

Beyond the numbers

1

4

7

2

5

8

3

6

9

The ease of cleaning and maintaining compact welded heat exchangers maximizes system uptime.



Maximum uptime. Here are th

In demanding industrial processes, replacing conventional shell-and-tube heat exchangers with Alfa Laval's compact welded heat exchangers – Compabloc or spiral – is a good idea for many reasons. They are smaller and more heat-

efficient than shell-and-tube heat exchangers. And thanks to their clever design, they also require much less service. The result is maximum uptime.

1

Infrequent cleaning

Compact heat exchangers require cleaning far less often than shell-and-tubes. The corrugated plate design of the Compabloc creates high flow turbulence. The resulting high shear stress dramatically reduces fouling. A spiral heat exchanger has a single-channel design that creates a powerful self-cleaning effect. As a result, the Compabloc normally operates three times longer between cleanings than a shell-and-tube – while a spiral heat exchanger is likely to run for numerous years without cleaning.

2

Easy access

Compared with shell-and-tubes, Compabloc and spiral heat exchangers are considerably easier to open and access for cleaning purposes. Their compact designs require minimal extra floor space for opening. And removing their front panel or cover is more convenient than extracting a bulky tube pack from its shell. Also, since a single compact welded heat exchanger normally replaces two shell-and-tubes, the total effort to access the interior is much reduced and requires less manpower.

3

Fast mechanical cleaning

Hydroblasting is typically all it takes to clean a Compabloc or spiral heat exchanger. No time-consuming drilling is required to open up clogged tubes. And thanks to their compact size, the water jet reaches every corner of each unit with equally high pressure. The bottom line: cleaning a compact welded heat exchanger is 4-10 times faster than cleaning a shell-and-tube.



Compabloc heat exchangers

Design temperature: -100/350°C (-148/660°F)
Design pressure: Full vacuum/42 barg (Full vacuum/600 psig)
Maximum heat transfer area: 840 m² (8985 square ft)
Lowest achievable temperature difference: 3°C (5.4°F)
Performance: Handle any corrosive medium

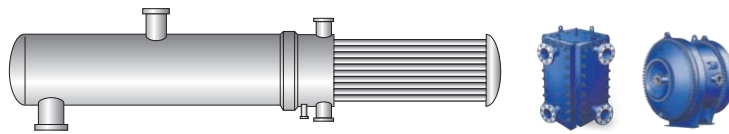
One example:

Due to fouling problems, the Nynäs bitumen refinery in Gothenburg, Sweden, replaced its shell-and-tubes with Compabloc welded heat exchangers. A total of 14 units are now used for gas oil cooling, gasoline cooling, vapour condensing, bitumen heating/cooling and steam heating.

The original shell-and-tubes needed a full week of cleaning once every year, at a cost of EUR 10,000 per unit. By contrast, all but one of the Compablocs are cleaned once every three years, using CIP and 3% NaOH. This takes less than a day and costs EUR 1,000. Only the bitumen interchanger needs to be opened and hydroblasted every year, an operation that takes two days.

The bottom line: the cleaning downtime is reduced by 90 percent, while total maintenance costs are 96 percent lower.

e secrets.



A compact welded heat exchanger – whether a Compabloc or a spiral – requires only a small fraction of the floor space used by a shell-and-tube with the same capacity.

4

Fast chemical in-line cleaning

Compabloc and spiral heat exchangers can also be cleaned quickly and conveniently using Alfa Laval's CIP (Cleaning In Place) unit and special detergents. The CIP unit is attached to the heat exchanger without disconnecting it from the process, which minimizes downtime. The CIP unit flushes all channels and dissolves fouling deposits on the plates – with no need to even open the heat exchanger. This reduces the consumption of panel and cover gaskets and other spare parts.

5

Capable cleaning liquids

In addition to the convenient CIP unit, Alfa Laval provides a selection of some 15 different cleaning chemicals – all optimized for different applications and types of fouling. These detergents are powerful, yet gentle to plates and gaskets – and to the environment. Alfa Laval's own lab regularly makes detailed analyses of fouling samples from customers, in order to find the optimum combination of chemicals, concentrations, temperatures, etc.

6

Predictive maintenance

AlfaCheck is a monitoring system that keeps close tabs on the operating condition of heat exchangers. Sensors placed at the inlets and outlets monitor the temperature differentials, flow rates and internal pressure drop – without interfering with the process. The AlfaCheck software analyzes these data continuously, to help determine the optimum cleaning frequency with regard to performance and system uptime.

Another example:

In 2001, an Eastern-European refinery replaced 12 shell-and-tube visbreaker feed/residue interchangers with eight Alfa Laval spiral heat exchangers.

Prior to the switch-out, the shell-and-tubes required cleaning every two months. The tubes on the hot side were drilled, flushed with hot diesel, then steamed at 200°C and finally hydroblasted. The whole process took 20-30 days each time.

Today, the spiral heat exchangers are cleaned every 1.5-2 years during planned turn-around of the plant. Coke formed on the hot-side covers of the hot-end units is removed by hydroblasting, while the cold-end units only require backflushing. In all, this requires five days of maintenance.

The bottom line: The refinery saves EUR 1.1 million per year in terms of maintenance, heat recovery and restored throughput.



Spiral heat exchangers

Design temperature: -100/400°C (-148/750°F)
Design pressure: Full vacuum/40 barg (Full vacuum/580 psig)
Maximum heat transfer area: 700 m² (7535 square ft)
Lowest achievable temperature difference: 3°C (5.4°F)
Performance: Tailor-made for fouling liquids

7

Field service

Due to severe operating conditions, a Compabloc may sometimes need repair. High-amplitude pressure peaks or variations, as well as high thermal gradients can, for example, cause mechanical fatigue resulting in a weld rupture. The best way to fix this is normally to call Alfa Laval's team of field engineers. They can be summoned on short notice and are fully equipped to make the repair on site – quickly and safely. As for spiral heat exchangers, their sturdy design makes them virtually unbreakable when handled appropriately.

8

Performance agreements

Alfa Laval offers performance agreements on four different service levels – ranging from simple ad hoc repairs to performance optimization at high efficiency levels. This structure helps make it easy and convenient to maintain high heat-exchanger uptime. The service levels are optimized for different applications and the demands they place on cleaning and preventive maintenance.

9

Service centers

Alfa Laval's 50+ service centres worldwide are on stand-by in the unlikely event of more serious damage to a Compabloc or spiral heat exchanger. The experience and specialized tools of the service centre will help get the damaged unit back in operation in the shortest time possible. The centre, often working closely with the field engineers, can help organize the dismantling, packaging and transportation of the heat exchanger.

The service you need. The convenience you want. Only from Alfa Laval.



www.alfalaval.com