



## From acid to energy

Alfa Laval heat exchangers in sulphuric acid production





# Recovered heat opens new doors

## Worldwide chemical

Once known as oil of vitriol, a name coined by Jabir ibn Hayyan, the 8th-century alchemist who is thought to have discovered it, sulphuric acid has subsequently become the most extensively used chemical in the world.

Thousands of plants now produce hundreds of millions of tons of this aggressive mineral acid every year, and it is used extensively in countless manufacturing operations.

## Putting heat to best use

Large-scale production of sulphuric acid releases substantial quantities of heat.

Due to current energy prices, this presents a sulphuric acid plant operator with significant commercial opportunities – if this valuable energy

can be recovered efficiently and reliably. Anything else is effectively money down the drain.

Plant operators are therefore increasingly on the lookout for ways to recover as much heat as possible from their sulphuric acid production in order to put this energy to new use or – when appropriate – sell it on the open market.

Enterprising sulphuric acid plant operators throughout the world now put recovered heat to profitable use for

- sale to operators of district heating systems
- use as heating media in adjacent processing facilities
- pre-heating boiler feed water
- generating fresh water
- local heating
- sale for use in other non-related production activities.

## Rapid payback

The efficiency of Alfa Laval plate heat exchangers makes it possible to recover so much energy that you can normally recoup the investment within less than a year. In many cases, you can actually achieve payback within as little as six months.

With current energy prices, some of Alfa Laval's customers have shown they can generate more revenue from selling recovered heat than from their actual sulphuric acid production.

As just one example, the Boliden Harjavalta plant in Finland uses Alfa Laval heat exchangers to recover no less than 40 MW of heat. This is then used in the processing of nickel (12 MW) and copper (8 MW), with 20 MW being sold for use in district heating.

The Boliden Harjavalta plant in Finland





# The technology payoff

## Thermal efficiency

The formidable thermal efficiency of Alfa Laval plate heat exchangers makes them ideal for both heat recovery and other duties in conjunction with sulphuric acid production, with the added benefits of low installation, operating and maintenance costs.

## Maximizing heat recovery

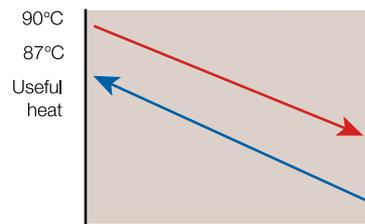
The closer the temperature approach between two fluids in a plate heat exchanger, the more heat is recovered. As illustrated, Alfa Laval heat transfer equipment enables you to achieve as close a temperature approach as possible.

Alfa Laval heat exchangers feature a special plate design that provides maximum thermal efficiency. Along with the fully counter-current flow, this enables you to achieve maximum heat recovery.

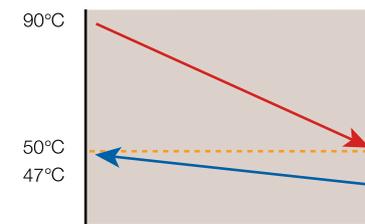
This means a much smaller heat transfer surface area is needed to achieve any given capacity. Alfa Laval heat exchangers are therefore much

smaller than traditional shell-and-tube heat exchangers. This space-saving footprint also cuts back on installation costs.

### Heat recovery using Alfa Laval plate heat exchangers



### Heat recovery using traditional shell-and-tube heat exchangers



## Results using advanced materials

The compactness of Alfa Laval heat exchangers means that equipping them with plates made of high-performance materials is still economical.

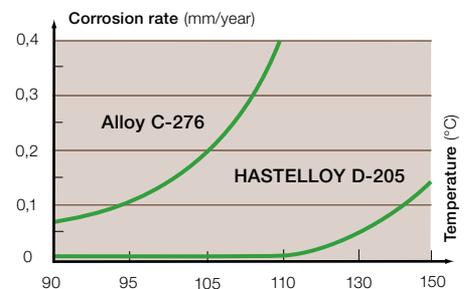
Using semi-welded Alfa Laval heat exchangers with plates made of HASTELLOY® D-205 (a nickel-based

