

Spiral Heat Exchanger



HES GmbH

Heat Exchanger Systems

HES Heat Exchanger Systems GmbH originated in 1997 from the company Kapp Apparatebau and is now a world-wide operating enterprise with more than 30-years experience in the design and manufacture of spiral heat exchangers (SHE).

HES is located in Schopfheim in the south of Baden-Württemberg, Germany, about 20 km north-east of Basel, Switzerland.

We develop, design, manufacture and market heat exchangers for a wide range of applications.

Our customers include well-known plant builders, engineering firms, the chemical and pharmaceutical industries, the mining and paper industries, steel works, refineries, water treatment facilities and many others.

The spiral heat exchanger was developed in the twenties for use in the paper industry by the Swedish engineer Mr Rosenblad. For the first time, a heat exchanger became available, that allowed trouble-free heat transfer between particle-loaded process streams.

In the beginning of the seventies, Kapp Apparatebau started manufacturing spiral heat exchangers on the basis of an own design that has distinct advantages over the Rosenblad-design which had been exclusively employed until then.

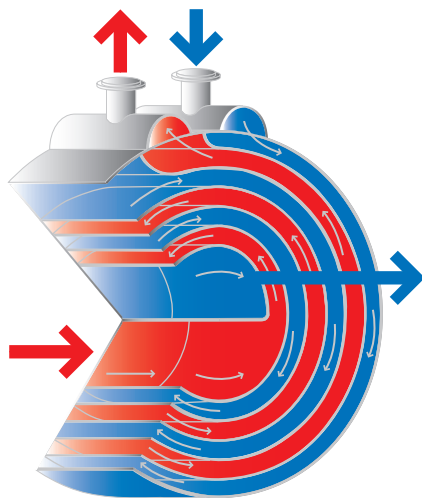
Nowadays, HES is the only company capable of manufacturing spiral heat exchangers both to its own design and to the Rosenblad concept in almost any size from any cold-workable and weldable material.

The spiral heat exchanger – a solution for a wide range of applications

The concept of a spiral heat exchanger is as simple as it is sophisticated. Two or four long metal strips, onto which spacer studs are welded, are wound around a core, thus creating two or four equally spaced single-passage channels.

The concentric shape of the flow-passages and the studs yield turbulence already at low Reynolds numbers. By optimising the flow pattern heat transfer is enhanced, whilst fouling is reduced. This yields a compact and space-saving construction that can be readily integrated in any plant and reduces installation costs.

Because of the all-welded and robust design and the low fouling properties, maintenance costs are reduced to a minimum. From the viewpoint of Total Cost of Ownership, the spiral heat exchanger is frequently the most cost-effective solution.



Tailored to the requirements

As the channel geometry can be varied with great flexibility, a spiral heat exchanger can be adapted ideally to the existing requirements and desires. Notwithstanding varying mass flows and desired temperature differences, a spiral heat exchanger often enables heat transfer in a single unit and offers an excellent turn-down ratio. The long single-flow passage channels offer almost any desirable thermal length by which difficult process flows can be heated or cooled in a single device, while avoiding any sharp turns of flow that so often cause blockages.

HES have developed a wide range of cores, each of which is tailored to accomplish specific tasks, which enables us to choose the right solution for any application.

An important feature of our design is the use of continuous strips from core to shell that enables internal and almost unreachable welding seams to be avoided entirely.

The execution of a unit can be chosen freely to our, or to the Rosenblad-design, which enables us to offer replacements units for all applications without the need of costly piping adjustments.

