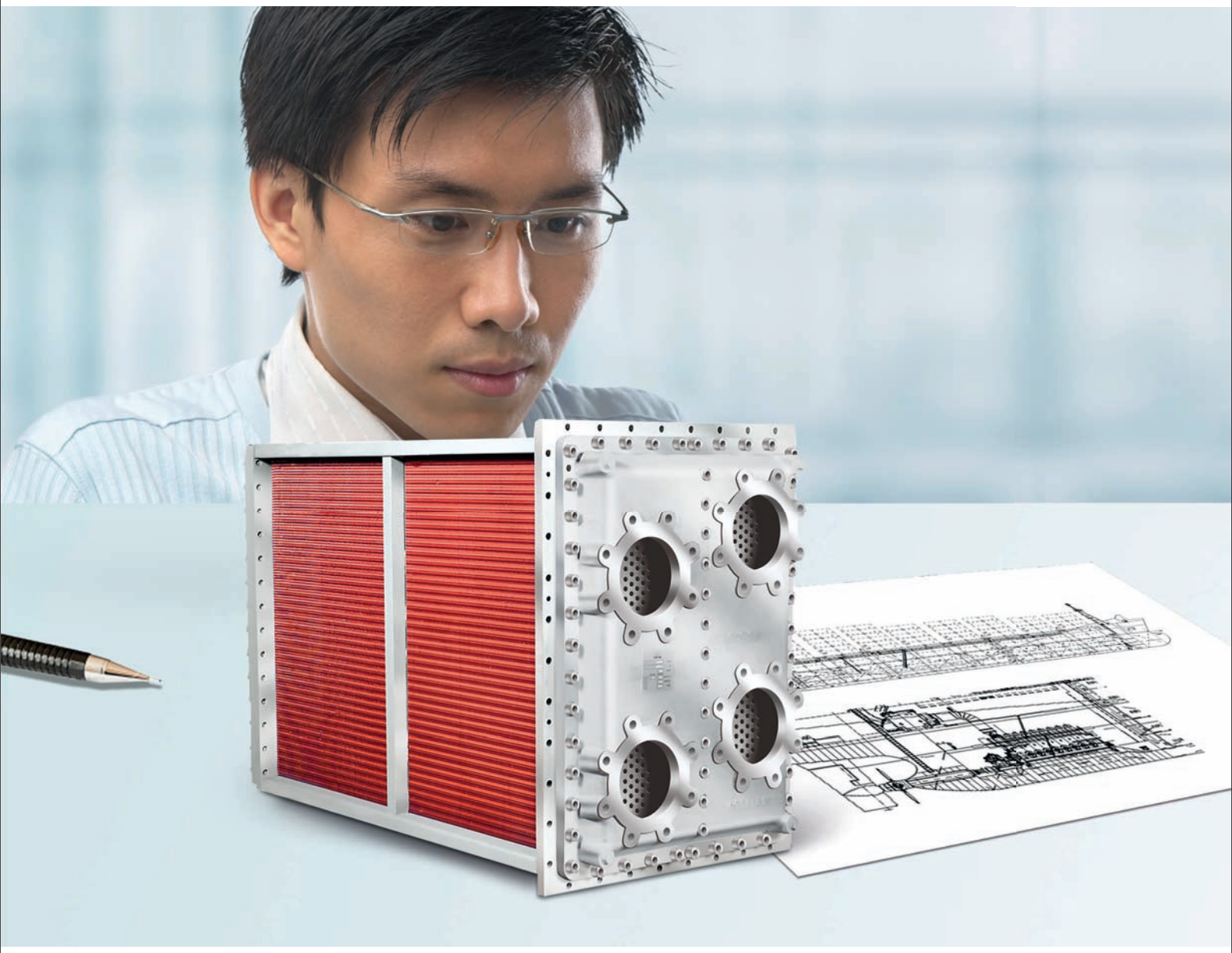


GEA Charge Air Coolers

Top-level engineering solutions

engineering for a better world

GEA Heat Exchangers



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-quality performance at all levels: beginning with precise engineering and moving all the way to first-class performance, we offer you a portfolio tailored to your individual requirements.