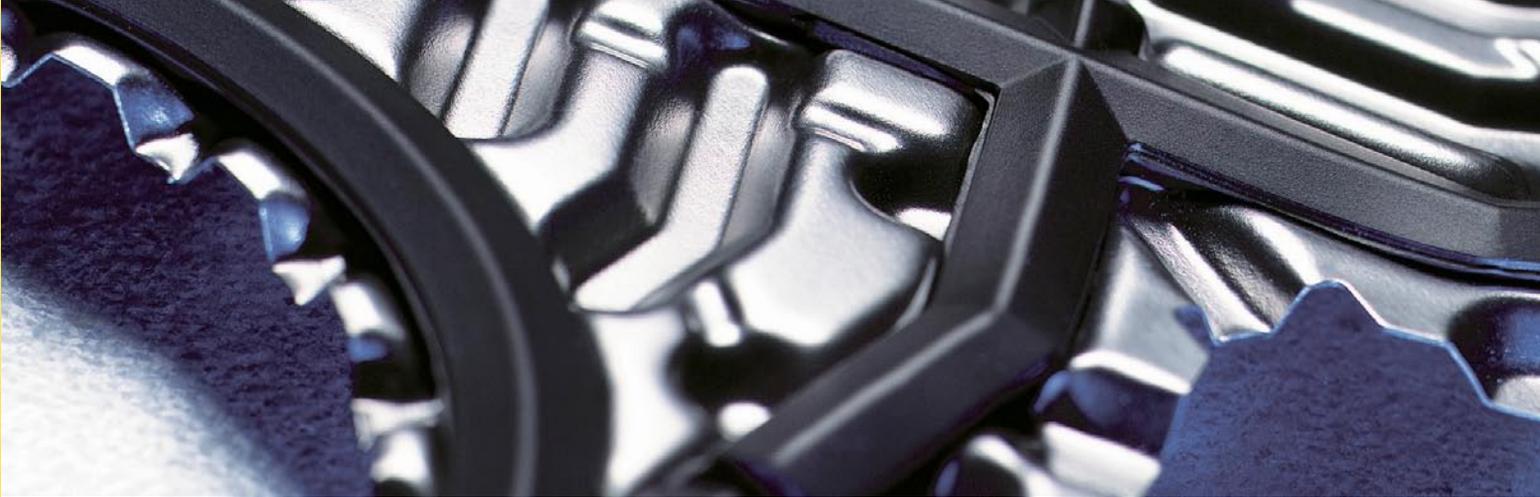


alloy), matched with extremely durable FKMS gaskets, it is possible to recover heat from concentrated sulphuric acid at temperatures as high as 130°C.

This makes it feasible to recover heat at levels once thought beyond the reach of plate heat exchangers, and to apply this valuable energy to a wider range of different uses.

**Durability performance in 98.5% sulphuric acid using plates made of HASTELLOY D-205 and C-276, respectively.**





# Experience counts

If you want to use heat exchangers to recover the maximum amount of heat, you need to be confident that your supplier knows the technology in depth, and is capable of applying it under these kinds of extreme operating conditions.

Alfa Laval is a world leader in developing and implementing heat transfer technology. We have more than 40 years' experience in recovering heat from sulphuric acid processing, with a track record that features more than a thousand installations all over the globe.

## Risk reduction

Sulphuric acid production always involves highly aggressive operating environments. The wide selection of corrosion-resistant plate materials and high-resilience gaskets available from Alfa Laval help you reduce the risk of any unpleasant surprises – or unscheduled downtime.

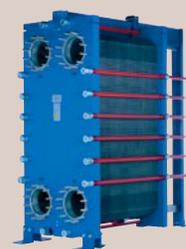
## Worldwide partner

The worldwide Alfa Laval parts and service organization is staffed by experienced service engineers, ready to assist you with performance evaluation, troubleshooting and field service – even at short notice. If you need assistance, Alfa Laval experts can be on the spot quickly.

We also maintain a specialist materials lab staffed by chemical engineers and materials specialists, ready to analyse which heat exchanger and gasket materials would be most cost-effective in your particular plant and production configuration.



