



Refrigeration technology for meat and poultry

In touch – hygienic solutions
for the food industry



After slaughtering, the cold chain begins – and with it our responsibility toward the consumer. Effective cooling and freezing of meat and poultry is essential for flawless and tasty food to become successfully marketable merchandise. GEA Refrigeration Technologies furthermore ensures cost effectiveness, since for us, energy efficiency and environmentally friendly refrigerants enjoy top priority.

In touch with your processes and requirements

Meat and poultry: cooling and freezing for premium quality

GEA Refrigeration Technologies is a synonym for industrial refrigeration. Since the end of the 19th century, it has been our business to cool processes and products and to transport goods at the correct temperature. Today we serve the food industry with a large share of our technologies, including the meat and poultry sector.

For us, “in touch” means customer proximity in every business relationship. GEA Refrigeration Technologies stands for refrigeration closely oriented to the requirements of the customer: economical, durable, energy-efficient, sustainable – and tailor-made.

All throughout human history, people have attempted to make meat durable. Sausage arose from these efforts. Its manufacture also permitted the effective exploitation of the by-products of slaughtering, such as blood and innards. Ever since antiquity, sausage has therefore been a fixed component of our diet. Refined over the millennia and characterized by typical national tastes, sausage products not only lead the list of favorite foods of many nations: they are also frequently among the valuable cultural assets of certain regions. The situation is similar with poultry, which is likewise rooted in the traditions of many countries. One only has to think of the British stuffed turkey roast on the first day of Christmas.



Most people today are in the fortunate position to be able to select from an opulent availability of meat according to their heart's desire – and can afford it. In the Middle Ages, however, meat was a privilege of the rich. Since meat at that time could not be cooled, it was preserved by being heavily salted and spiced with herbs.

In the Western world meat can be bought at all times and everywhere, and it is furthermore easy to transport and store. It also tastes good, even though it has usually had a long trip behind it before reaching your table. Apart from correct animal husbandry, feeding, and satisfactory slaughter, the prerequisite for safe and good meat is an uninterrupted cooling or freezing process. Temperature control at the beginning of the process requires special attention. For example, if the meat is cooled down too rapidly to below 10 °C/50 °F, it leads to muscle shrinkage, which makes the meat tough and leads to water loss. This “cold shortening” can be prevented if the meat is stored about 16 to 24 hours at about 16 °C/60.8 °F. The later freezing process also has considerable influence on meat quality: the faster that freezing plants reach the low temperatures, the less impairment of the meat's water-binding capacity.

Using GEA Refrigeration Technologies cooling and freezing plants, you can be certain that the meat not only tastes good. Our systems satisfy all hygienic standards and facilitate the construction of a functional cold chain. The investment in proper cooling management ultimately pays for itself, both for your company as well as the environment.

Whether the subject is cooling and storage of fresh meat or cooling and freezing methods for further food processing, our profession requires considerable specialized know-how as well as great sensitivity and precision. With extreme care, prudence, and a love for detail, our engineers work out the suitable refrigeration technology for every kind of meat and poultry. GEA Refrigeration Technologies simply makes the best of your products.

Every sector of the meat and poultry processing industry sets its specific requirements on controlled temperature, during dressing, processing, storage, and packaging. Depending on the application, GEA Refrigeration Technologies ensures the correct temperature – cool or ice cold, and if required, precise to one degree.

If the subject is sausage, we will gladly get under your skin – for example with our GEA Geneglace flake ice generators. If poultry production is your profession, let us inspire you with the innovative spirit of our engineers, with modern and energy-efficient cooling and freezing plants.

GEA Refrigeration Technologies for poultry production

Top of the line in cooling and freezing technology



Humans can build up 80 grams of body protein from 100 grams of poultry: which means high biological value. The majority of people consider turkey and chicken in a less scientific light, and simply enjoy the food. However, this luxurious diversity is brought to you by extensive cooling and freezing measures.

