

# Honeywell Solstice<sup>®</sup> ze (HFO-1234ze)



CUSTOMER INSIGHT: MAURER BAKERY

## A Cool Solution for an Eco-Friendly Bakery

**Honeywell**

**climalife<sup>®</sup>**



**iceCool**

Mein  
**MAURER**

# A Cool Solution for an Eco-Friendly Bakery

“After one year of operation, the installation is working safely as expected and helping us achieve our environmental targets, as well as delivering a long term solution that will meet refrigerant regulatory requirements in the future without any additional investment in system renovation.”

**Tobias Maurer, General Manager**



### Summary: Where traditional craft meets innovation

The Maurer Bakery is a family bakery and retail business preparing bread and other products that are chilled or frozen for onward distribution to the company's network of 42 bakery-café outlets in Germany. In all, Maurer employs 400 people, 70 of whom work in the company's two production facilities. Maurer is proud of its traditional approach to bread-making (“einfach, gutes Brot”) and operates during the night in order to deliver products to stores that open every morning at 6am.

The newest factory, which extended the production surface from 2,500 to a total of 6,000 square metres, includes a very large preparation area, 25 cold rooms and 4 freezer rooms, all cooled via a cascade system, which has been designed for a life-cycle of at least 20 years. The design had to take account of the requirements of F-GAS Regulations and, as a consequence, the company looked to its refrigeration partner, Ice COOL, who in collaboration with ECR and Climalife Holland could define the low GWP solution. Honeywell's Solstice® ze (HFO-1234ze), with a GWP of <1 according to the IPCC 5th review, was matched with CO<sub>2</sub> to create the first such industrial cascade system. It is also the perfect fit for Maurer's commitment to energy efficiency and low environmental impact.

### Results

- The partnership successfully delivered and implemented the first-ever Solstice ze/CO<sub>2</sub> industrial cascade system for chilling and freezing.
- The refrigeration performance is very satisfactory on all different climates required for the production and offices, which guarantees the high quality required for this business
- Other than reducing the direct emissions by 99.9% and indirect by the improved CoP, the installation provides a future-proof solution with high safety standards.

### Background: Rising to the challenge

Central to the decision of Maurer over the refrigeration system was the ability not only to meet incoming regulations but to implement a strategy that would bear down on energy consumption and enable the company to meet its stated environmental aims.

The design of the refrigeration system was key in the development of the new production facility at the bakery. Maurer worked closely with Ice COOL, which specializes in customized solutions for the development of hygienic, eco-friendly and energy-efficient refrigeration for bakeries.

They spent 6 months working through the challenge of designing a cascade system that could operate efficiently and accommodate the different pressure

profiles of the refrigerants, collaborating closely with ECR.

ECR-Nederland BV has a strong reputation for customised solutions, notably by applying very powerful 3D design modelling wrapped inside a full project package, compliant with PED and other regulations, and this approach was harnessed to ensure that Maurer was able to evaluate system performance and approve the overall design.

The Solstice ze option was introduced to ECR by Climalife Holland, the Dutch branch of the leader of refrigerants distribution in Europe. Climalife had previously participated in a number of field trials involving Solstice ze and highlighted the innovation as a future-proofed, lowest possible GWP solution. One major benefit is that Solstice ze is not considered a fluorinated greenhouse gas and thus is not included in the quota allocations that will restrict placing HFCs in the market after 2015.

The system design was optimised to the lower pressure of Solstice ze versus the traditional refrigerant R-134a. As Solstice ze is mildly flammable, Ice Cool checked with a certified body about ATEX compliance, who assessed that given the very low risk of Solstice ze in that system design, ATEX extra measures were not needed.

## Project Implementation: Installing an industry 'first'

Maurer commissioned the chiller/freezer system in November 2013 following extensive evaluation of Solstice ze undertaken by Climalife and ECR as part of the Ice COOL design.

