Heat Exchange Solutions

Innovative designs, industry-proven technology

Alfa Laval: The Innovator in Heat Exchange Technology

With over a century of experience, Alfa Laval is a world leader in heat exchanger technology.

Continuous innovation by Alfa Laval in areas of sealing, pressing, strength and efficiency, have allowed our exchangers to be used in over 50,000 applications worldwide.

Alfa Laval holds more than 130 patents in heat exchanger design. Innovations include the first graphite plate and the first double-wall plate heat exchanger. With five plate pressing facilities, numerous service and support centers, and the industry's most extensive R&D program, Alfa Laval is the largest and most service oriented manufacturer of plate heat exchangers.

Today, Alfa Laval offers the most advanced and highest performance plate heat exchangers by continually refining the design with new patented technological improvements.

Plates that go into Alfa Laval exchangers are rigorously tested to ensure quality and high performance. Testing includes light-box and penetrant testing and a hydrotest in both balanced and unbalanced conditions.

Alfa Laval products are available with certification for UL, CE, ASME, CRN and others.

Plate Heat Exchangers

The plate heat exchanger consists of a series of thin, corrugated alloy plates, which are gasketed and compressed together in a carbon steel frame to create an arrangement of parallel flow channels. Ports at each corner of the plates act as the headers and the gaskets direct the fluid flow as well as provide the primary seal for the system. One fluid travels in the odd numbered channels and the second in the even.

A Superior Alternative to Shell and Tube

Alfa Laval plate heat exchangers are ideal for applications up to 350°F and 450 psig. Economically priced at a fraction of other exchanger types, they also offer: smaller footprint, lighter weight, lower fouling, and easier access for cleaning—all important considerations.

Mechanical problems associated with shell and tube exchangers such as vibration and cracked tubes are eliminated with Alfa Laval plate heat exchangers.

Also, when your production needs change, instead of adding new shells, plate heat exchangers can be reconfigured. Its flexibility saves time and money.

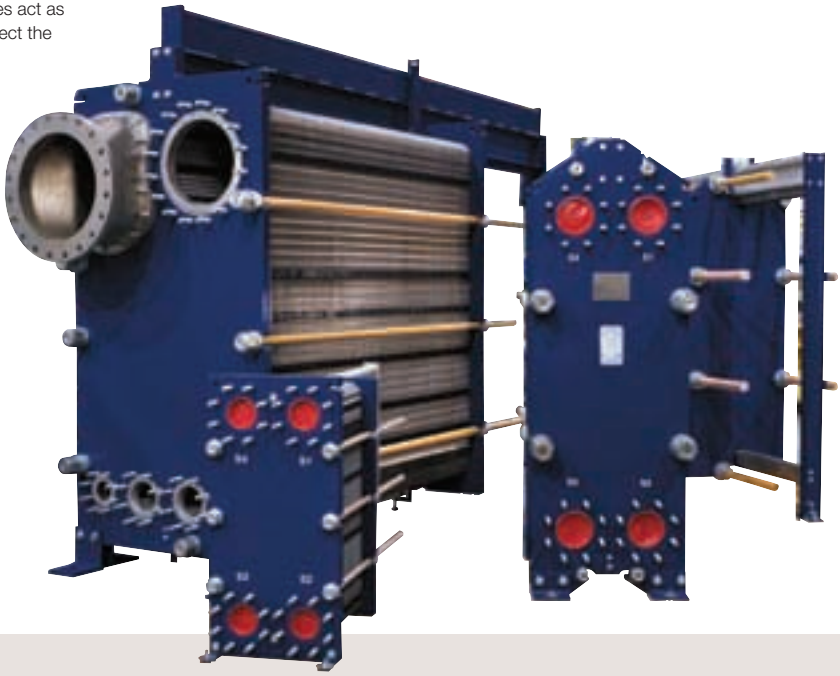
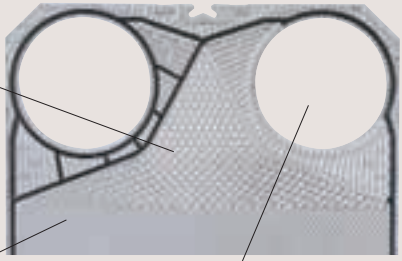
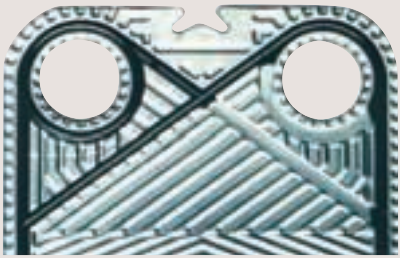


Plate Technology of Today
New designs provide improved uniform distribution and higher design pressure capabilities.

