

Customer Insight: Unes / U2 Supermarket Chain

Supermarket innovation:

**MINIMUM COSTS, CARBON (GWP<1) AND
ENERGY (-35% EXPECTED) FOR
INTEGRATED HEATING & COOLING & A/C**



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“The new cascade system in our Parma supermarket drives the entire cooling, heating and air conditioning needs of the store at reduced cost and is a template for a lower carbon and more sustainable solution for our sector. It also future-proofs our investment beyond the change in F-Gas Regulations.”

Dr. Gianfranco Iannace – Arch. Fabio Gabanella
Unes/U2

“This system design, along with Solstice ze, enables commercial enterprises, including supermarkets, to plan beyond 2020, safe in the knowledge that their investment will not only deliver a more sustainable solution it will also stand the test of time.”

TDF Natale Mandelli

Summary: A cooling system that drives cooling, heating and air conditioning with overall GWP<1 thanks to Solstice ze

The supermarket industry is a heavy user of energy for keeping products cool and for ensuring a comfortable environment for customers. Traditionally, refrigeration, heating and air conditioning have been driven by separate systems, but now refrigeration specialist TDF, working with Honeywell, has developed eCold, a cooling system that delivers all these building service requirements in one solution, making boiler, chiller and a.h.u. (air handling unit) unnecessary.

The designers have created an innovative cascade system that combines Honeywell’s Solstice® ze refrigerant with CO₂ for a new U2 store in Parma (Italy), with the result that one system can satisfy the entire cooling, heating and aircon needs via a single architecture. And because Solstice ze is 100% non-ozone depleting with a GWP of less than one, it is fully compliant with the European F-Gas regulation and can be used without an end date.

The system design in Parma is delivering impressive operational benefits:

- Single process solution simultaneously satisfying hot and chilled store requirements
- Reduced power supply of 45kW compared to three system architecture (refrigeration/heating/air conditioning)
- Reduced annual maintenance savings estimated at 15,000 Euros
- 100% non-ozone depleting refrigerant with a GWP of less than 1
- Energy Consumption reduced by an estimated 35%
- Reduced technical space (no boiler, no chiller, no a.h.u.)

Background: Where process efficiency meets environmental responsibility

TDF is a consulting company that specializes in developing innovative refrigeration systems and, conscious of incoming regulations, has been working on architectures that meet the needs of retail clients and the operating environment by embracing low carbon technologies.

Anticipating one of the limitations of the Fgas Regulation related to refrigeration systems for commercial use with a capacity of 40kW or more that will limit the use of fluorinated refrigerants with GWP above 150, TDF has developed a Honeywell Solstice ze based system on behalf of its client – the Unes / U2 supermarket chain (part of FINIPER Group) – that will not only comply with the upcoming changes but which harnesses the heat energy generated by the cooling system.

Application: Designing a future-proof, low carbon future

In the case of the new U2 Parma store, TDF designed a Solstice® ze / CO₂ cascade system capable of satisfying the cooling, heating and air conditioning needs of the operation in one holistic solution.

Solstice ze (150kg charge) is used as the primary refrigerant for cooling a pumped CO₂ MT system, with CO₂ (400kg) then cascaded to the LT system to deliver the required performance.

However, what's particularly innovative is that not only is the system meeting the needs of the store's food preservation requirements, it also replaces conventional boiler and air conditioning units, using a heat exchanger to capture the energy generated by the Solstice ze-fed cooling system to heat the store, provide hot water and cool the store environment in summer.

Not only does this reduce capital outlay and energy costs, its compact design takes up less of expensive supermarket floor space. Critically, the ultra-low GWP of Solstice ze, its compliance with future regulations and the lower carbon output ensure the longevity of system performance and create significant ROI metrics.

Moreover, the mild flammable qualities of Solstice ze (A2L) provide much greater flexibility in system installation and in charge size than other refrigerants.