**The result is the first industrial cascade installation that combines Solstice ze for medium temperature control and CO<sub>2</sub> for low temperature.**

The cascade configuration has also enabled Maurer to meet its commitment to low energy consumption and reduced environmental impact. Indeed, as part of the system set-up, total energy performance is now closely monitored.

From a technical perspective, bringing Solstice ze and CO<sub>2</sub> together in a single configuration presented challenges because CO<sub>2</sub> is a high capacity, very fast fluid, whereas Solstice ze is slow to reach steady stage because of its lower capacity. It took this combined expertise to deliver a solution that not only meets the needs of Maurer but also has great potential across the food industry.

In this system, Solstice ze is used for direct expansion on the high side down to evaporating temperatures of -10°C and -15°C, feeding the cold rooms as well as the working area where products are prepared. CO<sub>2</sub> is used on the low side for the freezer rooms and the blast freezing process needed for some special dough products. Electronic expansions valves are used on both the MT and LT operations. The circuits also include two Güntner Microx condensers (tube volume of 2x20L) with EC-Fans, one Alfa Laval heat

## System Information

MT Refrigeration	
Refrigerant	HFO-1234ze
Refrigerant charge	300 kg
Refrigeration power	245 kW
Cold rooms and cascade	5 x Bitzer piston compressors 206 kW @ -10°C Tevap 1 x Bitzer piston compressor 15 kW @ -15°C Tevap
Working area for food preparation	1 x Bitzer piston compressor 24 kW @ +5°C Tevap

LT Refrigeration	
Refrigerant	CO <sub>2</sub>
Refrigerant charge	150 kg
Refrigeration power	135 kW
Stroke freezing rooms	2 x Bitzer piston compressors 70 kW @ -38°C Tevap
Static freezing	3 x Bitzer piston compressors 65 kW @ -25°C Tevap