Plate Technology of the Past
Older, less efficient plate designs are susceptible to dead spots and provide significantly lower design pressures.

Distribution Area
Located at the top and bottom of the plate, this area is responsible for ensuring fluid is distributed uniformly across the entire width of the plate, eliminating dead spots. This is more complex on modern units where inlet and outlet are aligned vertically for easier piping. Alfa Laval's designs provide complete fluid distribution across even our widest plate.





Main Heat Transfer Zone
Critical for creating the highest turbulence consistent with desired pressure drop.

Entrance Neck
Designed for low pressure drop as well as low velocities for reliable erosion prevention.

Why You Should Consider Specifying Alfa Laval Heat Exchange Technology Instead of Conventional Shell and Tube Units

Lower Capital Cost
- Up to 90% less cost
- Less heat transfer surface, more efficient
- Less support/foundation, compact
- Less complicated piping, modular
- Higher heat transfer rates

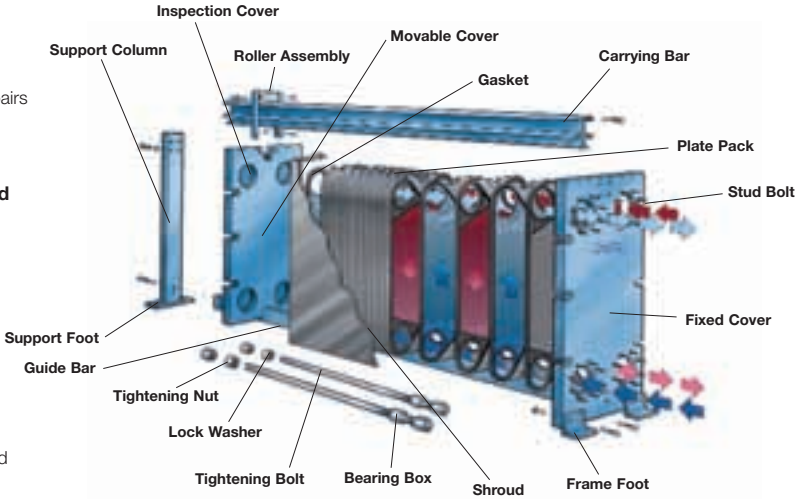
Lower Maintenance Cost
- Less labor and service time
- No extra equipment is required
- Easy access for inspection and repairs
- Minimized fouling with higher turbulence

Reduced Costs for Cooling Fluid
- Less cooling water required
- Can handle poor quality water
- Reduced piping and valve costs
- Reduced pumping costs

Modular Design
- Easy duty adjustment/add or remove plates
- Increased flexibility/no welds to cut
- Can handle a variety of processes
- Can be assembled or disassembled on site

Lower Hold-Up Volume
- 80-90% less hold-up volume
- More precise process control
- Lower weight
- Easier drainage

Greater Energy Efficiency
- Maximum heat recovery
- Closer approach temperature
- True counter current flow
- Capable of handling crossing temperatures



Space And Weight Comparison

PHE's vs. S&T's For Identical Duties: Space and weight required for plate heat exchangers vs. shell and tube units for identical duties in an offshore platform application:

	PHE	S&T
Total weight, drained, tons	16	96
Total weight, operating, tons	19	136
Floor area, installation, ft.^{2}	150	1130
Floor area, installation and maintenance, ft.^{2}	225	2045
Heat load per unit, million BTU/hr.	45	30
Number of units	4	6

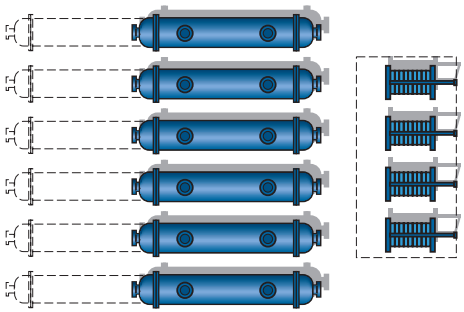


Plate Heat Exchanger Frame

With port connection greater than or equal to 6" (150 mm)

