



## **GEA Air Cooled Condensers. An Environmental Oasis.**





GEA Energietechnik is part of the Thermal Engineering Division of the GEA Group and specialises in dry and wet cooling systems.

[GEA Energietechnik GmbH]

## Member of an excellent group

GEA Energietechnik GmbH is part of the global GEA Group, which operates in more than 50 countries worldwide. It focuses on the two basic engineering processes of heat exchange and mass transfer and continues to advance the market for these key technologies.

### The benefits of GEA:

- You profit from the innovative strength of a strong group
- You utilise the synergies from all GEA divisions

All around the globe the energy sector, the food industry, chemical and petrochemical industries, air treatment and other sectors all benefit from the GEA Group's ability to deliver outstanding performance in the form of engineering excellence.

To meet this high-performance claim to optimum effect, the operations of the GEA Group have been reorganised into nine divisions: Air Treatment, Refrigeration, Process Equipment, Mechanical Separation, Farm Systems, Thermal Engineering, Process Engineering, Emission Control and Pharma Systems.

Each division is completely autonomous in its respective field. Short decision-making processes and extreme flexibility are a matter of course. Thanks to the transfer of expertise, the collaboration of the divisions on joint projects utilises synergies that have a direct customer benefit.

[Innovation]

## New Air Cooled Condenser design

In order maintaining its good position in today's hotly contested market the engineers of GEA Energietechnik GmbH developed two improvements which can be used for larger Air Cooled Condensers basically.

These two improvements are:

(a) The inclined exhaust duct routing reduces the steam side pressure drop between turbine and condenser and saves duct material as well as man power for manufacturing and erection. Power stations with turbine capacities up to 750 MW<sub>e</sub> have been designed and installed with the inclined duct routing. The maximum diameter of the inclined exhaust steam duct is presently 8000 mm.

(b) The supporting structure of the Air Cooled Condenser platform was derived from nature and therefore called "bionic design". This design reduces the number of foundations and saves structure material as well. Waste to energy plants with turbine capacity of 30 MW<sub>e</sub> as well as combined power stations with turbine capacity of 200 MW<sub>e</sub> already got installations with GEA's "bionic design".

Both new designs of GEA Energietechnik GmbH are patent-registered.

[Made in Germany]

## V-type Air Cooled Condenser

The V-structure is a highly successful Air Cooled Condenser design developed by GEA Energietechnik GmbH especially for smaller Air Cooled Condenser applications.

Benefits of the new configuration for GEA customers include reduced steel structure requirements, an integrated condensate tank, lower height and the use of standardised components.

The advantages of the V-structure, which satisfies strict noise emission requirements, are compelling.



Inclined exhaust steam duct  
Waste To Energy Power Plant  
Bielefeld, Germany



Bionic design  
Waste to energy power plant  
Herten, Germany



V-type ACC

[Environment]

## Reliable and sustainable

One of the key challenges of today's technology is to design environmentally friendly plants that preserves precious water resources. At the same time, heat exchange has to take place with maximum efficiency, whilst operating costs have to be kept as low as possible for the customer.

GEA Air Cooled Condensers are customised to the specific application and meet these criteria in full, scoring top marks in every category. Reference condensers all over the world are testimony to GEA's reliability and decades of expertise. The economical use and preservation of resources is crucial.

### The benefits of GEA:

- Optimum heat exchange
- Lowest possible operating costs
- Environmentally friendly condensers
- Preservation of natural resources

## The current status of booked and delivered GEA Air Cooled Condensers in July 2009



At GEA Energietechnik, sustainable systems form the basis for the preservation of natural resources.

Mode of Operation	Number
Public utility	216
Industrial power generation	218
Compressor driven turbines	138
Refuse incinerators / biomass	175
<b>Total</b>	<b>747</b>

[Know How]

## Designed in Germany – made by GEA

GEA Energietechnik is known for its comprehensive expertise in the field of cooling technology and, as a company within the Thermal Engineering Division, it offers the whole range of services for wet and dry cooling systems.

GEA's leading market position in the field of industrial cooling is partly due to its thorough command of both cooling processes. It's a well-known fact that experience pays off. For decades, GEA Energietechnik has been building cooling systems all over the world, covering everything from the construction of new systems to the enhancement, maintenance and optimisation of existing systems, always to the highest quality standards and incorporating the latest findings from its own research and development programmes.

Cooling your plant with a wet cooling tower is the common solution. But what if there's little or no water available? Or the available water is too costly? Or what if it gets so cold in the winter that the plume ices up roads, runways or neighboring facilities? Or what if there's no suitable place to discharge waste water? Or what if you are being challenged on issues of water conservation, pollution or aesthetics?

