

GEA Closed Circuit Coolers

Top-level engineering solutions



Top-level engineering solutions with operative excellence and dedicated project teams

Our teams are multi-skilled. Their knowledge of their customers' businesses ensures that they will find the optimum solution for each project. They take full responsibility for a project, from design to delivery, or support their customers in calculating the most suitable solution – as value-adding partners. At the same time, customers can rest assured that the GEA's specialists understand their overall processes and, consequently, their critical interfaces by virtue of their combined expertise.

GEA Heat Exchangers
Combined expertise and excellence in heat transfer

The internationally operating GEA Group focuses on process technology and components for sophisticated production processes in various end market applications. In each of its business areas, GEA is recognized by its customers as market and technology leader as well as a top innovator. GEA Heat Exchangers, which is the largest segment within the GEA Group, focuses on all heat exchanger activities and covers the most application areas, extending from air conditioning systems to cooling towers. As a result, GEA Heat Exchangers provides one of the most extensive – if not the most extensive – portfolios of heat exchangers in the world.

Operative excellence and customer proximity of GEA Heat Exchangers are based on the performance and experience of specialized Business Units. They are organized according to product group technologies. The finned tube compact heat exchanger systems offer nature-friendly and cost-effective solutions to cool air or liquids involved in refrigeration processes or industrial machines and engines.

One single technology for the world's industries

The use of air rather than water for cooling applications contributes to ground-water conservation and prevents surface water warming. It also allows the installation of efficient cooling systems at sites where water resources are scarce. GEA is a pioneer in industrial air coolers and a world market leader. With its heat exchanger compact systems, GEA can offer, with just one single technology, economic and safe optimum solutions, adapted to a large number of complex end-user requirements.

Thanks to a worldwide commercial network able to promote these heat exchanger compact systems, GEA can strengthen its technological leadership in products and services with greater customer benefits. GEA Heat Exchangers can also actively design compact systems, involving expertise of our customers and suppliers in future technological developments. Primary advantages for compact systems are high performance density, minimum footprints, and maximum efficiency with high safety standards. This compact technology enables customized engineering solutions even for niche market segments at a quite attractive price for quality and value added proposition. Our wide range of approved compact finned-tube systems, concepts, and designs is recognized throughout the world. In our research, planning, and production centers, these elements are constantly adapted to latest developments in technology and quality standards. This enables GEA to take any known operational condition into consideration and to optimize components.

Compact finned-tube systems, the product lines:

- **Closed circuit coolers**
- Charge air coolers
- Radiators / Dry coolers
- Commercial air coolers refrigeration
- Customized air coolers refrigeration
- Air cooled condensers refrigeration

Absolutely convincing
Tailored solutions with certified quality

Make your decision for top performance at all levels: from precise engineering to first-class service, we offer you a portfolio tailored from A to Z to your individual requirements.

Certified quality:

- ISO 9001:2000
- Det Norske Veritas
- Bureau Veritas
- ASME
- Russian Maritime Register of Shipping
- KTA 1401
- Additional certificates

GEA is your specialist for sustainability. In addition to low water and energy consumption, our solutions are also convincing by such important details as reliable performance and efficiency. Innovative GEA developments are the results of research and development work based on experience and know-how gained from many thousands of projects. We develop and build with the latest in computer simulation, assisted by full-scale laboratory testing. This allows us to sustainably optimize not only efficiency, but also environmental compatibility. At our planning facilities and in our factories we cover all the issues involving heat exchange: design, thermodynamic calculations, structural engineering, and manufacturing studies. Our installations satisfy all the many pertinent building and control regulations – and they can be supplied according to GEA standards or to your own requirements. We offer the support of a global company that provides expert international monitoring of projects, extending to turn-key solutions.