Different types for different tasks

Type A: ● COUNTER- OR CO-CURRENT-FLOW

- Both covers closing the spiral body
- Liquid/liquid as well as vapour/liquid-applications

Type B: ● CROSS-FLOW

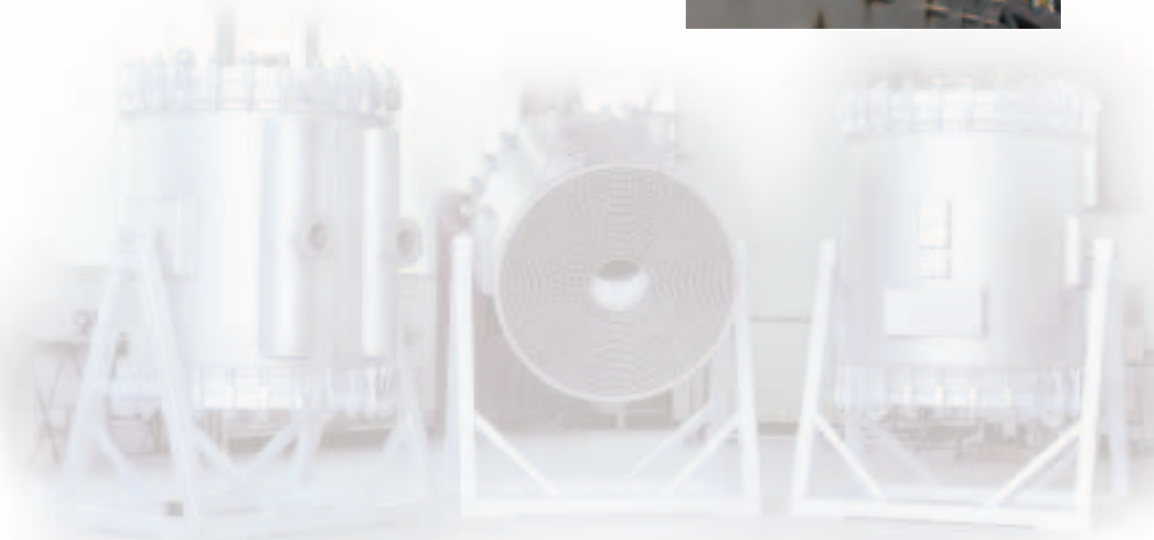
- Both covers at a distance from the spiral body
- (Overhead) condensation and evaporation applications

Type C: ● CROSS-/COUNTER- OR CO-CURRENT-FLOW

- One cover closes the spiral body; the other is at a distance
- Condensation applications with the possibility of condensate sub-cooling

Manufacturing capabilities:

Design and fabrication are executed in accordance with international pressure-vessel codes including PED (CE-Stamp), AD-Merkblätter, ASME (U-Stamp), AS1210 etc.; Quality is ensured by maintaining own written practises from proposal to delivery. Corresponding certifications to ISO 9001:2000 and Safety Quality License (SQL) are a matter of course.



CAPABILITIES AND APPLICATIONS

CAPABILITIES		
	from	to
Channel spacings	5 mm	70 mm
Channel widths	50 mm	2000 mm
Surface per unit	0.1 m ²	to 800 m ²
Design pressure	Vacuum	45 bar and above
Design temperature	-100°C	450°C and above
Materials	Carbon steel, (super-) austenitic stainless steel, duplex, Nickel and Nickel alloys, Titanium, Zirconium and others	
PV Codes	AD-2000, PED, ASME, AS1210, etc.	
Quality	ISO 9001:2000, SQL	
Certification for	Europe, China, USA, Australia	

APPLICATIONS	
Fluids	Liquids, suspensions, fibre- and particle-loaded liquids, (highly) viscous fluids, non-Newtonian fluids including slurries and sludges, vapour with and without inert gases
Tasks	Cooling, heating, heat recovery, (near-vacuum) condensation, evaporation, thermosyphon, reboiler
Application in the following industries	(Petro-) chemical, food, pharma, vegetable oil, water treatment, paper, steel and mining industries

Main applications

Liquids and slurries

Because of the single-flow passages, the spiral heat exchanger is State-of-the-Art-Technology especially in the case of fouling, viscous and/or particle-loaded fluids and is therefore frequently the first, if not the only choice. This is because bypassing is intrinsically avoided resulting in a self-cleaning effect by which potential blockages are washed away before they become a problem.

