



Air cooled heat exchangers

Robust and reliable for all loads and applications



What it is

Air cooled heat exchangers are commonly used in industrial applications where a reliable source of water is not available as a cooling medium. Air cooled steam condensers are a special type of heat exchanger employed to condense steam at the exhaust end of a steam turbine for both power generation and mechanical drive applications.

How it works

The hot process fluid to be cooled flows through finned tubes while the cooling air flows across the outer surface to remove heat. The cooling air is propelled by fans in either a forced draft or induced draft configuration.



Worldwide presence

GE's Oil & Gas business has more than 100 years of industry experience and 5,500 employees worldwide. Our Air Cooled Heat Exchanger team is centered in Vibo Valentia, Italy, and is an integral part of the larger Oil & Gas organization headquartered in Florence. Together, we provide complete solutions to all industry segments – with a broad and expanding portfolio of advanced technologies, plant equipment and services.

We are a global company with a local touch. Our highly experienced personnel offer comprehensive customer support backed by immediate access to all of GE's broad resources. Our people understand the local customs and regulations, and can help you identify and track growth opportunities.

Experience makes the difference

We have been a global leader in the fabrication of air cooled heat exchangers and steam condensers since the late 1960s. The first high tech pipe and bend air cooled heat exchanger we supplied in the early 1970s was for sweet gas with pressure slightly over 300 bar.

Our latest applications are for more than 650 bar with H₂S content as high as 18%. We have supplied more than 10,000 bundles for applications throughout the industry from upstream to hydrocarbon processing. Our investment in technology continues in an effort to meet even more extreme conditions.

The quality of our exchangers is a result of advanced design techniques employing the latest software, world-class fabrication facilities and capabilities, Six-Sigma quality methodology and extensive experience in both manufacturing and in-field service.

All our manufacturing processes are implemented in strict accordance with GE's world-class Six-Sigma quality system, which conforms to all major international quality assurance standards including ISO9001, BS5750 and UNI EN 29001. Compliance of the QA system with these standards is certified by LLRR.

Focused on quality





A complete range of products

	Gas re-injection	Gas compression & gathering gas lift	Liquefied natural gas	Gas pipelines & storage	Gas-to-liquids	Refineries & petrochemicals	Machinery lube oil cooling
Header configuration							
Pipe & bend	●			●			
Plug box		●	●	●	●	●	●
Cover plate						●	●
Finning type							
Extruded/Embedded	●	●	●	●	●	●	●
L-footed		●		●		●	●

Advanced technology in gas cooling

Gas type and pressure are the two key considerations behind proper design and materials selection to ensure the performance on which our customers rely over the long term.

Materials

The level of H₂S and CO₂ contained in the gas will significantly affect machine durability and performance relative to corrosion. We therefore choose special, heavy-duty materials for sour gas applications – not only for the air cooled heat exchanger, but for the whole plant. Advanced corrosion-resistant alloys such as Incoloy 825 require specialized welding techniques and we have the expertise to ensure high quality construction with these materials.

Welding

Very high pressures require special considerations in material type and thickness, design and manufacturing – particularly welding – all carefully adapted to the specific characteristics of the gas. Welding of complex parts and various thicknesses involves extreme heat and, therefore, demands expert care to ensure uniform cooling and to avoid material stresses. We analyze and relieve stress levels with local heat treatment (tube-to-header welds) and our specialized furnace (headers and flanges).

Our commitment to R&D

Since the late 1960s GE Oil & Gas has been a global market leader in the design and fabrication of air cooled heat exchangers and steam condensers. We are continuously advancing our technologies to meet our customers' requirements. Leveraging synergies across the entire GE network, we create solutions so that challenges on the horizon can be transformed into real opportunities.