With international standards on the safe side

As experienced manufacturers, we are fully aware of our responsibility. Protection of people and our environment – as well as customer demands for great cost effectiveness and reliability – obligate us to work with the very greatest of care. This is documented by our certification in accordance with ISO 9001:2000. End-to-end quality management guarantees the systematic implementation of this standard. In the design and engineering of our products, furthermore, we work strictly in accordance with the international standards of various classification companies. This is also security that you can depend on for every project.

Always well advised

In many cases, proven solutions are readily available. If, however, you must meet particularly specific or entirely new challenges, you can profit from GEA and its comprehensive consulting competence and its tailored engineering services. Prompt implementation of your ideas and wishes in a market- and customer-oriented solution is the result.

Service and support around the world

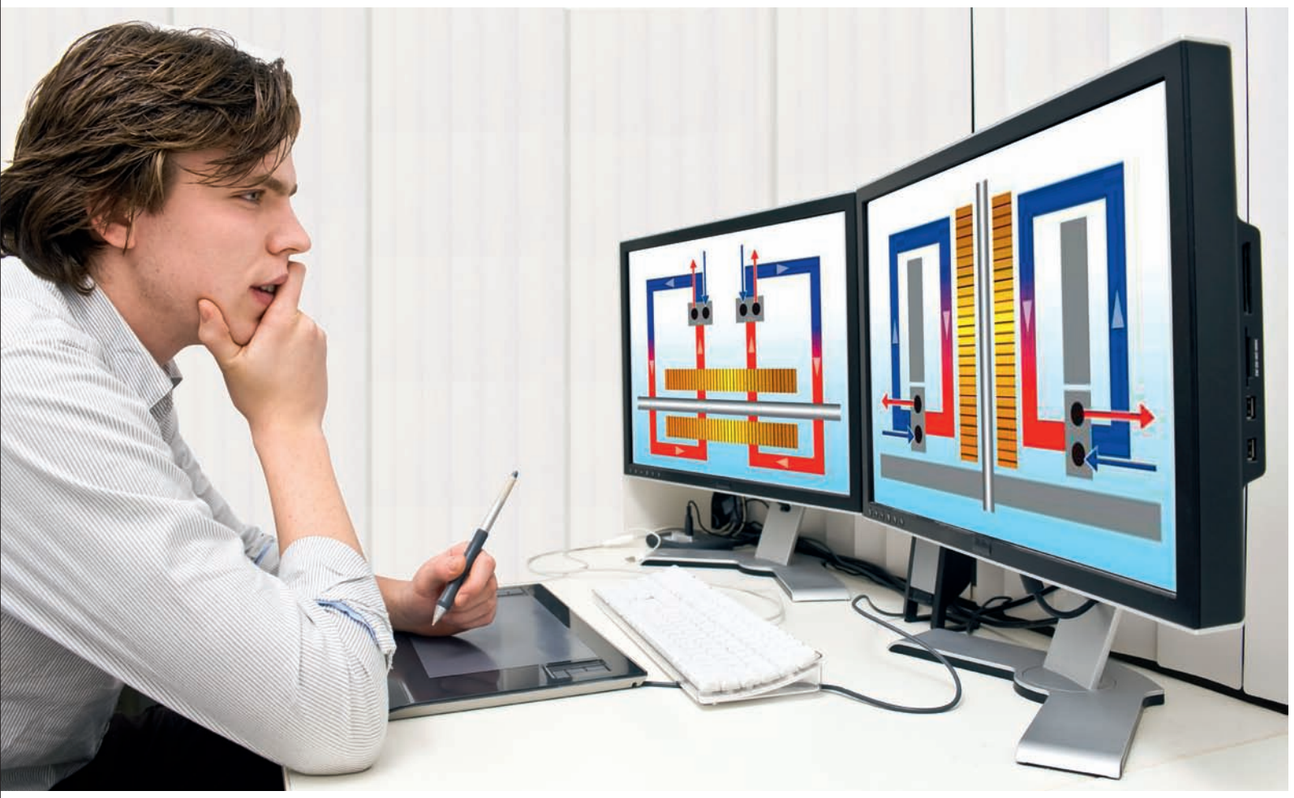
With our basis of a tightly meshed global network of branches, we are able to offer you top services anytime, anywhere. Whether maintenance or fast delivery of spare parts: our service and support represent an essential module to assure the availability and the cost effectiveness of your investment throughout the entire life cycle of your investment.



