FOCUS

More than cold. | Kältetechnik

LR Kältetechnik

Energy-efficient ice-skating in Malbun

New refrigeration design saves 50% of energy

New refrigeration design saves 50% of energy

L&R designs refrigeration system with Meteo controller for Sportprojekt AG

L&R has designed a very energy-efficient refrigeration system with a cooling capacity of 200 kW, intended for an outdoor ice rink. The considerable energy savings are made possible by the customised design of the system and by its Meteo controller, which monitors weather data and can produce as much cold as is necessary. In practice, this means halving energy consumption.

Unless you are looking to beat speed records or perform loop jumps, ice skating is a pretty energy-efficient affair. Once you get moving, the low friction between your skates and the ice makes it possible to slide without much effort.

If you do it on an outdoor ice rink, you spend energy indirectly, however, because a refrigeration system provides cold from under the ice.
Sportprojekt AG, located in Wolfhausen, Switzerland, offers ice rink facilities with a highly energy-efficient concept, which is based on two key elements.

Efficient substructure

The system is made with aluminium pipes, which is an excellent material for heat transfer. Independent testing has shown that these designs need 20 to 40 % less energy for their everyday operation compared to conventional ice rink systems made of EPDM.

Last year, Sportprojekt AG introduced another energy-efficient technology and hired L&R Kältetechnik to design a new cooling system. Using their experience with industrial cooling facilities, the engineers at L&R developed a customised concept, and with it, broke completely new ground. Dipl.-Ing. Christoph Wiemer, head of Special Systems: "We have a very wide range of completed refrigeration systems with all kinds of applications – most of them industrial, though. We had never designed an ice rink system before."

Predictive control using weather reports

The first thing to do is choose the temperature that is optimal in terms of energy consumption and the needs of the sport. However, that optimum temperature can be affected by ambient conditions. For example: if it rains, the target temperature must be set high; otherwise, the surface of the ice will be uneven. In any case, the quality of the ice must be constant, whether it is overcast and freezing or sunny and +20 °C outside.

This demands flexibility in refrigeration. In addition to producing better ice, it can save an enormous amount of energy. So, L&R has called its control system, which the company traditionally develops and programs on its own, the 'Meteo controller' ('Meteo-Steuerung').
The controller collects data from an integrated weather station and uses them as reference values in regulating the system. These data include temperature, wind speed, precipitation and solar radiation.

Improving the efficiency of refrigeration based on these data requires appropriate flexibility from the refrigeration system itself. The complete facility has a cooling capacity of 200 kW, designed as a dual-circuit system specifically for the operating parameters of an ice rink, which is located at a rather uncommon elevation of 1,600 metres. Christoph Wiemer: "The air is thinner at this height, which sets special requirements for condensers. Conventional ice rink systems often use series of industrial chiller units, which are not designed for such heights and low temperatures. They may be cheaper when you buy them, but there is much less operational efficiency in these conditions."

50% less energy consumed

The pilot system with the Meteo controller and an ice rink surface area of 600 m^2 demonstrated considerable energy savings during its first season in 2014 in Malbun/ Liechtenstein. Peter Kübli, CEO of Sportprojekt AG: "The system has generated energy costs of about CHF 6,000 so far while our typical estimate for this time would have been CHF 12,000–15,000. Our energy costs have been effectively halved."

This is an advantage for the environment, for the operator and for Sportprojekt AG: The reduced operational costs positively influence decisions for or against an ice rink system – both for local communities and private operators.

Refrigeration systems with the Meteo controller are 50% more efficient than conventional designs.

Eco-friendly coolant

The new refrigeration system is eco-friendly for another reason as well: it uses propylene glycol as a coolant, which is safe for humans and the environment. Its thermo-physical properties are somewhat less advantageous than those of other industrial heat transfer fluids, such as ethylene glycol, but this is more than acceptable if it reliably prevents environmental damage caused by leaks.

Follow-up projects in development

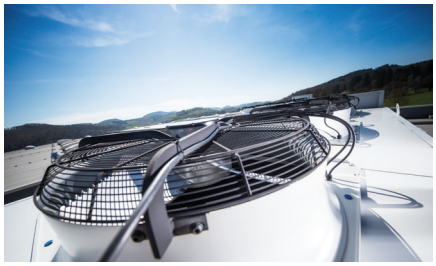
Since the success of the facility in Malbun, Sportprojekt AG has ordered more systems from L&R, some of which have already been partially constructed, and some are still in the design stage. The sizes of these facilities are very different: from a compact and mobile system that can be moved around in a trailer to a split system using the cutting-edge R 1234yf coolant with a CO_2-equivalent GWP of 4! All this combined with energy- and cost-saving operation.

Industrial refrigeration systems
Ultra-low temperature units
Control systems

L&R Kältetechnik

As unique as your project!

Surface treatments and electroplating



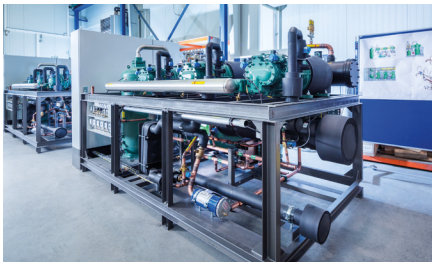
Chemical and pharmaceutical industry

Plastics and rubber industry

Food processing industry

Specialised civil engineering

Plant and mechanical engineering



Medical systems

Metalworking

Ready to start in your industry!

L&R Kältetechnik GmbH & Co. KG
Hachener Str. 90 a-c
59846 Sundern-Hachen - Germany
Phone +49 2935 9652 0
E-mail info@lr-kaelte.de
www.lr-kaelte.de

More than cold.