The actual cold chain begins right after slaughtering. The type of cooling depends on further processing: e.g., fresh meat is effectively cooled from about 42°C/107.6°F to 4°C/39.2°F in a cold air stream, within 60 to 70 minutes. If the product is later to be marketed as a frozen food, cooling with cold water at 0.5°C/32.9°F to 1°C/33.8°F is customary. Another cooling variant is spray air cooling, a combination of wet and dry cooling. The poultry is cooled both with sprayed cold air and at intervals with water. The vaporized water additionally withdraws heat from the surface. A special advantage of this method is that weight loss from the cooling process is comparatively small. Only then are the animals sorted by weight category and further processed, either frozen as entire birds or divided into parts. Chicken pieces such as fillets or wings – raw, par-fried, or fully cooked – are generally chilled or frozen in spiral freezers or directly released to the packaging area. When loaded as bulk product on a belt, chicken pieces are individually quick-frozen (IQF) in tunnels with gentle product agitation to prevent products from sticking together during freezing. GEA offers a wide range of spirals and IQF tunnels answering to exact product and processing specifications. Whole birds are individually packaged in polyethylene bags and then go into cartons with ten birds each. At slaughtering capacity of more than 6,000 birds per hour, the use of an automatic carton freezer is economically effective.

Milouoff, part of Milouot Group based in northern Israel, is a unique integrated enterprise engaged in all facets of the poultry business, with annual turnover of approx. 90 million euros. For the past 9 years, Milouoff has received the Five Stars of Beauty awarded in the Beautiful Industry, Beautiful Israel contest. Milouoff has invested 5 million euros in plant modernization with GEA freezers. Installed in 2010, one GEA I-VRT carton freezer and one GEA A-Tec series spiral freezer are now in operation. The GEA I-VRT system (variable retention time) freezes chickens and turkeys – as whole birds in carton or plastic totes – at a rate of 14,000 kg/hour. Holding capacity is 7,728 cartons or totes. This automated system runs in chilling or freezing cycle, with various air temperatures and product retention times. The GEA I-VRT – 30 m long x 12 m wide x 14 m high – represents a building in itself. For further-processed products, Milouoff selected GEA A-Tec series spiral freezers for their hygienic design and efficiency benefits. They freeze 1,500 kg/hour of raw chicken patties, sliced chicken fillets, and meatballs in a cold horizontal airflow, with optimal heat transfer and low energy to be charred with a consumption. The spiral freezer is designed and built to be cleaned with a Clean-in-Place (CIP) system: the stainless steel floor and enclosure are fully welded, and the floor is elevated on studs to eliminate dirt traps. This shows two different solutions from the GEA freezers range, each one adapted to product application and both offering maximum product quality and yield.



Flake ice from GEA Refrigeration Technologies cools the sausage mixture and prevents denaturation of the protein caused by excessive temperatures.

Flake ice for sausage production

Cold ice for hot sausages

Sausage has been a part of the human diet since antiquity. In ancient times sausage made it possible to keep meat from spoiling and was an optimal use of meat products. Today we delight first and foremost in the excellent taste of the practically countless types of sausage.



GEA Geneglace flake ice generator

An important component in the manufacture of cooked and simmered sausages, for instance, is flake ice. It is hacked and blended along with salt and meat in the cutting machine. Apart from cooling, the ice serves another function: in connection with salt, it releases water-soluble proteins contained in the muscle meat and allows them to swell so that the sausage becomes tender, juicy, and sliceable. One cannot add water for this purpose, because the meat otherwise “swims away” from the cutter knife and cannot be hacked finely enough.

Flake ice consists of wafer-thin chips and has a temperature of about $-7^{\circ}\text{C}/19.4^{\circ}\text{F}$. The large surface area of the chips ensures rapid, efficient, and homogenous cooling of the sausage mixture. Furthermore, due to their dry surface area, the ice flakes do not freeze together and can be stirred into the meat mixture without forming lumps. This also protects the cutter knife, which is not required to struggle against hard lumps.