Center of Excellence

To promote innovative developments, we founded our Center of Excellence within GEA Compact Systems. Experienced specialists work here who are particularly well acquainted with the precise engineering design of the systems they support.

Diversity in technical perfection
Compact finned-tube systems



In accordance with the area of operation, there can be considerable variation in the conditions under which heat exchangers operate. Within this context, we have developed an extensive portfolio of compact finned-tube systems. All systems are designed to match the customer's individual application, and thereby offer exact conformity to the customer's requirement data. We can work with a great variety and number of materials and geometrical configurations, to generate the best-possible solution. The result for you: maximum functionality and efficiency. Essential characteristics of our systems are recognized around the world and assure long-term availability of your systems.



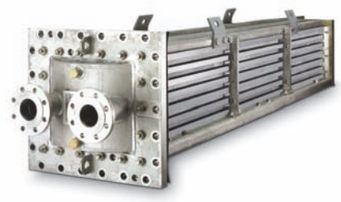
Closed circuit coolers

Our standard range of closed circuit cooler models is designed to satisfy the conditions presented by our customers involving thermal and mechanical-engineering requirements. This standard line includes a great number and variety of material combinations for tubes, fins, tube-sheets, chambers, and the like: e.g., copper, aluminum, CuNi10, CuNi30, various stainless-steel types, as well as titanium.
For requirements not covered by our extensive standard portfolio, we develop customized solutions – including highly effective systems for applications under extreme operational conditions.
Main applications: motors, generators; nuclear, coal-fired, gas-fired, hydroelectric, and wind power plants; series drive systems; and facilities for operation under extreme and special operating conditions.



Recirculation coolers

To protect mechanical systems from pollutants in ambient air – and to prevent complicated and cost-intensive cleaning operations – recirculation coolers move air in a circuit inside an airtight system. The air absorbs heat inside the machine and passes it on to a cooler – the recirculation cooler. There the cooler transfers the heat from the air to the cooling medium. An enclosure tightly encloses the components of the cycle. It routes the recirculated air from the air discharge port to the air intake of the machine.
Main applications: large electric engines and middle-sized generators for use in mining, power plants, wind farms, and offshore platforms.



Pressure gas coolers

The performance of efficient compressor systems can be enormously enhanced by special GEA compressed-gas cooling technology. The same applies to the area of drive technology, process engineering, and gas recooling. Our line of systems for compressed-gas cooling covers basic market requirements for gas volumes from 5,000 to approx. 500,000 Nm3/h in pressure ranges up to approx. 50 bar.
Main applications: water-cooled pressure gas coolers for industrial gases as well as process coolers and heaters in industry and in drying technology.

Wind power plants

The compact structural design of a wind-driven generator places special requirements on the installed size of the cooler. Our closed circuit coolers and recirculation coolers are exactly matched to the nacelles of wind turbines.

Hydroelectric power plants

Construction of new hydroelectric power plants is continuously rising around the world. Closed circuit coolers and recirculation coolers from GEA play a key role here – by assuring reliable cooling of the high-performance generators in these plants.

Fossil-fired power plants

Power plants based on fossil energy media such as coal continue to produce a highly significant share of the world's power. Closed circuit coolers and recirculation coolers by GEA have proven their effectiveness here as well, owing to their particularly great efficiency.

Nuclear power plants

As we all know, absolutely reliable cooling is a matter of life or death in nuclear power plants. In a great number of such stations, our cooling systems have proven their no-compromise quality for the safety of people and their environment.