"No Shift" 5-Point Metal-To-Metal Alignment System
- Keeps plates aligned easily during opening and closing
- Guarantees first time seal
- Improves reliability against gasket blow-out
- Extends gasket life

SS roller assembly to facilitate opening and avoid wear & tear on carrying bar

Carrying Bar
- SS profile to allow easy plate movement

5-point guiding system

Bolted construction (no welded parts) allowing field assembly and future expansion

Connections are available in stainless steel and titanium

Lifting lugs or lifting holes for safe & easy handling

Studded port connection allowing increased pipe loadings

In single-pass units: All connections in frame plate provides maintenance without disconnection of piping

All frames ASME-coded. Maximum design pressure up to 450 psi (31.03 bar). Design temperature up to maximum 350°F (176°C) minimum -40°F (-40°C).

Recess to secure bolts safely

Thicker frame covers with no reinforcements mean fewer tightening bolts and easier opening/closing

In multi-pass units: Blind flanges & inspection covers available

Superior bolt closing system

Bolted feet for increased stability and fixing to the floor

Protective shroud meeting OSHA requirement

All frames ASME Coded
- ASME, "U" and "UM" standard

Easy-To-Open, Easy-To Close Tightening System
- Low torque bearing box and lock washers allow easy opening and closing
- Simple, one person operation
- No special tools required
- Rolled threads eliminate galling and seizing
- Bolted construction (no welded parts) allows field assembly and future expansion

Heavy Duty Design Without Reinforcement
- Applies uniform plate pressure
- Eliminates flexing or bending of plates
- Creates a superior seal
- Extends gasket life

Special Plate Innovations

Diabon F® Nonmetallic
A composite of fused graphite and fluoroplastic, this unit offers excellent resistance for hydrochloric acid, AlCl3, and other corrosive materials. Unlike traditional graphite, Diabon F® has no porosity or permeability. It resists cracking and breakage during handling and use.

Wide-Gap Plate
With 5/8" channels free of contact points, this plate is ideal for fluids containing fibers or coarse particles. Each channel has been designed to eliminate bridging of solids in the entrance area.

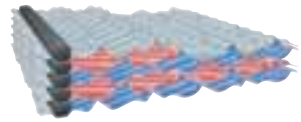


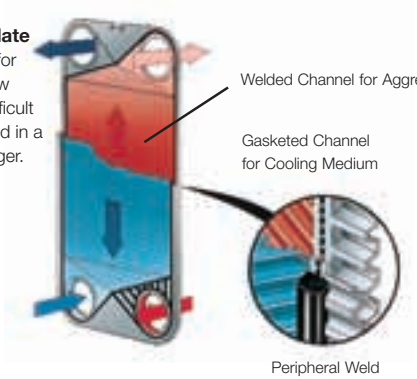
Plate Evaporator/Condenser
Compact and economically efficient, the plate evaporator/condenser replaces conventional large and expensive falling film units. Its deep channels, large ports and laser welding allows vacuum and low pressure evaporation and condensing for both aqueous and organic systems.

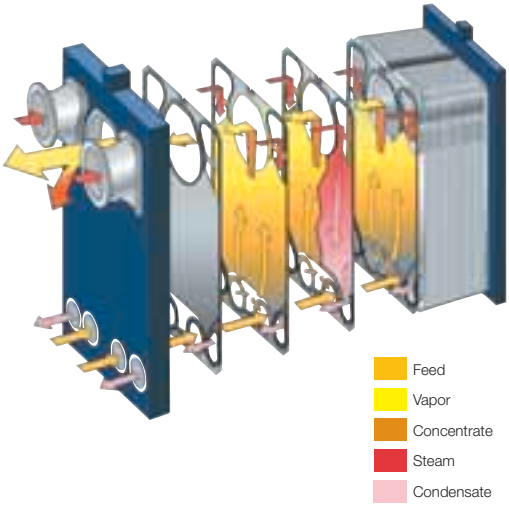
Double-Wall Plate
Composed of plates pressed simultaneously and laser welded at the port, it is designed for applications where additional reliability against intermixing is necessary to prevent catastrophe. Failure of one plate results in a external detection without interleakage. The second wall provides a double barrier between fluids, satisfying local health codes.

External detection if weld or plate fails

Welded porthole

Semi-Welded Plate
Welded channels for process fluids allow aggressive and difficult fluids to be handled in a plate heat exchanger.