Results: A system template for the future

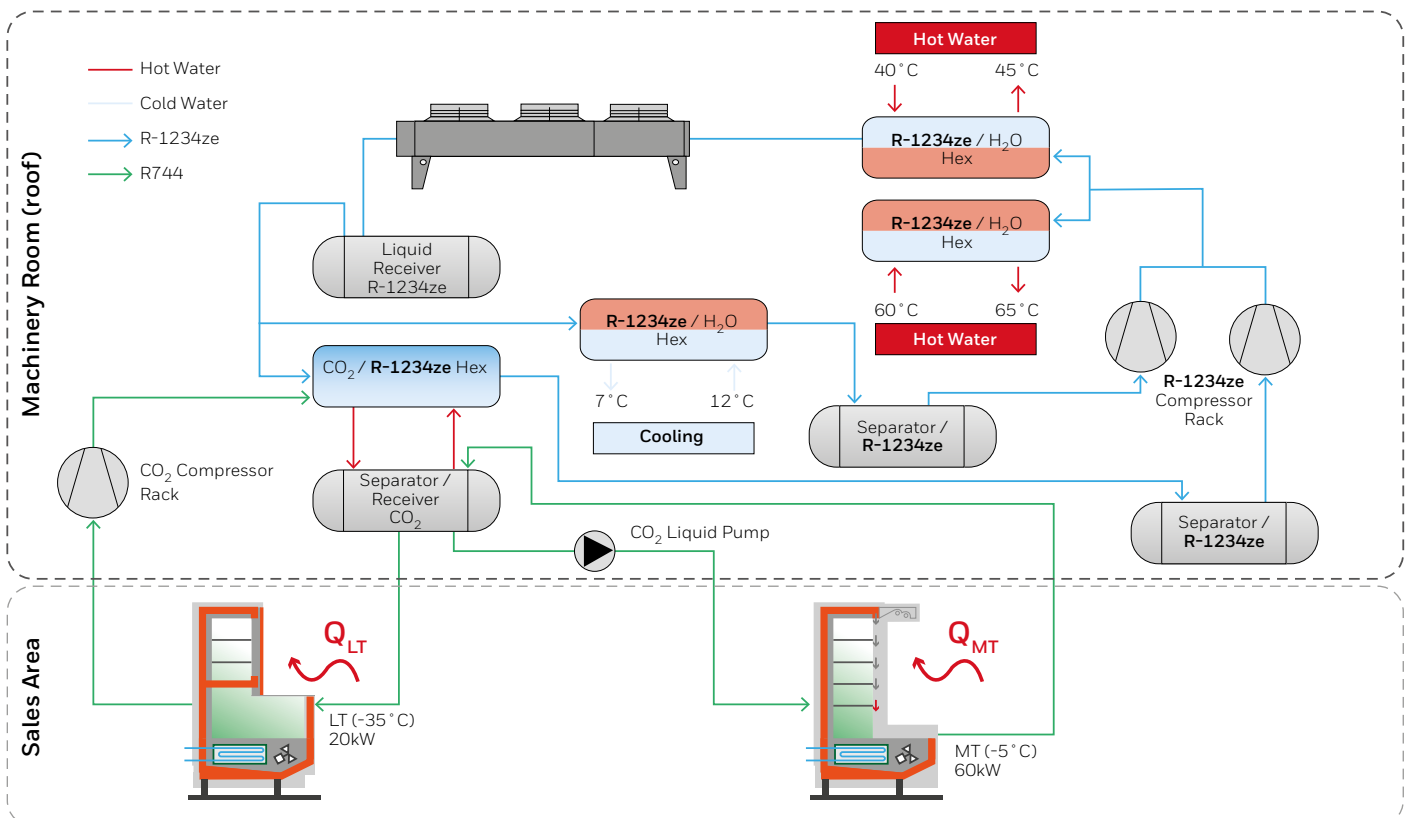
The U2 store has been operational since December 2014 and the management is currently evaluating cooling/heating system performance to consider similar architecture designs for future new stores and potentially in refurbishment projects.

Early indications are that power supply will reduce by around 45kW as a result of the new installation in Parma, thanks both to efficiency of the cooling system and its ability to drive heating and air-conditioning at the store. Anticipated energy savings are estimated around 35% over comparable stores, with the added advantage of lower capital outlay (no HVAC system or hot water boiler) and much reduced maintenance costs.

In addition, the municipality of Parma is interested in assessing the environmental benefits of the installation as an example of best practice for stores across its area, particularly as the new European Directive governing refrigerant leakage (EN378) is likely to permit a higher charge of Solstice ze (up to 70 kg) in public places.

Headline results:

- Solstice ze allows for integrated cool, heat and a/c system with GWP<1
- Energy consumption **reduced by an estimated 35%**
- Reduced capital and maintenance costs



	LT pack	MT pack	Air conditioning/Heating
Pack (TDF srl)	Central eCold multifunction heating/cooling/aircon (TDF srl)		
Cases (De Rigo)	Multideck w/doors (25m) Cold room (10m ³) Cold room (15m ³)	Multidecks (39.25m) Serveover (16.25m) Retrobank (6.25m) 6x Cold rooms (74m ³)	
Compressors (Frascold)	2x D3-6SK2	V25 103E inverter 2x Z30.126E Z40 154E (MT winter / ac in summer)	Z40 154E (off in winter)
T ^a setting Winter (-5°C Tamb)	CO ₂ -35°C/-5°C	Solstice ze -10°C/+50°C	Solstice ze -10°C/+50°C
T ^a setting Summer (+35°C Tamb)	CO ₂ -35°C/-5°C	Solstice ze -10°C/+45°C	Solstice ze +2-10°C/+45°C
Cooling capacity	20 kW	60 kW	115 kW / 150 kW
Refrigerant	CO ₂	Solstice ze (R-1234ze)	Solstice ze (R-1234ze)

Sector perspective: Processing a low GWP industry

There are considerable environmental and operational benefits associated with Solstice ze, resulting not only from its ultra-low GWP but also as an enabler for efficient heat recovery operations in industrial and commercial sites.

With the success of the U2 store in Parma, it is anticipated that many other similar applications will benefit from the design innovations linked to the use of Solstice ze.

Solstice ze is 100% non-ozone depleting and meets the criteria that are most important to refrigerants customers: Performance, Cost Effectiveness, Environmental Impact and Safety. It also benefits from low toxicity (ASHRAE class A) and is non-flammable at ambient temperature, and mildly flammable according to ASHRAE class 2L. It is significantly safer in use than alternatives such as hydrocarbons and ammonia, which are either extremely flammable or highly toxic.

Simulation Software

Honeywell's refrigerant free-download modelling software allows to run refrigerants and cycles simulations based on actual data.

Smart phones apps

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



Information and contact

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



RESPONSIBLE CARE
OUR COMMITMENT TO SUSTAINABILITY

RESPONSIBLE CARE

Honeywell Performance Materials and Technologies, as a member of the American Chemistry Council, has adopted Responsible Care[®] as the foundation of health, safety, and environmental (HS&E) excellence in our business. Responsible Care is the chemical industry's global voluntary initiative under which companies, through their national associations, work together to continuously improve their health, safety and environmental performance, and to communicate with stakeholders about their products and processes.

Our commitments:

- The safety of our employees
- The quality of our products
- Being responsible stewards for the protection of the environment, the communities in which we operate and our customers

Literature

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

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