

Gas/Gas Heat Exchangers

SULPHURIC ACID TECHNOLOGY



The transfer of large quantities of heat from one gas stream to another using large gas/gas heat exchange equipment is an essential feature of the Contact process for the manufacture of sulphuric acid.

Two different materials of construction are used:

1. **The Hot and Intermediate Heat Exchangers**
Stainless steel units are required to cool the hot gases (typically above 480°C) leaving the first and second catalyst beds.
2. **The Reheat and Cold Heat Exchangers**
Carbon steel units are generally used for the lower temperature duties, but stainless steel is offered as an option for prolonged exchanger life.
3. **Preheat Exchangers**
Stainless steel is used throughout.

Traditional design characteristics

The conventional designs of gas/gas heat exchangers had the following characteristics:

- They were made from carbon steel. High temperature units incorporated Alonized[®] tubes and/or metallized vestibules.
- They were thermally inefficient with low overall heat transfer coefficients.
- They were subjected to mechanical stresses caused by the maldistribution of gas flow on the shell side of the exchangers. This often led to deformation and cracking of the tubesheet.
- The tubes were rolled not welded into the tubesheet.
- They were vulnerable to high temperature oxidation and acid corrosion.



Features of Aker Solutions' design

- > All exchangers incorporate a patented radial pitch tube layout arrangement.
- > The central core of exchangers is free of tubes.
- > A disc and donut baffle arrangement is used for all types of exchangers.
- > For the hot duties, the units are fabricated completely from stainless steel.
- > All exchangers have strength welded tube to tubesheet joints.
- > For exchangers subject to the possibility of acid carry-over a 316L acid knock-out chamber is incorporated in the gas entry area.
- > Acoustic resonance is eliminated at the design stage.

Benefits of Aker Solutions' design

- > The radial flow tube layout significantly improves the thermal efficiency of the heat exchanger, resulting in smaller heat exchanger surfaces for a given allowable gas pressure drop. The result is that hot heat exchanger units made from stainless steel are price competitive with units made from carbon steel with Alonized® tubing. Most exchangers, even for large plants, can be fully shop fabricated thereby guaranteeing high quality tube to tubesheet joints.
- > The radial gas flow pattern and disc and donut baffle arrangement minimizes thermal stresses across the bundle by eliminating variations in temperature around the circumference of the heat exchanger.
- > The disc and donut baffle arrangement also allows complete 360° freedom to orientate the exchanger nozzles to optimize ducting arrangements.

- > The welded tube to tubesheet joints ensure long and leak-free life for all the exchangers.
- > The free area at the core of the exchanger can accommodate exchanger by-pass ducts, thus simplifying plant ducting arrangements.
- > The flexibility of the design can accommodate preheat exchanger configurations that are suitable for all types of fuels, including heavy fuel oil.

Aker Solutions also specializes in the design, supply and installation of replacement gas to gas exchangers on existing plants. The flexibility of the design enables most exchangers to be replaced with only minimum modifications to ducting and foundations.



Vancouver

Aker Chemetics

A division of Aker Solutions Canada Inc.

1818 Cornwall Avenue, Vancouver, British Columbia, Canada V6J 1C7

Tel: +1 604 734 1200 Fax: +1 604 734 0340

email: chemetics.info@akersolutions.com

Toronto

Aker Chemetics

A division of Aker Solutions Canada Inc.

2001 Clements Road, Pickering, Ontario, Canada L1W 4C2

Tel: +1 905 619 5200 Fax: +1 905 619 5345

email: akced.sales@akersolutions.com

www.akersolutions.com/chemetics