Also as a result of its execution, in the case of 'difficult' fluids, high heat transfer coefficients are established and in case of particle-loaded fluids sedimentation is avoided.

The spiral heat exchanger is almost free of dead-space and can be executed without any dead spaces. Cold- and/or hot spots are therefore excluded and temperature differences between the fluids of less than 3°C can be reached.

In particular, for sludge or sludge-alike applications the spiral heat exchanger is executed without spacer studs so that the risk of blockages is reduced to the absolute technical minimum.

Leakage is practically excluded by the all-welded channel construction. For this reason the spiral heat exchanger is ideal in the case of sensible, dangerous and/or aggressive fluids.

Because of the single-flow passage, chemical cleaning is extremely effective.

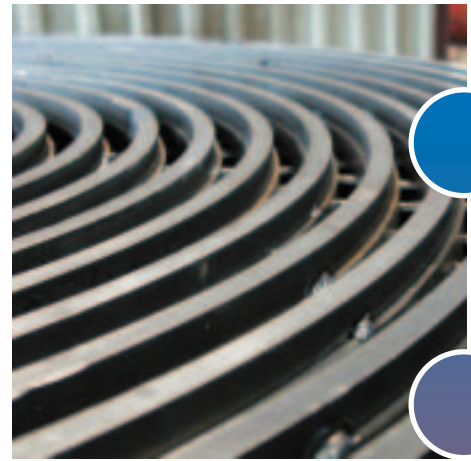
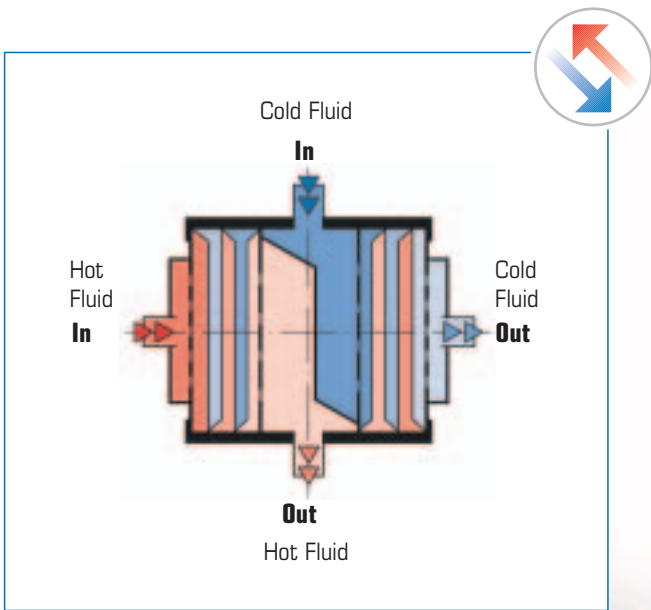
The covers are mounted with hook-bolts to enable easy access to the channels, which can also be readily cleaned mechanically. In particular for sludge or slurry applications, covers can be executed with hinges or davits, thus enabling very fast access that reduces down-time.

0,35 m², Ø 245 mm, Ti-Gr.2 Chlorine Application



40 m², Ø 1900 mm, Sludge Application





Hinges



Re-inforced covers



Body flange



Frame



Main applications

Condensation and Evaporation

In case of condensation applications, the spiral heat exchanger demonstrates its versatility. It is almost the ideal condenser, especially in case of condensing mixed vapours, with or without inert gases. The concentric, single-flow passage constitutes a perfect geometry for this task and is therefore a basis for maximised product recovery.

For condensation applications, there are three possible flow arrangements: **Counter-current**, **co-current**, **cross-current** and a **mixture of these**.

If pressure-drop is allowed, a unit with counter- or co-current flow is a good solution. Vapour, particularly with a high inert gas concentration, needs a sufficiently long condensation path, which can be realised by means of a spiral heat exchanger. In addition, the condensate and/or inert gases can be sub-cooled within the same unit.



