Heat transfer solutions for the semiconductor manufacturing industry

Choose peace of mind

Advanced temperature control for your process fluids

Alfa Laval heat exchangers come in a variety of materials, sizes, and capacities. But, thanks to our expertise in unique material selection, we can increase operational purity, reduce ultrapure water contamination, heighten resistance to aggressive media, and improve material lifetime regardless of which model you choose. Whatever the duty of your semiconductor plant, Alfa Laval has the right heat exchanger for your specific requirements.

Preparing acids and chemicals
Preparation before and inside the cleanroom requires precise temperature control. So, you need a heat exchanger that can handle aggressive medias like acid and chemicals. Equipped with graphite plates, Alfa Laval's Diabon plate heat exchangers can handle even the toughest media, making it the ideal solution for preparing acids and chemicals in your plant.

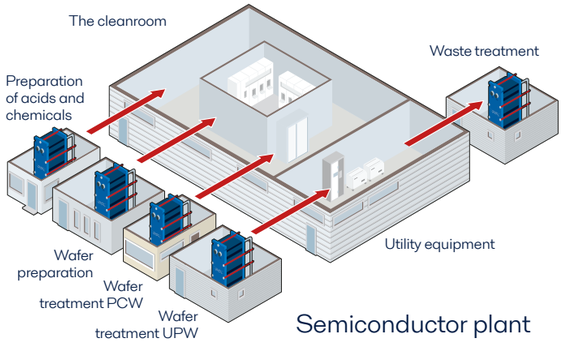
Wafer preparation
When cutting SI-ingots into wafers using wire saws, temperature control for the coolant and cutting slurry is essential. At Alfa Laval we have a range of suitable solutions to choose from. Whether you prefer our gasketed plate heat exchangers, AlfaNova all-stainless steel heat exchangers, or brazed plate heat exchangers we have a compact, reliable, and heat transfer efficient option for your water preparation processes.

Process cooling water (PCW)
Process cooling water (PCW) is used to cool utility equipment like lasers, compressors, and vacuum pumps in the semiconductor manufacturing process. This is where Deionized (DI) water comes in direct contact with machines via a heat exchanger that is connected to cooling towers or chillers. With an Alfa Laval heat exchanger attached to your system, you can use a mixture of both DI and any other cooling water, as each water type can be restrained to one side of the unit. This makes it a flexible option that can adjust to all your set thermal requirements.

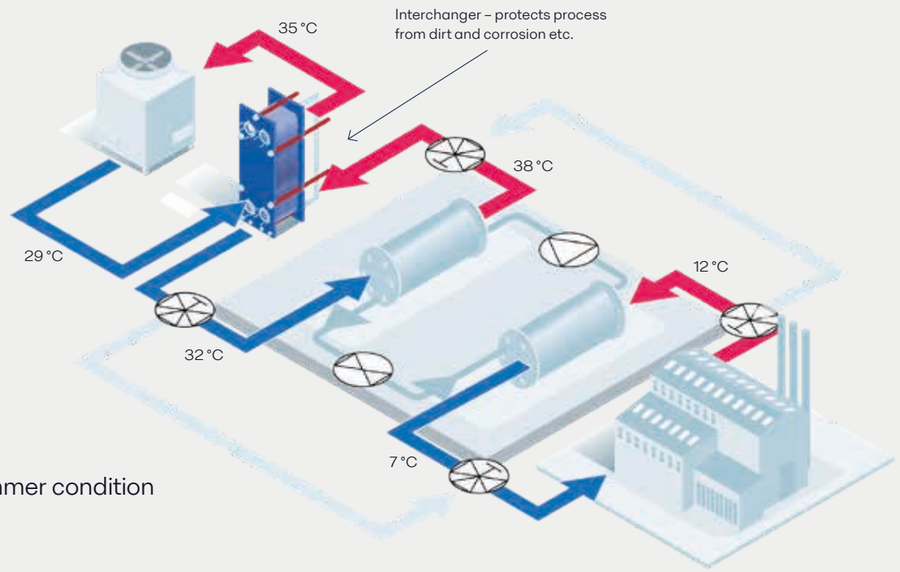
But that is not all, with the simple addition of a simple chiller bypass, Alfa Laval can help you save important energy and thousands of euros at the same time. When you have an open cooling tower, the water is often cool enough to fit plant requirements on its own during the winter months. So, with Alfa Laval heat transfer support, you can turn your chiller off and utilize the cooling tower water as a form of almost-free cooling.