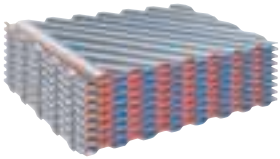




Alfa Laval Offers the Right Sealing System for Your Operation

Glued Gaskets
Should your operating condition promote gasket swelling, glued gaskets offer increased reliability, especially for repeated openings.

Replacement of glued gaskets is not necessary for servicing. Our two-part, oven-cured epoxy affixes the gasket firmly and will not dissolve. This is in great contrast to the single component glues other manufacturers use.



100% Welded
Completely welded plates expand temperature and pressure limitations to 650°F and 625 psig.

Glue-Free Gaskets
Glue-free gaskets offer fast and easy gasket replacement on site.

Sanitary Solutions

Frontline™
Pasteurization and general cooling/ heating of dairy, brewery, beverage and viscous products.

Baseline
Cooling and heating of dairy, brewery, beverage and viscous products and pasteurization in some applications.

Frame
The plates and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to the support column. The tightening bolts are equipped with ball bearing washers in order to facilitate opening and closing of the unit. The frame and support column have adjustable feet.

One unit can contain several heat exchangers, separated by connection plates with interchangeable connections.

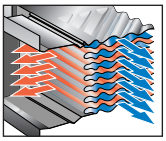
Fully Welded Heat Exchangers

Compabloc® Wide Gap Welded Heat Exchangers
Compact, efficient and technologically advanced, the patented Compabloc® is ideal for any industrial application requiring an efficient and economical heat transfer device without interplate gaskets. High-quality Compabloc® heat exchangers are designed with easy access for regular servicing, and for a long, low-maintenance lifetime resulting in low life-cycle costs.

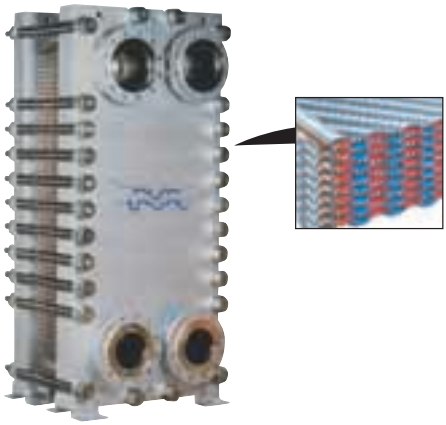
The heart of the unit consists of welded corrugated heat transfer plates of stainless steel or other appropriate exotic metallurgy.

The frame is just four columns, top and bottom heads and four panels with connections. The totally bolted design of Compabloc® allows quick disassembly of the steel frame for easy access to the heart for cleaning, maintenance, repair or replacement. In fact, the bolted design allows complete replacement of the heart without welding.

Main Features
- Heat transfer performances similar to the conventional gasketed PHE
- Cross-current flow arrangement produces fully counter-current fluid distribution that easily handles temperature-cross applications
- Adjustable and removable baffles allow easy variation of pressure drop to satisfy any thermal performance requirement
- Totally accessible on both sides
- Small footprint – a 3,200 square foot Compabloc® needs only 100 square feet of floor space



Compabloc® Welded Plate Heat Exchanger
Versatile as a liquid-to-liquid exchanger, interchanger, reboiler, condenser, evaporator, and steam heater, the all welded design has temperature and pressure limits of 650°F and 450 psig.

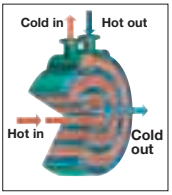


AlfaRex
The AlfaRex (**Alfa** Laval **R**esistant **Ex**changer) is a 100% welded plate heat exchanger designed to handle the high performance applications in the industry. With a total elimination of elastomer gaskets the AlfaRex handles high temperatures and high pressures as well as aggressive media on both sides. The AlfaRex works in the same way as a conventional Plate Heat Exchanger with alternating channels for hot and cold media and with full counter current flow pattern. The laser welds in the AlfaRex are applied in two dimensions only, in the plane of the plates (x,y). This allows the plate pack to expand and contract along the length of the plate pack (z direction) as temperature and pressure changes take place. This flexibility of the plate pack lets the AlfaRex handle applications with rapid changes in temperature or pressure, which would normally produce fatigue cracks in typical three dimensional welded designs. In addition to the plate pack, each connection of the AlfaRex is also designed to flex with temperature and pressure changes. Alfa Rex expands temperature and pressure limitations to 650°F and 625 psig.

