

SPIRAL HEAT EXCHANGERS





Tranter HES GmbH

Tranter HES originated from the acquisition of HES GmbH Heat Exchanger Systems GmbH early 2009. Tranter HES represents the impressive heritage in spiral heat exchanger design and manufacturing constituted by the combined experience of Kapp Apparatebau, HES, Canzler and Vaahto; the spirals-related know-how and production machinery of the latter two were acquired by HES in 2007. Tranter HES is a worldwide operating enterprise with more than 60 years of experience in the design and manufacture of spiral heat exchangers (SHE).

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

Tranter HES develops, designs, manufactures and markets 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.

Manufacturing Capabilities

Design and fabrication are executed in accordance with international pressure-vessel codes including PED (CE-Stamp), AD-2000 Merkblätter, ASME (U-Stamp), AS1210 etc.; Quality is ensured by maintaining own written practices from proposal to delivery. Corresponding certifications to ISO 9001:2000 and Manufacture License for Special Equipment (SELO) 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	0.1m 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 and others	
PV Codes	AD-2000, PED, ASME, AS1210, etc.	
Quality	ISO 9001:2000, SQL	
Certification for	worldwide	

Spiral Heat Exchangers

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



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



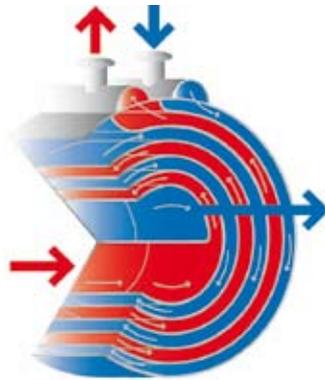
The Spiral Heat Exchanger

– 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.

Tranter 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 each application.

An important feature of our design is the use of continuous strip from core to shell that avoids weakening internal and almost unreachable welding seams, and thickness transitions, entirely.

The execution of a unit can be chosen freely in our, or in 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

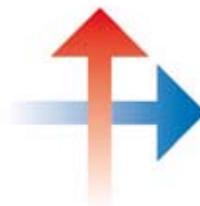
- Both covers closing the spiral body
- Liquid/liquid as well as vapour/liquid-applications



Type B:

CROSS-FLOW

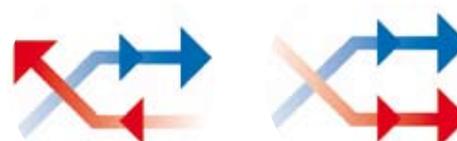
- Both covers at a distance from the spiral body
- (Overhead) condensation and evaporation applications



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





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 in the case of 'difficult' fluids, high heat transfer coefficients are established and in case of particle-loaded fluids sedimentation is avoided.

The standard 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 can be very effective.

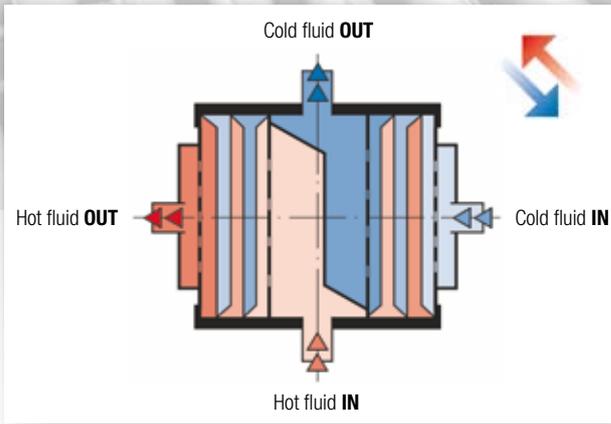
The covers are mounted with hook-bolts to enable easy access to the channels, which can also be readily cleaned mechanically. In particular for sludge or slurry applications, covers can be executed with hinges or davits, thus enabling very fast access that reduces down-time. Especially for a petrochemical environment and in the case of demanding design requirements, traditional robust through-bolted end cover mounting is available.



0.35 m², ø 245 mm, Ti-Gr.2 Chlorine Application



40 m², ø 1900 mm, Sludge Application



Hinges



Reinforced covers



Body flange



Frame



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.



If the 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 be sub-cooled, while having only a small pressure-drop at disposal, the combination of cross-/counter-flow is used.

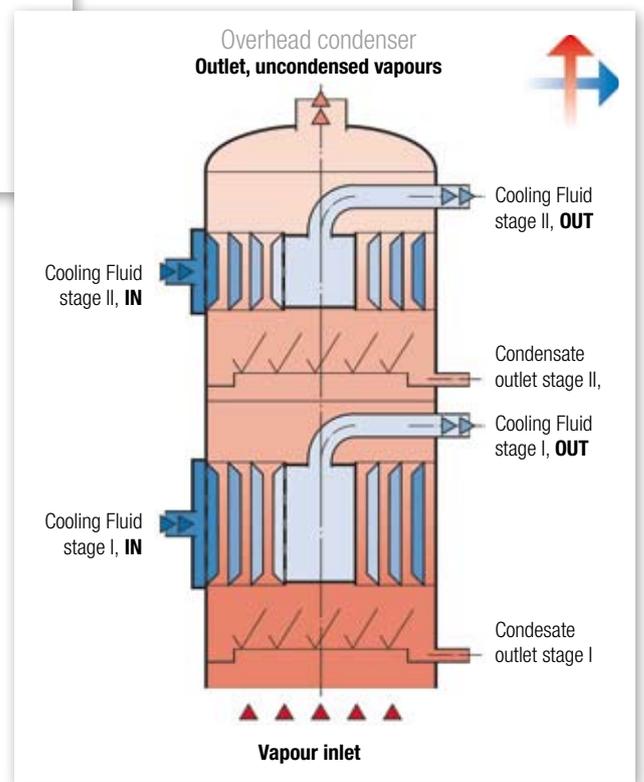
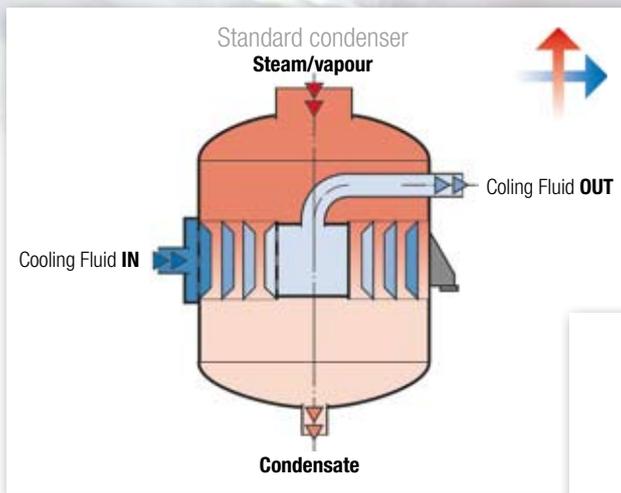
An outstanding advantage of the spiral heat exchanger as a condenser is that it can be flanged or welded directly onto a column as an overhead condenser. It is also frequently used to realise multiple-stage condensers. The assembly of the spiral condenser onto a column greatly reduces installation costs,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



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