Solstice™ ze Refrigerant

Honeywell

CUSTOMER INSIGHT:
CELLI SpA

Innovation and Originality Drive Food & Beverage Sustainability

RIVOIRA REFRIGERANTS by Praxair

CELLI DISPENSING EQUIPMENT

SECOP

“The commitment of Celli to reduce the environmental impact of its products and production processes is genuine and not dictated by fashion. The quantity and quality of the investments made over the years is proof of this.”

(Comm. Goffredo Celli, President & CEO)

Summary: Reducing Emissions through Life Cycle Thinking

In just a few decades, Celli SpA has become the leading designer and manufacturer in Italy of refrigeration and dispensing systems for beer, soft drinks, wine and water.
The company is an acknowledged leader in Europe and around the world both for its products - which it exports to 86 countries - and for its commitment to minimizing environmental impact, which is enshrined in a green program called Life Cycle Thinking.

The company's products and systems are produced in San Giovanni in Marignano, where it operates a policy of continuous innovation and originality. The success of this industrial-oriented philosophy is expressed through the relentless pursuit of quality, made possible through investment in advanced technologies and in its people.

In keeping with its environmental commitments, Celli recently worked with Rivoira (Praxair Euroholding) to introduce Honeywell's Solstice ze refrigerant (HFO1234ze) as a globally-compliant replacement for R134a in beverage dispensers.

A field test involving the Celli Brave 30ES - with a Secop (formerly Danfoss Compressors) NL10MF compressor - compared the performance of Solstice ze against R134a, which had previously been specified by the company.

Solstice ze is a refrigerant based on hydro-fluoro-olefins (HFO) with a Global Warming Potential of just 6 and an atmospheric lifetime of 18 days - compared to measures of 1430 and 13 years respectively for R134a.

Summary of field test results:

- Solstice ze delivered a 99.5% direct comparative emissions reduction over R134a
- Solstice ze exhibited lower discharge pressure (around 40% versus 134a), thereby reducing compressor mechanical stresses
- Solstice ze proved to be a near drop-in replacement for R134a, ensuring full optimization of current equipment

Background: Moving to an Eco Friendly Future

Underpinning the Celli business ethos is Life Cycle Thinking – a common sense environmental program that focuses on a "philosophy of the 6 Rs". These 'Rs' stand for Rethinking the product and its functions; Reducing energy and materials consumption; Replacing harmful substances with more eco-compatible alternatives; Recycling materials; Re-using parts where possible; and Repairing product rather than replacing. Over recent years, the company has identified new solutions to replace R134a – including CO_2 and Solstice ze – in response to global warming becoming its top environmental priority. As part of the Life Cycle Thinking programme, Celli set up a field test to assess the performance of Solstice ze against R134a in beverage dispensers with motors from ½–1hp power output. The Honeywell technology was selected for its low GWP and its ability to charge systems with more of 150g of refrigerant, so avoiding the use of potentially hazardous hydrocarbons.

Test Results: Dispensing low GWP

For the field test, Celli selected its Brave 30ES dispenser unit, which holds UN EN ISO 14021:2002 certification covering energy savings and reduced CO_2 emissions. This model can be used as a water dispenser, pre-mix or post-mix unit when a CO_2 source to carbonate water is included. Tests were conducted as post-mix unit. Using Solstice ze, this non-modified three tap system recorded a 20% reduction in power consumption, even while showing a close to 20% lower refrigeration capacity, thereby offering an equivalent CoP to R134a. The only adjustment made was to the refrigerant charge (5% more for Solstice ze versus R134a) – the evaporator, condenser, compressor and capillary tubes all remained as per the original equipment specification. Critically, from Celli's perspective, the trial proved the environmental benefits of Solstice ze, with >99.5% emissions reduction, along with lower discharge pressures across all measured ambient temperatures (a key contributor to extended product life). Consequently, Solstice ze demonstrated its credentials as an effective refrigerant across all climatic conditions, ideally suited to global distribution.