Ultrapure water (UPW)
This cycle is the most critical and delicate, as water comes in direct contact with the silicon wafer. As the cleanliness requirements are so high for this step, Ultrapure water (UPW) is needed to wash the silicon wafer and neutralize the acids like HF or H_3PO_4 that are used to etch the silicon wafer circuit. This means that no contamination is acceptable and the plate heat exchanger you use need to comply with strict requirements. Here at Alfa Laval, our plate heat exchanger portfolio offers a range of plate and gasket materials that are specially designed to meet all these stringent process demands. We especially recommend our Clean Build and silicone gaskets for this process as it creates a clean, high performing solution from the start.

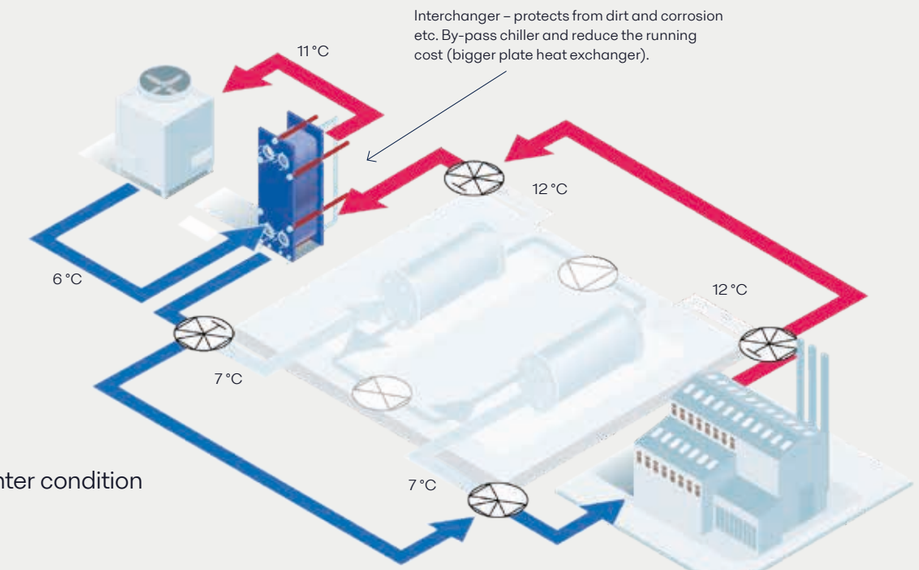
Waste treatment
When it comes to waste stream management, we also have a wide portfolio of technologies and solutions. Whether you need a plate heat exchanger to cool your waste stream media and neutralised acids, or a decanter and high-speed separator to cut and recover SI contaminated slurry, Alfa Laval has a product to support you.



Semiconductor plant



Summer condition



Winter condition

Alfa Laval Clean Build: Ultra-clean, ready-to-install heat exchangers for reliable production

In a cleanroom, even the smallest contaminants will have major consequences. With Alfa Laval Clean Build your heat exchanger arrives pre-cleaned and ready to be integrated into your ultra-clean semiconductor cleanrooms. Every unit undergoes a meticulous final cleaning in a class 10,000 environment (as per the Federal Standard 209E). This includes everything from the inside plate channel to the outside frame and packaging.

1. All channel plates are wiped using a DIW solution (gloves are worn throughout).
2. External surfaces are flushed with hot DI water filtered to 0.01 µm.
3. Ports and external frame surfaces are wiped down with DIW.
4. Hydrostatic testing is performed with DI water.
5. (Level A): Internally dried with filtered air. Final cleaning is performed in a Class 10,000 level clean room as per Federal Standard 209E.
6. (Level B): Internally dried with heated nitrogen (250° F).
7. Unit capped and packaged using shrink wrap to preserve cleanliness.

Alfa Laval Clean Build is also available for our Compabloc range as it supports high flows and high purity where you don't need to replace the plates. So, whatever your operational requirements, we can provide clean, reliable, and high performing heat transfer support. Reach out to our sales team for more information.

Alfa Laval **QP Silastic** gaskets

In collaboration with an industrial leader, we have developed the QP Silastic gaskets – a breakthrough in gasket technology, engineered specifically for the semiconductor industry.

Crafted from medical-grade silicone elastomer, our QP gaskets are based on a diethyl and methylvinyl siloxane (VMQ) copolymer reinforced with silica. This formulation is ultra-pure, meeting even the most stringent industry standards – where measurements in parts per trillion are the norm.

Benefits of QP Silastic Gaskets

- Designed for UPW applications where cleanliness is critical.
- Fully saturated silicone backbone ensures thermal stability in hot air environments.
- Thanks to their ozone resistance, they can be stored for later use with the proper packaging.
- Suitable for both titanium and stainless-steel heat exchangers.

We offer QP Silastic gaskets in a range of sizes to meet your specific design requirements.

Note: Not recommended for use above 100 °C (212 °F) with water or steam due to hydrolysis sensitivity.