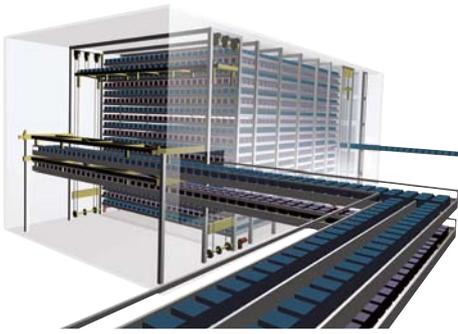


Our freezers are designed for hygiene, regardless if your product is raw, par-fried, par-baked, or fully cooked.

Refrigeration and freezing technology for meat production

Freezing on a massive scale

With respect to energy efficiency and the availability of your plant components, the engineers at GEA Refrigeration Technologies are sometimes bean counters. But the same passion serves them well in getting the larger view and looking beyond the immediate horizon: for example, to achieve great things in joint projects with our customers.



Refrigeration technology in XXL. Day after day, about 360 tons of meat can be frozen with our enormous GEA freezers. Thanks to the variable retention time, even different products can be simultaneously frozen or cooled.

Durable, efficient, low-maintenance, and everything in view: screw compressors of the GEA FES GL series with touch panel control.

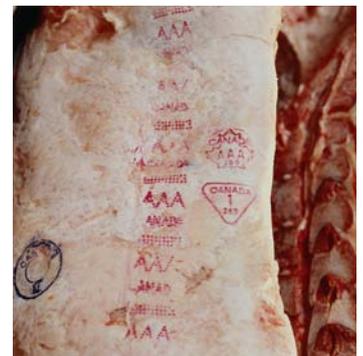
Whether it's beef or pork – as fresh meat, cut apart, or cooked, as ready-to-serve meals, or in cans – GEA Refrigeration Technologies offers reliable refrigeration and freezing solutions for almost everything that can be made from meat.

For freezing, GEA I-VRT carton freezers are a highly cost-effective solution, thanks to their full inventory control and minimal labor requirements. VRT stands for variable retention time. The system permits various products to be simultaneously frozen or cooled. This technology had already proven reliable in several factories worldwide and rapidly paid for itself.

Producers as well as consumers profited from improved storage life and product quality. Additional advantages of the VRT freezer: the efficient freezing process reduces work effort and noticeably cuts energy costs. A fault diagnosis program and a remote maintenance modem furthermore guarantee practically 100 % availability. Another benefit is the enormous holding capacity of the compact freezers, which in turn saves storage space and also make the devices advantageous for just-in-time production.

Our biggest freezing plant is as large as a multi-family dwelling, and strong enough to hold up to 30,000 cartons. The goods can be frozen for variable time periods of 24, 32, or 36 hours. The frozen food is brought in on nine different production lines, three of which serve the variable infeed systems.

GEA Refrigeration Technologies also scored in the sector of screw compressors with outstanding product characteristics such as reliability as well as simpler controllability and troubleshooting via the function-filled GEA FES GForce™ control panel. The compressor units are designed such that the unavoidable replacement of the thrust bearing can be easily carried out, with neither compressor nor seals being removed in the process. Moreover, refrigeration unit and freezer harmonize with each other perfectly and can be offered from one source.



Reliable refrigeration and freezing technology for premium products made from meat

Being able to chill or freeze meat and poultry products – and being able to guarantee product safety and quality – are two quite different challenges.

Protective chilling and freezing for top product quality

Professionally proper freezing for product safety, freshness, form, and taste



Improper freezing may result in detrimental quality changes. When foods with high water content are frozen slowly, they may later experience fluid loss by the phenomenon known as drip upon thawing. This fluid loss causes dehydration and nutrient loss in frozen food products. An ineffective freezing process may also produce meat-surface dehydration, which gives the surface of the product the appearance of brown paper. Such meat will quickly become rancid. Poor-quality frozen meat and poultry products generally result from freezers that are not designed specifically as food processing machines, but are merely basic assemblies of a conveyor, fans, evaporator, and insulated box. A dedicated industrial food freezer must conform to strict design specifications to ensure food quality and safety, as well as cost and energy efficiency.