Certified according to:

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

GEA has an outstanding reputation for sustainability. In addition to their low water and energy consumption, our solutions are also convincing for important details such as quiet operation. Our innovative developments are the results of research and development work that is firmly based on the experience and the know-how of thousands of projects. We develop and build systems with the latest in computer simulation, assisted by full-scale laboratory testing. This also allows us, going beyond efficiency, to sustainably optimize environmental friendliness as well. In our offices and factories we have mastered all the issues involving heat exchange: design, thermodynamic calculations, structural engineering, and manufacturing studies. Our installations meet a great number of building and control regulations and can be supplied according to GEA standards, or to your own requirements. We offer the support of a global company that provides international monitoring of projects, extending to turn-key solutions.

With international standards on the safe side

As experienced manufacturers, we fully recognize our responsibility. The protection of men and women and the environment, as well as our claim for great cost effectiveness and reliability, commit us to the greatest of carefulness in our work. Our certification as per ISO 9001:2000 is good documentation of this fact. The end-to-end quality management in our work assures systematic implementation of this standard. In the design and engineering of our products, we furthermore produce in accordance with the international standards of a number of recognized classification institutions. This also means reliability that you can depend on for every project.

Always well advised

In many cases, proven solutions are readily available. If you face especially specific or entirely new challenges, however, you will profit with GEA from comprehensive consulting competence and tailored engineering services. The result: prompt implementation of your ideas and wishes in a customer- and market-oriented solution.

Service and support around the world

Supported by a finely meshed network of branches around the world, we are capable of offering you the services you need – whenever and wherever you require them. From maintenance to fast supply of spare parts, and far beyond: our service and support people provide a crucial module to assuring the availability and the cost effectiveness of your investment throughout its entire life cycle.

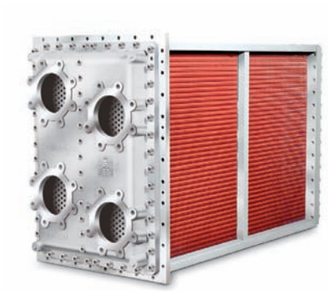


Center of Excellence

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.

Heat exchange – fully up to date
Compact finned-tube systems







The conditions under which a heat exchanger must operate can vary considerably, depending on the area of application. In light of this situation, we have developed a broad spectrum of compact finned-tube systems. All of these systems are designed in accordance with the particular customer application – which therefore offers exact observance of customer performance requirements. We can manufacture with a great number and variety of materials and geometrical configurations, to create the optimal solution for each application. Maximum functionality and efficiency are the results for you. Attributes of these systems – such as their corrosion protection, developed and patented by GEA – are recognized around the world and assure ongoing availability of the systems.

Charge air coolers

For more than 50 years now, GEA has been leading in the development and manufacture of charge air coolers. These coolers for diesel and gas engines are well known throughout the world for their excellent performance and reliability. We enjoy long-term collaboration with world-famous engine manufacturers and licensors such as MAN B&W, Wärtsila, MTU, MAK, DEUTZ, Caterpillar, Hyundai, etc. And we have manufactured hundreds of charge air coolers for various marine diesel engines, including the powerful engines 12K98ME-C and l4RTfIex96. In China alone, we supply charge air coolers for nearly all 4-stroke engine manufacturers, including state enterprises. Marine diesel engine charge air coolers are still being manufactured in Europe, although the very largest engines are built in the Far East. Our combined experience enables us – in close collaboration with engine manufacturers and plant-systems contractors – to develop dedicated, customer-oriented, and economical concepts for optimization of the complete charge-air modules on an engine. As result of the use of special materials, advanced coating technology, and new finned-tube systems, application of GEA Charge Air Coolers is also effective in engines that burn biogas and other special gas fuels.
Main applications: Marine, off-road, and stationary diesel and gas engines with performance over 200 kW ...

Exhaust gas recirculation coolers

This technology, developed in close collaboration with our customers, ensures that – with large-size diesel engines – the recirculated exhaust gas is mixed at the lowest possible temperature with the air of combustion. The result is effective reduction of nitrogen oxide emissions. This technology, already now fulfills future emission guidelines according to IMO (International Maritime Organization), Tier (the US exhaust-gas standard), EURO, etc. The patented design enables cooling of gases, some of which are over 700 °C, down to 50 °C. All tests conducted with customers, at their facilities, have shown conformity with pollution results conducted at the prominent Research Centre for Internal-Combustion Engines and Thermodynamics at Rostock University in Germany. These tests have verified conformity of operational characteristics, especially pollution behavior and transferred heat output.
Main applications: Marine, railway, and off-road diesel engines ...

