



## **Refrigeration technology for cold stores and distribution centers**

In touch – efficient solutions  
for the food and beverage industry



When being cooked, various kinds of food can very well just be thrown into one pot – but not in cold storage or during transport. Efforts toward greater energy efficiency as well as increasingly strict hygiene regulations demand discerning and individual planning of cooling and freezing engineering. With equipment of GEA Refrigeration Technologies, effective maintenance of the cooling chain is a matter of no great difficulty.

## In touch with your processes and requirements

# Storage and distribution: so that fresh food arrives fresh

*For us, “In touch” means nearness to customers in every sense.*

*GEA Refrigeration Technologies represents refrigeration solutions oriented closely to the needs of customers: economic, energy-efficient, long-lived, sustainable – and carefully customized.*

GEA Refrigeration Technologies is synonymous with industrial refrigeration. Beginning as early as the late 19th century, it has been our business to refrigerate processes and to control the temperature of transported goods. Today, we also serve the area of cold stores and distribution with a major share of our technologies. In this sector, easily perishable foods represent a challenge. Experts estimate that, worldwide, more than one-third of all perishable goods never reach the consumer. The reason: insufficient cooling during storage and transport. Minor shortcomings do not mean that fruit and vegetables automatically become unappetizing, but they are unappealing and are simply not purchased. For fish and meat, on the other hand, even slight carelessness within the cooling chain can allow the concentration of pathogens to increase and endanger the health of consumers. Refrigeration before production and especially afterward safeguards your good reputation as processor of foods and prevents financial losses. It furthermore protects the environment, since mushy fruit and wilted lettuce rot on garbage dumps and burden the air with methane. If less is thrown away, then less needs to be cultivated and processed. This in turn reduces water and energy con-





sumption, and saving products increases the efficiency of your company. We direct all of our attention to each and every product, since each individual foodstuff must be stored at its own ideal temperature and humidity. Warmth is also not always your worst enemy, since frost and temperature fluctuations during loading and unloading can make many goods quickly age. This is why we are the best bean counters when it comes to refrigeration processes: but sometimes we do compare apples and pears. This is because these two types of fruit as a rule need a cold store in which – in addition to temperature and humidity – oxygen and carbon dioxide content must be monitored.

Our technicians and engineers are also a well-versed team when it comes to storage and transport of the newest innovations from the convenience food sector. The trend to prepared and ready-to-eat products is reflected by appreciably greater refrigeration needs and, not least, by great changes in the appearances of supermarkets. It is especially the larger food retailers who are returning to their roots and are banning many non-food articles from their shelves. They increasingly offer their customer a larger selection of fresh, prepared, and ready-to-eat products: for example, salad mix for the office lunch break. This product group requires additional energy for logistics, stores, and presentation. In addition, the trend to longer opening hours is also associated with greater energy consumption. What could therefore be more logical than to strike a good balance between quality and costs with an investment in an advanced, energy-efficient refrigeration system?

In this brochure you will find numerous sophisticated technical solutions with which you can save energy in refrigeration for transport and storage, and ensure that your goods retain their freshness. With their love of detail, our engineers design the ideal refrigeration plant for each type of food. Our goal is not merely to create solutions for you that are long-lived as well as cost-effective, but also energy-saving and environmentally protective. After all: what counts is a maximum of benefits under economic conditions, with a maximum of environment and climate protection. With GEA Refrigeration Technologies, your products will be on everyone's lips.

**Every single area of the industrial branch of food cold stores and distribution poses its specific requirements for effective temperature control. Depending on the application, experts at GEA Refrigeration Technologies provide the right temperature – cool or ice-cold, and exact to one degree if necessary.**

Supermarkets offer their customers an ever-growing diversity of fresh goods and convenience food. This trend has been accordingly accompanied by greater requirements for energy-efficient refrigeration technology. Advanced systems can indeed exploit significant potential for savings in refrigeration.