Providing service to the industry

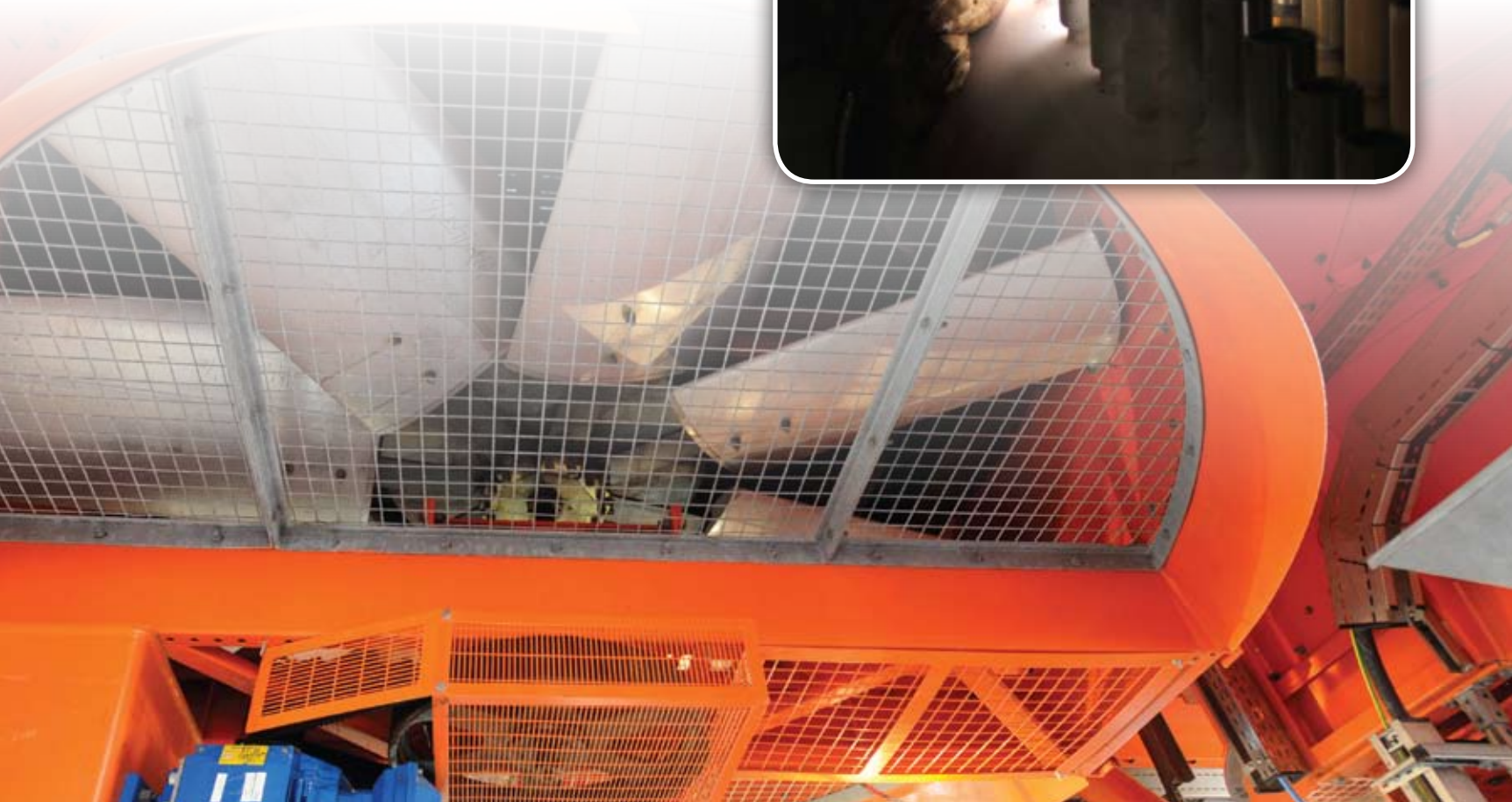
GE Oil & Gas offers a complete portfolio of after-sales services to keep heat exchanger and condenser equipment operating at peak performance for many years, or to upgrade them to meet more stringent regulations or new operating requirements. Beyond parts and bundle replacements, our services include:

Optimization

The performance of air coolers is checked and diagnosed by collecting data on air flow, tube flow, fan power and the overall status of the equipment, and processing it directly in the field. We provide a detailed action plan to optimize air cooler performance.

Upgrades and modification

It is also possible to upgrade any installed air cooler and increase the machine capacity. The performance assessment can provide useful information on what upgrades are feasible for the current equipment and the GE experts are able to perform any kind of modifications including re-qualification to provide performance guarantees.



Air cooled heat exchangers

Design flexibility and manufacturing quality to meet all pressure and temperature requirements

Cover plate configuration

These exchangers are generally used for dirty fluids with low operating pressures in applications such as cooling of machinery oil and heavy hydrocarbons in refineries.

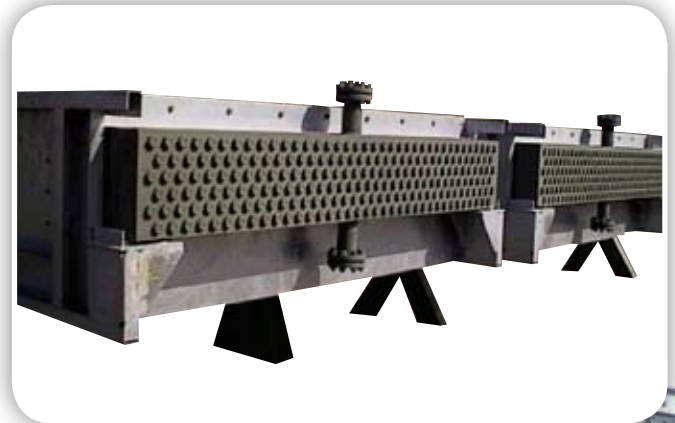
Cover plate heat exchangers are designed for ease of maintenance. A flanged, removable cover allows complete access to the inside of the header for cleaning – since this feature substantially limits the design pressure, this type of heat exchanger is not recommended for critical service applications. Operating conditions are typically up to 35 bar (507 psi) and processed fluids can be very viscous.



Plug box configuration

These exchangers are suitable for a wide range of applications and services involving cooling and condensing of hydrocarbons and gases over a broad range of process conditions in any size plant.

