



Alfa Laval Packinox

Plate-and-shell heat exchanger

Introduction

Alfa Laval Packinox plate-and-shell heat exchangers are ideal for demanding heat recovery duties in processes with high temperatures and pressures.

Thanks to its unique design, a Packinox combines the thermal and hydraulic efficiency of welded plate heat exchangers with the high-temperature and high-pressure resistance of shell-and-tube heat exchangers.

The result is a compact heat exchanger with high capacity, high heat-recovery efficiency and minimal pressure drop.

Applications

Alfa Laval Packinox plate-and-shell heat exchangers are used as feed/effluent heat exchangers in:

- Catalytic reforming
- Paraxylene production
- Hydrotreating/hydrodesulfurization
- Paraffin dehydrogenation for LAB Plants

Packinox's design is tried-and-tested, with more than 450 units in operation in plants across the world.

Superior performance, high reliability and short payback time has made Packinox the industry standard in energy-intensive applications such as catalytic reforming and aromatics production.

Benefits

An Alfa Laval Packinox offers many benefits over a shell-and-tube solution:

Maximized energy efficiency

- Fully customized design for optimal performance
- Outstanding heat recovery – minimal HAT (hot approach temperature) and thermal efficiency >95%
- Optimal mixing of the liquid feed and the recycle gas
- Low pressure drop
- Ideal conditions for high yield
- Guaranteed performance



Improved profitability

- Low CAPEX: high capacity and compact size make it possible to replace multiple shell and tube or plate heat exchangers with a single unit
- Low OPEX: robust design and reliable operation as well as continuous performance follow-up from Alfa Laval
- High return on investment

Reduced CO₂ emission

- Optimized use of raw material in operation thanks to the compact size
- Less fossil fuel consumption

Alfa Laval Packinox

How it works

The core of an Alfa Laval Packinox plate-and-shell heat exchanger is a fully welded bundle of heat transfer plates.

The counter-current flow of the hot and cold media in combination with the high turbulence maximizes heat transfer between the streams.

The plate bundle resides inside a pressure vessel filled with the cold-stream gas under high pressure. This means the plate bundle is only exposed to the differential pressure between the hot and cold streams, thereby minimizing the mechanical stress on the plate welds.

Effective mixing

The liquid feed (naphtha or mixed xylene) enters a Packinox plate-and-shell heat exchanger from the side and is mixed with the recycle gas in the mixing chamber. The liquid is sprayed into the recycle gas using Alfa Laval's patented Spray Bars, ensuring a more homogenous liquid/gas mixture compared to traditional mixing in the feed pipe. This optimizes heat transfer in the plate bundle and minimizes mechanical stress.

Thanks to Alfa Laval's Spray Bar technology and the possibility to optimize the plates' corrugation pattern according to operating conditions, Packinox plate-and-shell heat exchangers offer greater flexibility than shell-and-tubes when setting the ratio between the liquid feed and the recycle gas, allowing for smaller gas flows without compromising lifting efficiency.

Packinox Performa

Packinox Performa gives you a detailed view of the operation and condition of your Packinox heat exchanger by providing a real-time view of the operation, and weekly reports with condition analyses and performance predictions. This makes it easy to optimize maintenance, ensure reliable uptime, and maximize energy efficiency.

Design configuration

Customized design

Each Packinox heat exchanger is designed and built to the exact conditions under which it will operate. Performance is optimized by selecting the correct plate pattern, gap distance, plate dimensions, number of plates, ΔT , and pressure drop. The result is outstanding performance and cost effectiveness.

