Quality Heat Exchangers

FUNKE

Safety heat exchangers

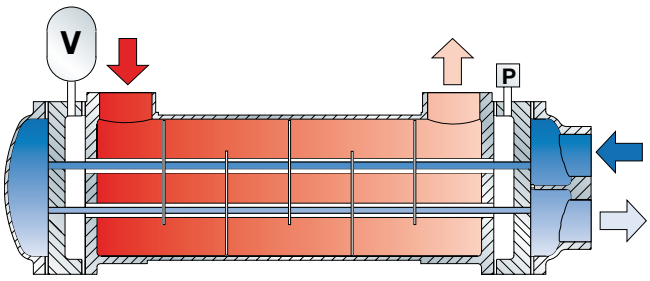
Model series SWF, SWP, SWF-HE, SWP-HE

With partnership into the future

FUNKE is a leader in the development and production of quality heat exchangers with a heat transfer area of up to 2 400 m². The range of products comprises shell-and-tube heat exchangers, bolted and brazed plate heat exchangers as well as oil / air cooling units and electrical oil pre-heaters. Thus, as one of the few producers worldwide, FUNKE offers solutions with optimum thermodynamic designs for different industries and virtually all applications.

FUNKE focuses on customer orientation, highest quality standards, flexibility and advisory skills – important benefits na company of just the right size is able to offer.

FUNKE safety shell-and-tube heat exchangers model series SWF / SWP



Blue = tube area · Red = shell area · White = safety space
P = pressure control device · V = volume expansion tank

Safety heat exchangers are designed as three chamber devices with straight internal tubes and fixed (F) or removable (P) tube bundle. In each individual internal tube of the tube bundle a further smaller internal tube is installed. These concentric internal tube pairs form radial gaps which are interconnected by the design of the double tubesheets and thus produce the enclosed safety space. A mixing of the flowing operating media is prevented in this way.

This sealed safety space is filled with a special barrier fluid. It is responsible for the heat transfer in the radial gap and functions as a transmitter in the leak monitoring system. The safety area is sealed off and permanently monitored for pressure changes (pressure monitoring P).

In the case of a leakage of the shell or tube sides, the corresponding pressure change within the safety space will be detected by the pressure control device and signalled accordingly. The safety area is also equipped with an expansion tank (V) which prevents false alarms due to thermal volume or pressure changes.

Double SWP with
volume expansion tanks

In conventional technical solutions with double tubes, the outer tube has a relatively rough structure on its interior. FUNKE, however, shifts the structure to the outside of the inner tube and uses a finer structure in a pyramid shape.

The advantages of moving the structure to the inner tube are
- Contact area between inner and outer tube of a double tube increased by up to 80%
- Optimized distribution of safety channels
- Heat transfer with or without transmitter fluid in the safety area
- Optimum tube/tube sheet connection by rolling in with groove and/or welding
- Crevice corrosion prevented by applying the inner tubes after tubes are welded in
- Compact sizes and reduced weight

Safety shell-an-tube heat exchangers with hydraulically expanded double tubes

FUNKE's new SWF-HE and SWP-HE ranges meet the increasingly stringent requirements for systems based on this safety principle.

A variety of structural tubes (Source: Wieland)

Hydraulic expansion of the tube pair

Cross section of a tube pair after expansion

Applications

In case of leakage the application of FUNKE safety shell-an-tube heat exchangers prevents from transferring pressure and temperature to the other side and avoids other undesirable consequences such as

- A chemical reaction when the media mix together
- Possible damage to the low pressure side of the heat exchangers
- Damage to downstream system components from mixed media or increased temperatures and pressure
- Hazards for human beings and the environment
- Removing, replacing and disposing of mixed media
- Downtime due to the need of purchase a replacement or make repairs

In double tube systems, the required safety space is created by a pair of tubes – a smooth outer tube and an inner tube with a surface texture which is plastically deformed (expanded) under pressure.

The FUNKE safety shell-and-tube heat exchangers with expanded double pipes are mainly used in the chemical industry, pharmaceutical technology, solar industries, natural gas pre-heating and transformer oil cooling (according to DIN EN 501216-9).

Technical design

Design	Construction regulations	Materials	Inner tube quality	Design parameters
• SWF HE; fixed tube bundle heat exchangers with two fixed sheets and expansion compensation • SWP HE; tube bundle heat exchangers with removable tube bundle and floating head	• AD 2000, • EN 13445, • ASME VIII Div.I (U- Stamp), • TEMA Standard	• Steel • Stainless steel • CuNi materials (Double tubes in material combinations on request)	• Seamless	• Max. operating pressure -1/100 barg (on both sides) • Max. design temperature -10/400 ° C (on both sides) (other options available on reques)

Quality means safety. Each unit built by FUNKE is design and pressure tested. Additional approvals are also available in accordance with quality authorities such as:

- American Bureau of Shipping (ABS)
- Bureau Veritas (BV)
- Det Norske Veritas (DNV)
- Germanischer Lloyd (GL)
- Lloyds Register of Shipping (LRS)
- Technischer Überwachungsverein (TÜV)

as well as customers' test and inspection regulations.

ISO 9001 · ISO 14001 001

FUNKE has been certified according to DIN EN ISO 9001:2008, DIN EN ISO 14001:2004 and is an approved manufacturer according to:

- EU Pressure Equipment Directive 97/23/EC (PED), Module H/H1
- HP0 in connection with DIN EN 729-2
- ASME U-Stamp incl. ASME R-Stamp
- Custom Union (TRTS 032/2013)
- China Certificate

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