Cogeneration plants

Cogeneration power plants of all kinds profit from the innovative strength of GEA. One good example here is not only conventional natural-gas engines, but also engines of the newest generation powered by special types of gas. These systems are also sustainably supported by our efficient charge air coolers.



The power of efficiency
Compact systems for the energy industry

Throughout the range from diesel power stations to cogeneration plants: the energy business uses our charge air coolers for efficient performance of its power plants. By the use of special materials, advanced coating technology, as well as innovative finned-tube systems, these coolers can also be effectively used in the field of special gases: such as plants using biogas, landfill-gas, mining-gas, wastewater-gas, and syngas.

New challenges sustainably mastered
Diesel power stations and cogeneration plants

Our charge air coolers for main engines in power plants are well known around the world for their outstanding performance and reliability. The increased use of biogas and other special gases poses particular challenges for these systems. The new GEA compact finned-tube system, made of corrosion-resistant stainless steel, has enabled us to successfully increase the service life of charge air coolers while maintaining optimal performance.

Product features: Charge air coolers

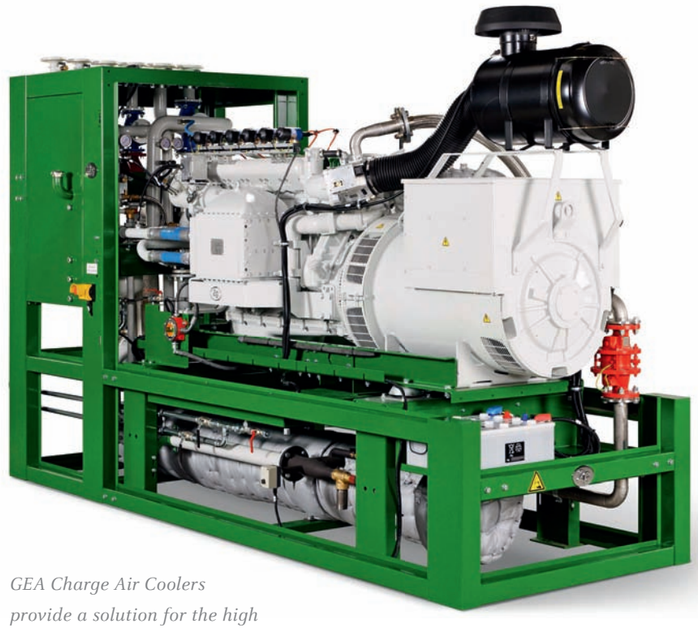
- Stainless steel as material
- Conformity with strict the regulations for gas engines
- Finned-tube configuration and fin geometry optimized by CFD
- Minimized fouling at the gas-side cooling surface
- Embossed and especially designed structures on the fin surface for effectively guiding the air flow through the heat exchanger
- Contribution of virtually the entire surface to the heat-transfer process

Charge air coolers for 2- and 4-stroke diesel engines

The performance capacity and the reliability of our charge air coolers have enabled us to use them around the world for many years now in 2- and 4-stroke diesel engines. The purpose of these charge air coolers is to employ a turbocharger to cool down the required fresh intake air to temperatures between 40 and 60 °C after its compression and subsequent heating. This application of charge air coolers increases the air volume supplied to the combustion process and, in turn, enhances the effective performance of the engine.

Charge air coolers for natural gas plants

In natural-gas plants, charge air coolers from GEA also represent the first wise choice. Ongoing further development of gas engines over recent years has led to increasing demands placed on charge air coolers. These demands include stricter requirements with respect to corrosion, soiling, and service friendliness. The new GEA compact finned-tube system made of corrosion-resistant stainless steel offers an excellent option for significantly increasing the service life and the service friendliness of charge air coolers – without appreciable impairment of the power density of the components.



GEA Charge Air Coolers provide a solution for the high technical demands of 2G's cogeneration plants from the agenitor series.



Stainless steel and an especially designed fin geometry make the mixed gas cooler ideal for work with all special gases.