Safety first
Compact systems for the energy industry

In the energy business, safety enjoys extremely high priority. For this reason, companies throughout the world count on GEA for heat exchange. Because they know that these systems meet the most stringent demands – whether nuclear, hydroelectric, coal-fired, gas-fired, fossil-fired, or wind power plants are involved.

Energy for the world
New standards enhance efficiency



Hoover Dam in USA.

Worldwide energy demand continues to rise, and the development of efficient solutions for performance enhancement is one of our greatest challenges. GEA makes a crucial contribution here in all types of power plants. Our specific customer solutions in generator design have enabled sustainable optimization of the efficiency of energy generation.



Product features: Closed circuit coolers

- Tube system with enhanced heat transfer
- Possibility of modifying the number of tubes, installed either next to or over each other
- Less use of material, but with a higher performance level

Product features: Recirculation coolers

- Great number and variety of material combinations
- Noise suppression and filter systems as required
- Forced-ventilated recirculation coolers in our portfolio
- As needed, accessories for process monitoring and factory cabling

Renewable power plants

Renewable sources of energy, such as wind and water, are playing an increasingly important role. GEA supports their continual expansion. The requirement for increasingly large generators is growing for wind farms: and these turbines are being more and more frequently cooled by water. For this purpose, recirculation coolers – equipped with one or more closed circuit coolers – are directly installed at the generator and sealed there. In hydroelectric power plants, our closed circuit coolers ensure optimal cooling of the high-performance generators. An outstanding reference project is the Three Gorges Dam on the Yangtze River in China. With an installed generator capacity of 18,200 MW, it is currently the largest hydroelectric power plant in the world.



GEA Closed Circuit Cooler with air duct for large generator (special: GAMMA cooler for Siemens).

Fossil-fired power plants

In conventional power plants as well, closed circuit coolers and recirculation coolers from GEA clearly demonstrate their advantages. As in other types of power plants, the cooling systems are designed in accordance with the individual project – and offer optimal heat exchange with minimal use of material. Many prominent power-plant operators – such as Siemens and Alstom – take advantage of this efficiency for their fossil-based power plants of the latest generation.



Fossil-fired power plant in Amsterdam.

Nuclear power plants

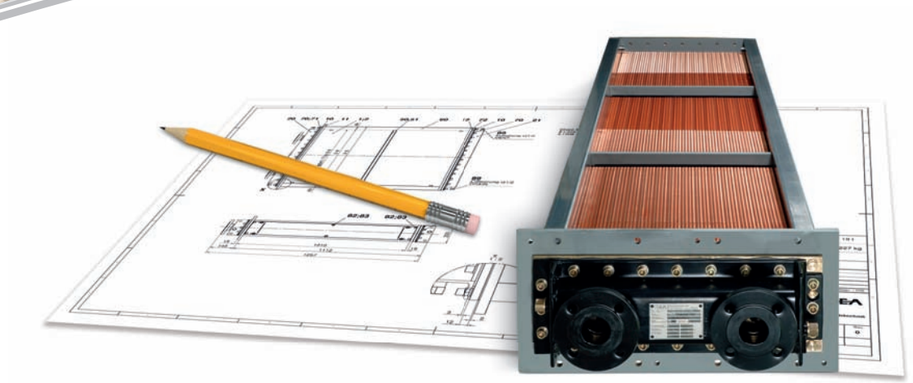
Even more than in any other type of power plant, safety is absolutely paramount in nuclear power stations. A key role under this aspect is played by the cooling system that is thermally designed to fit customers demand and offers optimum heat transfer and pressure drop with minimal material usage. With our many official approvals and certifications like KTA 1401, we can offer a highly effective overall solution for this technically very demanding challenge as well. In numerous current projects, our innovation capability is particularly evident – especially in the first super-large natural-ventilation cooling towers, which we are presently building in China.



Nuclear power plant.