Spiral Heat Exchangers

The Problem Solver
In addition to normal heat transfer applications, the spiral heat exchanger is particularly effective in handling sludges, liquids with solids or fibers in suspension including slurries, and a wide range of viscous fluids.

Maximum Heat Transfer
The spiral heat exchanger approaches the ideal in heat transfer equipment. It is compact and requires less installation and servicing space than conventional exchangers of equivalent surface. Essentially, the unit is an assembly of two long strips of plate wrapped to form a pair of concentric spiral passages. Alternate edges of the passages are closed so that media flow through continuous, leak-proof channels.



True Counter-flow Operation
The hot fluid enters at the center of the unit and flows from the inside outward. The cold fluid enters at the periphery and flows toward the center.

Curving Passage Creates High Turbulence
At a velocity that would be marginal and approaching laminar flow in straight tubes, good turbulence is obtained in the spiral heat exchanger owing to its continuously curving passage.

Natural Scrubbing Action Eliminates Deposits
The scrubbing effect of the fluids in each side of the spiral heat exchanger minimize fouling significantly compared with tube style heat exchangers resulting in much higher performance.

Compact Design Reduces Space Requirements
The wrapped circular arrangement of the heating surfaces in the spiral heat exchanger makes an extremely compact unit.

Compaplate® Wide Gap Welded Heat Exchangers

With proven installations worldwide, Compaplate® offers many advantages over traditional exchangers for high fouling services. The wide gap between plates, and the smooth plate corrugation, minimize fouling. The dirty fluid side is completely accessible for mechanical cleaning and inspections, minimizing downtime.

The unit achieves high heat transfer coefficients and is designed to handle up to four fluids in the same exchanger, allowing heating and cooling with various grades of service fluids. It has no interplate gaskets and so problems of gasket compatibility and temperature constraint are eliminated.

Main Features
- Wide-gap free-flow channel
- No interplate gaskets
- Small footprint
- Can be cleaned without removing piping
- Meets ASME and other major international codes
- Up to 50% cost reduction over shell & tube exchangers

Plate Coil Heat Exchangers

Exceptional Versatility
Plate Coils are the most versatile prime surface heat transfer product available, and come in limitless combinations of materials, shapes and styles. They are made single or double embossed, flat or curved, as single coils or manifolded into banks to meet virtually any process requirement. Immersion coils or external clamp-on coils are available, as are jacket sections for building directly into tanks.

Superior Design & Fabrication
- Unique design provides enhanced turbulent flow resulting in good heat transfer efficiency
- Advanced die-forming fabrication techniques give maximum structural strength
- Mechanical integrity allows the highest burst pressures of any units available with the same materials, thickness and weld spacing
- Die-formed heat transfer surfaces are smooth and uniform, offering exceptional resistance to fouling

Design Considerations
- Best suited to moderate heating/cooling or temperature maintenance requirements
- Designed to be used as either an external or integral heating/cooling element
- Maximum ASME design pressure: approx. 400 psig (27.5 barg)
- Maximum design temperature: approx. 650˚F (340˚C)

Heat Saving Energy Banks

- Long-life Plate Coil Banks provide a large prime heat transfer area in compact module, with total flexibility in plate coil sizes, materials, plate centers and manifold designs
- Variable gap between the Plate Coils, combined with the unique geometry of the embossing, allows efficient recovery of waste heat
- Condensing gas economizers attain high heat transfer coefficients in services requiring condensation of moisture from a gas or vapor stream
- Smooth contour of the embossing reduces fouling
- Can be supplied with removable access doors to allow cleaning and inspection

Contherm® Scraped Surface Heat Exchanger

Functional Description
The product is pumped into the lower end of the Contherm heat exchange cylinder. As it flows through the cylinder, it is continuously agitated and removed from the cylinder's precisely finished walls by the scraping blades. This scraping action results in thin film product heating or cooling, a surface free from fouling deposits, and a corresponding high heat transfer rate.

The rotor can be driven by either a top mounted electric (belt and sheave or direct coupled) or hydraulic motor drive. Either drive can be adjusted for varied rotor speeds – an important feature when a number of different products are to be processed.

Heating or cooling media flows in the annular space between the Contherm's heat exchange cylinder and the insulated jacket. When liquid media or steam is used, a spiral coil is installed in the annulus to provide a higher heat transfer efficiency. Steam, glycol, brine, or water enter the heat exchanger from the top end; refrigerants, such as ammonia and Freon, enter from the lower end.