Charge air coolers for non-natural gas plants

The field of application of special gases is still very young in comparison to other industrial areas. In addition to small, decentral generation of energy with a company's own primary-energy generation facilities, these challenges arise especially with the use of relatively unresearched fuels that are difficult to officially regulate – and with the extreme chemical and physical stresses placed on the materials used. With the use of special materials, advanced surface treatment, and – not least – our compact finned-tube system, however, effective use of charge air coolers is indeed possible even in the area of special gases. Surface treatments in the form of Delta Seal, KTL, or tin plating are available for enhancement of the corrosion resistance of the material. The choice of stainless steel as base material for the finned-tube system significantly enhances corrosion resistance over any other material previously used. Mixed-gas coolers, built of stainless steel, are especially effective in operation with aggressive accompanying substances in the gas mixture to be cooled. The new GEA compact finned-tube system is primarily characterized by the configuration and the geometry of the fins, as developed by computational fluid dynamics (CFD). This design allows great efficiency of the heat exchanger with a minimum of susceptibility to soiling. The structures embossed on the surfaces of the ribs plays a key role in this process. The special geometry of these impressions produces the required turbulence and guides the gas mixture to be cooled through the heat exchanger in such a way that virtually the entire surface of the ribs takes part in the heat exchange process.



The biogas industry needs fast innovative answers for the plant-construction and subcontractor industries. Our charge air cooler, constructed of stainless steel, is one excellent answer.

Oil and gas tankers

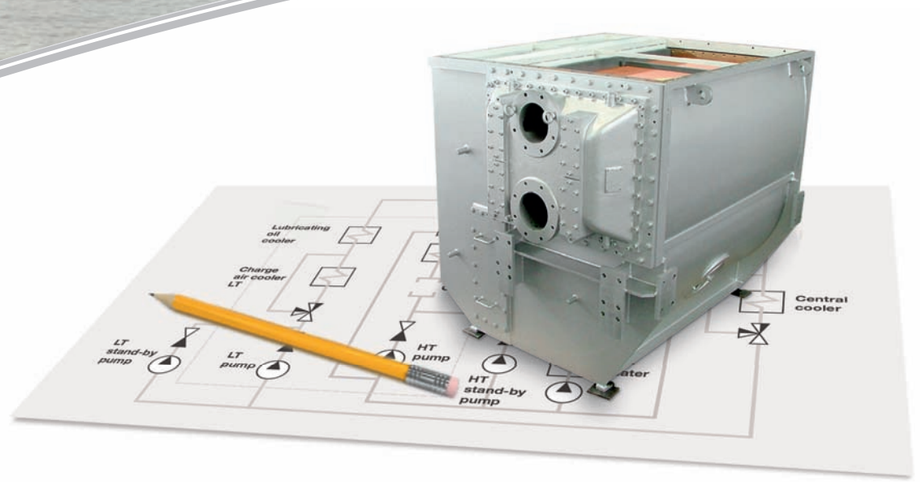
Whether diesel, gas, or dual-fuel engines: Compact systems comply with all standards applicable to energy operations: ASME, AD, BS, API, GOST, as well as all other codes related to heat exchangers.

Container ships, dry-cargo vessels, and trawlers

For these ship types as well, operators are keen to achieve enhancement of engine efficiency and of environmental compatibility. In any case, GEA is the right contact partner for you.

Cruise ships, ferries, tugboats, and mega-yachts

The use of optimized materials and proven processing techniques allow development and production of all customer-related components in accordance with the applicable international standards.



Moving the giants of the ocean
Compact systems for the marine industry

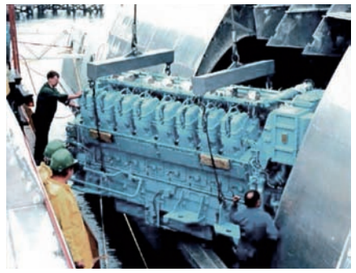
You can find our solutions in supertankers, cruise and cargo ships, trawlers, freighters, ferries, and mega-yachts. We design and manufacture charge air coolers and exhaust gas recirculation Coolers for diesel engines, gas engines and dual-fuel engines. Compact systems comply with all standards required for energy operations: Codap, ASME, AD, BS, API, GOST, as well as all other codes related to heat exchangers.

On the right course for the future as well
The marine industry



Our marine specialists put more efficiency and sustainability on board.