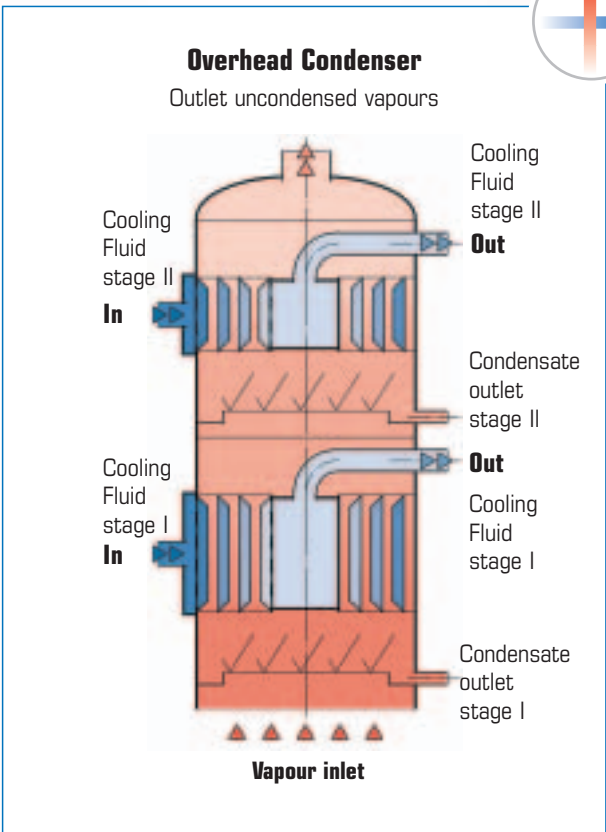
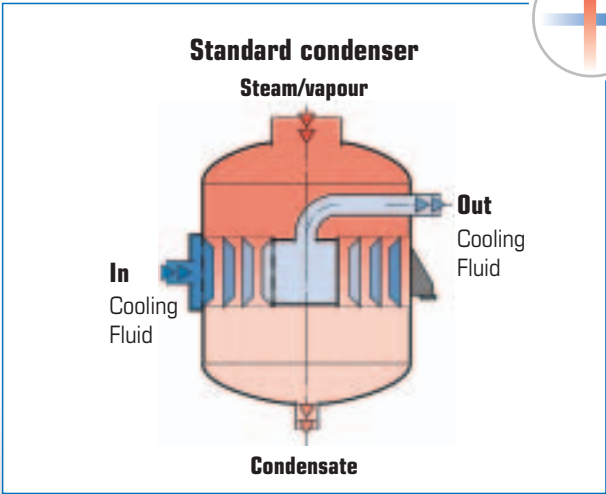
In the case where pressure-drop needs to be minimised, such as in near-vacuum applications, the vapour is condensed in a cross-flow arrangement with the cooling fluid. As a result of the short flow passage, but high cross-sectional area available, high flow rates of vapour can be condensed at pressure-drops of less than 1 mbar. Also in this case, inert gases can be removed readily.

In the case where the condensate needs to be sub-cooled, while having only a small pressure-drop at disposal, the combination of cross-/counter-flow is used.

An outstanding advantage of the spiral heat exchanger as a condenser is that it can be flanged or welded directly onto a column as an overhead condenser. It is also frequently used to realise multiple-stage condensers. The assembly of the spiral condenser onto a column greatly reduces installation costs, because connecting pipework is reduced to the minimum.

3-stages overhead condenser

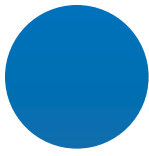




Bottom condenser



Know-how, flexibility and service



With our experience in all applications of the spiral heat exchanger, we can assist our customers in many ways. As a result of development, design, engineering and fabrication all being carried out by us in our facilities at one single location, we can quickly respond to customer requirements and wishes. The excellent team-work with our worldwide network of representatives and co-operation partners provides local and direct access.



Apart from the high standards of our engineering work and fabrication, exemplary quality management and full technical documentation belong to every unit we deliver.



Customer feedback and the resulting experience play a vital role.

Our customers contribute importantly to the development of our company, which is required in a rapidly changing world, and ensures the continuous improvement process within our company.