State-of-the-art heat exchangers for **every duty in your plant**

Gasketed plate heat exchangers

Alfa Laval provides a comprehensive range of traditional plate heat exchangers (PHE), featuring gaskets between the plates. With plates in stainless steel or titanium, they are a well proven and efficient solution for heating, cooling, heat recovery and other heat transfer duties.

Applications
- Ultrapure water
- Process cooling water
- Wafer preparation

Benefits
- High thermal efficiency for effective heat transfer
- Low installation cost
- Easy dismantling and cleaning
- High performance with low hold-up volume
- Versatile, modular design
- Environmentally efficient

DIABON® plate heat exchangers

Plate heat exchangers in the DIABON® range are equipped with graphite plates. They combine the high efficiency heat transfer benefits of conventional plate heat exchangers with the exceptional corrosion resistance of graphite material.

Applications
- Preparation of acids and chemicals

Benefits
- All the benefits of conventional PHEs
- Designed to handle the toughest media
- Will withstand all types of acids
- Virtually indestructible

Welded plate heat exchangers

Alfa Laval supplies a range of totally gasket-free, fully welded plate heat exchangers. The units are suitable for high temperature and high pressure thermal duties.

Applications
- Ultrapure water
- Process cooling water

Benefits
- All the benefits of conventional PHEs
- Laser welded for strength
- Compact flexible designs
- Able to withstand pressures up to 40 barg (580 PSI)
- Temperatures up to 350 °C (660 °F)
- Able to handle very low maintenance requirements

Brazed plate heat exchangers

Unlike traditional heat exchangers, the brazed plate heat exchanger (BHE), consists solely of surfaces that make an active contribution to heat transfer.

Applications
- Ultrapure water
- Process cooling water
- Wafer preparation

Benefits
- Compact durable designs
- Easy to install
- Rapid response to temperature changes due to small hold-up volumes
- Able to withstand great strains in demanding applications
- Able to withstand pressures up to 45 barg (660 PSI)
- Handles temperatures up to 225 °C (440 °F)
- Can be configured to your specifications

Fusion-bonded plate heat exchangers (AlfaNova)

The AlfaNova is the first plate heat exchanger in the world to be made entirely of stainless steel. This is made possible by unique active diffusion bonding technology patented by Alfa Laval. The AlfaNova's 100% stainless steel construction minimizes the risk of corrosion and makes this high efficiency heat exchanger suitable for a use in a wide range of applications using hazardous media.

Applications
- Ultrapure water
- Process cooling water
- Wafer preparation

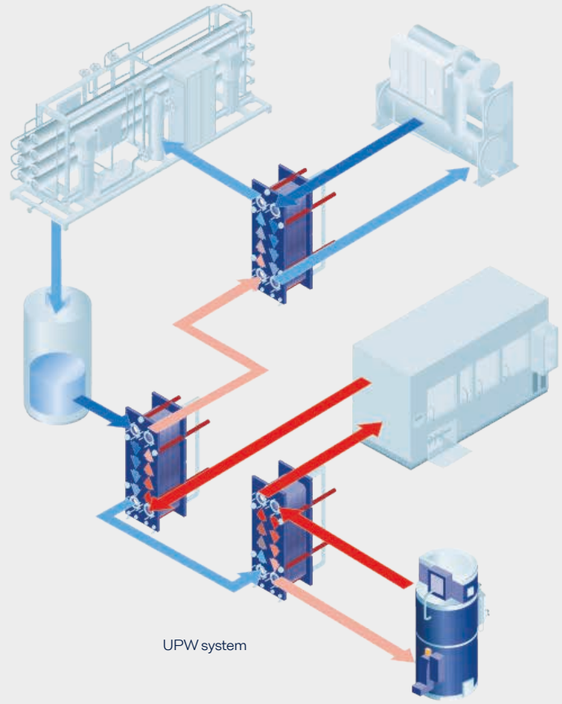
Benefits
- Extremely compact design
- Able to withstand great strains in demanding applications
- Able to withstand pressures up to 30 barg (435 PSI)
- Handles temperatures up to 550 °C (1,020 °F)
- Can handle hazardous media
- Minimum risk of corrosion

Energy efficient semiconductor production

During a project with a major UPW System supplier, we used Alfa Laval technology to recover heat from ultrapure water (UPW) systems in a semiconductor fabrication facility. These systems are critical to the production process, as silicon wafers are rinsed with UPW between each step. By recovering the heat from used hot UPW, the facility made substantial energy savings, demonstrating how even the most demanding and sensitive processes can benefit from heat recovery solutions.

We are also present outside of the cleanroom, with energy efficient waste treatment solutions. Take a large South Korean semiconductor manufacturer as an example. With an Alfa Laval TS35 heat exchanger added to their system, they could replace steam as their primary heat source. By optimizing their operations and prioritising heat reuse as an important heat source, they only needed to include their existing steam heat exchanger when higher temperatures are required. Since the switch Alfa Laval has helped them recover 25-30Gcal/ day in waste heat, saving 15 tonnes of steam each day. This equates to several hundred million KRW in fuel costs.