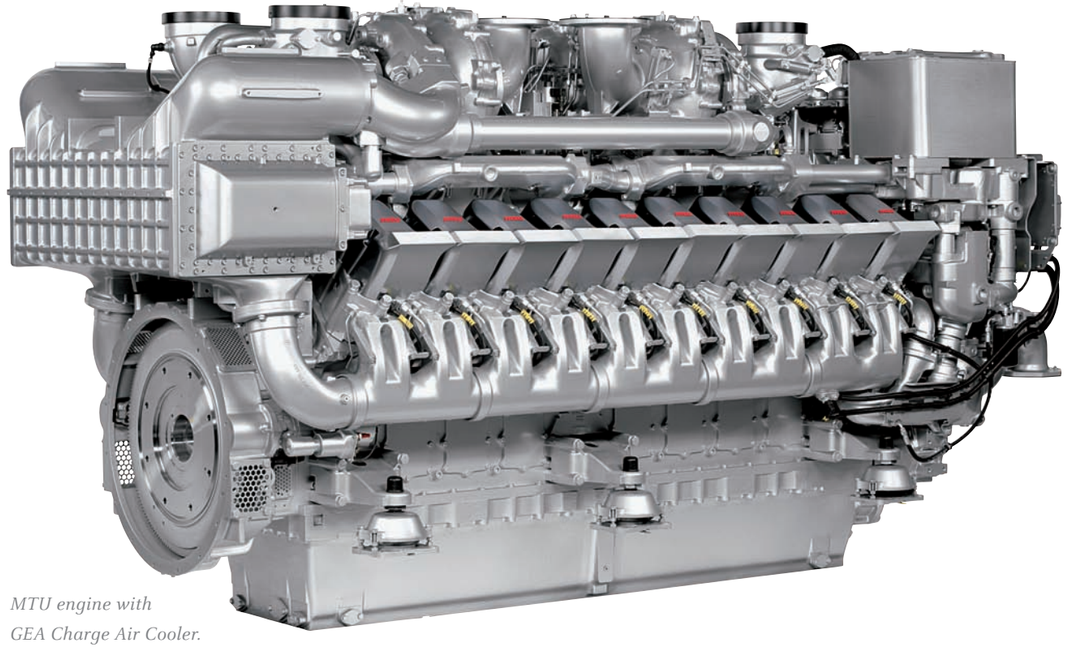
Our marine solutions are designed for maximum benefits over the entire service life of the units. This life-cycle benefit is ensured not only by first-class product quality: a further bonus takes the form of customized solutions that can be perfectly adapted to the customer's needs. Modernizing units during operation, performing retrofitting, and upgrading according to the latest state of the art allow us to enhance performance on an ongoing basis.



Coolers for 4-stroke engines

Maritime activities of today simply cannot do without cooling systems such as ours for diesel and heavy-oil engines. The use of optimized materials and proven production processes means that we can develop and manufacture components according to the customer's requirements and international standards. Our decades of experience offer our customers particular benefits here. The great challenge for engine manufacturers is to continually improve engine efficiency as well as environmental compatibility. Boosting the charge air is considered here as one of the most promising development fields from the standpoints of future security and innovation lead. As innovative partner of the most prominent engine manufacturers, we have accepted this challenge. Outstanding examples here are our charge air coolers for 4-stroke engines. Reference projects – such as equipping the AIDA fleet with solutions from GEA – clearly show that our top-efficiency systems also fulfill the most demanding of expectations. This applies not only to efficient cooler performance, but also to the dimensions of our coolers. Thanks to their compact design, they have led the way in our sector in regard to installation space, weight, and use of materials.





MTU engine with GEA Charge Air Cooler.

In the area of emission reduction, our exhaust gas recirculation cooler has set new standards. It advances exhaust-gas recirculation technology known until today with the goal of reducing NOx emissions inside the engine, thereby reliably fulfilling regulations according to IMO, Tier, EURO, etc. The exhaust gas recirculation cooler also meets other demanding requirements such as high temperatures, up to 700 °C, exhaust gas containing sulfur, and soiling by soot particles. No consumable process materials are needed, and design can take place entirely according to the customer's specifications. Our exhaust gas recirculation cooler is available in two versions: with low-pressure exhaust after the turbocharger, or with high-pressure exhaust located downstream of the turbocharger.

