



The right solution at the right time

DSM Special Products – Rotterdam, The Netherlands

Case story



One single Alfa Laval Compabloc heat exchanger successfully replaced no fewer than seven shell-and-tube heat exchangers at the DSM Special Products plant in Rotterdam. The most important criteria for this key decision were the short delivery time, reliability and low capital investment costs.

DSM Special Products has been producing benzoic acid and derivatives at the Rotterdam plant ever since it was opened in 1965. One of the most critical elements in this production process is the ammonia cooler. Until recently, DSM was using seven shell-and-tube heat exchangers in series for this application.

During 2002, the company discovered the first hole in one of the tubes. This turned out to be due to corrosion, with the result that DSM decided to repair the shell-and-tube units over the following year. However, while production was stopped early in 2003, it was discovered that the damage was more severe than first thought, and this meant that restarting the installation was no longer an option.

The need for a new cooler therefore suddenly became urgent. At that point, DSM Special Products turned to Alfa Laval because the company was familiar with both Alfa Laval products and reputation for quality. DSM was very pleased with the way Alfa Laval approached the critical situation that the company was facing. Head of Inspection Bart Kooyman van Gulderen said, "Alfa Laval responded very quickly, and immediately took the initiative to visit our plant and discuss the project in detail."

A feasibility study, in which Alfa Laval's Compabloc heat exchanger was compared with an exact replacement of the existing shell-and-tube installation, showed that a Compabloc would be a good alternative at an economical cost. The short delivery time was also a key issue in the decision-making process. The lower capital investment costs of the Compabloc unit also made it possible to select a corrosion-resistant plate material, without exceeding the budget.

One single unit replaces seven shell-and-tubes

The Compabloc heat exchanger is built around a pack of corrugated plates, without gaskets between them. The plate pattern creates a maximum of turbulence, which in turn results in outstanding heat transfer efficiency. In a Compabloc with multipass on both sides, the overall flow pattern is counter-current, which enables temperature crossing and close temperature approach – all within one single unit.

The process

Cooling using ammonia plays an important role in the production of benzoic acids. The cooling process involves two types of fluids – ammonia-rich and ammonia-poor. At a certain point, the ammonia needs to be removed from the ammonia-rich fluid. This fluid is fed into the distillation tower and then stripped, resulting in ammonia-poor fluid as the bottom product. The stripped ammonia is removed from the top of the tower.

The Compabloc serves as an interchanger to warm most of the incoming ammonia-rich fluid by cooling the outgoing ammonia-poor fluid. Because of the large amount of energy that is recovered here, DSM Special Products places high demands on the reliability of its interchanger. Any unforeseen downtime would force the company to use alternative – more expensive – energy sources.

Experience

It was not until the Compabloc unit had been installed at the Rotterdam site that DSM employees actually saw a Compabloc “at work”. Nevertheless, the company felt confident about working with Alfa Laval. The operators were amazed at the small size of the Compabloc. As Process Engineer Arnold Blonk said, “When the Compabloc unit arrived, some colleagues could hardly believe that this single small unit would be capable of taking over from our seven shell-and-tubes, but at the same time I knew I could rely on Alfa Laval.”

The Compabloc unit has now been running continuously since May 2003, and has proved to be the right solution. Difficulties with control valves, which used to be an indication of malfunctioning of the tubes, are now a thing of the past. The absence of vapour bubbles means the small, efficient Compabloc is performing well and easily coping with the load – providing DSM Special Products with an excellent replacement for the bulky, inefficient shell-and-tube units.

Key facts about Compabloc

The Compabloc is a high-efficiency, all-welded compact heat exchanger designed for aggressive or hazardous process services. It is available in six sizes, with heat transfer areas in the range 0.7–320 m² (7–3450 sq ft).

The heat transfer area is made up of a pack of corrugated plates welded alternately to form the media channels.

The plate pack is supported by an upper and lower head and four side panels, which accommodate the connections. The fully welded plate pack extends design limits and provides improved reliability. Because there are no inter-plate gaskets, compatibility concerns are eliminated, and maintenance and operating costs are reduced.

Access for inspection and cleaning is fast and easy.

Plate materials

- 316L, 304L, 317L, 904L, 254 SMO and AL6XN stainless steels
- Titanium, Pd-stabilized titanium
- C-2000, C-276, C-22 and B3 alloy.

Specifications

Design pressure: min. vacuum/max. 35 barg (500 psig)

Design temperature: min. –30°C/max. 350°C (-20/660°F)

Connections: PED and ASME (with or without U-stamp)

How to contact Alfa Laval

Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com