



# Alfa Laval Packinox for paraxylene production

## Combined feed/effluent heat exchanger



**Installing an Alfa Laval Packinox combined feed/effluent heat exchanger is an easy way to minimize investment costs when building a new paraxylene plant. A single Packinox can replace several large shell-and-tube heat exchangers, thereby lowering investment costs. In addition, the low pressure drop and exceptional heat recovery means a Packinox brings maximum process yield and low energy costs throughout its entire lifetime.**

### **The industry standard for heat recovery in paraxylene plants**

Low CAPEX, high capacity, outstanding efficiency and exceptional operational reliability have made Alfa Laval Packinox the industry standard for feed/effluent heat recovery in paraxylene plants.

We have designed and manufactured Packinox heat exchangers for paraxylene production since the early 1990s. At present there are more than 350 Packinox units in operation in refineries and petrochemical plants around the world, with an excellent track record.

### **Minimal investment costs**

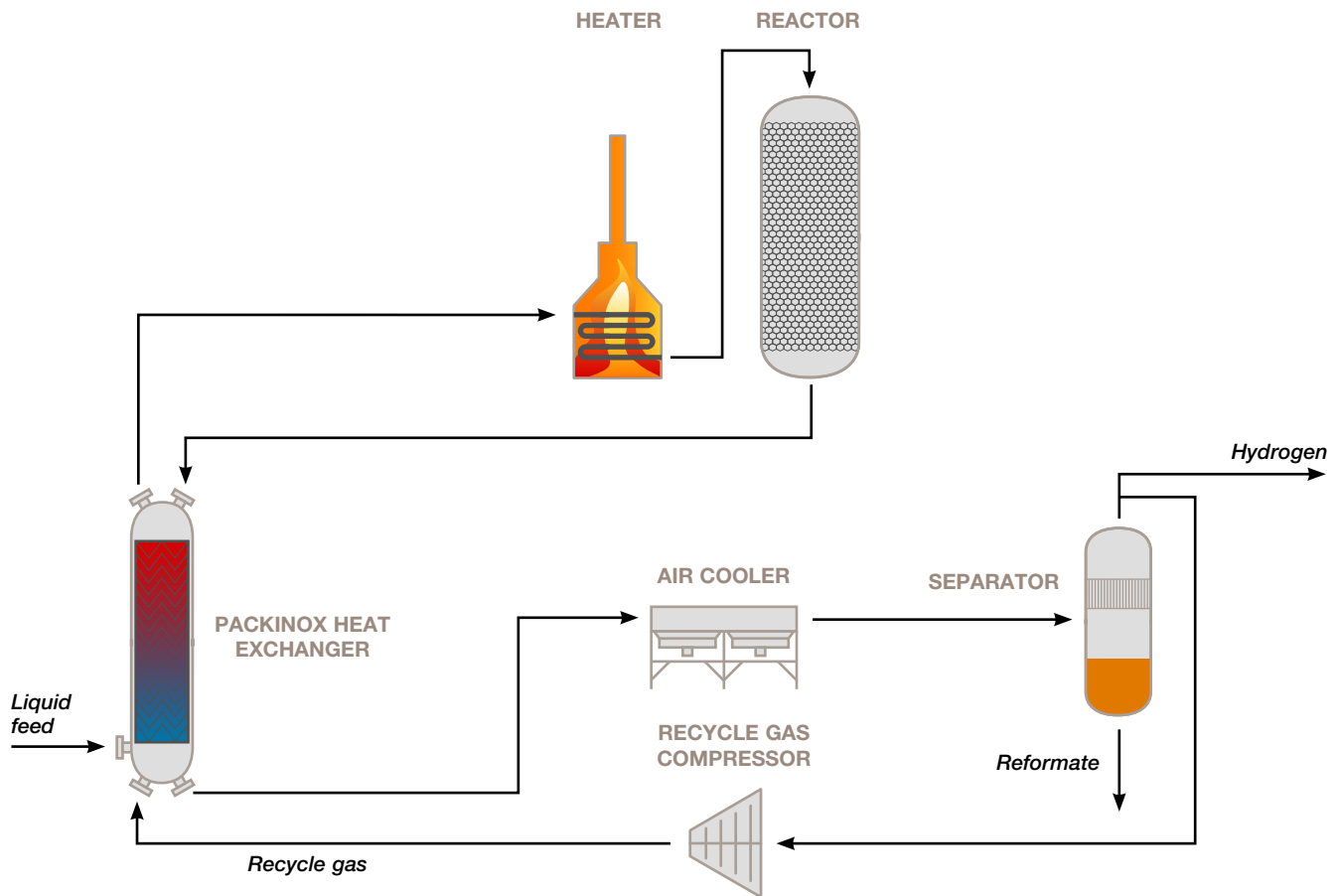
Thanks to high thermal efficiency, Alfa Laval Packinox heat exchangers are very compact compared to shell-and-tube heat exchangers. One single Packinox can often replace several – much larger – shell-and-tube units. This leads to major savings for plot space, civil engineering, structures, piping, instrumentation, etc. when building a new paraxylene plant.