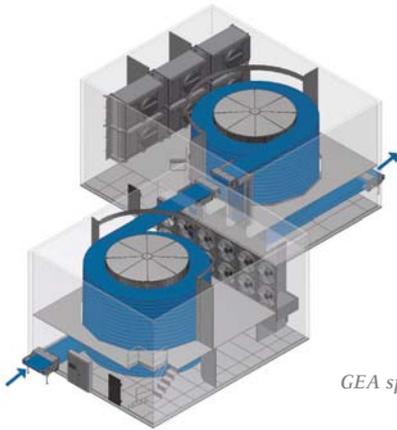
Throughout its entire range of freezing systems, GEA Refrigeration Technologies and its experts in frozen-food applications are perfectly in step with the stringent requirements applicable to food processing. This applies to the designing and building of freezing products, as well as to their selection for particular processes. With GEA capability to test your products and conduct airflow as well as heat-transfer simulations in our technology center, we ensure selection of the best solution to guarantee the product quality you require. We especially design our freezers and chillers to guarantee optimal product handling, optimized heat transfer, and great equipment durability, with full integration as technological systems into your processing line.

With respect to product safety, we at GEA apply the same experience and expertise to create efficient machines that are hygienic and easy to clean. The area of meat and poultry processing is one in which we must satisfy the most stringent hygiene requirements – and product safety becomes even more critical with fully cooked products. Whereas cooking frozen products after thawing will destroy any pathogens present, ready-to-eat products such as fully cooked chicken are not heated again – and therefore demand an extremely hygienic chilling process before packing.

Whatever product you are processing – chilled or frozen; raw, par-fried, or fully cooked; discrete, bulk, or packed – GEA Refrigeration Technologies ensures efficient and hygienic handling in touch with your production process.



GEA IQF tunnel freezers and chillers



GEA spiral freezers and chillers

The European Hygienic Engineering and Design Group (EHEDG) publishes detailed technical guidelines for meeting hygiene requirements in food processing equipment. GEA spiral freezers and IQF (individually quick frozen) tunnel freezers are especially designed and built in compliance with EHEDG guidelines. In the section on welding, these guidelines clearly specify: “The design philosophy of a hygienic plant follows three central themes. 1. Products must flow freely through the plant and not stagnate, 2. The plant must be easy to clean and sanitize, 3. The contents of the plants should be protected from the environment. As a result, welds must also be subject to the same requirements.” In North America, similar guidelines were developed by the Equipment Design Task Force (ETDF) from the American Meat Institute (AMI). This working group, comprised of representatives from numerous meat and poultry processing companies, came up with 10 principles of sanitary design to reduce and control the risk of *Listeria* contamination in processing plants for ready-to-eat meat and poultry processing. GEA freezers are designed and built according to these guidelines applied in the essential hygienic design standards for food industry.

GEA equipment is built with fully welded stainless steel, including the floor and enclosure. The design prevents dirt, water, and soil from remaining on surfaces. All structures are on elevated studs, which eliminate dirt traps and allow better draining on the already sloped floor. Assemblies are welded following strict methods and checked for quality in our manufacturing facility. All these design elements result in equipment that can be cleaned efficiently with a Clean-in-Place (CIP) system. With support from experienced food processing experts, we at GEA have developed a recirculating CIP system for meat and poultry equipment. Similar to a dishwasher, the system circulates volumes of water to effectively wash your freezer. This system also provides the option of repeating a sequence to intensify cleaning if you are running products with heavy coatings. These capabilities reduce water consumption compared to manual washing of your equipment and to use of traditional foaming systems, which typically require you to repeat the entire cycle for additional cleaning. To ensure reliable operation, we have designed this CIP system with self-cleaning spinners and multiple filters that operate sequentially throughout the cycle. GEA freezers and chillers are fully customized for exact integration in processing lines.

