

Team spirit: GEA and partners take refrigeration to new level

Speed, precision and experience are success factors in speed skating and ice hockey, as well as in project management. GEA Heating and Refrigeration Technologies and its project partners, the Gesellschaft für Kälte- und Klimatechnik (Society for Refrigeration and Air Conditioning Technology) and the engineering firm Möller & Meyer, achieved a cool feat for the Erfurt Ice Sports Center in Erfurt, Germany.

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During the short summer break from the beginning of May to the end of August 2021, all parties involved succeeded in refurbishing the refrigeration system at the Erfurt Ice Sports Center in record time. GEA supplied three SP1 SB-5A single-stage screw compressors for the ice sports center.

Those responsible at the Erfurt Ice Sports Center have high hopes and expectations of the newly installed technology. Initial evaluations since commissioning until May 2022 show that operating and maintenance costs have already been noticeably reduced. Furthermore, the use of 30 tons of the natural refrigerant ammonia (NH₃) with a global warming potential (GWP) of zero has always been a fundamental component of refrigeration technology in Erfurt and reduces the CO₂ footprint of the entire plant.

A lot of ground to cover

The center was initially built in 1957. Today, the Erfurt Ice Sports Center consists of the speed skating hall (Gunda Niemann Stirnemann Hall), the ice hockey hall, two functional buildings and the ice technology building. The speed skating hall (length 190 m, width 90 m, height 17 m, hall floor area approx. 15,000 m²) houses the 400m speed skating rink (two competition rinks and one warm-up rink, each four meters wide, totaling 4,760 m² of ice surface) and a standard 60x30m ice rink. Up to 4,000 enthusiastic spectators cheer on the speed skaters at top national and international competitions.

The ice hockey hall from the 70s has a standard ice field of 60x30m and has 1,500 spectator seats. Training and com-



↳ Competitors, but also amateur athletes and school children, find the best sporting conditions thanks to GEA's refrigeration technology.



↳ GEA equipped the Gunda-Niemann-Stirnemann-Halle in Erfurt, Germany's best-known ice sports center, with the latest cooling technology.

petitions in figure skating, ice hockey and curling are held here. Also affectionately known as the "Kartoffelhalle" (Potato Hall), the ice hockey arena is home to the Black Dragons Erfurt, top club of the Oberliga Nord in Germany.

Heating and cooling

The hall interior temperature can be heated to 10°C via 77 ceiling air heaters. A ventilation system consisting of ten decentralized units with an air flow rate of 8,000 m³/h each ensures good fresh air quality in the hall even when the maximum spectator capacity is utilized. Air dryers are integrated in the ventilation units. This prevents condensation from forming on the supporting structure and "raining" onto the ice surfaces.

The ice machine house is located next to the southeast curve of the circular rink. All three ice surfaces are cooled from this location. Ammonia is used as the coolant. In total, cooling pipes with a length of almost 100 km are installed under the ice surfaces. The cooling capacity of all cooling units is 3,068 kW. The heat generated during ice preparation is extracted from the coolant by a heat recovery system and used to heat the speed skating rink. Each of the three ice surfaces can be iced separately and cooled to the desired temperature. If required, the osmosis plant can be put into operation for ice preparation. This makes it possible to remove almost all salt components from the water and significantly improve the ice's sliding properties.

A team effort

In 2019, the engineering office Möller & Meyer from nearby Gotha was commissioned by the city of Erfurt to develop a renovation concept for the refrigeration system in the ice sports center in Erfurt and to break down the corresponding costs of the individual trades and services. The aim of the project was to replace the screw compressors that had been in operation since 1997, as maintenance and repair costs had risen sharply in recent years. In addition, energy costs were to be saved by the sum of all measures in the end. Several variants of the refurbishment and their dependencies were then examined and compiled in terms of costs and schedule dependencies. An important point here was



➤ Type plate from one of 3 compressor packages

the operator's objective that the refurbishment be carried out during the operational break in May/July 2021. By September 2019, the planning could be completed in this respect and handed over to the client. With the documents, explanatory reports were written for the requested funding sources in order to transparently present the conversion measures. The state of Thuringia and the federal government then reviewed the documents and approved the funding in 2020.

With the release of the funds, the specifications for the conversion measure's compressor replacement and new construction of control technology could be drawn up and published in the fall of 2020. The contract was then awarded to Gesellschaft für Kälte- und Klimatechnik, Cologne, in a public tender in February 2021.

In mid-February 2021, the concrete implementation began. In the course of work preparation and ordering, it was possible to quickly start clarifying all relevant boundary conditions for a smooth rebuild. This was done with a clear project schedule, drawn up and followed up by the engineering firm Möller & Meyer.

On May 4, 2021, the old cooling generation plant of the Erfurt Ice Sports Center was decommissioned. However, this did not happen overnight.

Thanks to the targeted efforts of all the companies, planners and builders involved, the complete conversion of the facility was completed on August 23, 2021.

GEA solution

GEA supplied three SP1 SB-5A single-stage screw compressors for refrigeration at the Erfurt Ice Sports Center. The GEA Grasso SP1 series of single-stage screw compressors are designed to meet highly individual needs from medium to the largest cooling capacity ranges. The



➤ Refrigerant separator of the existing system



➤ Screw compressor package with GEA Omni control panel

SP1 series consists of 16 models ranging from 524 kW to 7,721 kW (R717 | -10 / +35 °C | 3,600 rpm) cooling capacity. The Grasso SP1 series is particularly attractive because of its versatility, whether in the food industry or in a high-pressure version for CO₂ in a heat pump system or in an explosion-proof version for chemical applications. GEA customers can choose from a wide range of options and tailor packages to meet all individual needs. And here, the choice of the Erfurt Ice Sports Center and all project partners fell on the use of three SP1 SB-5A single-stage screw compressors.

Omni Control Panel

The "command center" of the refrigeration plant at the Erfurt Ice Sports Center also relies on GEA technology. The GEA Omni Control Panel is designed as an open system. This means that it can be used to monitor and control not only the relevant components from GEA, but also components from other suppliers.

As a universal command center, the customized GEA Omni system works closely with the S7 control system. The control panel displays operating statuses not only for main components, but also for auxiliary equipment. Operators at the Erfurt Ice Sports Center can control the entire cooling system from a single control panel - whether for monitoring and managing primary equipment such as compressors, condensers, vessels and evaporators, or the position of individual valves and pumps. The GEA Omni System Control Panel also has integrated energy management functions. For the operators and users at the Erfurt Ice Sports Center, GEA Omni offers everything operators expect from a control panel: maximum efficiency and reliable operation of their facility. This advanced, industrial control panel optimally integrates and coordinates all necessary system components, resulting in a demand-driven, highly energy-efficient operating plant, coinciding with all the necessary qualities of the ice center.

About the Company

GEA Heating & Refrigeration Technologies is a global specialist in industrial refrigeration, heating and sustainable engineering solutions. It produces turnkey cooling and heating installations, custom-engineered systems, compressors & compressor packages, chillers, controls, and heat pumps to meet precise temperature requirements. The company's proven technologies provide customers with reliability, operating efficiency, sustainability, and long equipment life cycles that reduce total cost of ownership.