			Pull down Tamb –0°C		Pull down ice bank			
T Ambient	**Refrigerant**	**Charge gr**	**Time min**	**Discharge pressure bar**	**Time min**	**Discharge pressure bar**	**Ice weight kg**	**Ice forming speed gr/min**
16°C	R134a	300	53	8,6	100	8,4	12,3	123
	HFO1234ze	315	69	6,5	130	5,2	13,1	100
	Diff%		–23%	+32%	–23%	+62%	–6%	+23%
24°C	R134a	300	76	11,4	118	10,6	12,3	104
	HFO1234ze	315	92	8,6	149	6,6	12,7	85
	Diff%		–17%	+33%	–21%	+61%	–3%	+22%
32°C	R134a	300	95	14,5	150	12,0	12,2	81
	HFO1234ze	315	125	11,3	190	8,3	12,6	66,3
	Diff%		–24%	+28%	–21%	+45%	–3%	+22%
43°C	R134a	300	136	20,0	219	17,0	11,9	54
	HFO1234ze	315	162	14,8	291	10,8	12,9	44
	Diff%		–16%	+35%	–25%	+57%	–8%	+23%

Feedback: Meeting Common Global Warming Obligations

"The company leaves no stone unturned and every year invests significant resources in the testing and industrialisation of new, increasingly environmentally-friendly machines. Where we see opportunities to mitigate our environmental impact – for example in the use of new refrigerants – these will be carefully considered and analyzed for the contributions they can make to a sustainable future."

Luca Faedi,
Responsible for Production and Technical Department

Sector Perspective: Creating a cleaner future

The Celli water dispenser using Honeywell's Solstice ze was first exhibited at the Mostra Convegno in Milan (Italy) in March 2012 – plans are now well advanced to demonstrate the refrigerant's effectiveness in soda and beer coolers at a number of upcoming shows. Celli's adoption of this technology reflects growing demand in the Food & Beverage market for the application of refrigerants with low GWP, energy efficiency and reduced carbon emissions in a global (all regions, all climates) and sustainable way.

The table below illustrates the relative merits of refrigerants current in use in the F&B industry.

	134a	1234ze	CO_2	R600	R290
ASHRAE classification	A1	A2L	A1	A3	A3
GWP	1430	6	1	3	3
Flame limits- ASTM E681-04 at 21°C* LFL (vol% in air) UFL (vol% in air)	 N/A N/A	(at 100°C) 7% 12%	 N/A N/A	 1,80% 8,40%	 2,10% 9,50%
Heat of Combustions (kJ/g)	4,2	10,7	N/A	45,6	46,3
Burning Velocity (cm/s)	N/A	N/A	N/A	41	46
Minimum Ignition Energy (mJ)	N/A	(at 54°C) 61000 to 64000	N/A	~0,25	0,25
PED (97/23/EC) class	2	2	2	1	1
Flammability for handling and storage	No	No	No	Yes	Yes
Commercial Availability	Yes	Yes	Yes	Yes	Yes
Ease of adoption	Baseline	Moderate - Easy when systems can be designed	Difficult - Very sophisticated systems	Difficult - Flammability issues limit charge amounts	Difficult - Flammability issues limit charge amounts
Cost of adoption	Baseline	Moderate	High	High	High

Download **Genetron Properties Suite software** for free at
http://www.honeywell-refrigerants.com

Available on the App Store

Download **Honeywell retrofit calculator** and
PT Chart iPad Apps for free on iTunes.

Honeywell
Fluorine Products Europe B.V.
Laarderhoogweg 18
NL-1101 EA Amsterdam
The Netherlands

Honeywell
Belgium N.V.
Haasrode Research Park
Grauwmeer 1
3001 Heverlee, Belgium
Phone: 32-16-391-278
Fax: 32-16-391-277

Honeywell
Belgium N.V.
RMP/RRP Leuven
TVA/BTW BE 0402130326

www.honeywellrefrigerants.com

RIVOIRA REFRIGERANTS by Praxair

CELLI® DISPENSING EQUIPMENT

SECOP

November 2012

RESPONSIBLE CARE®

Honeywell