Drive systems

Powerful and sustainable solutions by GEA are found in most types of power stations, transformer stations, air-separation plants, the ship-building industry, railway rolling stock, and wind turbines.



Total solutions individually tailored
Compact systems for drive systems

Drive systems represent a market with an extensive number and variety of areas of application – a special challenge for the development of complete heat exchanger systems. Customized solutions in accordance with individual standards represent our core competence. We offer high-performance systems that are tailored down to the smallest detail to the specific requirements of an equipment unit.

Well-cooled power
One-stop solutions with premium quality



Coal mining tower.

Only a company that has powerful engineering ability – combined with robust, versatile products – can provide full service on the market of drive technology. Our aim is to produce coolers with market-driven solutions and to generate premium quality for our customers' products. Standard configurations for series-production machines and special custom-designed systems round off our product range. We have developed solutions for extreme circumstances, special operating conditions, and limited space.

Closed circuit coolers for drive systems

Closed circuit coolers from GEA have been designed for a great number and variety of applications. A great diversity of environmental conditions act on systems, depending on place of operation and application sector. In addition to climate conditions, it is also essential to take full account of the water quality – for example – at a particular location. Our engineering specialists conscientiously examine these criteria and make professionally competent decisions on material selections, in order to assure optimal functionality and long service life of the systems. Our standard range includes various material combinations for tubes, fins, tube plates, chambers, etc.: e.g., copper, aluminum, CuNi10, CuNi30, various stainless steel variations, as well as titanium.

The more powerful the equipment unit, the more important an efficient cooling system. Compact systems are also optimally prepared for the most extreme of operating conditions.





Recirculation coolers for drive systems

Especially for the market in drive systems, GEA offers recirculation coolers with an extensive variety of material combinations. The enclosures of our systems are carefully matched to your machines – and can of course be equipped with noise suppression and filter systems. Our product portfolio also includes forced-ventilated recirculation coolers; as required, they are equipped with accessories for process monitoring and are cabled at the manufacturer's plant. As a result, you obtain units ready for use that are quickly and simply installed.

Product features:
Closed circuit coolers

- Tube system with enhanced heat transfer
- Possibility of modifying the number of tubes, installed either next to or over each other
- Less use of material, but with a higher performance level

Product features:
recirculation coolers

- Great number and variety of material combinations
- Noise suppression and filter systems as required
- Forced-ventilated recirculation coolers in our portfolio
- As needed, accessories for process monitoring and factory cabling

Compact systems mean space savings: the latest generation of recirculation coolers.





Full speed ahead!

Merchant and military marine activities are attaining a continuously more important role for our modern society. Our coolers are used on many and various ships and make an essential contribution to quality of life and safety on board.

At home on all the seven seas
Compact systems for marine and special applications



Whether for cruise ships, container freighters, vehicle ferries, submarines, or icebreakers: our systems assure reliable cooling for all types of ships. In addition, we manufacture special solutions for switch boxes and offshore platforms. Our closed circuit coolers, recirculation coolers, and explosion-protected coolers can comply with all the standards required for energy operations: Codap, ASME, AD, BS, API, Gost, as well as all other codes related to heat exchangers.

Closed circuit coolers for the marine industry

Ship generators must assure reliable power supply on board. Closed circuit coolers from GEA are used for these generators, charging generators, and for systems for cooling of room air. For applications on ships, strict requirements especially apply for unit installation sizes and for the choice of materials. In addition, seawater is often used for cooling, which places more stringent demands on the resistance of materials. Our compact systems satisfy these specifications in exemplary fashion.

Recirculation coolers for the marine industry

The Oasis of the Seas – with a length of 360 m, 16 decks, and space for more than 6,200 passengers – is currently the largest cruise ship in the world. For comparison, it is five times the size of the Titanic. On board this colossus, a total of six recirculation coolers from GEA are hard at work. As part of the on-board power plant – and in linked operation as genset – they cool three motors that generate energy for the power consumers on board. Fifty percent of this power is needed for hotel operations, refrigeration facilities, HVAC, and various sports facilities, and the other half is used for electrical drive systems. The trust of ship engineers and shipbuilders in our recirculation coolers is first-class proof of the outstanding performance capabilities of these systems.

