermal requirements.

In other words, the closer the input and output temperatures have to be to each other; the more efficient the heat exchanger has to be. The efficiency of the heat exchanger is determined by how closely it matches the thermal requirements of the duty. Higher thermal requirements need longer plates and lower thermal requirements need shorter plates.



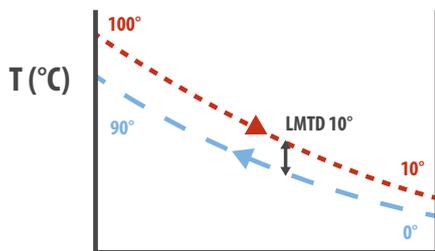
**NTU** (Number of Heat Transfer Unit)

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**Warm Temperature In - Warm Temperature Out**

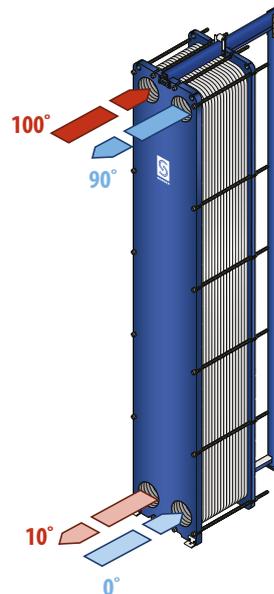
**LMTD** (Logarithmic Mean Temperature Difference)

### High Thermal Requirement

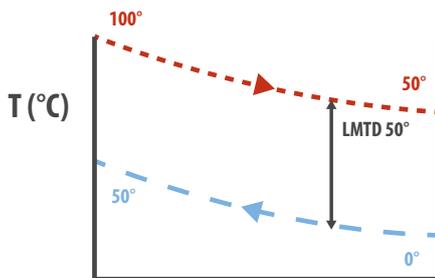


$$NTU = \frac{90}{10} = 9$$

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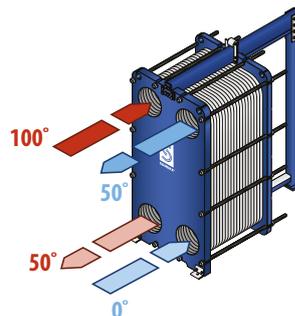


### Low Thermal Requirement



$$NTU = \frac{50}{50} = 1$$

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*The closer the input and output temperatures of the two media have to be to each other; the longer the plates must be.*

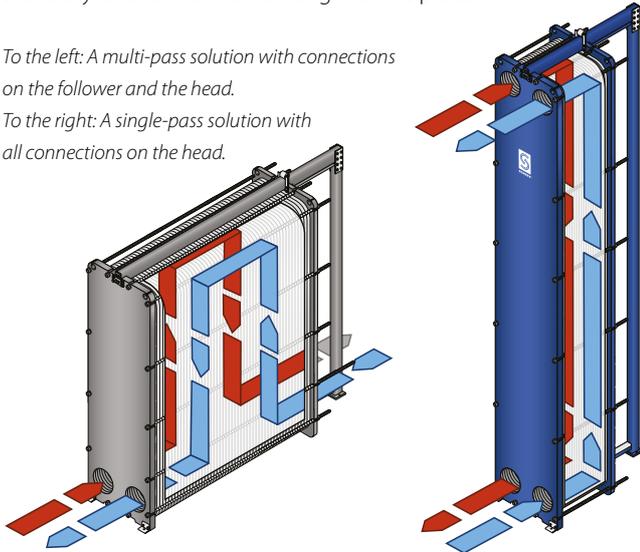
## Number of Passes

Multi-pass solutions are rarely an efficient choice, as they are more space demanding and require more plates for effective heat transfer. Our plate range is developed to ensure that we have plates that match each individual NTU requirement.

Having plates that match the exact NTU value required in a process, is essential for the efficiency of the plate heat exchanger and enables us to provide our customers with single-pass solutions that have all connections on the head of the plate heat exchanger.

When the plates of a solution do not match the thermal requirements of the duty, you must use more passes within the heat exchanger to artificially extend the thermal length of the plates.