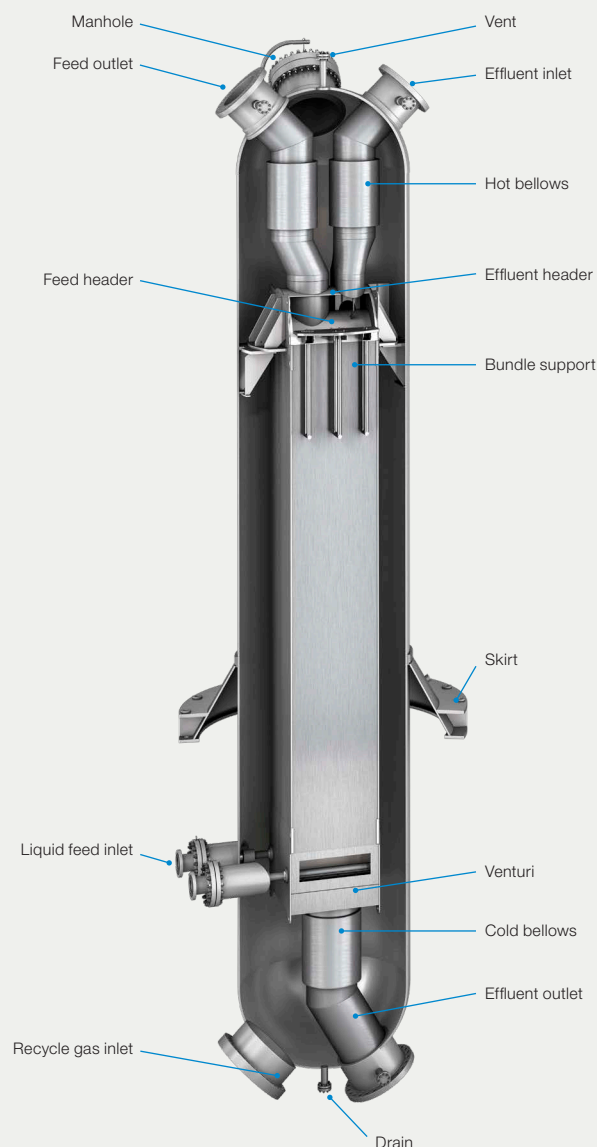


For more information about Packinox Performa, visit our website or download our product data sheet >>

Low pressure drop with HyperCut

A low operating pressure is key for high yields in catalytic reforming and xylene production processes. Packinox heat exchangers combine excellent heat recovery with low pressure drop, usually within the range 0.3 to 1.5 bar (total flange-to-flange, both sides).

Thanks to Alfa Laval's unique HyperCut plates, the pressure drop over the distribution area of the plates is very low. This means more of the available pressure drop can be utilized in the heat transfer area of the plate, resulting in higher heat transfer.



Robust design

Alfa Laval Packinox plate-and-shell heat exchangers are designed and built for maximum operating reliability. The chevron pattern on the heat transfer plates is produced using underwater explosion forming, a technique developed by Alfa Laval, in order to maximize the mechanical strength of plates. Laser welding is used to ensure high weld quality and strength.

We operate under a rigorous quality management system, and thorough inspections are performed at each step of the production process.

Accessible for service

The plate pack is accessible for service through a manhole at the top of the unit and through one of the bellows from the bottom. All welds can be repaired, channels can be plugged and bundle can be replaced if necessary.

Optionally, the shell can be equipped with a body flange, allowing the entire top of the unit to be opened. This facilitates access to the plate pack greatly, enabling quick and easy upgrades.

Installation

Alfa Laval Packinox heat exchangers are installed in an upright position (the pressure vessel is fitted with a skirt or brackets) within minimal footprint.

Dimensions

Current size range

Shell diameter: 1.5 m to 6 m (3 to 18 ft.)

Shell total length: 10 m to 20 m (30 to 65 ft.)

Total weight: 30 to 400 metric tons (60,000 lb. to 600,000 lb.)

Equivalent S&T surface area: 1,000 to 35,000 m² (10,000 to 375,000 sq. ft.) in a single shell.

Technical data

Construction materials

Bundle

Stainless steel (SS 321, SS 316, SS 304, etc.).

Qualified construction materials include all types of austenitic stainless steel, including highly corrosion resistant Alloy 6 Mo.

Vessel

Qualified construction materials include 1.25 Cr 0.5 Mo, 2.25 Cr 1.0 Mo, stainless steel, carbon steel or other qualities as per customer requirements

Bellows

Inconel, Incoloy or other, subject to demand.