Whatever product you are processing – chilled or frozen; raw, par-fried, or fully cooked; discrete, bulk, or packed – GEA provides you with leading industrial solutions that maximize energy efficiency with top product quality and yield. And it’s not by chance that the major chicken processor in North America remains true to GEA for its chilling and freezing equipment.



GEA A-Tec series recirculating CIP system



Raw chicken in boxes in a GEA I-VRT carton freezer

Food processing companies bear great responsibility to the consumer. For this reason, especially strict hygienic regulations apply in this sector. Apart from hygienic airlocks, disinfection, and specialized clothing, a suitable air treatment system ensures clean and safe surroundings.

Hygiene is our top commitment

Low microbe concentration – from dressing to sealing



Handling animal-based foods requires special caution with respect to spoilage and pathogens. For this reason, strict hygiene standards in slaughterhouses and meat processing plants play a decisive role. For example, GEA Refrigeration Technologies offers a system which avoids airborne contamination of the slaughtered carcass. The climate-controlled plant monitors the temperature and moisture as well as the dust loads. It simultaneously creates a comfortable environment, without drafts, for the workers. An example of this kind of system is one we installed in a poultry operation production line for cutting and packaging chicken thighs.



The air conditioning plant is installed in the ceiling and consists of several mixing boxes which filter the entire air stream. Air distribution takes place in the cavity between the ceiling and the points of distribution. According to the principle of low turbulence (laminar flow), the air flows from top to bottom in the cutting and packaging area. This reduces particle concentration in the air and on the sensitive products. The air is input again, in turbulent flow, near the floor and ceiling, and is subsequently filtered in the circulating air unit. It is then re-introduced into the room. This recirculated air operation considerably contributes to energy-saving.



Cleanroom quality, thanks to laminar flow, ensures ISO class 4 in the immediate proximity of the products, and class 7 in the entire room. In addition, overpressure prevails in the room, in order to prevent the intrusion of non-filtered air into the production area. The system also provides for control of the dew-point temperature, to avoid condensation on the product surface.

The process of cutting and packaging chicken pieces permits absolutely no compromises in matters of hygiene. The same is of course also true during the freezing process of meat pieces, which often takes place in spiral freezers. Equipment from GEA Refrigeration Technologies is extremely easy to maintain: the entire housing is made of stainless steel for the benefit of hygienic operation. Moreover, GEA engineers place great value on smooth and easy-to-clean surfaces so that microbes cannot collect in corners.

Low-turbulence displacement flow prevents contamination of products in the cutting and packaging area.



When cutting beef or chicken thighs, it does not suffice just to wear specialized clothing and have disinfected hands and shoes to produce hygienically faultless products. Absolutely essential is air treatment with cleanroom quality: for example, from GEA Refrigeration Technologies.

Our products are not simply products. They are solutions to your problems. We provide you with a multitude of predefined as well as individually configurable solutions. This ensures finding the right configuration for your application: one which harmonizes planning and assembly outlay, functionality, investment, and operating costs.

GEA Refrigeration Technologies for meat and poultry

Our products for your products

Tunnel chillers and freezers

Energy-efficient GEA chilling and freezing tunnels are the right solution for gentle handling of bulk products. The individually quick frozen (IQF) process assures that the goods do not stick together. Optimum fan configuration assures matching of the airflow to lightweight products to efficiently prevent product blow-off. Varying belt options and multiple temperature-zone possibilities flexibly handle any application for pre-cooling, chilling, freezing, crusting, and after-glaze hardening. GEA designers have placed great emphasis on hygiene: GEA IQF tunnels are built with fully welded stainless steel, including modular floor and enclosure. GEA Refrigeration Technologies offers a wide range of IQF tunnels from 0.5 to 3 t/h, with fully prefabricated machines up to 3 t/h and more, with modular pre-assembled machines.