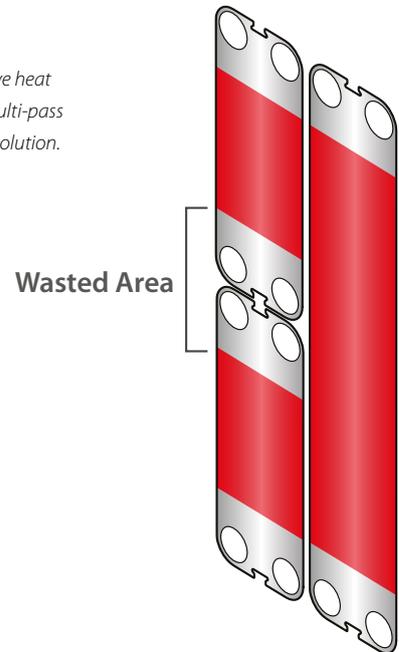
To the left: A multi-pass solution with connections on the follower and the head.  
To the right: A single-pass solution with all connections on the head.



Hypothetically, a two-pass solution is equivalent to stacking two plate heat exchangers on top of each other, thus combining the length of two plates. However, a multi-pass solution needs a much larger number of plates to achieve the desired output compared to a single-pass solution that matches the thermal requirements.

The drawback of using more plates is the additional distribution areas that do not transfer heat as efficiently as the main heat transmission area. This makes multi-pass solutions inferior to single-pass solutions by default.

Comparison of the effective heat transmission areas in a multi-pass solution vs. a single-pass solution.

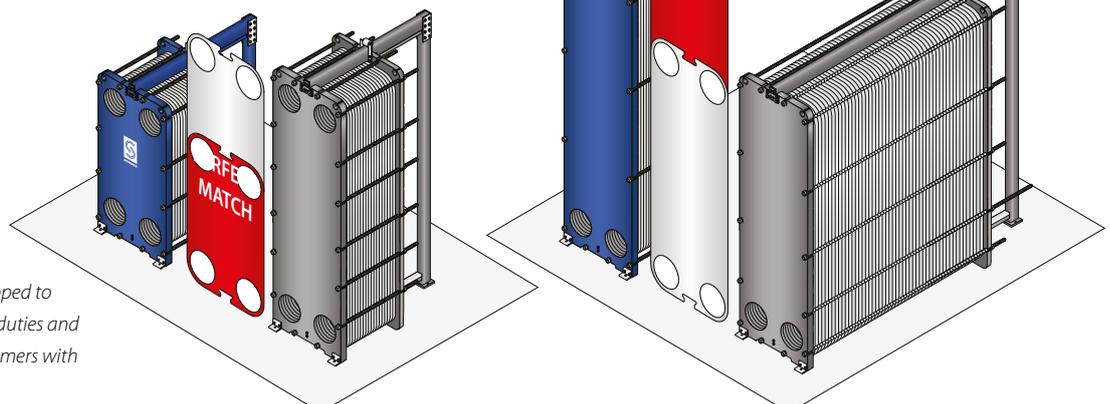


## Consequences of Not Having the Right Plates

Not having the right plate for the thermal duty greatly reduces the efficiency of the plate heat exchanger.

For example, if you do not have long, slim plates for a duty with high thermal requirements, the plate heat exchanger must be built as a multi-pass solution to handle the thermal duty.

Another example would be over-dimensioning the heat exchanger. By not having plates that perfectly match a duty with low thermal requirements, the purchase price of the plate heat exchanger becomes much too expensive. The reason for this, is the unnecessary amount of materials needed for construction. Furthermore, an over-dimensioned plate heat exchanger is difficult to control, making it extremely hard to achieve efficient operation in the entire system.



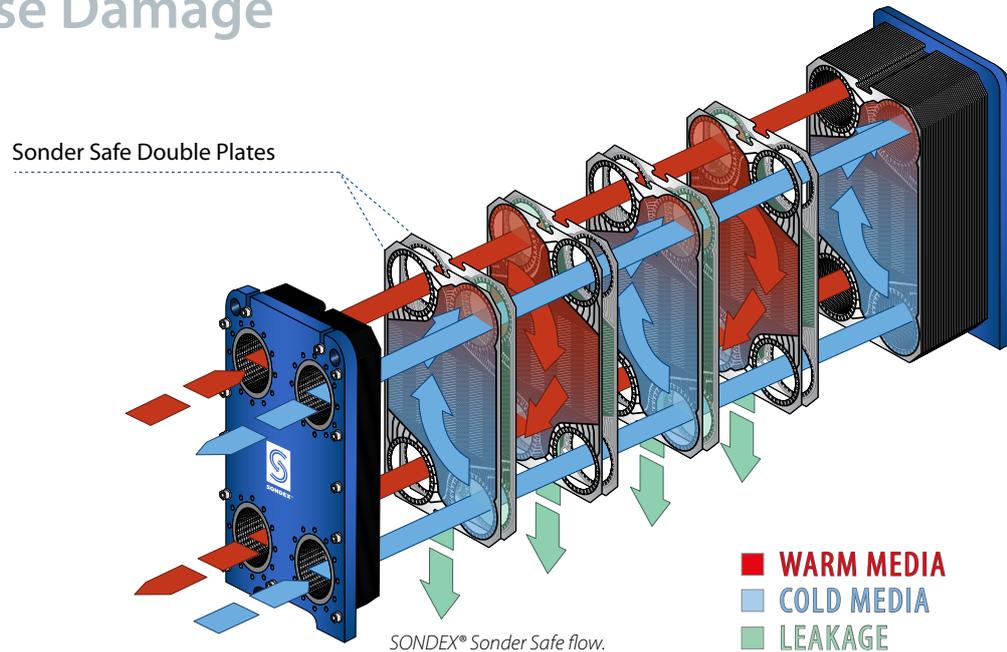
Our plate programme is developed to perfectly match most thermal duties and our goal is to provide our customers with the optimal technical solution.