For more information about our service offering, visit our website:
Service offerings for Packinox heat exchangers >>

Pressure and temperature operating limits

Temperature

The typical design temperature is up to 550°C (1,000°F). Design temperatures as high as 650°C (1,200°F) have been achieved. Note: internal bellows compensate for thermal differential expansion.

Pressure

Our reference list includes exchangers with design pressures ranging from 3 bar to 140 bar.

Differential pressure between feed and effluent is the bundle's only mechanical limitation. As a conservative measure, we currently limit this value to 55 bar (depending on the configuration and operating temperature).

Codes and Standards

Alfa Laval Packinox's quality and environmental management systems are certified according to ISO 9001 and ISO 14001. We comply with all international standards for pressure vessel manufacturing, for example ASME U, U2, R, NB, as well as all local standards and regulations (PED 2014/68/EU, ATEX, EN 13445, CODAP, AD 2000-MERKBLATT, High Pressure Gas Control Law, TR CU 010/2011 and TR CU 032/2013, Korea Gas Safety, etc.)



Packinox heat exchanger installed in a catalytic reforming unit.

Unique features



HyperCut

Unique plate design that increases reliability and reduces pressure drop

The design of our patented HyperCut plates increases the mechanical robustness and operating reliability of your Packinox heat exchanger, reduces the pressure drop over the distribution areas, and improves operability. This makes it possible to maximize heat recovery, minimize size and CAPEX, and reduce the overall pressure drop.



Explosion Forming

High-strength plates with long, reliable lifetime

The pattern on a Packinox heat transfer plate is formed by the shockwave from an under-water explosion. This one-step operation minimizes residual stresses in the plates, making them mechanically stronger. The end result is very high operating reliability and longevity.



ALOnline

Digital services for maximum uptime and performance

We offer a range of digital services for our Packinox heat exchangers, including process optimization, condition monitoring and predictive maintenance through our Packinox Performa software, as well as remote guidance and support from our experts via video link.



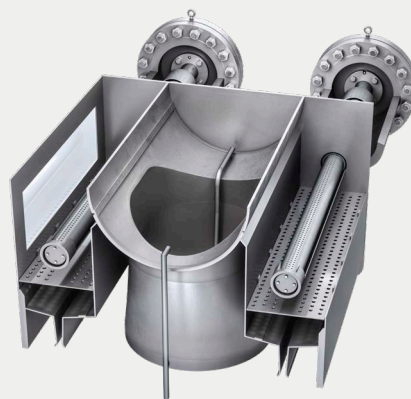
ALOnsite

Qualified support at your facility

With Alfa Laval as your partner, you have the full backing of our global service network, including 24/7 remote technical support. We can be at your plant within 1-2 days if you need onsite assistance.



For more information about Packinox plate-and-shell key features, visit our website >>



Alfa Laval's unique Spray Bar technology ensures effective mixing of the liquid feed and the recycle gas. The gas enters from the bottom and passes the Spray Bars, where the liquid feed is sprayed into the gas.



Spray Bar

Optimized mixing

Internal mixing of the liquid feed and recycle gas is unique for Packinox heat exchangers. Our patented Spray Bar technology ensures perfect mixing, resulting in better heat transfer, less mechanical stress and more reliable operation compared to mixing in the inlet pipe.



PlateWash

Washing system that eliminates the risk of fouling

The PlateWash system monitors the pressure drop in the heat exchanger and allows operators to engage water spraying during operation whenever fouling begins to accumulate. This ensures maximum performance over time and minimizes the risk for costly, unplanned downtime due to cleaning.

Option: Packinox+

Alfa Laval Packinox plate-and-shell heat exchangers can also incorporate Alfa Laval's new FlexFlow technology.

This is the optimal solution for highly asymmetric duties where flow rates differ greatly, for example, liquid-to-gas and gas-to-gas duties.



For more information about our Packinox+ offer, visit our website >>

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