Customer story: How waste heat recovery helped reduce energy costs and carbon emissions



UPW system

The leader in plate technology

Alfa Laval is the largest manufacturer of plate heat exchanger solutions in the world. Our advanced manufacturing processes and plate designs make us stand out from the others:

- **Single-step pressing of plates gives more efficient heat transfer.**
- **Patented distribution area design**, resulting in maximum use of the heat transfer area, higher design pressure capabilities and minimal fouling.

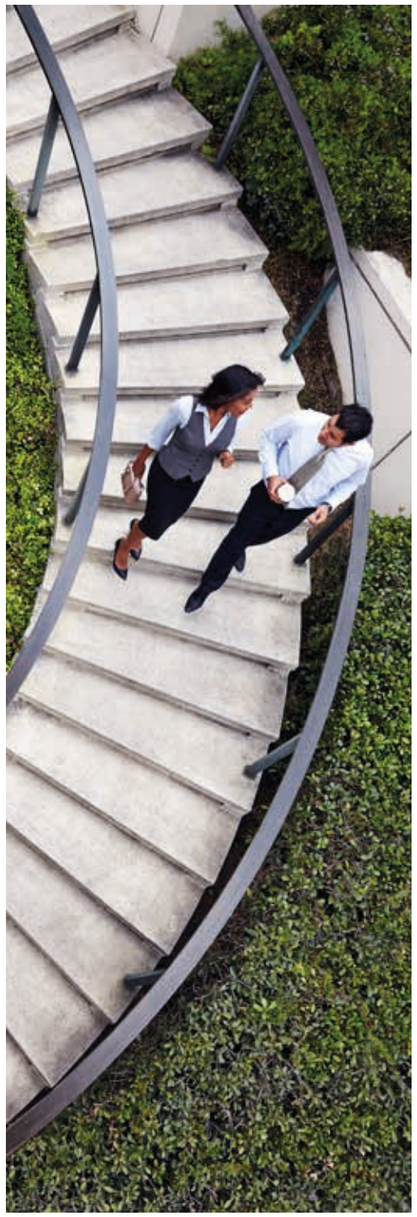
The expert in materials selection

Alfa Laval heat transfer solutions include the option of advanced materials tested in our own materials laboratory, these include, for example:

- **Silastic gaskets** that make plate heat exchangers suitable for ultrapure water.
- **Diabon plate heat exchangers** with acid-resistant graphite plates.
- **AlfaNova**, the all stainless steel plate heat exchanger.

For **heating and cooling solutions** Alfa Laval is the better choice

We know semiconductor manufacturers have more important things to think about than heating and cooling process fluids. Nevertheless, it must be done - efficiently, economically and without problems. That's why it pays to choose a supplier with the best technology, the right amount of experience within the industry, and the resources to support customers anywhere in the world. You've come to the right place.



Sustainability first
All our heat transfer solutions are designed to help industries reduce energy consumption and minimize their environmental impact. A key aspect of Alfa Laval's commitment is our focus on heat recovery – capturing and reusing energy that would otherwise be wasted. Not only does it lower carbon emissions, but it also reduces energy costs significantly across a range of industrial processes.

Fast, reliable support worldwide
With a global network of partners and sales companies, as well as a highly efficient supply chain, we can offer fast, reliable, deliveries for even the largest projects. In fact, we are so committed to providing reliable, sustainable support for our customers, that we have extended our worldwide Parts and Service network to support other heat exchanger brands as well as our own. This level of support offers non-stop performance and true peace of mind. And, with manufacturing hubs located all around the world, we can scale up with our customers as demand grows, making us a service partner like no other on the heat exchanger market.

Advanced heat transfer solutions
Alfa Laval is a leader in the field of heat transfer technology. We have extensive R&D facilities, our own materials laboratory, and acknowledged expertise in material selection. Our solutions come with a long lifetime and benefit many customers by minimising ultrapure water contamination.

Extensive product portfolio
Alfa Laval offers a broad range of extremely reliable heat exchangers in different sizes, capacities, and materials. Our products can recover high levels of heat, while reducing energy and water consumption at the same time. And, with strict environmental and quality policies and products that are ISO 9000 and ISO 14000 certified, you can rely on us to supply the right heat exchanger for any application.

A knowledgeable sales force
Our sales force has a store of knowledge and experience when it comes to the semiconductor manufacturing industry. Reach out to one of our specialists to find out more about how we can optimize the heat transfer solutions in your semiconductor plant with energy efficiency.

Contact Alfa Laval
Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com

EFU00143-2-EN 2601