## Compressors for model supermarkets

### Reliable products support energy-saving efforts



Glatt – a shopping center that opened in 1975 in the Swiss community of Wallisellen, near the city of Zürich – was one of the first and largest shopping centers around Zürich. One of the tenants of the shopping center is a large branch of Migros, a popular supermarket chain. After more than three decades of operation, it was high time to upgrade the refrigeration plant of the supermarket. Indeed: cooling of products represents the lion's share of energy costs in a supermarket. Together with partner companies, the supermarket operator – Genossenschaft Migros Zürich (GMZ) – replaced all refrigeration systems. They installed two new plants for cooling above 0 °C/32 °F, and one deep-freeze system. In their investment, GMZ carefully considered not only the procurement costs: their prime criteria were low ongoing operational costs and high energy efficiency.



With such major investments, it is all the more important that the system after installation is convincing with respect to long service life and cost effectiveness. This is possible only if all system components are flawlessly inter-coordinated. For the responsible refrigeration planner for Migros – Planungsbüro SSP Kälteplaner AG – it was not difficult to find the optimal compressors: owing to its good experience for many years with the company, it chose GEA Bock compressors from GEA Refrigeration Technologies.



The Migros systems for cooling above 0 °C/32 °F feature various design configurations. One of these two plants is an indirect R134a system that operates in secondary mode via a coolant-medium system. The resulting combination refrigerates 220 meters of refrigerated display equipment and five cold-storage rooms, and dissipates the heat emitted by the CO<sub>2</sub> freezer unit. The second of the two Migros systems is operated as a stand-alone R134a direct expansion system. It supplies 55 meters of refrigerated display equipment and one cold-storage room.





Meat is one of the foods that is highly sensitive; as a result it requires a closed cooling chain. The components of such complex refrigeration plants must serve as a model example of performance and reliability.

The refrigeration plant for the freezer units operates on the direct-expansion principle and supplies 45 meters of freezer display units, as well as one freezer-storage room. Heat exchangers use heat from desuperheating from the second refrigeration unit and the freezer unit, as well as the heat of condensation from the second refrigeration unit to heat water in the supermarket. The heat from desuperheating is specifically returned to the supermarket through ceiling radiators. Under the supermarket there is a raised floor whose temperature is controlled with the aid of the recooling system. This solution offers the advantage of saving energy here as well by using heat emitted by cooling processes. With the aid of the heat pumps operated in the supermarket refrigeration center, the greatest share of this emitted heat is used, as required, as primary heat by the first refrigeration unit. To save additional energy, the first compressors are frequency-controlled during partial-load operation in all three refrigeration units. The other compressors all operate with a classical output-control system.



*Compressors from GEA Refrigeration Technologies guarantee for the Swiss supermarket Migros perfect temperature in the fresh-foods department.*



The cold-storage operators at the French harbor  
Port de pêche de la Turballe cool the freshly caught fish  
on ice until they are transported. Machines  
by GEA Refrigeration Technologies produce the ice.



Refrigeration technology for top product quality

Fresh from the catch long after the catch

GEA Refrigeration Technologies supplies ice generators to fishermen throughout the world. We have supplied hundreds of fishing ports with ice generators and ice-storage banks in Morocco, France, Belgium, Chile, Mexico, and Spain – to name only a few examples.



*Fresh fish is picked up at the distribution center*



*Ice tower with conveyor system*



*Put on ice – for good quality*

Once fishermen have landed their catch, it must be placed on ice immediately – for example, here at the French fishing port Port de pêche de la Turballe. This harbor, located near Saint Nazaire, is a gigantic transshipment point for fish, primarily sea bass, mackerel, and octopus. In addition to tourism, the fishing industry is the main source of income for this region.

A cheerfully colorful fishing fleet of netters, coastal fishing boats, and deep-sea trawlers characterizes the harbor scene – and this fleet needs large amounts of ice. Some trawlers go out for only 15 to 30 minutes at a time, to spoil their customers with very fresh fish quality. When they return, they distribute their catch in the harbor distribution center, Center de Maree, where a number of dealers and wholesalers operate cold-storage facilities directly where the fishermen directly store their catch.

