



## Alfa Laval DIABON® plate heat exchangers

The perfect choice when corrosion is an issue



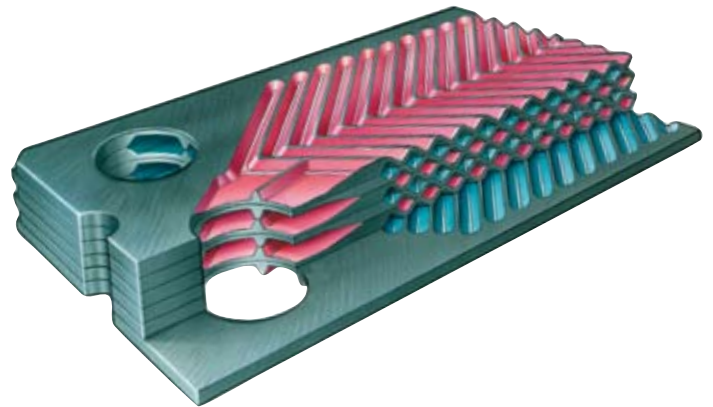
Alfa Laval and SGL Carbon, Germany, worked together to develop DIABON<sup>®</sup> plate heat exchangers. This collaborative effort combines Alfa Laval's plate heat exchanger know-how with SGL Carbon's expertise in graphite process equipment. The resulting product combines the high-efficiency heat transfer benefits of conventional plate heat exchangers with the exceptional corrosion resistance of graphite material.

This makes Alfa Laval DIABON<sup>®</sup> plate heat exchangers ideal for duties in which metallic plates with low corrosion resistance cannot live up to service life requirements, and where the heat transfer efficiency of heat exchangers that use materials such as glass and Teflon<sup>®</sup> is unacceptably low. Compared with other graphite solutions, such as graphite blocks, Alfa Laval DIABON<sup>®</sup> plate heat exchangers provide the additional advantages of reduced fouling and full access to the heat transfer surface.



DIABON<sup>®</sup> plate heat exchangers are therefore ideal for handling highly corrosive fluids such as:

- hydrochloric acid and gas in all concentrations
- sulphuric acid up to 90%
- hydrofluoric acid up to 60%
- all concentrations of phosphoric acid
- pickling acids in surface treatment plants
- electrolytes used in the mining industry
- mixed acids
- chlorinated hydrocarbons
- catalysts such as aluminium chloride.



#### Design features

Alfa Laval DIABON<sup>®</sup> plate heat exchangers work on the same principle as conventional plate heat exchangers, except that the plates separating the media are made of special graphite materials. The graphite plates are available in three different material grades, DIABON<sup>®</sup> F100, NS1 or NS2. The channels formed when these graphite plates are assembled in a plate pack are sealed by PTFE gaskets. In addition, the tightening bolts on the frame are fitted with springs to compensate for thermal expansion of the plate pack, hence minimizing the risk of cracking the plates.



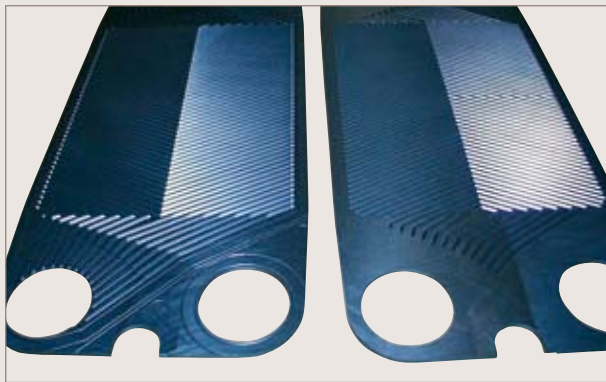
#### PTFE rope gasket

Alfa Laval DIABON<sup>®</sup> plate heat exchangers are all supplied with a PTFE rope gasket. When the heat exchanger is assembled, this gasket rope is flattened to a very thin film (approx. 0.2 mm). The thinness of the gasket means that the area in contact with the chemical is very limited, resulting in an extremely long service life. To date, the gasket has proved resistant to attack by all known chemicals, as well as resisting very high temperatures (>180°C). In addition, the gasket can be kept in storage for virtually unlimited periods.

### DIABON® F100

DIABON® F100 is a special graphite material in which the graphite particles are encapsulated in a fluoroplastic film. This not only forms a strong bond, but also cuts down the risk of oxidation and chemical attack on the graphite material. This means that DIABON® F100 has superior chemical resistance to highly corrosive oxidants such as nitric acid, which is present in stainless steel pickling acid.

In addition, the smooth non-porous surface with anti-adhesive properties minimizes fouling on the plate surface. The anti-fouling properties of the plate design are also increased by a special plate pattern that enhances turbulence.

