Closed-loop cooling is the preferred way of cooling key processes in petrochemical plants, refineries, power plants and other heavy-duty industrial environments.

Closed-loop cooling is safe, reliable, effective and gentle on the environment. And Alfa Laval's wide range of plate heat exchangers and filters make your system flexible, cost-efficient and long-lived.

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

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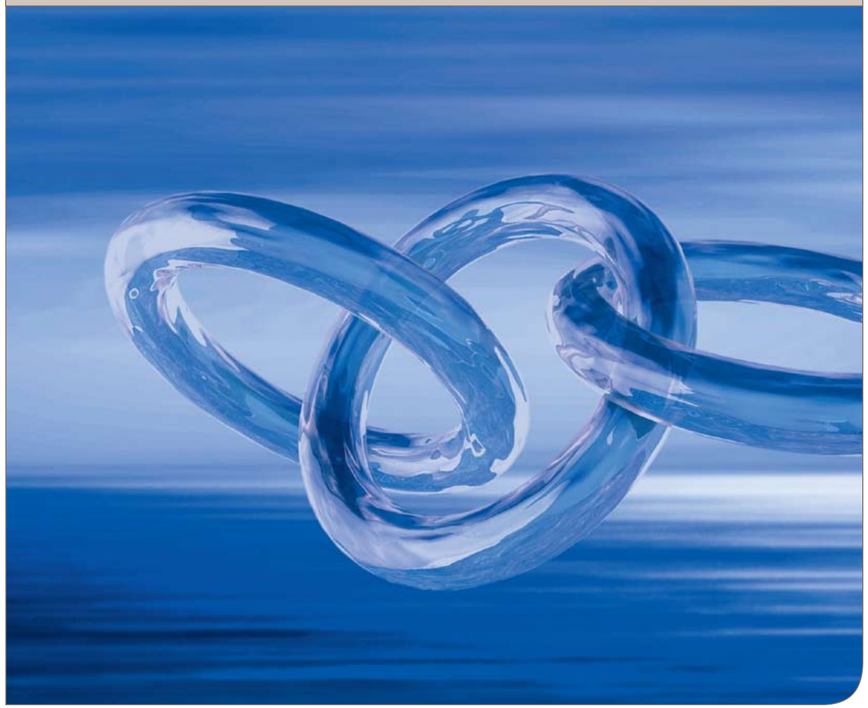
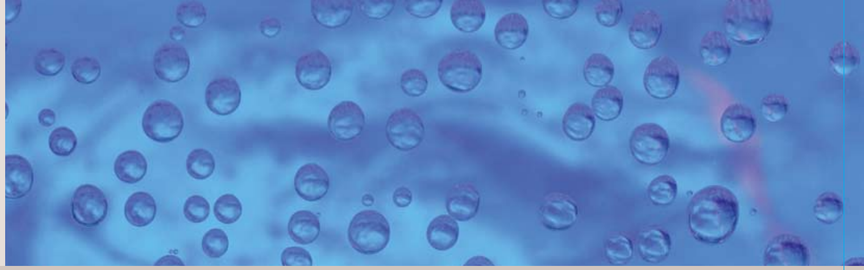
Open for closed-loop cooling.

Complete solutions from Alfa Laval.



The Alfa Laval advantage

- Alfa Laval's experience of industrial process cooling is unparalleled anywhere.
- No project is too complex for Alfa Laval's closed-loop cooling specialists.
- Alfa Laval's global presence, with more than 50 service centres worworldwide, makes local customer support widely available.



Your closed-loop cooling partner

Alfa Laval is a world-class supplier of closed-loop cooling solutions for just about any industry where such solutions play a key role. Alfa Laval offers a cost-efficient range of large plate heat exchangers and effective filters. We also have the expertise to design optimized combinations of the two, and the project management experience to deliver exactly to specification.

Separating the loops
The principle behind closed-loop cooling is simple. You separate the external cooling water from the actual process-cooling water by running them in independent circuits. The only connection between the circuits is a large plate heat exchanger.

The advantages are numerous. External cooling water is kept out of all processes – while process water is confined to the plant, with no risk of contaminating external water. This sharply reduces the risk of environmental impact in case of leakage in the process.

With no external water entering any process equipment, the risk of fouling is greatly reduced and the need for cleaning and maintenance is minimized. And because the corrosive external water is kept out, stainless steel is sufficient in the process heat exchangers.

Getting the job done
Closed-loop cooling projects are often complex. Selecting, dimensioning, manufacturing, documenting and delivering the best possible heat exchanger and filter solution require skills and experience.

Alfa Laval has the specialists – in design engineering, material sourcing, quality, logistics and project management – to get the job done. They can support customers (contractors and plant operators) before and after the actual installation – with everything from design optimization to cleaning procedures, start-up testing and optimal operation.

Approved and certified
Our products meet necessary industry standards such as API. Alfa Laval is certified for design and manufacture according to pressure-vessel codes such as ASME III, ASME VIII and EN13445 (PED).

All documentation pertaining to a specific project – including acknowledgements, schedules and component tracing data – are kept available and continually updated on line.

Finally, as the largest manufacturer of compact heat exchangers, Alfa Laval has a strong business relationship with its suppliers. This helps ensure the availability of key components and materials, even in a situation of shortage.

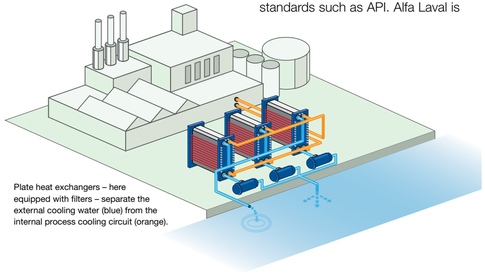


Plate heat exchangers – here equipped with filters – separate the external cooling water (blue) from the internal process cooling circuit (orange).

