

Trane® Leverages Solstice® Technology to Drive Cooling and Heating Innovation

“By adopting Honeywell’s Solstice technology, we have created solutions that improve performance for customers while also safeguarding them against the escalating costs of refrigerants, such as R-134a, associated with the HFC phasedown.”

*Erik Van Oossanen, Portfolio Manager, Applied Chillers Europe
Trane®*

Case Study



As world-wide demand grows for increasingly efficient products to reduce energy and resource consumption, cooling and heating technology companies are focused on system design that integrates safety, performance and lower environmental impact.

One such business – Trane® – which is part of Ingersoll Rand, is leading the way in leveraging the performance benefits of Honeywell’s Solstice low global warming potential (GWP) refrigerants to develop a new generation of HVAC-R systems, replacing refrigerants such as R-134a scheduled for phasedown under F-Gas regulations.

The partnership with Honeywell has enabled Trane® to create new process cooling and heating systems focused on combining low environmental impact with enhanced performance. This includes the launch of its new CITY range, which widens the operating map of compact cooling and heating solutions for smaller commercial buildings by successfully integrating Solstice ze® with screw compressor technology.

The Trane® strategy aligns with the Ingersoll Rand Climate Commitment to achieve a 50 percent reduction in greenhouse gas (GHG) refrigerant footprint of its products by 2020.

The Needs

- Identify low GWP refrigerants that would meet the exacting requirements of the Ingersoll Rand portfolio of EcoWise products, enabling customers to reduce their GHG footprint and save money without sacrificing performance or safety
- Successfully integrate the selected refrigerants into new product designs to guarantee equivalent or better performance than predecessor refrigerant and chiller combinations
- Adopt refrigerants that not only enhance performance but are proven to be safe to use, are non-toxic and nonflammable*
- Equip customers against the spiralling costs associated with F-Gas HFC phasedown refrigerants, such as R-134a

* Solstice ze is nonflammable below 30 °C



Solstice ze (HFO-1234ze)

The Solution

Honeywell’s new generation HFO refrigerants have been widely adopted by Trane® for its cooling and heating systems. In 2014, Trane® specified Solstice zd (R-1233zd), with a GWP = 1, for its ECTV centrifugal chillers and then went on to integrate Solstice ze (R-1234ze), GWP <1, in 2016 for its screw and magnetic levitation chillers and water-to-water heat pumps. In 2018, the company unveiled a breakthrough innovation, harnessing the potential of Solstice ze to widen the operating conditions within the capacity range of scroll compressors to create its new compact CITY cooling and heating offer with screw compressor. The new operating conditions reach -12 °C for process application cooling as well as 80 °C for heating purposes.

The Benefits

- Created wider operating maps for Trane® chillers and heat pumps, opening up new product design opportunities, including the new CITY range of HVAC-R products
- Enhanced system performance in established markets, including data centre applications, and new products for process industries using negative temperature applications, such as food and beverage, replacing natural refrigerants that require significant safety mitigation systems
- Helped improve overall efficiency, with the potential to lower the total cost of system ownership
- Provided environmental preferable solutions that are safe and reliable, offering a near zero GWP alternative to natural refrigerants without any of the inherent safety concerns
- Opened up new process cooling and heating system design innovations, stretching the capacity reach at both ends of the spectrum from 150 kW up to 2800 kW, enabling the introduction of new screw compressor chiller and heat pump systems



CITY Innovation

Trane® has always taken a leadership position in environmental stewardship by helping building owners meet environmental preferable goals without compromising efficiency, reliability or safety. Now Trane® has developed a new HVAC range for smaller buildings that opens up a new market segment. Until now, there has been no scroll compressor solution using a <1 GWP refrigerant that could deliver the required capacity. However, the operating map of Solstice ze has enabled Trane® to launch its new compact CITY cooling and heating solutions based on screw compressor technology, offering products ranging from 150kW – 400kW.

There are three CITY concepts:

CITY Comfort: cooling in tight city buildings – the system fits a standard elevator for ease of installation

CITY Booster: a heat pump for water sources at 5–30 °C, including district heating schemes and waste water sources, elevating output temperatures to up to 80 °C, from 67 °C achievable previously

CITY Process: a dedicated cooling design for process applications down to -12 °C (typically food and drink), overcoming the toxicity and flammability safety concerns associated with 'natural' refrigerants.

The Solstice Advantage

Solstice ze

Solstice ze refrigerant (HFO-1234ze) is an ultra-low GWP alternative to traditional refrigerants for energy-efficient chillers and/or commercial air conditioning in supermarkets and commercial buildings. With a GWP <1 – a 99.9% reduction in direct impact versus R-134a – it also meets key performance, cost effectiveness and safety criteria.

Solstice zd

Solstice zd (HFO 1233zd) is a nonflammable, ultra-low GWP replacement for R-123 for low pressure centrifugal chillers, offering better capacity and similar efficiency to R-123. With a GWP=1, this refrigerant also offers great potential in high temperature heat pumps. Major chiller manufacturers have already announced product ranges based on Solstice zd.

With its new CITY range, Trane® has created a new HVAC product that stretches the capacity reach of screw compressor technology, thanks to the application of Solstice ze.

This configuration enables enhanced heating solutions to be delivered, with heat pump output temperatures now elevated from 67 °C to 80 °C – allowing building owners to move away from fossil fuel heating systems.

“The use of R-1234ze aligns perfectly with our Climate Commitment while supporting our customers’ sustainability initiatives. In 2014, Ingersoll Rand publicly committed to increase its energy efficiency and reduce greenhouse gas emissions (GHG) related to its operations and products – the adoption of low GWP refrigerants is very important to these environmental goals and also in helping our customers achieve their own targets.”

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For more information

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