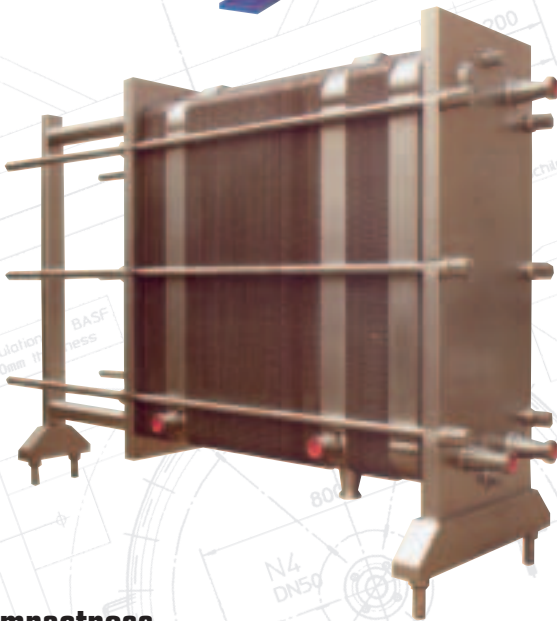
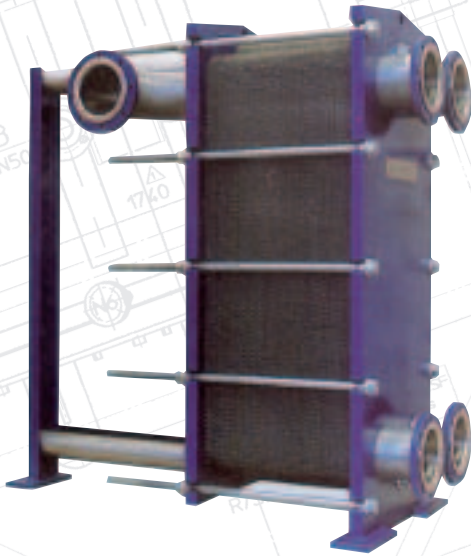
By our development and manufacturing of ever more mechanically sophisticated units and prototypes, we have repeatedly set new standards and technical possibilities for the spiral heat exchanger.

For new applications, test units are available that enable a co-operative elaboration of solutions that respond to given process heat transfer challenges. Repairs and overhauls of existing units of all brands can be executed effectively and efficiently both in the plant and in our shop.



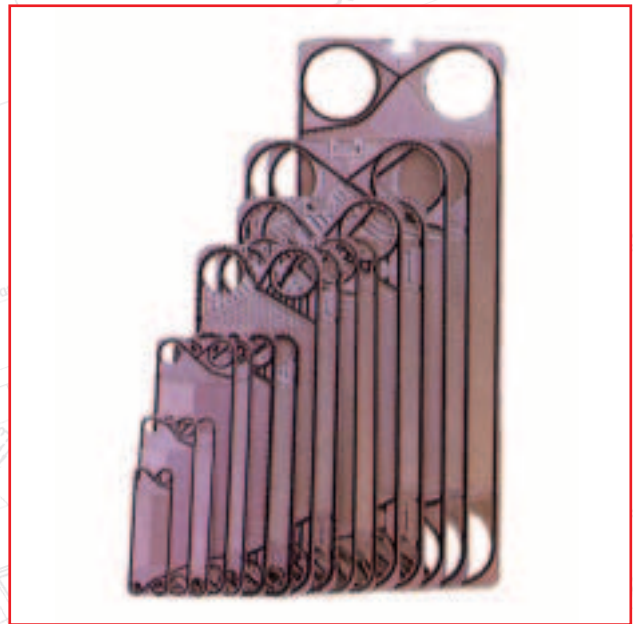
Always prepared to take new challenges, we look forward to receiving your next inquiry.

PLATE HEAT EXCHANGER



Reliable design, high efficiency, broad range of application:

This heat exchanger is made from a stack of plates, pressed between a fixed front plate and a movable pressure plate. To avoid the mixing of the fluids there is a gasket all around the plate.