If you're facing one or more of these problems, GEA Energietechnik GmbH has the perfect answer: a reliable, efficient Air Cooled Condenser (ACC). A GEA Air Cooled Condenser does not rely on water for cooling and hence there are no waste water disposal problems. This makes it ideal for water scarce areas, zero discharge plants, or situations that mandate plume elimination.

Cond. Capacity t/h	Turb. Capacity MW <sub>e</sub>
121,729	53,402
10,336	3,250
4,726	1,013
6,144	5,166
142,935	62,831



ACC located on top of a turbine building

### The benefits of GEA:

- Global presence
- The combination of decades of experience and ongoing research and development work
- Cooling systems that are customised and bespoke to your needs



Air Cooled Condenser for combined cycle power plant Livorno, Italy  
E.on Produzione Centrale Livorno Ferraris

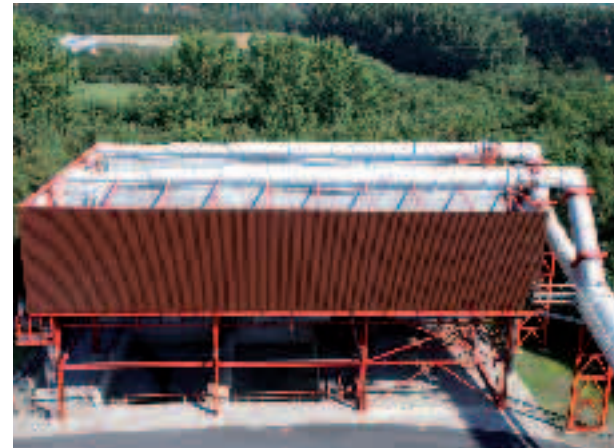
[System Technology]

## You'll find us to be an oasis of information and solutions

GEA began developing this ACC technology in Europe in 1939 to conserve diminishing water resources. Over 600 GEA Air Cooled Condensers (ACC) have been installed and are still operating worldwide. In fact, more than 70 have been operating for over 30 years.

GEA Air Cooled Condensers can be arranged in a variety of configurations, including a space-saving A-frame design, which can be installed at grade level or on a rooftop. The V-type arrangement offers standardised module sizes for small size Air Cooled Condensers. GEA also offers vertical and horizontal designs for sites with either limited spaces, severe height limitations or aesthetic concerns. GEA Air Cooled Condensers can be equipped with two proven fin tube systems (see picture).

They are constructed with either rugged all steel hot dip galvanised two row tube systems with large size elliptical fin tubes or high efficiency aluminium finned single row tube systems with flat type carbon steel steam channels. In any case the unique GEA single-pressure, two-stage condensing process minimizes sub-cooling, corrosion and freezing risks. If you face problems of scarce water supplies, zero blowdown requirements or community and aesthetic concerns, a GEA Air Cooled Condenser may be the most economical solution. It may also be the only solution that will allow your plant to be built at all.



Waste To Energy Power Plant  
Bielefeld, Germany

### The benefits of GEA:

- Systems that meet customer's specifications
- Use of the expertise of the entire GEA Thermal Engineering Division
- Complete turnkey systems
- No interface problems

## Fin Tube Systems

Two tube row design with hot dip galvanised elliptical fin tubes.



One tube row design with aluminium finned flat shape tubes.



[Maintenance, service and optimisation]

## Service for high productivity

GEA services go beyond plant completion. GEA offers a broad range of services and system technology that features all the benefits of GEA expertise.

Plant upgrades to increase performance or to exchange spare parts are available with GEA's own tried-and-tested products. The confirmed properties and performance values have been proven many times in applications in the world's largest, state-of-the-art cooling facilities.

Inspections and regular servicing are crucial. The results of the inspections can be analysed, either online or on-site, in collaboration with specialist engineers and technicians of GEA Energietechnik.

GEA Energietechnik offers the complete range of services, from engineering up to turn-key supply of ACC units:

- Basic and detail engineering
- Erection, procurement, optimization and manufacturing
- Commissioning and test run
- Modifications and revamping
- After-Sales-Service
- R & D (modelling, heat transfer examinations on fin tube systems)



Online fault management: solutions are developed in direct consultation with the customer.



Visual inspections play an important role at GEA. They enable early fault detection and elimination.

### The benefits of GEA

- Calculation, simulation and optimisation of planned upgrades
- Optimised performance
- Inspections and servicing during planned shutdowns
- Monitoring and maintenance of all of the system components. Service contracts and service agreements, planned maintenance inspections and condition reporting



Thermal Engineering

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