



## Sustainable performance

Improve your cooling operations with Alfa Laval Niagara Wet Surface Air Coolers



# Effective, reliable cooling

Optimizing your cooling processes is a straightforward way to improve sustainability – both in business and environmental terms. With the right equipment you maximize cooling performance and energy efficiency, while keeping water consumption and service costs low.

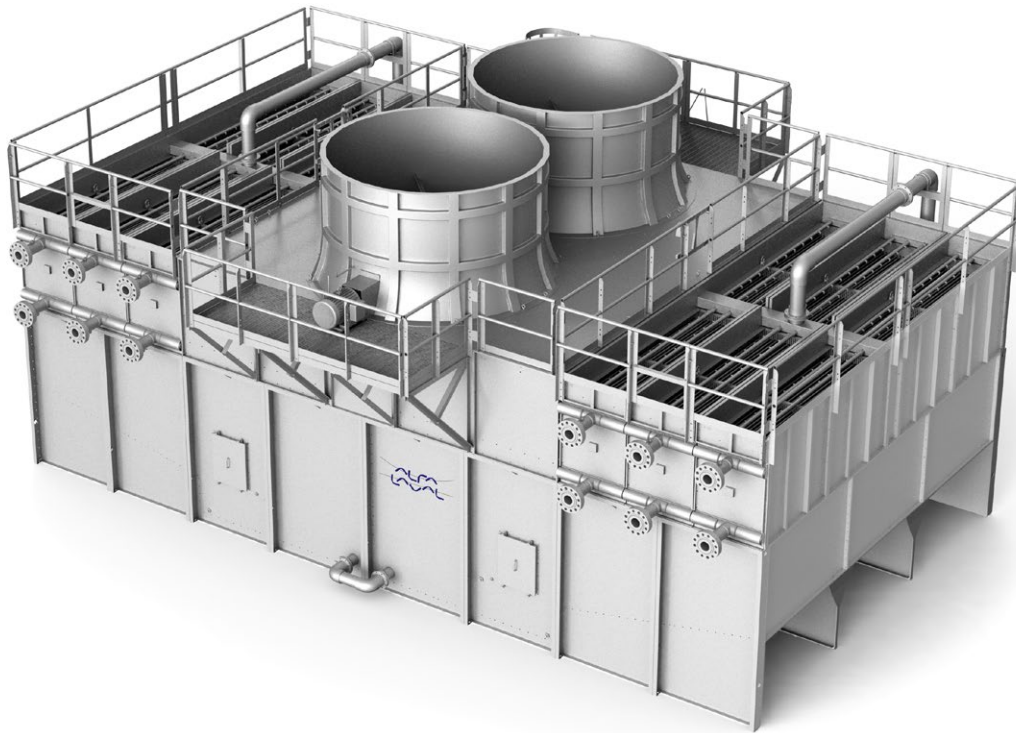
Alfa Laval Niagara Wet Surface Air Coolers are custom-built, closed-loop cooling and condensing systems that help you do just this. They are used in a wide range of applications where low temperatures and high operating reliability is a must in industries such as oil & gas, refinery, power, pulp & paper, petrochemicals and steel.

An Alfa Laval Niagara WSAC can in many cases replace a cooling tower plus heat exchanger or a traditional air-cooled heat exchanger, and they offer many advantages:

- Lowest process fluid outlet temperature
- Minimal water consumption
- Low energy consumption
- Compact size
- Low service needs
- Lowest lifecycle cost

Please contact your local Alfa Laval representative or visit [www.alfalaval.com/wsac](http://www.alfalaval.com/wsac) to learn more.





## Unique technology

Thanks to Alfa Laval's unique WetSurface and FlexWater technologies, a WSAC system offers better cooling performance, lower operating costs, smaller installation footprint and lower maintenance requirements than a traditional cooling solution, such as a cooling tower plus heat exchanger or an air-cooled heat exchanger.

### Operating principle

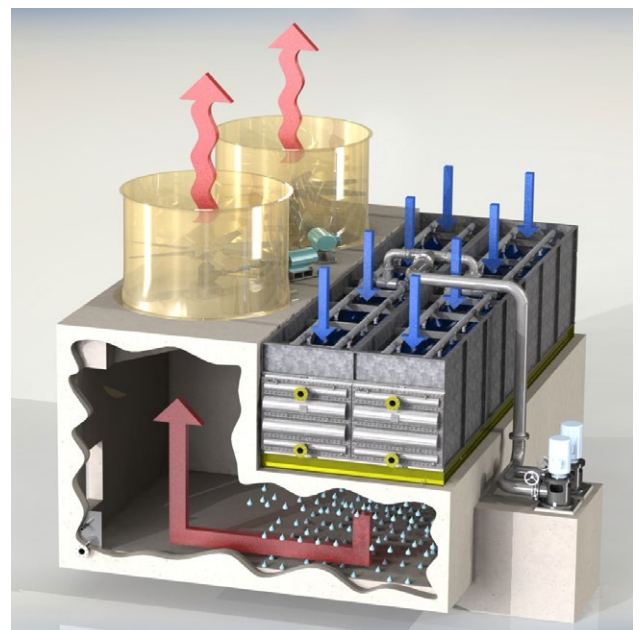
An Alfa Laval Niagara WSAC can be used for liquid and gas cooling, as well as condensing duties.