The efficient heat recovery in a Packinox also reduces the load on the heaters and coolers, meaning you can install smaller, less costly units.

The compressor can also be smaller since the pressure drop in a Packinox heat exchanger is very low.

### **High yield thanks to a low pressure drop ...**

The low pressure drop in a Packinox heat exchanger makes it possible to operate the process at a lower pressure than would be possible with shell-and-tube heat exchangers, which increases the yield.



The total, flange-to-flange pressure drop for both sides can be as low as 0.5 bar, compared to 1 bar for vertical and 6 bar for horizontal shell-and-tube heat exchangers.

**... and an optimum flow of recycle gas**

A second factor that influences the yield is the liquid feed/ recycle gas ratio. To maximize the output, this ratio should be as high as possible. But it is critical that the flow of recycle gas is sufficiently high to lift all the droplets through the heat exchanger.

Alfa Laval's unique Lifting Controller software makes it easy to set the optimum flow rate of the recycle gas by continuously analysing operating data and clearly indicating the minimum value required to lift the liquid feed. This makes it easy to optimize operations over time and especially when conditions change, e.g. when switching feed stocks.

The design of a Packinox heat exchanger makes it more flexible to operate than a set of shell-and-tubes, and allows you operate it with a lower gas flow without compromising lifting, resulting in higher yield.

**Low operating costs**

A Packinox heat exchanger is able to recover much more of the energy in the reactor effluent than a shell-and-tube heat exchanger, and consequently the feed is preheated to a higher temperature. The hot approach temperature can be as low as 20°C (36°F), meaning the load on the heaters and the cooling system is reduced, as are energy costs.

Maintenance costs are kept low thanks to minimal fouling and cleaning needs, as well as the easy-to-service design.

Alfa Laval Packinox combined feed/effluent heat exchanger installed in a petrochemical plant.



### The easy way to increase capacity in existing plants

If heater capacity is limiting production, the easiest way to resolve this bottleneck is to exchange existing shell-and-tube heat exchangers for a Packinox.

The outstanding heat-transfer efficiency in a Packinox results in a reduced load on the heaters and enables a higher production rate.

In revamp projects where shell-and-tube heat exchangers are exchanged for a Packinox, there is no need to replace equipment such as compressors, heaters, etc. and existing structures can often be reused with minimal alterations.

### Knowhow and experience

All Alfa Laval Packinox heat exchangers are fully customized and optimized for high reliability and performance. We have a close cooperation with some of the world's leading licensors and we understand the challenges producers of petrochemicals are facing.

For more than 30 years we have been performing regular performance analysis on our entire installed base. This has allowed us to perfect the calibration of our design software.

We put all our knowledge and experience into the design of each heat exchanger to make sure our customers get the best possible solution in terms of low total cost of ownership and maximum production capacity.

### Example – New 200,000 bpd isomerization unit

	Shell & tube HEX HAT = 50°C (90°F)	Packinox HEX HAT = 40°C (72°F)
Number of shells	8	1
Duty	160.1 Gcal/h (635 MMBTU/h)	168 Gcal/h (666 MMBTU/h)
Additional heat recovery	-	7.9 Gcal/h (31 MMBTU/h)
<b>CAPEX</b>		
Equipment cost	7,600,000 EUR	6,700,000 EUR
Installation cost	3,040,000 EUR	1,675,000 EUR
Total installed cost	10,640,000 EUR	8,375,000 EUR
Total CAPEX savings		2,265,000 EUR
<b>OPEX</b>		
Fuel savings per year *	-	3,886,400 EUR
<b>Total savings at startup (CAPEX savings)</b>		<b>2,265,000 EUR</b>
<b>Total savings after five years' operation</b>		<b>21,697,000 EUR</b>

\* Assumed fuel cost = US\$300/tonne

#### 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)