The supply of ice must of course be guaranteed until trucks pick up the fresh catch – so GEA Refrigeration Technologies has installed an ice generator with ice tower in the distribution center. To be ideally prepared for peak periods, the ice is produced in advance and stored in the ice tower. The ice is stored there hygienically, in accordance with food regulations, and in perfect consistency – and is available at the push of a button. The tower has a display that indicates the level of the remaining ice. An integrated weighing function and a coin-operated dispensing function make the procedure simple. Whoever needs fresh ice, pays for it at the scene, according to weight. The icy goods are always dispensed according to the first-in, first-out principle (FIFO), via a dispensing screw.

In addition to flake ice – the type of ice produced in this application – the fishing industry is increasingly using liquid ice, a water-ice suspension. On the basis of its liquid consistency, it can be easily pumped – which means that the ice production and the dispensing points can be relatively far apart. The extremely small ice crystals are gentle on the fish skin and cool the cargo especially fast and uniformly. The GEA product portfolio includes five land-based liquid-ice machines that cater to this trend.

#### **GEA Refrigeration Technologies for cold storage and distribution in fishing harbors:**

- Ice generator
- Automatic ice store for 30 to 100 tons
- Conveyor system and automatic dispenser for 10 to 30 tons per hour
- Weighing function and coin-operated dispensing



*Pneumatic conveyor*





For the long transport from the sea to the weekly market, the local deli, or the supermarket, fish and other seafood need a great deal of ice. For product presentation as well, ice from the generators of GEA Refrigeration Technologies is first choice.

So that good things arrive in good shape

## Gourmets help themselves to cool delicacies



*Efficient logistics, well-organized cold storage, and a great deal of ice: they all ensure that the consumer can enjoy food products with flawless taste and quality.*

The eyes have it for eating. Although looking is hardly important on fishing ships or in transport trucks, it does play a very important role at the fish counter in the supermarket or at the fish shop. The optical impression: it must be appetizing and clean as a whistle. When this applies at the fish displayed at the counter, then gourmets don't hesitate to help themselves. For this reason, flake ice has become a familiar sight at supermarket fish counters. The same could be said of GEA Refrigeration Technologies, since the company, for example, has equipped several dozens of supermarkets in the French chain E.Leclerc with ice generators. The benefits of this kind of ice are obvious: flake ice can be easily formed and spread around on a display. It does not clump, and the flakes do not stick together.

Trained sales staff at supermarket displays finds it easy enough to ensure that prepared foods make an appealing presentation: one that lasts the whole day, and in which the ice does not shrink to an unsightly mass. Counter staff can model little ice mounds or hollows and to arrange every fish, clam, and shellfish for an appetizing and attractive





Fresh fish and seafood – appetizing and hygienic presentation with flake ice.

impression on shoppers. In addition, it is possible to provide a surface that slopes toward the customer, so that he or she can optimally inspect the delicacies on display. Elements serving purely for decorative purposes also have stable support in flake ice. Stability, indeed: with flake ice, there is no basket with clams to fall over. Nothing shrinks together or slips apart unattractively. The pure, white impression of flake ice naturally provides a fascinating contrast to the vivid colors of the seafood being offered – a benefit that should not be underestimated in merchandise display. A dash of psychology is also involved here, since the color white has always symbolized cleanliness and purity.

Flake ice has a temperature of around  $-7^{\circ}\text{C}/19.4^{\circ}\text{F}$  and melts extremely slowly in comparison to other types of ice. As it melts, its trickling constantly rinses off the displayed foods, which reduces the formation of microorganisms. Although flake ice is relatively dry, it is still moist enough to keep seafood from drying out. The thin and delicate ice flakes also guarantee that fragile fish skin remains intact and that it suffers from neither pressure points nor ice burn. As a result, it provides the perfect basis for long-lasting, healthy freshness – and, in turn, for solid business relationships between fish dealers and customers. Every morning, counter staff must replace the flake ice on which their foods are displayed. In this respect, this work is especially convenient for employees at E.Leclerc. In many cases, their ice dispensers are directly over the counters, and they merely have to press a button for the flake ice to fall directly onto their display area. This sophisticated system saves transport in vehicles and shoveling into the market. It is fast and more hygienic: the less handling of the ice, the less the danger of its contamination by staff or tools such as shovels. But not all supermarkets can implement such clever solutions, since no two operations are identical.