- **Compactness**
- **Low Investment Costs**
- **Low Fouling and Easy Cleaning**
- **Flexibility**

Frame and plates are the principle parts of a Plate Heat Exchanger

The plates are rather thin, minimum 0.5 mm, cold stamped metallic plates. They are designed in two basic ways: washboard and herringbone types. The corrugation serves mechanically, to increase rigidity and heat transfer area and increases turbulence and heat transfer from a thermal-hydraulic point of view.

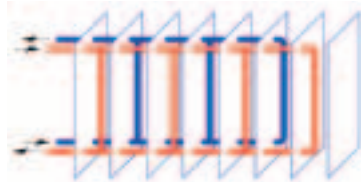
Broad variety of plates, materials and gaskets

- The plates are selected according to the requirements defined by the application
- Gaskets are selected according to the type of fluid and process conditions
- Easy access, easy cleaning
- Easy maintenance, easy replacement of plates or increase of heat transfer area

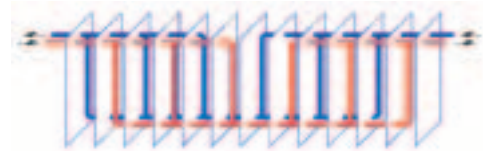
Flow pattern customised to your needs

Co-Current / Counter-Current

Standard applications

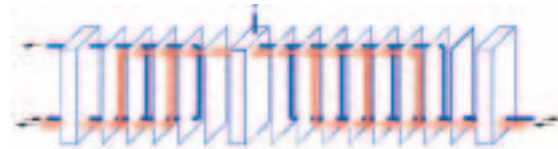


Two- / multi- pass Counter-Current



Counter-Current with two independent cooling circuits

e.g. application for the dairy industry



Selection criteria:

- Compact design
- Exchange surface up to 2000 m²/unit; maximum flow-rate 5000 kg/h/unit
- Maximum pressure 23 bar
- Maximum temperature 180°C
- Mechanical cleaning of both circuits
- minimum temperature difference: 1°C
- high heat recovery rates up 90% or more
- Dimensioning as per AD-MERKBLATT, ASME and European rules
- Wetted material from: Stainless steel, titanium, titanium palladium or nickel alloy (Hastelloy C 2000 / C22)
- Fabrication according to European norm (PED 97/23/CE)