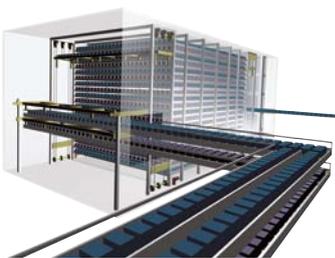
Spiral freezers

Adapted to discrete products, GEA A-Tec series and GEA E-Tec spiral freezers and chillers handle capacities up to 7 t/h. In a homogeneous and efficient cold airflow, food products are conveyed on hundreds of meters of belt wound up in spiral for minimal footprint. Belt infeed and outfeed orientations are tailor-made for perfect integration into your processing line. Frost management systems, sequential defrost (SD) and snow-removal systems (SRS) can extend running time from 1 shift to 14 days of operation without stopping to defrost. Our Clean-in-Place (CIP) systems ensure comprehensive cleaning with reduced labor and water consumption. Our GEA A-Tec series spiral freezer range is specially designed and built for the most stringent hygiene requirements and ease of cleaning, with stainless steel fully welded structures, unit floors, and enclosures.



Carton freezers

GEA I-VRT (variable retention time) carton freezers can simultaneously handle all your products in various sizes and types – packed in cartons, plastic totes, or plastic shrink wrap with variable chilling and freezing profiles. GEA I-VRT systems provide in-line automated solutions for product handling, from the production room to the freezer or chiller, and on to the palletizing area, while providing chilling or freezing retention times adapted to each product. Freezing output ranges from 2.5 to 50 tons per hour. Accurate temperature control assures optimal product quality. GEA carton freezers offer a highly cost-effective solution, thanks to their full inventory control and minimal labor requirements.





Ice generators

Cooling by pressing a button – this is possible with the GEA ice generators. GEA Refrigeration Technologies resorts to decade-long experience as the first European manufacturer of ice makers, and offers more than 40 models in various sizes. GEA ice generators and machines deliver dry flake ice for sausage production, which ensures outstanding product quality.



Packages and skids

Compressors perfectly harmonized with each other, including the complete peripherals on a stable, minimal-vibration frame – these are GEA packages and skids. With our all-around solutions for refrigeration, you can rest assured that everything has already been well thought out at the factory. What is more, you will be pleased by the low installation costs, since the units are completely delivered on the frame, fully connected and plug-wired.



Piston and screw compressors

With its broad offering of piston and screw compressors, GEA Refrigeration Technologies covers all conventional requirements of refrigeration in the meat and poultry production sector – from cooling directly after slaughtering, in the actual production processes, and up to product storage in cooling and deep-freeze facilities. As different as the temperature requirements of the various meat types and products are, our specialized components ensure that your goods reach the consumer in outstanding quality.



Valves and fittings

At first sight inconspicuous, on second thought immensely important: the most suitable valves and fittings. These are harmonized to the applications, and not only with respect to the maximum permissible pressures. The response characteristic of the valves, the durability of the components to the media used, resistance to exterior influences, and much more mean that small components make a large contribution to the long service life and safety of your plant.



Control systems

Similar to valves and fittings, control technology also often leads a shadowy existence, because its performance is not measurable in imposing kilowatt details or volume flows. But here is where intelligence counts. Control technology helps to find the optimal operating point, to save energy, to determine machine running time and utilization, and to permit maintenance according to the machine state. Whether for individual devices or complete refrigerating plants, we deliver the control technology that provides the maximum benefits.

The products named here are only an excerpt from our extensive portfolio. They suffice to show, however, that GEA Refrigeration Technologies has many facets. We can consider your particular problem from the right perspective and assemble what is needed from a multitude of products that best cover your requirements. You profit by employing tried and tested system components that, thanks to high-end control technology, can be assembled to a harmonious total solution providing exactly what you are looking for: moderate investment, minimal operating costs, and maximum benefit.