Coolers for 2-stroke engines

The great efficiency and the environmental compatibility of our charge air coolers and exhaust gas recirculation coolers are likewise fully exploited for the benefit of 2-stroke engines. Here as well, we support engine manufacturers with customer-tailored solutions that fully conform to all individual requirements and international regulations. Our solutions offer their benefits not only for all new facilities: in retrofit situations they also make a key contribution to the systematic enhancement of performance and sustainability.



GEA Charge Air Cooler for marine applications.

Product features: Charge air coolers

- Safety under extreme conditions
- Compact design – low weight and small space requirements
- Simple installation thanks to plug and play
- Maximum process efficiency and availability
- IMO compliance
- Optimal investment protection

Product features: Exhaust gas recirculation coolers

- The latest GEA development in the field of emission reduction
- Effective reduction of NOx levels inside the engine unit
- These benefits even at temperatures up to 700 °C

Freight trains

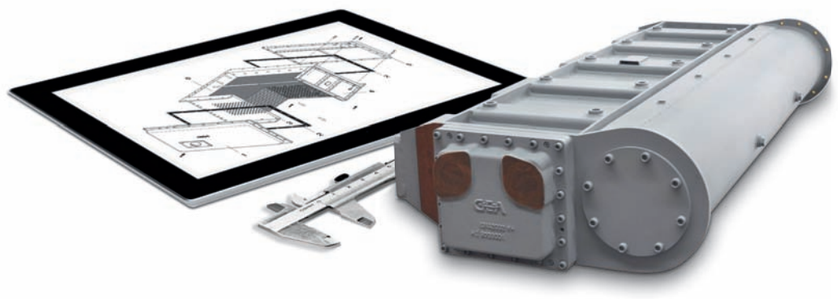
Freight trains are absolutely essential for continental logistics. Many trains on the international railway network are equipped with engine cooling by GEA, which ensures that they get their freight reliably to their destinations.

Passenger trains

Green signals all around for safety and reliability. In the equipping of passenger trains as well, engine manufacturers around the world depend on cooling systems by GEA.

Mining trucks and other heavy haulage-vehicles

Mining trucks and other heavy-weights in our transport systems are subject to special demands. Their diesel engines must provide top performance over long periods of time. Just as essential for them are reliable cooling systems such as those offered by GEA.



Full speed ahead with flawless engineering
Compact systems for the transport industry

GEA has developed special solutions for the locomotive industry and for mining equipment. We design and manufacture charge air coolers for thousands of types of diesel engines. They are custom-made for all individual engine designs, particular installation criteria and varied operational conditions. In addition to their great performance efficiency, these charge air coolers are popular owing to their compact dimensions and their good resistance to vibrations.

Better solutions for wheel and rail transport
The transport industry

In addition to fuel, charge air is the most essential component for efficient engine combustion. The efficient cooling perfomance of charge air coolers by GEA means that they sustainably contribute to enhancing the efficiency of diesel locomotives. All around the world, engine manufacturers take advantage of our quality to equip locomotives and other heavy-haulage land vehicles with future-oriented technology.





Our coolers in heavy-haulage vehicles.

Charge air coolers for diesel engines

The greater the total weight, the more energy required to put it into motion. Weight – in addition to temperature – accordingly has great influence on fuel consumption. The lower the temperature of engine intake air, the better the consumption of fuel: which in turn reduces emissions. As a result, charge air, in addition to fuel, is the most important component for especially effective combustion. Efficient cooler performance improves the efficiency of the entire engine, which means that less fuel is required for the same performance. Thanks to the compact design of our coolers – achieved by their innovative fin geometry – our products have pioneered in the transport sector with regard to installation space, weight, and use of materials. Mining trucks and other heavy-haulage vehicles profit as a result. Even under the most extreme operational conditions, our solutions support the maximum functionality and reliability of diesel engines.



Charge air coolers for diesel engines in locomotives

In both passenger and freight trains: our charge air coolers have proven themselves thousands of times. Systems developed by GEA efficiently and reliably cool diesel engines in a great variety of models and generations. The sustainability of our systems is shown not least in our major success on the Chinese market. It was as long ago as 2000 that the Chinese Ministry of Railways officially designated GEA as approved subcontractor. We have established close collaboration with all locomotive manufacturers in China. All GEA Charge Air Coolers have passed the performance test conducted by the China Railway Ministry Science Institute. The first charge air cooler delivered for the DF 11 locomotive engine has passed the 900,000 km operation verification test.

