

Risk Analysis of SR type CORRESIC[®] Heat Exchangers according PED 2014/68/EU

Works Standard

1. Determination of hazard potentials

- 1.1 If the permitted operating conditions are exceeded (see 4.1 and 4.2), pressurized equipment and accessories e.g. PTFE bellows, gaskets, tubes, tube sheets etc. may
 - a) leak or
 - b) burst
- 1.2 If so, the following risks may occur
 - 1.2.1 Leaking pressurized equipment and accessories may result in
 - a) the release of hazardous gases or liquids, or
 - b) media mixing (media may react with one another leading to additional pressure increase).
 - 1.2.2 Bursting pressurized equipment may cause risks a) and b) listed above. Additional risks may occur as a result of bursting devices.

2. Risk assessment

Leaking or bursting pressurized equipment may

- 2.1 injure or poison operating personnel and/or third parties
- 2.2 contaminate or poison the environment, for example air, water, soil and buildings/systems

3. Protection goals

The risks identified above must be considered using suitable calculations, design and manufacturing as well as through specific assembly and operating instructions. They can then be avoided or eliminated by applying the handling regulations.

4. Analysis

Due to the risks identified above, the calculation, design, manufacturing and testing must be carried out in compliance with recognized technological guidelines, for example, according to the AD 2000 Merkblatt, DIN standards, or the PED or TÜV standards.

- 4.1. The heat exchanger should only be operated within the limits of permitted conditions of use:
 - 4.1.1 Allowed overpressure and vacuum should correspond to those specified in drawings, name plates, and the heat exchanger manual
 - 4.1.2 Allowable temperature should also correspond to specifications in drawings, name plates, and the heat exchanger manual
 - 4.1.3 Chemical load: This is universal, insofar as the product side has not specified any limitations. The service side should be appropriately labelled for service media
 - 4.1.4 Aging information about SiC ceramics and PFA polymers are unknown. Revolving pressure tests can ensure proper safety.



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- 4.2. CORRESIC® heat exchangers do not require any compulsory accessories
- 4.3. Assembly and operating instructions should be followed strictly.
- 4.4. If this pressurized equipment is manufactured in accordance with the regulations and directives set out above, and used within the limits of allowable operating conditions, dangers and risks can be eliminated to a large extent.
- 4.5. The remaining risks inherent in all technical devices must be minimized using adapted operating measures. This includes, for example, employing trained personnel and wearing protective clothing, monitoring universal pressure and temperature etc.

5. Final comment

Shell & tube heat exchangers with ceramic SiC tubes have been available for approximately twenty years, and a range of experiments have been performed to test their safety. By considering the conclusions drawn from this hazard analysis and following the rules regarding assembly and operating, the equipment can be safely operated.

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