HES

The right partner
for heat-transfer solutions

Heat Exchanger Systems GmbH

Hohe-Flum-Straße 31

79650 Schopfheim, Germany

Telefon +49 (0) 7622/6 66 89-0

Telefax +49 (0) 7622/6 66 89-30

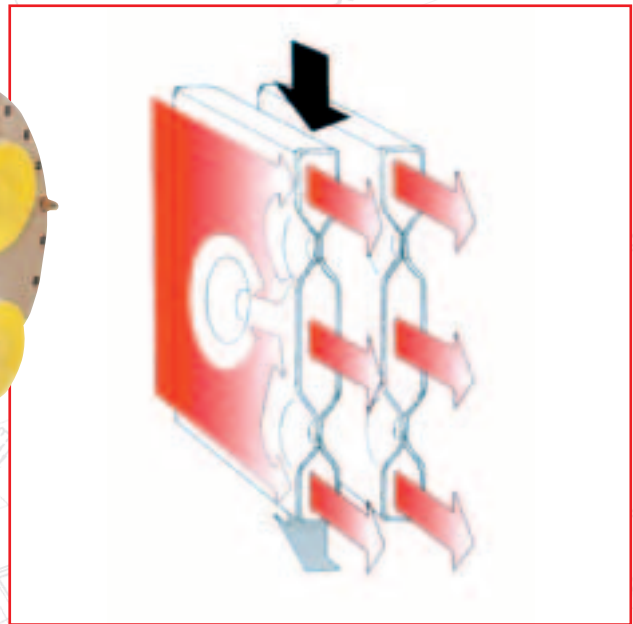
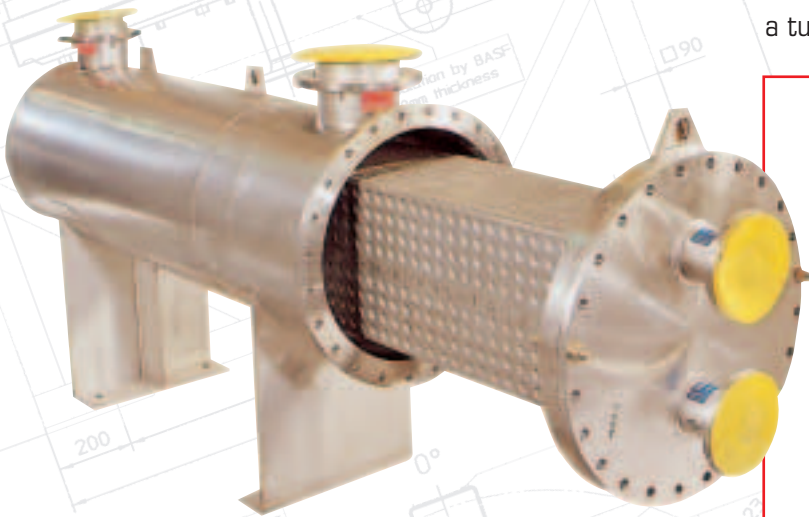
E-mail hes@hes-kapp.de

Internet www.hes-kapp.de

WELDED SHELL AND PLATE HEAT EXCHANGER

Original design, simple technology, high efficiency and extreme reliable:

This heat exchanger is made from a bundle of welded dimpled plates, inserted into a shell. The junction between the shell and the bundle is made via a plate sheet similar to a tube sheet in a tubular exchanger.



- **The performance of plate heat exchangers**
- **The reliability of tubular heat exchangers**
- **Self floating U plates for cyclic use**

Extremely simple, a large range of possibilities:

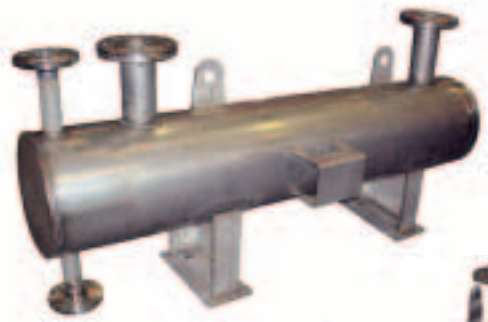
As with a tubular exchanger, shell-side circulation can take place via a set of transversal baffles or even via a flow parallel to the bundle using a sleeve. As such, this welded dimpled plate and shell exchangers are designated by analogy to tubular exchangers according to the type of front box and shell type.



The 3 main configurations are:

Type S-CFU:

Entirely welded construction, very compact and extremely safe because it is totally gasket-free.



Type S-BFU:

The plate side is entirely welded; the bundle being removable, the shell side can be mechanically cleaned.



Type S-DFU:

The bundle is extractable and the front box can be removed. The shell side is perfectly mechanical cleanable. The plate side can be opened for inspection. Very rapid bundle or plate replacement is possible.



Selection criteria:

- Compact design 10 m²/m³ – 1.0 m x 3.0 m floor space for 200 m²
- Exchange surface from 0.33 m² to 200 m²
- Maximum pressure 25 bar plate side, 40 bar shell side
- Maximum temperature 350°C
- Mechanical cleaning on 1 circuit
- All welds can be inspected
- Monophase, condensation or evaporation operation
- Construction according to all codes
- Stainless steel, duplex or nickel alloy construction (Hastelloy C 2000 / C22)
- Fabrication according to European norm (PED 97/23/CE)