But in any case, GEA Refrigeration Technologies can offer flake ice at the push of a button, even if generator and ice storage are a few steps away from each other.

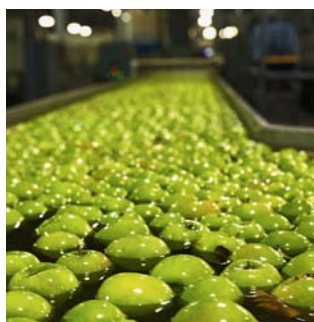


Flake ice generator

For outstanding products that customers especially like to buy, satisfactory storage before and after manufacture is critical – in addition to technically flawless production. In order that you can operate cost effectively over the long run, you must keep up with the state of the art. Our experts will gladly acquaint you with the most recent developments.

## Ensuring that goodness enjoys good storage

### Energy efficiency in storing and distributing



*Effective cold storage has a crucial effect on the quality and the keeping quality of your merchandise – and on your good reputation. Go ahead with the optimal solution, and decide for GEA Refrigeration Technologies if you are planning the new construction or upgrading of your cold-storage facilities.*

Apples are healthy, low in calories, and – thanks to sophisticated storage technology – are inexpensive throughout the year. We casually let these vitamin-rich snacks roll around in school rucksacks and office bags – after all, they look really stable and robust. But appearances are deceiving: apples are truly demanding when it comes to their storage. This goes for the familiar apple varieties from Betko Fresh Produce, including Golden Delicious, Braeburn, Pink Lady, and Granny Smith. Each year this South African company sorts and packs 50,000 tons of apples, 75 % of which are exported. Until they begin their trips to the Northern Hemisphere, they remain for a while after harvest in special cold-storage rooms equipped with systems from GEA Refrigeration Technologies. Betko stores them in crates in controlled atmospheres to slow the ripening and aging processes. In these warehouses, measurement and control systems keep temperatures slightly below freezing and the oxygen content at 2 % or lower. By now Betko has installed 72 cold-storage rooms with a capacity of 98,000 boxes of apples (each box has 500 kg).

But it's not only freshly picked fruit that must be carefully stored – freshly processed foods are also sensitive in storage. For the largest Dutch manufacturer of delicatessen salads and sandwiches, GEA Refrigeration Technologies has modernized the refrigeration of three storage areas. The existing system, based on R22 as refrigerant, was no longer able to assure the required room temperature of 2 °C/35.6 °F. Our engineers installed a central ammonia pump that – in accordance with the customer's wishes – can later be connected to the central cooling system. In addition to this pump, the new facility includes a compressor, a frequency-controlled electric motor, an oil separator, an air-cooled condenser, a high-pressure float valve, ammonia separators, and evaporators.

This facility, including gas sensors and ventilation system, is installed in an insulated machine room, directly behind one of the cold-storage rooms. The piping system consists of steel, insulated with polyisocyanurate (PIR) hard foam and aluminum. It withstands high pressures and is tested for leaks. The air condenser is installed in a cold-storage room. The products are cooled by means of naturally defrosting air coolers that are positioned on the same side as the machine room.





These South African apples are stored in a controlled atmosphere that retards the ripening process. Such delicious pome fruit is transported to the Northern Hemisphere from February to October.

Our products are not simply products. They are also solutions for the problems that you face. We present you with a great number of pre-defined as well as individually configurable solutions. This enables you to find the optimal configuration for your application – one that balances out expenses for planning and equipment installation, functionality, as well as investment and operational costs.