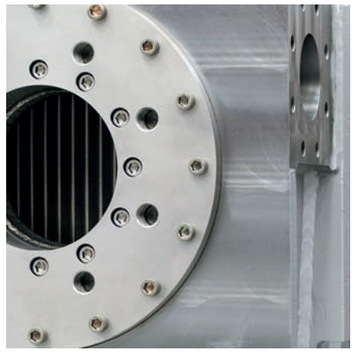


In their development of new trains, many leading companies depend on GEA.

Product features: Charge air coolers

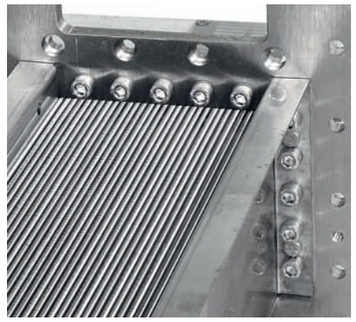
- First-class product quality
- Safety under extreme conditions
- Compact design – low weight and small space requirements
- Reduction of interfaces
- Simple installation thanks to plug and play
- Maximum process efficiency and availability
- Economical use of natural resources
- Reliable protection of people and the environment
- Proactive service
- Optimal investment protection

Progress at a glance
Details on technology and functionalities



GEA Exhaust Gas Recirculation Coolers for emission reduction.

Progress is based on the continuous and innovative further development of proven systems as well as on groundbreaking ideas and their successful implementation. Our charge air coolers are adapted to many and various requirements, circumstances, and environmental factors. The exhaust gas recirculation cooler is our latest development for emission reduction and complements existing exhaust-gas recirculation systems with the aim of reducing NOx emissions within the engine and of satisfying international emission guidelines.



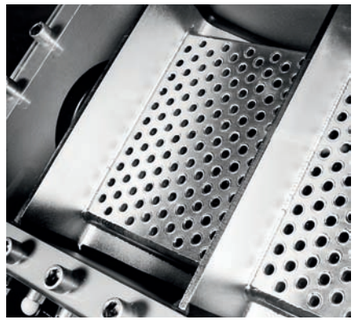
Stainless-steel version for corrosion resistance.

Charge air coolers in general

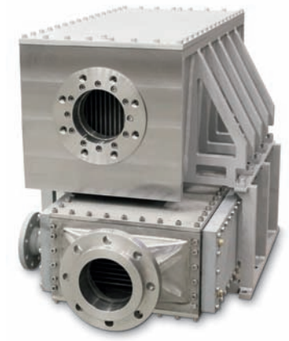
As specialists we offer numerous concepts for optimizing heat transfer according to specific applications. Global cooperation with official approval and classification authorities (such as LRS, GL, BV, etc.) means that we can also certify GEA Charge Air Coolers according to Inspection Certificate 3.1 and EN 10204 if requested. High degrees of flexibility allow us to adapt to the principal concepts of engine manufacturers. We are therefore able to design individual charge air coolers as block, case, or slide-in coolers – as well as in the form of special models.

Charge air coolers for special gas engines

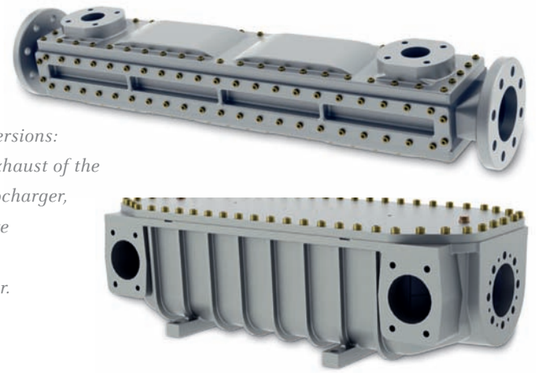
Products developed by GEA also allow stable and effective operation of conventional engines that operate with special contaminated gases such as biogas. These benefits apply above all to special areas of application in which – for technical or economic reasons – an upstream gas purification system is not installed. Conventional charge air coolers based on copper or aluminum materials cannot cope with such processes. Our use of special materials such as high-quality stainless steel, special surface-treatment substances, and the compact finned-tube system has enabled us to succeed in meeting these requirements as well. Our solutions optimally and significantly guarantee system resistance and long service life even under extreme conditions.