The WetSurface technology used in a WSAC system is based on evaporative cooling. The hot process medium flows through prime surface tube bundles that are sprayed with water. The heat causes the water to evaporate and the vapour is removed by fans that draw cool air over the tubes.

The water that does not evaporate is collected in a basin and is reused as spray water. The same cooling water can be reused 6-10 times, depending on water quality.

Next, the air/water vapour stream is forced to make a 180° turn, which effectively removes free water droplets and minimizes drift.

An Alfa Laval Niagara WSAC is a closed loop system, meaning there is no risk of contaminants entering the process stream.



Tubes with a hot process medium are sprayed with water. As the water evaporates, heat is rejected from the process medium.

# Benefits

## Lowest process fluid outlet temperature

WetSurface technology gives the system a single approach to the wet bulb temperature, thereby lowering the output temperature of the process fluid more than is possible in cooling tower systems. Compared to a traditional (dry) air-cooled heat exchanger heat transfer is much more efficient in a WSAC, resulting in a more compact system, lower outlet temperature and lower power consumption.

## Minimal water consumption

A WSAC system can operate with higher cycles of concentration than cooling towers, i.e. the cooling water can be reused more times, and water of low quality, such as blowdown water from a cooling tower, treated wastewater or seawater can be used as makeup water. This means that water costs are significantly lower for a WSAC.



### WetSurface

Maximum cooling efficiency and lowest possible outlet temperature.



### FlexWater

A WSAC can operate on recycled water of low quality such as blowdown water.



### HybridCool

Combined wet and dry bulb cooling for minimized water consumption.



### ALOnsite

Global, onsite service by skilled engineers.

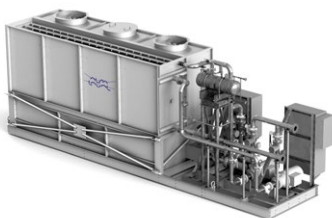
# Fully customized

All Alfa Laval Niagara WSAC systems are custom-designed according to our customers' specifications and are fine-tuned to fit the requirements and conditions of their intended duties. They come in all sizes from small packaged units to large field-erected systems.

Alfa Laval can supply HybridCool systems with sections for both dry and wet cooling, allowing operators to choose operating mode depending on ambient temperatures. The units can also be designed to cool several separate process streams independently.

Alfa Laval WSACs are engineered to meet heavy-duty industrial requirements and standards. They are fireproof, can sustain pressures up to 170 bar (2,500 psi) and be designed to meet ASME, TEMA, PED and API specifications.

All components are made of hot-dip galvanized steel for high corrosion resistance. For applications with corrosive media, the tube bundles are offered in a variety of materials, for example different grades of stainless steel, super duplex and titanium.



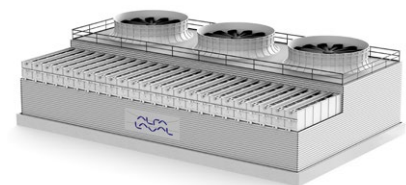
## Packaged WSAC systems

- Compact, skidded, pre-piped and pre-wired units, complete with control cabinets
- Factory tested
- Plug-and-play units, fast and easy installation



## Modular WSAC systems

- Medium-sized systems ideal for expanding capacity
- Casings made of heavy-gauge steel
- Delivered in pre-fabricated modules that are easily assembled on site



## Field-erected WSAC systems

- Our largest systems
- Concrete basin with overlying structure made of fibre-reinforced plastics (FRP) or concrete
- Lowest total cost of ownership for high-capacity cooling/condensing

# Comparison with other technologies

Alfa Laval Niagara WSAC systems produce the coldest possible process outlet temperature compared to other technologies. Other WSAC advantages are shown in the

table below. In this example the dry bulb air temperature is 37.7°C (100°F) and the wet bulb temperature is 26.1°C (79°F).

	Wet Surface Air Cooler (WSAC)	Cooling tower plus heat exchanger	Traditional air-cooled heat exchanger (dry)
<b>Practical approach temperature</b>	5.6°C (10°F)	8.3°C (15°F) in total, 5.6°C (10°F) for CT and 2.7°C (5°F) for heat exchanger	8.3°C (15°F)
<b>Coldest practical process temperature</b>	31.7°C (89°F)	34.4°C (94°F)	46.1°C (115°F)
<b>Water consumption</b>	Low-medium	High	Not applicable
<b>Electrical consumption</b>	Low	Medium	High
<b>Space requirements</b>	Small	Medium-large	Large
<b>Total system cost</b>	Low-medium	Medium	Medium-high
<b>Maintenance</b>	Low-medium	Medium-high	Low

## Service

An Alfa Laval Niagara WSAC is designed and built for minimal maintenance and all components are easily accessible. The water spray system is reached from the top and, unlike cooling towers, there is no tower fill where dirt and fouling can accumulate. The tubes are placed with enough space for airborne debris to fall through the bundle, down to the basin where it is filtered out in a pump screen.

WSAC systems can be designed to handle highly fouling media and by removing the header, the tubes are accessible for cleaning.

Alfa Laval offers support for all types of service on WSAC systems. Our experienced field service technicians are available 24/7. We are glad to help with assistance during installation and commissioning, optimization of performance, training of operators, etc.



### **Alfa Laval in brief**

Alfa Laval is a leading global provider of specialized products and engineering 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](http://www.alfalaval.com).



ALFA LVAL is a trademark registered and owned by Alfa Laval Corporate AB.