



# The Compabloc compact heat exchanger cuts downtime and service cost

Nynäs refinery in Gothenburg, Sweden

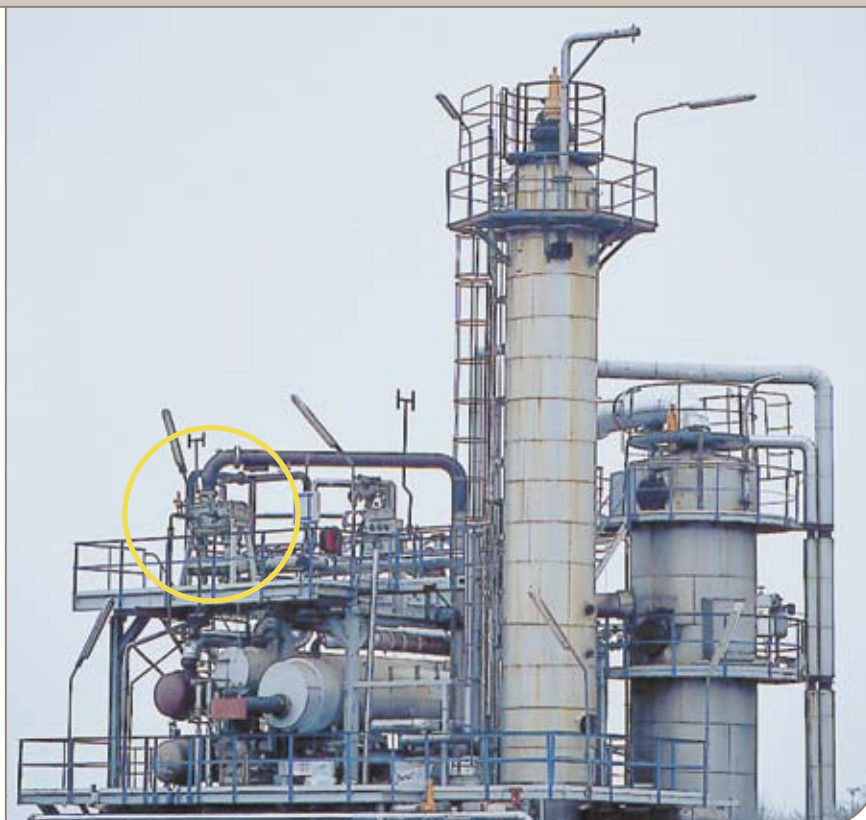
Case story

Nynäs Petroleum is one of the major producers of bitumen in Northern Europe. The bitumen is used for road asphalt, roof tar and pipeline coating. Their production also includes speciality oils such as naphthenic oils used in transformers. Nynäs operates refineries in Sweden, Belgium, England and Scotland. In the Gothenburg refinery there are now eleven Compabloc heat exchangers in successful operation.

Originally all the heat exchangers in the Gothenburg refinery were of the traditional shell & tube type. Large, heavy and service demanding.

Since the beginning of the nineties these shell & tube exchangers are in the process of being gradually phased out and replaced with the more compact and efficient Compabloc exchanger. To date eleven Compablocs have been installed. Eight of the them are operating in process duties such as cooling of kerosene and gas oil in atmospheric distillation, vapour condensing in the vacuum tower and preheating and cooling of bitumen in the oxidation tower. Three of the Compabloc exchangers are used as steam heaters, heating the water circuit which is used to maintain the crude oil and bitumen storage tanks and pipelines at elevated temperatures in order to facilitate the pumping of these media.

All the exchangers are designed with the heat transfer area and other wetted parts in corrosion resistant material. The condensers in the vacuum tower are in titanium due to the possibility



Atmospheric and vacuum columns with Compabloc vacuum condenser indicated with circle. Picture of heat exchanger on reverse side.

of chlorides in the vapour. The other process exchangers and the steam heaters are all in stainless steel AISI 316L.

## Easy to install

All the Compabloc process coolers associated with the atmospheric and vacuum towers are installed at high level where space is at a premium. When one of the old shell & tube condenser was removed it gave potentially room for either three horizontally or alternatively six vertically mounted Compablocs. The withdrawal area for

the tube bundle has then not been taken into account.

## Great savings in service cost

The replacement of the shell & tube heat exchangers with Compablocs has also resulted in a drastic reduction in exchanger downtime. When the shell & tube exchangers were in operation they had to be cleaned once per year. Local regulations also stipulated that they had to be opened every year for inspection. This operation took one week per exchanger.



A horizontally mounted Compabloc in titanium used for vapour condensing in the vacuum distillation tower.



Three Compablocs operating in the atmospheric distillation tower for cooling of kerosene and gas oil.

Today, ten of the eleven Compablocs are only cleaned once every three years. This is done by means of a Cleaning-in-place (CIP) operation where warm, dilute caustic is circulated through the exchanger. This procedure, which does not require the exchanger to be dismantled, has greatly simplified the cleaning so that this can now be carried out in less than a day. No annual inspection is required by the local authorities as all the wetted surfaces are in corrosion resistant materials.

The low fouling tendency of the Compabloc can be attributed to the high shear rates along the heat transfer wall, which is free from corrosion products and dead pockets where the

liquid can stagnate. Only one of the Compablocs, the cooler for oxidised bitumen, is on the same service cycle as the rest of the shell & tubes that are still in operation in the refinery. This cleaning is done once per year by means of high pressure water jet, an operation which takes two days.

With the change to Compablocs, the service downtime for all the exchangers except one unit over a three-year period has therefore decreased from three weeks to one day. This translates into a reduction of the service cost from Euro 25 000 to less than Euro 1 000 per exchanger.

### 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 ranging between 0.7 to 320 m<sup>2</sup> (7 to 3 450 sqft). The heat transfer area is made up of a pack of corrugated plates alternatively welded 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 100% welded plate pack extends design limits and offers 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

Stainless steel 316L, 304L, 317L, 904L  
 Avesta 254 SMO, AL6XN  
 Titanium, Pd-stabilized titanium  
 Alloy C276, C22, B2

### Specifications

Design pressure min/max: Vacuum/32 barg (460 psig)  
 Design temperature min/max: -30/350°C ( -20/660°F)  
 Connections: ANSI or DIN flanged  
 Codes of construction: ASME (with or without U-stamp), AD-Merkblätter, Stoomwezen

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