## GEA Refrigeration Technologies for cold stores and distribution centers

### Our products for your products



#### Piston and screw compressors

With its extensive offerings of piston and screw compressors, GEA Refrigeration Technologies covers all normally encountered requirements placed on the provision of refrigeration for cold- and deep-freeze storage. As varied as the temperature requirements for sensitive products may be, our components always assure that even easily perishable goods reach their consumers in outstanding quality.



#### Ice generators

Icy coldness at the press of a button – this is possible with ice generators from GEA Refrigeration Technologies. As the first European manufacturer of ice generators, GEA offers decades of experience, as well as 40 models with various capacities. These systems deliver slurry ice and dry flake ice – two ice grades widely used for the transport of seafood.



#### Ice towers

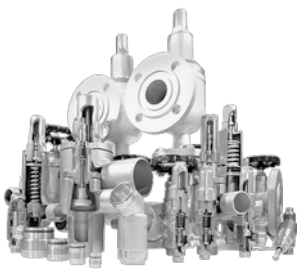
It is not always possible to perfectly harmonize ice production and ice consumption. In such cases, it makes sense to stockpile ice in towers. GEA Refrigeration Technologies offers ice-storage towers in various models and capacities. These silos can be set up inside or outside, and a pneumatic conveyor system takes the ice to where it is needed.





### Packages and skids

Perfectly inter-coordinated compressors, including their complete periphery, on stable, low-vibration frames – these are the GEA packages and skids. With our package solutions for refrigeration, you can rest assured that everything has been well thought out for you at our factory. And you can also be satisfied with low installation costs, since the units are completely delivered on a skid – ready to be hooked up and plugged in.



### Valves and fittings

They are inconspicuous at first glance, but immensely important at second: the most suitable valves and fittings. They are matched to their particular application – and not only with regard to maximum permissible pressures. The response behavior of the valves, the resistance of the components to the media used and to external influences, and a great number of additional functions and features mean that these small components make a major contribution to the service life and the safety of your systems.



### Control systems

Similarly to valves and fittings, control systems often remain unnoticed, since their performance cannot be measured in impressive kilowatt ratings or volumetric flow. But it can be evaluated intelligence – which helps to find the optimal operating point, to save energy, to determine machine operating times and capacity utilization, and thus to enable maintenance based on equipment operating state. Whether for individual units or complete refrigeration systems – we deliver the control systems that assure you maximum benefits.

The products named here represent only a small selection from our comprehensive portfolio. But this selection should make it clear that refrigeration technology from GEA has many facets. This enables us to assemble those products for you – from the correct standpoint and from the great options in our portfolio – that will optimally satisfy your requirements. In this process you will profit from tried and proven system components that are assembled to provide a harmonious overall solution, and to offer you what you are looking for: moderate investments, minimum operating costs, and maximum benefits.

Are you looking for a company that understands your sector? A company that realizes the many and various demands that fruit, vegetables, fish, and meat place on cooling and freezing technology? People who know what is going on during transport and reloading, what even small temperature fluctuations can cost your company, and what reliability is demanded of each individual component? Then you have come to the right place with GEA Refrigeration Technologies. We solve your refrigeration problems – because we offer not only products, but also solutions – just as individual as your business and as customized as your production facility. And we are not only at your side during the planning phase: we also take care of the project engineering, implementation, commissioning, and maintenance of your equipment.

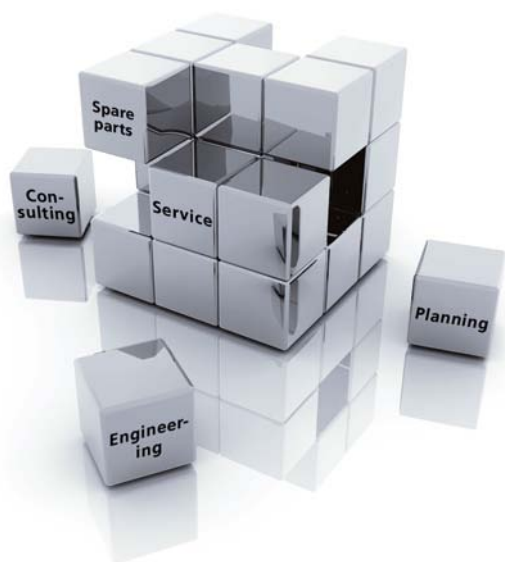
## In touch – customer proximity with top priority