Complex project at NIST

The National Institute of Standards and Technology in Maryland, USA, operates the nation's largest research reactor licensed by the Nuclear Regulatory Commission (NRC). Built in 1965, the plant first used shell-and-tube heat exchangers for its heat-transfer needs. In 1994, these were replaced with five semi-welded plate heat exchangers from Alfa Laval, configured for a closed-loop cooling. They are used for cooling purification water and for cooling the reactor water. NIST's requirements on all nuclear-island equipment are particularly rigorous, putting considerable pressure on Alfa Laval's project team to meet all industry standards and provide all the necessary documentation.

A perfect fit for every loop

Alfa Laval's line of large plate heat exchangers come with porthole sizes up to 500 mm and flow capacities up to 4,700 m^3/h. Plates are available in a variety of materials and executions to suit different project circumstances. As a result, Alfa Laval can propose the right heat exchanger for every closed cooling loop, with a perfect thermal fit and the required mechanical performance. Customers also get the optimum number of units – with respect to the thermal duty, the installation floor plan and the required stand-by capacity.

Compact, efficient, flexible
Plate heat exchangers are, in many ways, ideal for closed-loop cooling and utility duties. They are compact, efficient and flexible, and can easily be adapted to capacity changes. They are also very fouling-resistant, requiring a minimum of cleaning.

Compared to other technologies, e.g. stand-alone cooling towers, closed-loop cooling with PHEs requires less make-up water and a minimum of water treatment. Consequently, there is less maintenance and less pumping – both of which result in significantly lower operating costs.

In some parts of the world, an integrated cooling system is required, combining closed-loop PHEs and cooling towers. This is a common solution when local authorities enforce a temperature cap for the returning seawater.

Adaptation is standard
Alfa Laval's plate heat exchangers are extremely adaptable and easy to optimize for each duty at hand.

The size of the portholes, the number of plates, their thickness and corrugation patterns can all be varied to meet pressure-drop and design-pressure specifications. Plate materials include stainless steel, titanium and even Pd-titanium.

For customers with non-standard operating conditions and requirements, Alfa Laval can design and build a fully customized PHE from the ground up, with characteristics beyond the standard range.

Easy cleaning
Despite their fouling-resistant properties, Alfa Laval's plate heat exchangers sometimes need to be cleaned. This can be done in several ways.

A convenient method is CIP – Cleaning In Place – using special cleaning equipment and appropriate chemicals. CIP is quick and effective, and extends the lifetime of plates and gaskets compared to mechanical cleaning methods. Since no opening of the heat exchanger is required, cleaning normally takes less than 4 hours. An AlfaCheck monitoring system can help determine the correct cleaning intervals and evaluate the cleaning result.

Backflushing is a way of removing incoming sand. Without even interrupting the cooling process, the PHE flows are simply reversed for a brief moment at regular intervals, allowing the external, cool side to clean itself from debris.

37 heat exchangers in a loop

Eastern Petrochemical Co./SHARQ, a joint venture between Saudi Basic Industries Corp. and a Japanese consortium, produces Polyethylene and Ethylene Glycol. Its closed-loop cooling system (integrated with cooling towers) uses water from the Gulf along Saudi Arabia. The water runs through a total of 37 large Alfa Laval plate heat exchangers (T50M-FG) with titanium plates. An ALF 60R filter is connected to each PHE. Alfa Laval managed this large and complex project, including design optimization, material sourcing, logistics and installation support.

The filter completes the cooler

ALF is Alfa Laval's all-purpose filter designed for installation with plate heat exchangers in closed-loop cooling (and many other filtration duties). ALF filters remove any kind of unwanted objects in the external water – including sand and various biological matter – before it enters the PHEs. This minimizes maintenance and cleaning of the PHEs, while maximizing their operating life. The ALF filters are self-cleaning and require virtually no maintenance.

Eliminate problems
If foreign materials such as seaweed, mussels and mud are allowed to enter a plate heat exchanger, the heat transfer is rapidly impaired. Sand and other erosive materials also increase the wear on plates and gaskets, ultimately causing costly shut-downs and repairs. ALF filters will minimize these problems.

Objects and particles are trapped in a filter basket before the water is discharged to the PHE. From time to time, the basket is flushed clean in an automatic two-step process, ensuring that all debris is removed from the basket and flushed out. This takes place without interrupting operation.

Flexible installation
Installation of the ALF filter is very flexible in terms of pipe dimensions, nozzle orientation and footprint. The filter comes in a variety of sizes, with connections and flow capacities up to 800 mm and 8,500 m^3/h, respectively. This means that a single filter unit can serve more than one plate heat exchanger – a cost-efficient set-up in many situations.

Nuclear trouble-shooting

The two closed-loop cooling systems in a major Chinese nuclear power plant rely on six Alfa Laval M30 PHEs in titanium. Each uses sea water from a shallow bay which brings mud with sand, sea shells and seaweed into the system. To minimize fouling, the systems were equipped from start with ALF filters. Even so, the tough operating conditions led to fouling and erosion of the PHEs. Alfa Laval technicians investigated on site and deployed an array of remedies, including chlorination procedures, flow-rate adjustments, backflushing and modified plate configurations. As a result, the plant has seen a dramatic decrease in maintenance and increase in the operating life of the plates.