On start-up, air is completely purged from the Contherm. At the end of a processing run, the product can be drained or "chased" by water resulting in minimal product loss.

Flow Rate
The Contherm's maximum flow rate is application specific and determined by the temperature program, nature of the product, and type of duty.

Brazed Heat Exchangers

First introduced by Alfa Laval 20 years ago, the brazed heat exchanger, BHE, comprises a number of stainless steel plates, a frame plate and a pressure plate. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels. The media are kept in the unit by a brazed seal around the edge of the plates. The contact points of the plates are also brazed to withstand the pressure of the media handled. Connections are in the front and the rear cover plate and the channel plates are corrugated to improve heat transfer efficiency and to make them rigid. Each steel plate is covered with copper foil then brazed in a vacuum furnace.

Materials available: Stainless steel 316 plates brazed with either copper or nickel.

Nickel: In addition to all of the advantages and applications of the copper brazed heat exchanger, the nickel brazed heat exchanger may be used for ammonia, deionized water and laser cooling applications.

Performalence™ by design

- Performalence is a unique, patented Alfa Laval heat exchanger design with key features and benefits that increase performance in relation to size. Thus, your product can be downsized – saving space and money.

- The heat transfer plates have been redesigned with a new, shallower pattern. This increases the turbulence, providing a 30% higher heat transfer coefficient than traditional solutions. The new pattern also minimizes pressure drop caused by brazing joints.

- A new plate pattern between the port area and the heat transfer area improves distribution and ensures 100% utilization of the available heat surface.

- A new port configuration allows a higher flow rate, ensuring a very low local pressure drop and an even wider capacity range. Since less pumping energy is required, smaller pumps can be used.

- The internal design reduces the risk of fouling which means longer service/cleaning intervals.

Built-in fatigue resistance

Alfa Laval BHE with Performalence will incorporate thinner, more flexible plates. These are less likely to suffer from cracking due to thermal fatigue caused by the wide temperature variations that occur in district heating networks.

Thus, the new generations of BHEs have prolonged life expectancy compared to the units that are traditionally used in heating applications.

Alfa Chill
Alfa Laval has now added another dual-circuited brazed heat exchanger, with its unique Equalancer refrigerant distribution system, to their range of brazed heat exchangers. It is a compact, cost-efficient heat exchanger that provides maximum heat transfer in a minimum of space. For the customer, this means a well-balanced cooling effect, energy savings and faster installation.

The Equalancer System™
The Equalancer System is fully integrated into the plate so that there are no additional loose parts to manufacture and install. It optimizes heat transfer by distributing the refrigerant more evenly across the plate and through the plate channels. This permits the heat exchanger to achieve a close temperature approach and decreases the need for superheating.

The Dualaced System
In the Dualaced System, two completely independent refrigerant circuits are “interlaced” or alternated with one single water circuit in order to maintain continuous contact between the liquid circuit and the two refrigerant circuits. With this system, the active refrigerant system maintains contact with one side of the water channels, even at part load when the system is reduced down to 50 percent of chiller capacity. This minimizes the risk of freezing and ensures a balanced thermal load and precise liquid outlet temperature control. Thus, system efficiency is improved even in cases when only one circuit is in operation.

Air Dryers
Providing you with Heat Exchangers and added value accessories in the compressed air market – Alfa Laval offers a complete range of Combidryers for refrigerated air dryers. The Combidryer is a brazed plate heat exchanger designed specifically for compressed air dryers, consisting of both the air to air and the air to refrigerant heat exchanger. Combidryers are designed for high thermal performance and low-pressure drop, covering a capacity range from 37-1400 Nm 3/h (22-825 scfm). Within this range, we also offer a diagonal flow solution.

Double-Wall Working Principles
The double-wall plate heat exchanger works in the same way as a conventional brazed plate heat exchanger, but differs in that the single plates between the two media are replaced by plate pairs, double-walls, consisting of two identical plates stacked on top of each other. In the unlikely event of any internal leakage, the double-wall design prevents the two media from mixing, and an external leakage will be visible instead.

Combi Gas Boiler Heat Exchanger BP10
The BP10 is the new Alfa Laval plate heat exchanger (BPHE) for the combi gas boiler market. The features of the BP10 are designed specifically to meet the operational demands on domestic hot water production in combi gas boilers.