The right partner
for heat-transfer solutions

Heat Exchanger Systems GmbH

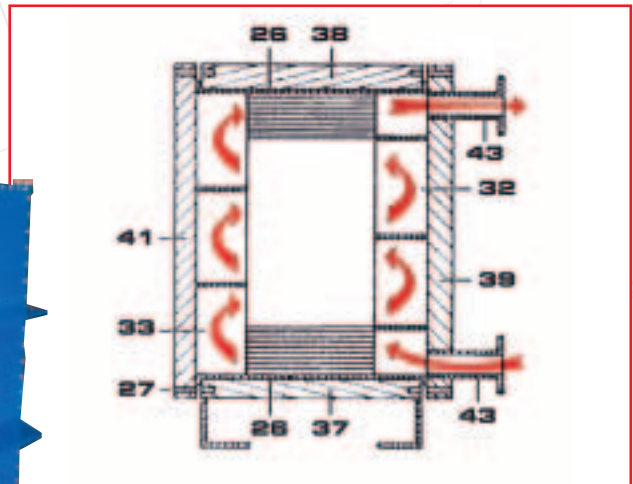
Hohe-Flum-Straße 31
79650 Schopfheim, Germany
Telefon +49 (0) 7622/6 66 89-0
Telefax +49 (0) 7622/6 66 89-30
E-mail hes@hes-kapp.de
Internet www.hes-kapp.de

HEATEX® WELDED PLATE HEAT EXCHANGER



A European patent

- Pressure effects on mechanical construction are dealt with by a unique patented design
- Easy attachment of the bundle onto the frame
- A totally accessible heat transfer surface



Construction principle

A rectangular bundle, constructed in accordance with two basic concepts, is inserted into the core of the frame which consists of four posts and two bases.

Each circuit is equipped with two inspection doors providing access to the entire heat transfer surface. The channels are open along the entire width of the distribution chamber and closed in longitudinal direction.

The distribution chambers are created by the free space between posts and doors and may be baffled on each circuit in order to optimize the circulation of fluids.

- **Free gap channel for slurry**
- **Ideal for condensers on „FDA“ plant**
- **Easily cleanable**
- **Floating plates system for cyclic use**



Total accessibility

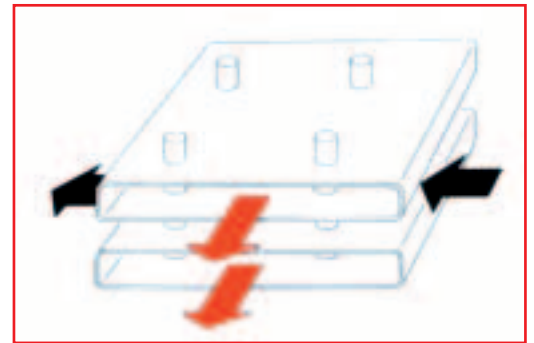
- The 4 doors may be hinged to provide rapid access to both flow channels for maintenance purposes.
- The cleaning depth is generally less than 500 mm.
- As both circuits are accessible, all of the unit's welds can be inspected from the outside.



Transfer surface customised to your needs

Two dirty fluids

Type HXS: Two rectangular smooth-wall flow channels equipped with spacers.



Highly charged fluid

Type HXE: A dimpled flow channel, a free gap flow channel.



Selection criteria:

- Compact design 200 m²/m³ – 1.5 m x 1.5 m floor space for 500 m²
- Exchange surface up to 200 m²
- Maximum pressure 35 bar
- Maximum temperature 450°C
- Mechanical cleaning of both circuits
- Channel widths from 3 to 40 mm
- All welds can be inspected
- Monophase, condensation or evaporation operation
- Dimensioning as per AD-MERKBLATT, CODAP and European rules
- Stainless steel, duplex or nickel alloy construction (Hastelloy C 2000 / C22)
- Fabrication according to European norm (PED 97/23/CE)



The right partner
for heat-transfer solutions

Heat Exchanger Systems GmbH

Hohe-Flum-Straße 31

79650 Schopfheim, Germany

Telefon +49 (0) 7622/6 66 89-0

Telefax +49 (0) 7622/6 66 89-30

E-mail hes@hes-kapp.de

Internet www.hes-kapp.de