Customized coolers for special applications

The area of customized applications is a special field for which we develop solutions tailored to our customers. Safety and reliability play an outstanding role here, especially on the offshore market. Our product portfolio contains closed circuit coolers and recirculation coolers as well as fan motors and accessories for process monitoring. A wide range of customized material combinations ensures the great reliability of our equipment units. Official turnover procedures, compliance with directives, and certifications are often absolutely necessary in this field. Our quality management covers all applicable standards: e.g., ABS, DNV, RINA, GL, AMSE U-STAMP, ISO 9001, and ATEX. For each customer application we develop the optimal solution and thereby assure a particularly high level of safety and reliability.

Benefits of customized applications:

- First-class product quality
- Safety under extreme conditions
- Compact design
- Reduction of interfaces
- Maximum process efficiency
- Economical use of natural resources
- IMO compliance
- Proactive service
- Optimal investment protection



GEA Recirculation Cooler for special ATEX motor.



Offshore applications pose extremely rigorous demands on quality and security. GEA delivers the required special applications, including explosion-protected systems.

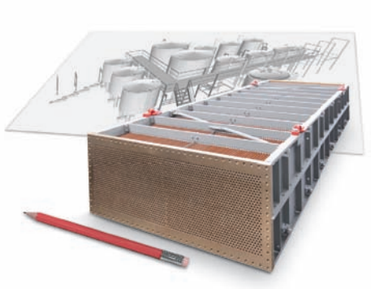


Concentrated acids, fuels, gases, and explosives

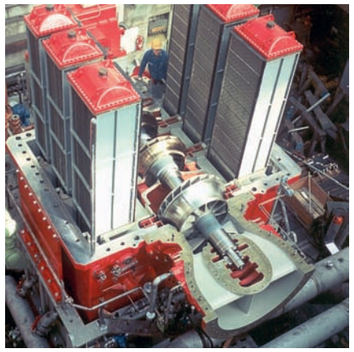
Production of these essential industrial raw materials is not feasible without efficient cooling systems. The pressure gas coolers from GEA offer technology that optimally implements all the applicable performance parameters.

First choice in compressor systems and process technology

Compact systems for the oil, gas, and chemical industries



Our range of pressure gas coolers covers basic market requirements for gas volumes from 5,000 to approx. 500,000 Nm3/h in the pressure range up to around 50 bar. It includes water-cooled pressure gas coolers for industrial gases such as air, oxygen, chlorine, carbon dioxide, helium, hydrogen, gaseous hydrocarbons, and gas mixtures. The revolutionary AFC pressure gas technology significantly enhances the reliability of compression, air-separation, and process-technology facilities.



Pressure gas coolers for compression in the chemical industry

In large chemical complexes, service providers often centrally supply industrial gases such as air, oxygen, and nitrogen. Turbine and piston compressors raise the pressure of these gases to the required levels. This is where our pressure gas coolers come into play. After each compression stage, coolers dissipate the heat of compression via a water cooling circuit, which assures top efficiency in compressor operation.

The photo above shows MAN turbocompressors by Air Products GmbH in operation in the German community of Hattingen. This prominent German supplier of industrial gases counts on the quality and the performance of GEA for the cooling of its compressor systems.



Pressure gas coolers for process engineering in the chemical industry

In their process engineering, the chemical industry likewise depend on efficiency enhancement from GEA. An important field of application of pressure gas coolers is the further processing of various products such as petro-chemicals, paint and coatings or polyurethanes. During the course of its continuous development, the chemical industry also relies on coolers from GEA. The most pressing current challenges of the chemical industry include the following: contribution to sustainable development, development of new energy sources, feeding of growing populations, and protective handling of resources.