Compared with conventional BHEs, the BP10 offers you:
- High heat transfer thanks to the optimal design for combi boilers resulting in:
  - less heat transfer area needed
  - less scaling due to decrease in primary inlet temperature
  - less scaling risk, due to high turbulence
- High water hammer resistance giving:
  - longer lifetime

Dedicated Oil Cooler
In addition to all of the benefits of the standard Brazed Heat Exchangers, the Alfa Laval Dedicated Oil Cooler incorporates additional features that make it by far the most efficient solution for cooling hydraulic oil on the market today.

Global Labs and Customer Test Centers

We improve your performance. Time and time again.
Alfa Laval is committed to the continued technical development of evaporators and condensers for refrigeration, air conditioning and air products. It is this commitment that enables us to offer our customers more efficient solutions than other manufacturers. We realize that there are times that unique applications require unique systems engineering and testing. Alfa Laval's global lab competencies allow for extreme performance testing under a wide variety of operating conditions – wherever and whenever you need it. This testing is based on your operating parameters – giving you the priceless opportunity of testing and re-testing your system prior to use in the marketplace.

Our lab technicians view real-time sensor input and analyze output right on the premises. Should further analysis be needed or desired, other Alfa Laval facilities may be allowed access to this data – taking full advantage of our limitless internal knowledge bank. This allows for testing of unique applications, the most intricate systems and extreme operating conditions.

At Alfa Laval's state-of-the-art Customer Testing Center in Newburyport, Massachusetts, a staff of professional laboratory technicians assists customers in optimizing the equipment and operating conditions to fit their exact product and process.

Analytical Laboratory
The analytical testing program provides customers with data on the products' physical properties including moisture content, pH, specific gravity, and particle size. Cone-and-plate or plate-and-plate viscometers are used for quantitative analysis.

At Alfa Laval, we know that it is critical to our food processing customers to preserve precisely the taste, texture and quality of their food products. And it is equally important for our non-food customers to maintain the exact quality of their products. That is why Alfa Laval offers them the opportunity to determine the best configuration of their process line before they purchase the equipment.

Certifications

Alfa Laval products are available with certification for UL, CE, ASME, CRN and others.

- UL
- ASME
- CE
- CRN

Full Service

Alfa Laval offers you the most comprehensive technical service in the industry. With our extensive manufacturing and service background, we understand the importance of well-maintained equipment. We know the problems and costs of downtime. That is why at Alfa Laval we guarantee that our repairs will be done properly – the first time – every time.

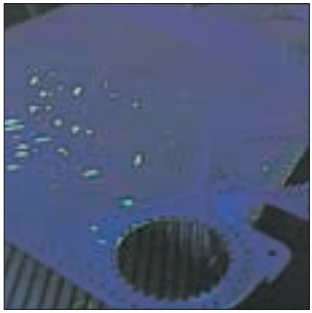
World Class Customer Service

- World wide field service
- Fast turnaround
- Experienced, factory-trained technicians
- Genuine OEM parts and Spare Parts Kits
- All makes and models of plate heat exchangers serviced
- One year warranty on all work performed
- Nationwide technical sales representation
- Fully equipped service centers in the major industrial areas

Plate Heat Exchanger Repair – Wherever you are, whenever you need it

Unique 4-Step Reconditioning Process
Alfa Laval's unique 4-step reconditioning process, along with the highest quality workmanship, provides savings in shutdown and replacement costs as it reduces the risk of breakdowns and increases the life of the heat exchanger.

Gasket removal using liquid nitrogen. Complete removal of gasket and glue without damaging the plate.



Crack detection under ultraviolet lights ensures that reconditioned plates are defect free.

Special 2-component epoxy gluing, followed by an oven cure for the strongest bond, provides longer gasket service life.

Chemical cleaning of plates in heated, agitated tanks. Ensures a clean, deposit-free metal surface.

Set up Business Card Slits

Providing the world with processing solutions.

Alfa Laval is a leading global provider of specialized products and engineering solutions. Our equipment, systems and services are dedicated to assisting customers in optimizing the performance of their processes, time and time again.

We help them heat, cool, separate and transport products such as oil, water, chemicals, beverages, foodstuff, starch and pharmaceuticals. Our worldwide organization works closely with customers in almost 100 countries to help them stay ahead.

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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 to
access the information directly.