The distributor (header) of this model is a completely welded box with holes in front of each finned tube to allow cleaning and inspection. The design effectively meets competing needs such as low cost and high versatility. This configuration can cover most common applications with operating conditions typically up to 220 bar (3,192 psi).



Pipe & bend configuration

This equipment uses a header made of forged pipe and is designed to withstand very high pressures.

It is recommended for use with clean fluids since no inspection openings are provided. Its fully welded design is especially suitable for critical and hazardous applications. Designs can handle extremely demanding pressure – over 650 bar (9,427 psi) – temperature and material conditions.



Finning

Together with header features, finning of the tubes is key to air cooled heat exchanger performance. GE produces three types of finning.

Extruded

High efficiency fins for higher temperature applications (typically up to 300°C). These fins provide the base tube with complete and permanent corrosion protection against atmospheric contaminants.

Embedded or grooved

High efficiency finning for high operating temperatures (even up to 400°C).

L-footed

Standard fin for low temperature applications (typically up to 170°C) where some degree of tube wall protection is required.



Applications

	Header configuration			Finning type	
	Pipe & bend	Plug box	Cover plate	Extruded/ Embedded	L-footed
Gas re-injection	•			•	
Liquefied natural gas		•		•	
Gas pipelines & storage	•	•		•	•
Gas-to-liquids		•		•	
Refineries & petrochemicals		•	•	•	•
Machinery lube oil cooling		•	•	•	•

Air cooled steam condensers

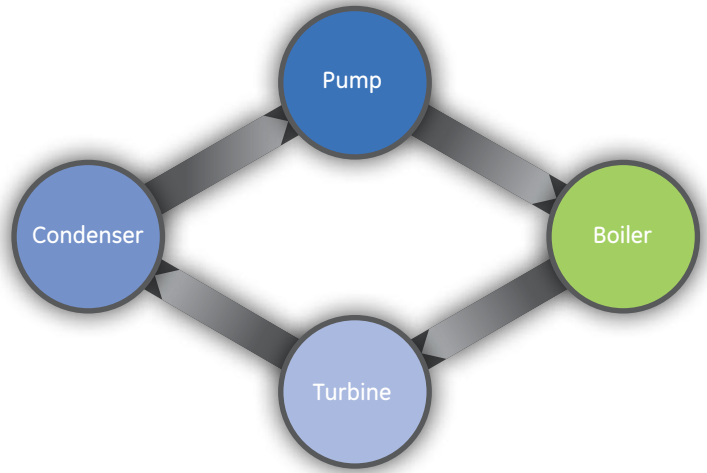
Thermodynamic design to meet all unique project specifications

Advanced, single-source solutions

Air cooled condensers are preferred to water cooled condensers when there are special environmental or water-shortage conditions. The steam condenser is a vacuum-tight, air cooled heat exchanger, usually with bundles sloped at approximately 30° to reduce the footprint and with 100% fully welded connections.

Our system is a full package consisting of the core unit and all auxiliary equipment needed for operation of the condensation steam plant. With over 60 years of extensive experience in this area and advanced thermodynamic design capabilities, we fine-tune the critical connection between the condenser and steam turbine for optimized performance in any steam cycle. Our designs also ensure uniform operating conditions within the heat exchanger to avoid the formation of air pockets.

The breadth of our experience also gives customers a single point of responsibility for an entire project – which is highly beneficial to overall system efficiency and reliability, speed of problem solving, and reduced project management costs.



GE Oil & Gas provides the industry-unique capability to optimize plant performance with a condenser-turbine package that is fully matched through the entire design process. The turbine, condenser and pump are all manufactured by GE Oil & Gas, while the boiler is supplied by our verified supplier to exact GE specifications and quality standards



Applications

Power generation

- Thermal solar, CSP
- Waste to energy
- Cogeneration
- Combined cycle

Mechanical drive

- Refinery
- Ammonia and urea
- Methanol
- Ethylene

Package supply

- Vacuum system
- Finned tube bundles
- Pumps
- Hot well
- Steam duct
- Piping
- Site assembly

Installed fleet capabilities

Fin technology	<ul style="list-style-type: none">• Embedded and extruded• Non-porous aluminum
Operating temperature	-25°C to 50°C
Max. finning tube length	15 m
Turbine exhaust pressure	Min. 0.05 barA
Inlet flange temperature	Min. 33°C



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GE imagination at work



Middle East Heat Exchangers Co. Ltd.
شركة الشرق الأوسط للمبادلات الحرارية المحدودة

Investing in local partnerships to maximize process, skill and technology transfer across the region

Local partnership

In October 2009, a 50-year relationship was reinforced by combining the TAMIMI Group's local engineering strength with GE's global technology leadership. Our latest joint venture is dedicated to serving Saudi Arabian, Middle East and North Africa customers with localized manufacturing and testing capabilities, as well as rigorous supply chain logistics and transportation resources. The partnership also promotes Middle East growth through technology transfer and the development of skills for the local workforce.

Technologies & support

Heat exchangers and condensers for all high pressure, process plant and low pressure applications. Expert field service and life cycle support for installation, maintenance, upgrades and modifications to ensure optimized long-term performance.



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