The photo above shows the main factory of BASF in Ludwigshafen, Germany. With more than 160 chemical productions, hundreds of laboratories and workshops it is Europe's largest continuous industrial complex. Within this facility many of GEA pressure gas coolers are installed to sustain a lot of different processes with their save, well proven and sophisticated technologie.

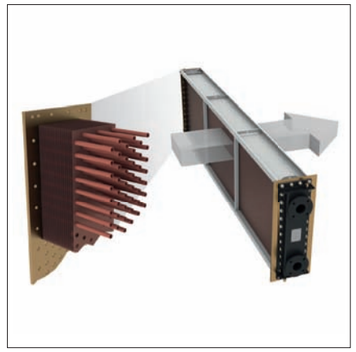


Pressure gas coolers and closed circuit coolers for air separation plants in the oil and gas industries

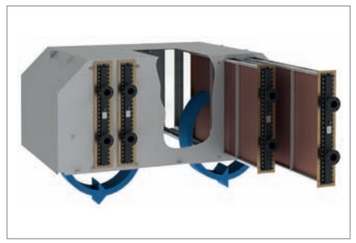
An additional key field of application for our pressure gas coolers is for gas recooling in air separation facilities. In these plants, turbocompressors produce the pressure required for the process of air liquefaction. The compressors used here are multi-stage units, in which isotherm coolers dissipate the heat of compression via a water cooling circuit after each compressor stage. Revolutionary pressure gas cooling technology sustainably enhances the performance capability and reliability of such compressor systems. These advantages also benefit Air Liquide Group – world market leader in gases for industry, medical applications, and environmental protection.

The photo above shows the new air separation plant of Air Liquide in the German city of Gundelfingen.

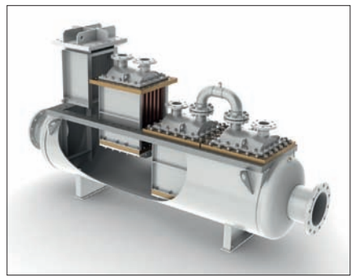
Designed for your demands
Details on technology and functionalities



A 3D animation showing the function of a GEA Closed Circuit Cooler.



This 3D animation shows the function of a GEA Recirculation Cooler – here, in combination with four GEA Closed Circuit Coolers.



GEA Pressure Gas Coolers assure efficient heat exchange in process engineering.

The closed circuit coolers by GEA are the result of decades of experience and development work. Owing to GEA design of cost-effective and safe heat exchangers with high efficiency as well as long life cycles, we hold the leading position in design and manufacture of coolers for generators, electric motors, and other electric equipment.

Closed circuit coolers

GEA Closed Circuit Coolers are designed according to customers' requirements and assure exact compliance with their performance specifications. The 3D animation (above left) shows how air moves through the fins and passes to the compact finned tube system, with effective heat transfer. Our finned systems enhance heat exchange to the tube system and allow low material usage without performance loss. Tooling flexibility allows each system to be adjusted with its tube banks side by side or on top of each other, and offers options of meeting extreme customer demands. Our many official approvals and certifications allow us to design and manufacture closed circuit coolers for many and various applications.

Recirculation coolers

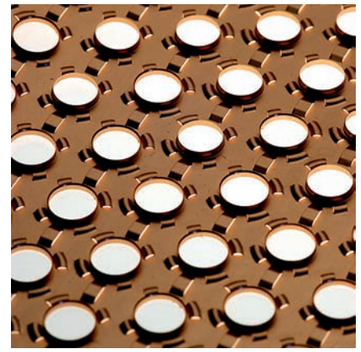
The 3D animation (middle left) shows how air moves through the fins and arrives at the compact finned tube system before it cools electrical devices. Our systems vary according to customers' demands and can be equipped with 4 closed circuit coolers, as shown in the picture. Units with 1, 2, 4, or even 6 coolers are available. The enclosure design, as well as the vertical and horizontal orientation of the coolers, can be adjusted according to the customer's wishes. Special certifications or official approval requirements can be taken into consideration in your system for future projects.