Detail of a GEA Exhaust Gas Recirculation Cooler.



GEA Exhaust Gas Recirculation Coolers are designed for temperatures up to 700 °C.



Available in two versions: for low-pressure exhaust of the gas after the turbocharger, or for high-pressure exhaust upstream of the turbocharger.

Exhaust gas recirculation coolers (EGR)

This new cooler generation is based on a recently developed finned-tube system. Designed by a CFD program, both the finned-tube configuration and especially the fin geometry of this new system provide great efficiency for the heat exchanger by minimizing fouling at the gas-side cooling surface. The embossed and especially formed structures on the fin surface also play a significant role in this process by creating the necessary turbulence inside the fin tube stack and guiding the air flow through the heat exchanger in such a way that practically the entire fin surface contributes to the heat transfer process. Depending on prevailing environmental conditions, various stainless steel materials can be used for the new finned-tube system: e.g., 1.4512 (AISI 409), 1.4404 (AISI 316L), and 1.4539 (904L as per ASTM A240).

Product features: High-pressure loop EGR

- Compact heat exchangers, made of heat- and corrosion-resistant stainless steel and consisting of the new S79X finned-tube system
- Aquifer system cases that – due to the special arrangement of the separating plate and the mounting of the heat exchanger – reduce to a minimum the mechanical stresses that usually occur during thermal expansion at high temperatures
- Compact, customized, and service-friendly design, in which the water and gas connections can be adjusted to customers' requirements and which enables quick disconnection of the heat exchanger for maintenance purposes

Product features: Low-pressure loop EGR

- Proven block-cooler design featuring highly corrosion-resistant stainless steel
- Customized connections for water, gas, and condensate draining, which also enable quick disconnection of the heat exchanger for maintenance purposes
- Simple disassembling of frame parts for cleaning, such as sidewalls and headers, which enables optimal access to the heat exchanger core

Your GEA experts for charge air coolers worldwide

Reachable always and everywhere

EUROPE

Center of Excellence
GEA Maschinenkühltechnik GmbH
Südstraße 48
44625 Herne, Germany
Phone: +49 2325 468-801
Email: info-gmt@geagroup.com

GEA Bloksma BV
Draaibrugweg 15
1332 AB Almere,
The Netherlands
Phone: +31 36 549 23 00
Email: bloksma.info@geagroup.com

GEA Polska Spolka Z O.O.
Ul. Sikorskiego 38
58-160 Swiebodzice, Poland
Phone: +48 74 8500 800
Email: info.polska.pl@geagroup.com

AFRICA

GEA Maschinenkühltechnik GmbH
Südstraße 48
44625 Herne, Germany
Phone: +49 2325 468-801
Email: info-gmt@geagroup.com

ASIA

GEA IHE Systems (China) Co. Ltd.
No. 8 Yangtian Road, Jiujiang
Economic Development Area
241007 Wuhu Anhui, China
Phone: +86 553-5951222-0
Email: info-ihe-china@geagroup.com

GEA IHE Systems India
F-602, SAI ANSH,
Opp. Jui Nagar Station (W),
Plot no. 7, Sector 11, Sanpada,
Navi Mumbai - 400705, India
Phone: +91 98204 53979
Email: jayakumar.nair@geagroup.com

OCEANIA

GEA Maschinenkühltechnik GmbH
Südstraße 48
44625 Herne, Germany
Phone: +49 2325 468-801
Email: info-gmt@geagroup.com

NORTH AMERICA

GEA Maschinenkühltechnik
100 GEA Drive
York, PA 17406, United States
Phone: +1 717 855-0145
Email: david.wente@geagroup.com

SOUTH AMERICA

GEA do Brasil Intercambiadores Ltda.
Estrada SP 354 km 43,5 - Serra dos Cristais Franco da Rocha - SP - CEP 07803-970, Brazil
Phone: +55 11 4447-8800
Email: vendas.gdb@geagroup.com



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

© GEA Heat Exchangers. All rights reserved. 12/2011. www.papp.cc