### With a view to your success

#### Engineering

The logistics of apples, broccoli, or fresh fish: in the storage and transport of your products, individual refrigeration requirements cannot be satisfied with standard solutions. Virtually all large refrigeration systems are thought out on an individual basis, so that your investments remain low and your benefits come out high. Nevertheless, in your supermarket, where every cubic meter is precious and ever more extensive refrigeration systems compete for space in cramped quarters, there is still the possibility of combining standard components in customized manner, and thus to arrive at a tailored solution. A solution that is optimally matched to your requirements with respect to investment, functionality, space requirements, a minimum of maintenance, and long life cycles. And, on top of everything, our solutions are energy efficient, to ensure thrifty application of valuable resources.

In dialog with our experts, you will soon realize that you are speaking not only to refrigeration engineers. You will see that your contacts at GEA Refrigeration Technologies for development and engineering speak your language and understand your sector. That promotes dialog with you, simplifies formulation of problems, and finally leads to implementation of safe and reliable systems that have been harmonized with the transport and storage functions you require. And, since we deliver complete measurement, control, and instrumentation technology in addition to the hardware, interface problems simply do not exist. After signing the contract, our team will by no means desert you. It will support the setup of your systems, as well as assembly and commissioning of your equipment. After all: we accept responsibility for the success of your business.







## Contracting and redesign

It is a paradox, but one of which we are well aware: even in the largest warehouses or supermarkets, space can be at a premium. This is why we help you to find the optimal solution and to arrive at optimal integration of the required technology in existing infrastructure – even without interrupting production. In many cases, enhancement of your benefits will also occur. This is because, for example, our systems require less space, enable a fluctuation of cooling or freezing output, allow completely different products to be frozen at the same time – and because they simply save energy. After all, we are well aware that special standards apply in work with food. Place your trust in the experience of our engineers. They create solutions with a long view, to assure that your investments bring in maximal returns.

## Service

Many foods react sensitively to minimal temperature fluctuations – which means you must be able to depend on the refrigeration technology in your cold stores. We are at your service for preventive and restorative maintenance, when you need us: also on the weekend if necessary. And to ensure that down time remains at a minimum, we would be glad to flexibly plan human resources as well. This flexibility will likewise be reliably supported by the mechanical engineering involved – which is why we place such value on low-maintenance, rugged equipment assemblies. And, if intervention should now and then become necessary to maintain the reliability of our equipment, we stand ready with advice for your staff and train them in the most important maintenance work for “in-between”.

## Spare parts

Whether as part of regular maintenance or owing to unplanned down time: even the longest-lived system now and then needs a spare part. And such parts must be available not only when you need them, but also where. This is why we have support points around the entire world that stock the normal wear, spare, and exchange parts from GEA Refrigeration Technologies for you. This means, for example, that minor repairs or maintenance won't become a major problem. To simplify logistics, we also pay attention as early as the machine-design phase that the same wear parts will be used in as many different modules as possible – which eliminates unnecessary proliferation of part types. For us, this means simpler warehousing operations at the service support points. For you this enhances the chances of spontaneous availability and fast assignment of our service team. A win-win situation that saves both of us time and money.

### GEA Refrigeration Technologies works toward the following:

- Comprehensive consulting and responsible project support
- Great investment security
- Future-proof solutions
- A maximum of equipment operating time
- Long equipment life cycles
- Low energy consumption
- Minimal operating expense
- Highly competent service
- Fast spare-parts delivery
- Technologies that are friendly to the climate and the environment

*Would you like to learn more about us and our solutions? Then go to GEA Refrigeration Technologies at [www.gea.com](http://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.

