

WHIRLPOOL CORPORATION DELIVERS ENERGY EFFICIENT REFRIGERATION PRODUCTS

With Honeywell Solstice® Blowing Agents

Whirlpool Corporation is committed to delivering energy efficient refrigeration products that embrace innovative solutions focused on environmentally preferred technologies.

**DAVID KLEIN,
VICE PRESIDENT,
GLOBAL REFRIGERATION**

“We are investing significantly in our R&D and working globally with our partners to create a sustainable future. HFOs have shown real promise both in terms of environmental impact and in helping us provide end consumers with a strong value and payback proposition.”

Honeywell

Around 55% of Whirlpool's global refrigeration portfolio utilizes hydrocarbon-based insulation and refrigerants. That commitment led Whirlpool, one of the world's leaders in refrigeration, to seek out a more environmentally preferred replacement for blowing agents that would improve the energy efficiency and environmental performance of Whirlpool's products. That search led to hydro-fluoro-olefins (HFOs) and Honeywell.

As energy efficiency regulations evolve, refrigerator manufacturers need innovative ways to meet new requirements. HFOs have the potential to significantly enhance the system energy efficiency of refrigerators while greatly reducing their environmental impact. Working with Honeywell, Whirlpool is developing an HFO-based Fourth-Generation foam that combines a low global warming potential (GWP) with superior insulating performance (lambda).

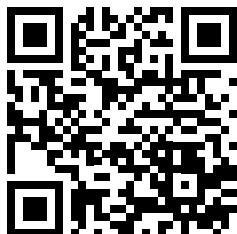
Not only will this approach improve Whirlpool's products, but it will also contribute to a lower overall TEWI (Total Effective Warming Impact) at a country level thereby reducing the residential load on current power infrastructure and the associated CO₂ emissions.

HFOs BENEFIT FOR REFRIGERATION

Fourth-Generation HFOs, such as Honeywell's low GWP Solstice® Liquid Blowing Agents (LBA), have the potential to deliver significant environmental and energy efficiency benefits in the refrigeration sector while maintaining excellent appliance lambda performance (see fig 1).

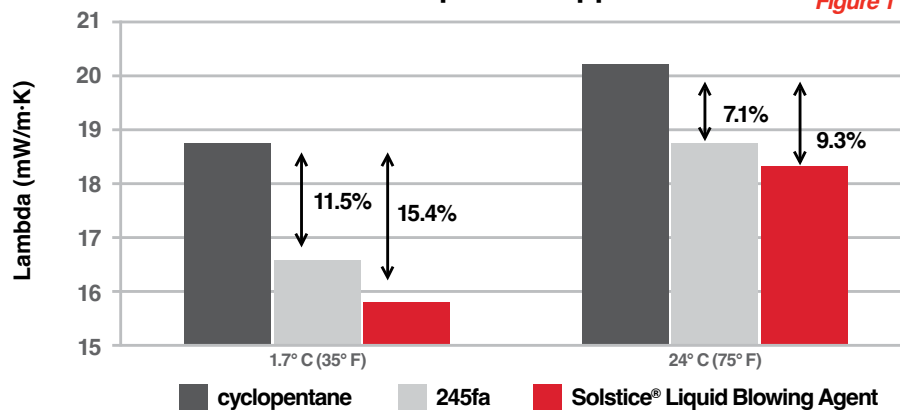
For more information

hwll.co/solstice-lba-appliance



Lambda Comparison Appliance

Figure 1



In a trial undertaken by Whirlpool, household refrigerators and freezers having an internal volume of around 600lt, manufactured using an optimized Solstice® LBA were shown to have a superior energy performance by an average of 2% vs 245fa and 8-10% vs cyclopentane that provides Whirlpool with another potential solution to meet the global trend of stringent future energy targets while providing the end consumer with the best value proposition possible.

% Energy Efficiency Improvement (refrigerator power consumption)

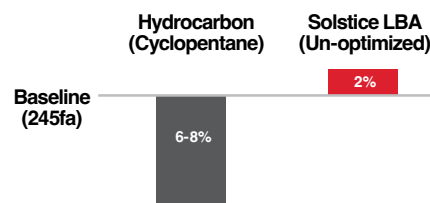


Figure 2

Solstice® LBA has a global warming potential (GWP) of 1, 99.9% lower than Hydrofluorocarbon (HFC) blowing agents. Solstice® LBA helps customers realize energy efficiency goals, with

a 10% improvement in insulation performance vs hydrocarbons. Solstice® LBA is non-ozone-depleting, nonflammable (ASTM E-681 and EU A11), listed under the U.S. EPA's Significant New Alternatives Policy (SNAP) program to replace ozone-depleting substances, listed on the TSCA inventory/registered under REACH, VOC-exempt (per U.S. EPA), and manufactured in the U.S.

Solstice® LBA is also cost-efficient. It offers a near drop-in replacement for liquid HCFC and HFC blowing agents without the need for costly hydrocarbon storage and handling or risk-mitigation equipment.

"Fourth-Generation HFOs enable manufacturers such as Whirlpool Corporation to develop products that deliver superior energy efficiency while meeting consumer demand for performance. These innovations ensure that stringent global energy regulations can be satisfied, based on value-driven solutions that exceed end-user expectations and remain wholly consistent with a low carbon future," says

**- WARWICK STIRLING,
SENIOR DIRECTOR, GLOBAL SUSTAINABILITY,
WHIRLPOOL CORPORATION.**



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Original case study was published in 2013.

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