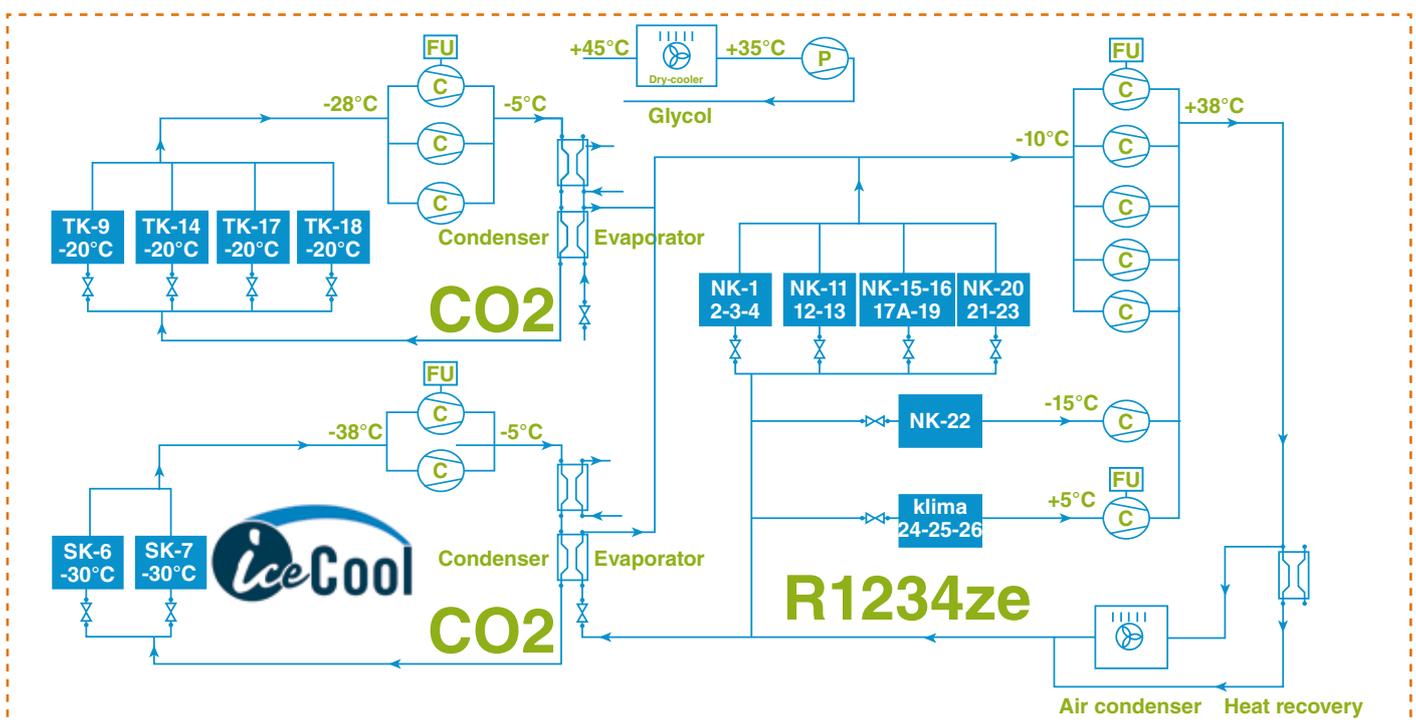


exchanger for heat recovery of 300 kW and one dry cooler for CO<sub>2</sub> discharge gas cooling.

## Sector Perspective: Delivering a low GWP solution

Maurer's adoption of Honeywell Solstice ze reflects growing demand in the Food

& Beverage market for the application of refrigerants with low GWP, energy efficiency and reduced carbon emissions. The refrigerant is an alternative to R-134a, with a GWP of <1 and ideally suited to chillers, vending, CO<sub>2</sub> cascade systems, air dryers and heat pumps.



# Feedback: A winning combination

“Using our long experience of working with HFCs, ammonia R-290 and CO<sub>2</sub>, we have tested Solstice ze and confirmed that it has a better CoP. When taking account of the total cost of ownership and failure/safety issues, we believe that Solstice ze is a perfect solution for installations such as this. We are currently considering Solstice ze as an option for supermarket high side refrigeration combined with CO<sub>2</sub> on the low side.”

**Udo J. van der Meer, ECR-Nederland BV**

“We had to go through a learning curve to optimise the entire installation performance, as Solstice ze and CO<sub>2</sub> are not the easiest combination due to their very different capacities and speeds to reach steady stage. But now we are satisfied and positive that a cascade system combining Solstice ze with CO<sub>2</sub> is a sound, reliable and efficient choice when the design and safety conditions are properly handled.”

**Peter Wehrens, Ice Cool**

## Available tools

### Simulation software

Honeywell's refrigerants modelling software is a free-download software program that eliminates the guesswork involved in selecting a refrigerant by allowing refrigeration engineers to run simulations based on actual data. The tool runs property calculations of refrigerants, conducts thermodynamic evaluations of air conditioning and refrigeration cycles, and provides a first principle thermodynamic comparison of new alternative refrigerants for retrofit applications or new system designs.

The software models systems from simplified basic cycles to large, complex refrigeration systems. The results can be exported to Microsoft Excel, where the data can be manipulated in a variety of ways. The software also creates typical Mollier diagrams (Pressure-Enthalpy, Temperature-Entropy).

### Honeywell Belgium N.V.

Interleuvenlaan 15i  
3001 Heverlee, Belgium  
Phone: +32 16 391 212  
Fax: +32 16 391 371  
E-mail: [fluorines.europe@honeywell.com](mailto:fluorines.europe@honeywell.com)

### Smart phones apps

Download **Honeywell PT calculation applications** for **iOS and Android** free



### Literature

Honeywell has a wide range of literature available on Solstice® ze including case studies, customers references, etc.

### Information and contact

For information and support on new applications, contact your local Honeywell representative, visit [www.honeywell-refrigerants.com/europe](http://www.honeywell-refrigerants.com/europe) or send us an email at [fluorines.europe@honeywell.com](mailto:fluorines.europe@honeywell.com)



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