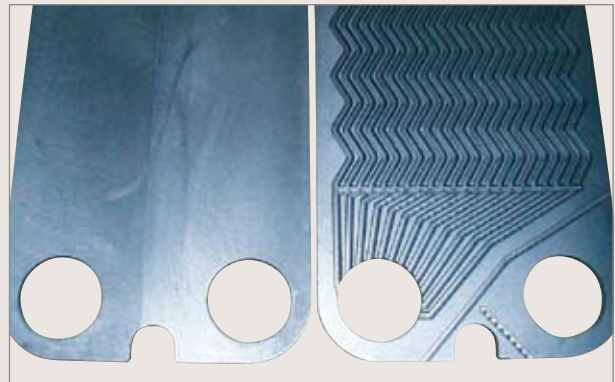


DIABON® F100 plate pattern

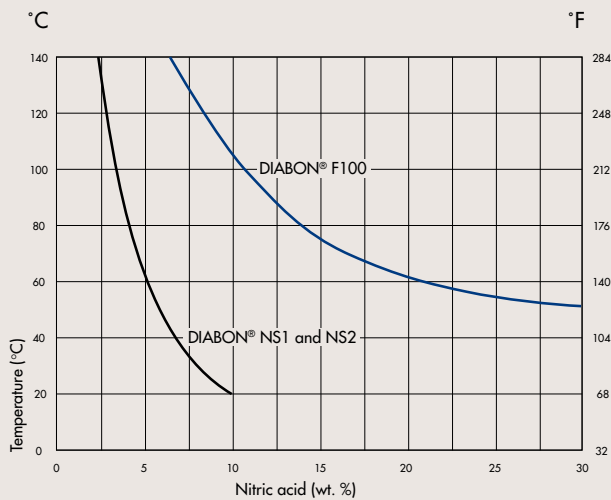
### DIABON® NS1 and NS2

DIABON® NS1 and NS2 are both resin-impregnated fine-grain graphite materials with a highly homogeneous structure and uniform distribution of pore size. This provides a combination of high strength and excellent heat transfer properties. Finite element calculations show that Alfa Laval DIABON® NS1 plate heat exchangers have a safety factor against stress and fatigue cracking that is five times greater than comparable graphite block heat exchangers. DIABON® NS2 meets more stringent specifications than NS1 and is more resistant to corrosion, as well as being impermeable to gases and liquids, and less liable to swell.

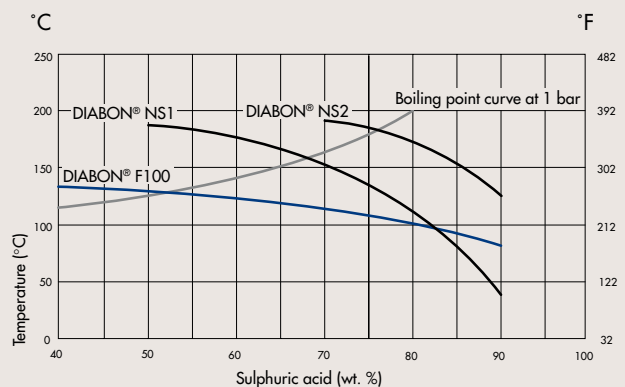
Both DIABON® NS1 and NS2 plates have a machined fin plate pattern on one side and are smooth on the other. This pattern provides highly efficient heat transfer, combined with low pressure drop. These plates are thus particularly suitable for steam heating and for condensing corrosive fluids. The plate pattern also makes this type of heat exchanger well-suited for use with fibrous fluids.



DIABON® NS1 or NS2 plate pattern



Compared with standard resin-impregnated graphite DIABON® F100 offers superior resistance in oxidating environments



Resistance towards sulphuric acid for DIABON® F100, DIABON® NS1 and DIABON® NS2



Alfa Laval DIABON® plate heat exchangers in F100 material used for weak sulphuric acid cooling in the mercury recovery section of a Finnish zinc plant.



Alfa Laval DIABON® plate heat exchanger in F100 material used for cooling of a mix of hydrochloric acid and chlorinated hydrocarbons in a US plant.

#### Advantages of DIABON® plate heat exchangers

- Excellent corrosion resistance
- High thermal efficiency, twice as high as in graphite blocks
- Reduced fouling tendency (DIABON® F100)
- Suitable for condensing duties (DIABON® NS1 and NS2)
- Suitable for handling of fibrous media (DIABON® NS1 and NS2)
- Flexible solution, just add/remove plates
- 5 times greater safety factor (DIABON® NS1 and NS2) against stress and fatigue cracking than graphite block heat exchanger
- Full access to heat transfer surface.

Alfa Laval and SGL Carbon have installed more than 2,000 DIABON® plate heat exchangers to date, for applications that include

- hydrochloric acid processes
- carbon and stainless steel pickling
- mining
- chlorinated hydrocarbon processes
- fertilizer production
- etching of aluminium foil
- pigment treatment
- wastewater treatment.



Alfa Laval DIABON® plate heat exchanger in F100 material used for cooling hydrochloric acid in a German plant.



Alfa Laval DIABON® plate heat exchangers in NS1 material used for cooling carbon steel pickling acid in a German steel plant.

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#### How to contact Alfa Laval

Contact details for all countries are continually updated on our website. Please visit [www.alfalaval.com](http://www.alfalaval.com) to access the information direct.