You are searching for a company that understands your industry? One that knows the many and various requirements meat and poultry make on cooling and freezing technology in the slaughterhouse? That knows the reliability is demanded from every individual component? And that realizes what meat production and further processing involves? Then you are at the right address. We can solve all your cooling system problems. Because we offer solutions and not only products – exactly as individual as your business and as tailor-made as your production plant. And we are not only there for you in the planning phase – we are also involved in project planning, implementation, commissioning, and servicing of the plant.

In touch with our customers

With a view to your success

Engineering

Whole halves of cattle or tender chicken wings – refrigeration systems cannot be designed with off-the-rack solutions for the storage and production of meat and poultry products. Almost every substantial refrigeration system is well thought out, so that your investments are low and your benefits high. However, even in your factory, where every cubic meter counts and many technical plants are accommodated on the smallest possible space, there is the possibility of combining standard components to individualize and find a customized solution. A solution optimally suited to your requirements as to investment, functionality, space, low maintenance, and long service life. Our solutions are also energy-efficient, using the least possible amount of valuable resources.

In dialog with our experts you will discover that you are dealing not just with refrigeration engineers. Because our people in development and engineering speak your language and understand your industry. This promotes a mutually fruitful dialog, facilitates the understanding of your problem, and finally leads to safe and harmonious facilities that are coordinated to the warehouse or specific production task. And since, apart from the hardware, we also deliver the complete measurement and control technology, your interface problems dissolve in thin air.

After concluding the contract, our team does not leave you alone. We support the design of the plant, as well as assembly and commissioning at the final destination. After all: we accept responsibility for the success of your business.





Engineering and modernization

As we are well aware: it can sometimes get tight even in the largest factory buildings. Consequently, we will help you to always find the best possible solution for your product and to integrate new required technologies into an existing infrastructure – also during ongoing operation. Such changes are often accompanied with real benefits. For example, because our equipment demands less space, cooling or freezing performance is enhanced. Or because different products can be simultaneously frozen together. Or because our units simply save energy. We are also especially aware that special standards apply for handling food. You can rely on the experience of our engineers. They work out far-sighted solutions that bring maximum returns on your investments.

Service

Maintenance and service do not always proceed according to plan. No problem. We are there if you need us. And to keep down-times brief, we are happy to flexibly plan our human resources. Our mechanical engineering design will also not fail in flexibility, which is why we place great importance on little maintenance and robust equipment. And if intermediate interventions are nevertheless necessary to maintain the reliability of our equipment, we provide your crew with expert advice and train them in the most important maintenance work in-between.

Spare parts

Whether within the scope of maintenance or because of an unplanned standstill: the most long-lived plant now and then requires spare parts. It must be available not only whenever you require it, but also wherever. We maintain support sites all over the world that keep wear and replacement parts of GEA Refrigeration Technologies on stock ready for delivery at all times. This way, smaller repairs do not become large problems. To keep logistics simple, our machinery is designed such that, wherever possible, wear parts are employed in multiple models, thus reducing the number and type of spare parts. For us, this means stocking fewer parts at the service support points. For you, it means increasing the chances for immediate availability and rapid return to full operation. A win-win situation that saves us both time and money.

GEA Refrigeration Technologies works toward the following:

- Comprehensive consulting and responsible project support
- High investment security
- Future-oriented solutions
- A maximum of equipment operating time
- Long equipment life cycles
- Low energy consumption
- Minimal operating expense
- Highly competent service
- Fast spare parts delivery
- Climate- and environment-friendly technologies

Would you like to learn more about us and our solutions?

Go to GEA Refrigeration Technologies at www.gea.com



We live our values.

Excellence • Passion • Integrity • Responsibility • GEA-versity

GEA Group is a global 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.