## Alfa Laval products used in sulphuric acid plants



Gasketed and semi-welded plate heat exchangers for absorption tower acid cooling, drying tower acid cooling and scrubber acid cooling

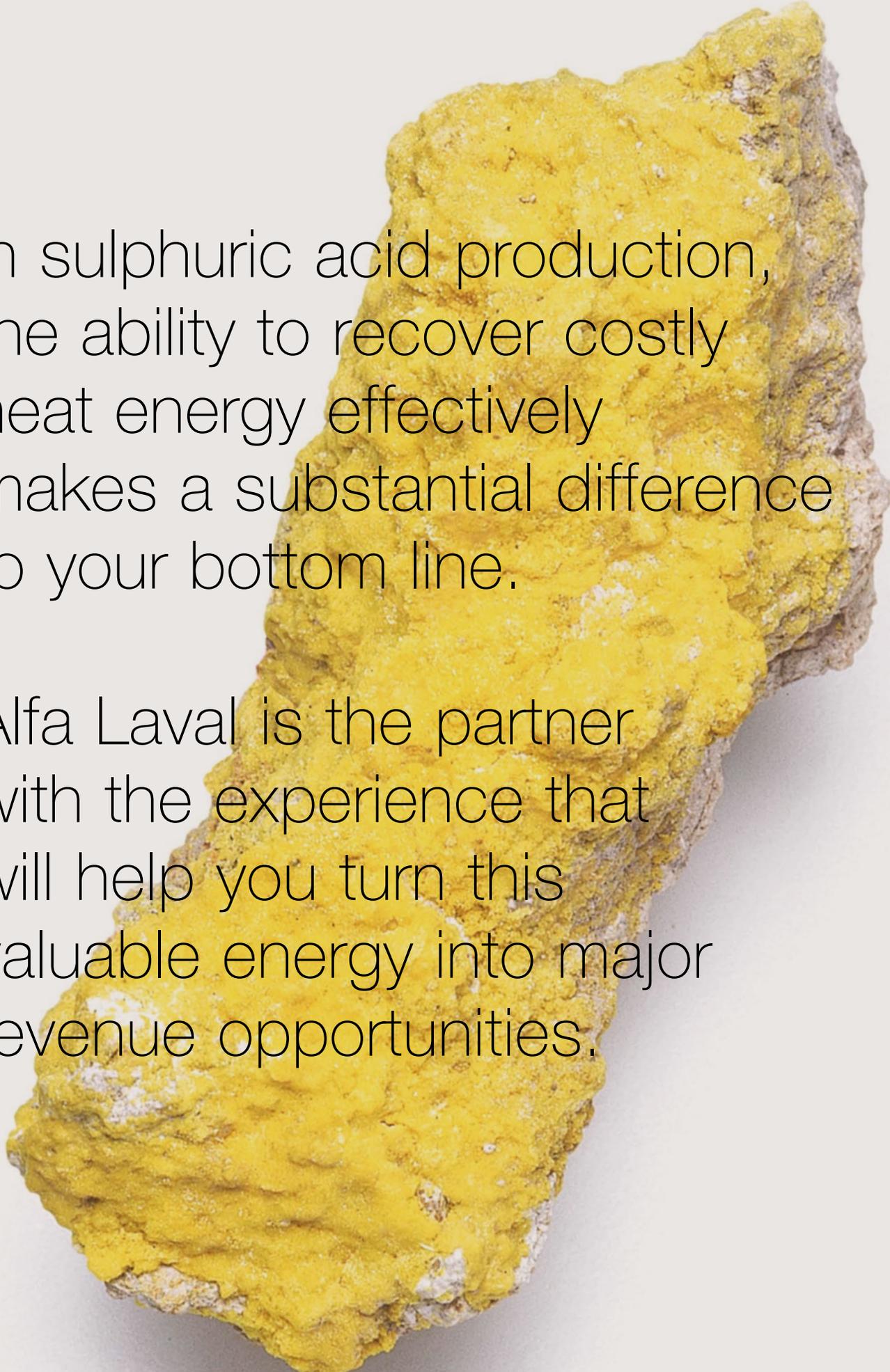


DIABON® plate heat exchangers for scrubber acid cooling



Spiral heat exchangers for cooling and condensing moist gas

Spiral heat exchangers and plate heat exchangers for oleum cooling and oleum/oleum interchange



In sulphuric acid production, the ability to recover costly heat energy effectively makes a substantial difference to your bottom line.

Alfa Laval is the partner with the experience that will help you turn this valuable energy into major revenue opportunities.

## **Alfa Laval in brief**

Alfa Laval is a leading global provider of specialized products and engineered solutions.

Our equipment, systems and services are dedicated to helping customers to optimize the performance of their processes. Time and time again.

We help our customers to heat, cool, separate and transport products such as oil, water, chemicals, beverages, foodstuffs, starch and pharmaceuticals.

Our worldwide organization works closely with customers in almost 100 countries to help them stay ahead.

## **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](http://www.alfalaval.com)