## Always the Efficient Choice

We aim to design all our plate heat exchangers as single-pass solutions, with all connections on the head of the heat exchanger for easy installation and maintenance. Single-pass solutions are the optimal, preferred choice for almost all duties, both in terms of energy consumption, but also in regards to the plate material needed.

# Sonder Safe Leakage Protection System

## Ultimate Safety - Detect Leaks Before They Cause Damage



SONDEX® Sonder Safe plates are the ultimate safety measure. On the off chance that the plates get damaged, the Sonder Safe system eliminates the risk of mixing the media being treated in the heat exchanger.

A Sonder Safe plate is made by pressing two identical plates together and laser welding all four inlet holes in order to form a “double plate”. This creates a tiny pocket within each “double plate” that will allow leaking media to escape. Due to our optimized design, Sonder Safe plates are able to maintain the high heat transfer efficiency of conventional plates while providing additional safety.

### Leakage Detection

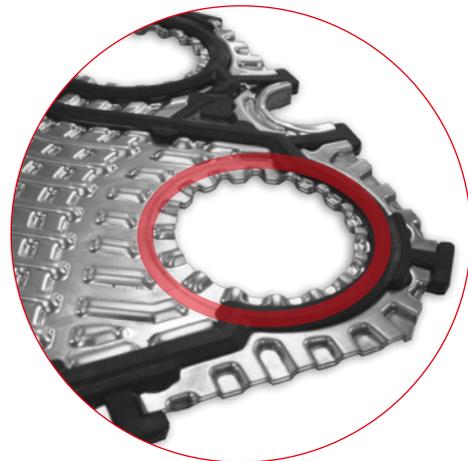
The “double plate” Sonder Safe system is designed to make any leakage, however unlikely, visible from outside the plate heat exchanger. This means that leaks caused by corrosion damages or cracks in the Sonder Safe plates will identify the malfunctioning plates. Consequently, the heat exchanger can be taken out of service until it has been repaired.

### Premium Protection

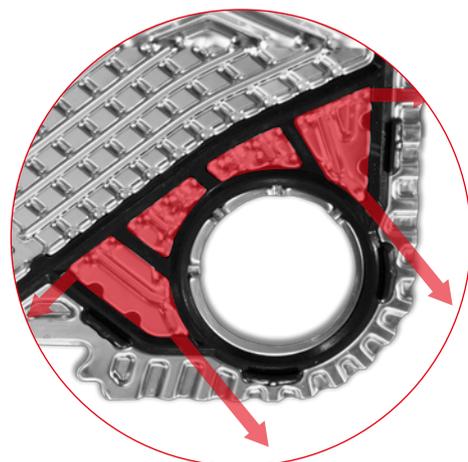
Because all leaks are external instead of internal, the media will never mix. This makes Sonder Safe plates the ideal solution when the heat exchangers utilize media that must not be allowed to mix at any cost.

There can be several reasons as to why it is crucial that the media do not mix: the media may be ruined, they can be hazardous, or pose an environmental threat.

Additionally, all SONDEX® plates and gaskets are designed with a special “drain zone” to further prevent damage in the unlikely event of a leakage. The two media cannot mix, as this safety feature forces the media to leak externally in case of gasket defects, or if the gasket has been misaligned due to the impact of pressure surges.



SONDEX® Sonder Safe plate.  
The “double plate” inlets are welded together.



Drain Zone.

ENGINEERING  
TOMORROW

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