Pressure gas coolers

GEA compressed gas cooling technology is a key component in our portfolio: one which has grown in importance over several decades of continuous development, design, and operating experience. Since the efficiency of compressors is essentially determined by the cooler technology integrated, we have essentially contributed to technological progress through development of the extensive GEA finned-tube ranges.

Fin tube system

As specialist for thermal equipment, GEA provides a wide range of fin tube system. For operating requirements in close circuit coolers, the extensive GEA range of fin tube models has proven highly efficient. These standard tube types satisfy the requirements of all current close circuit cooler specifications. These fin tube systems have been selected, further developed, and thermodynamically optimized according to individual requirements. To satisfy the demands posed by various water and air qualities, as well as the customer's specifications, we provide a wide selection of dimensions and material combinations for tubes, tube fins, tube sheets, and water headers. Our standard range of tube material includes CuNi, high-strength brass, carbon steel, and stainless steel. The special coating of GEA fins enhances the corrosion resistance of the fin tube system. The surface is protected to prevent damage by aggressive impurities of the gases that are cooled and that accumulate in the condensate. This appreciably extends the service lives of the coolers.



GEA fin with turbulators.

Designed and built according to international standards

Our pressure gas coolers are manufactured according to the required design codes (e.g., PED-Pressure Equipment Directive 97/23/EC, AD datasheets, DGRL 97/23/EG, and ASME codes) and are inspected by TÜV, Lloyds, Stoomwezen, etc. Our range of services covers pressure gas coolers for gas quantities up to approx. 500,000 Nm3/h in pressure ranges up to around 50 bar. Efficient water separation systems allow exceptionally space-saving models. Their product range contains water-cooled pressure gas coolers for industrial gases such as air, oxygen, chlorine, carbon dioxide, helium, hydrogen, hydrocarbons, as well as mixed gases. Process coolers and heaters for industry and drying technology complement this range.

Material combinations available:

- Tube material: Cu, CuNi10, CuNi30, steel 1.4404, titanium
- Fin material: Cu, Al, steel
- Tubesheet material: CuNi10, CuNi30, CuZn38SnAl, steel, titanium, steel 1.4404, steel 1.4541, steel 1.4571
- Waterheader material: Steel + Rilsan coating, stainless steel, cast iron (GG), RG7, RG10, RG12 (GBZ), CuNi10, CuNi30

Applicable coatings:

- Tin plating (for copper fins)
- Epoxy-phenolic gold (for aluminium fins)
- Hot dip galvanizing (for steel fins)

Your GEA experts for closed circuit coolers worldwide

Reachable always and everywhere

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Sales / Distribution

Production / Manufacturing

Expect one-stop solutions

By concentrating various performance fields into a single, one-stop solution, GEA especially enables more effective control of the complex processes in heat transfer. It also speeds up order execution and simplifies preventive and remedial maintenance of heat transfer facilities. In this way, GEA creates clear and personally addressable responsibility for the entire process of project implementation. In a global, tightly meshed network, our highly qualified staff provides all key processes industrial production and air treatment.
GEA has set a new standard for efficiency, reliability, and availability in heat exchange. With production and service locations around the world, GEA Compact Systems as part of GEA Heat Exchangers offers, based on a single-source technology, a unique industrial network to provide excellence in engineering and expertise in local services and comprehensive support of our customers in a wide range of dedicated applications.

Excellence Passion Integrity Responsibility GEA-versity

GEA Group is a global mechanical engineering company with multi-billion euro sales and operations in more than 50 countries. Founded in 1881, the company is one of the largest providers of innovative equipment and process technology. GEA Group is listed in the STOXX Europe 600 Index.

www.gea-heatexchangers.com

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