



INCREASED THERMAL PERFORMANCE WITH LOWER ENVIRONMENTAL IMPACT IN COMMERCIAL APPLIANCES

CASE STUDY



HENRIK WAGNER, GROUP LEADER PRODUCT DEVELOPMENT PU RIGID FOAMS BASF POLYURETHANES GMBH

“Our success in developing rigid foam systems using Solstice® Liquid Blowing Agent is meeting increased demand from our customers for more energy efficient solutions that deliver higher performance with low environmental impact.”

Commercial refrigeration equipment and water heater OEMs are achieving significant gains in thermal performance, thanks to a new F-Gas compliant polyurethane insulation system developed by BASF using Solstice® Liquid Blowing Agent (LBA).

BASF, a leading supplier of rigid and spray foam polyurethane technologies, has launched their new Elastopor H2070 HE and Elastopor H2270 HE series – a two-component, long shelf-life drop-in replacements for HFC and water-blown systems in commercial appliances and water heater equipment respectively.

Solstice® LBA – a hydrofluoroolefin (HFO) – opened up the potential for significant thermal insulation performance gains, while maintaining ultra-low global warming potential (GWP) and non-ozone-depleting properties.

Parallel to this, OEMs are constantly in search of improved sustainable

solutions to bring to the market as part of their corporate social responsibility and environmental management programs. This aspect also provides a competitive differentiation in front of potential customers like supermarket chains or end consumers.

THE SOLUTION

BASF identified Solstice LBA as an ultra-low GWP and non- ODP drop-in replacement for HFC- and water-based rigid polyurethane foam systems, with the potential to deliver improved thermal insulation performance, dimensional stability and at lower density levels.

THE BENEFITS

Solstice® LBA:

- Has improved insulation performance, up to 20 % compared to water-blown polyurethane foams
- Is cost effective through material savings thanks to up to 35 % lower density than conventional water-blown foam systems
- Does not require modification of existing machine nor ATEX capex since it's not flammable
- Has a long shelf life of the two-component preblended system (up to four months)
- Is a non-ozone depleting and F-Gas compliant solution without sacrificing performance
- Achieves fast demolding time, good surface adhesion, dimensional stability and good compressive strength at lower density levels

THE NEEDS

- Develop solutions that maintain or improve the energy efficiency of the appliance in order to be compliant with the Ecodesign Directive
- Develop a drop-in replacement for HFC-based rigid polyurethane foam systems that would require no production equipment modification or additional capital expenditure on equipment for flammable containment
- Identify and test an ultra-low GWP and non-ODP liquid blowing agent to meet market demand for a fully-blended polyurethane foam system offering excellent thermal performance, a long shelf-life, good miscibility (mixing) and easy processing for OEMs
- Create an alternative to water-based foam system by providing improved insulation performance, with low density and good dimensional stability to offer cost of ownership advantages



BASF – EXPANDING THE RIGID FOAM MARKET THROUGH INNOVATION AND PERFORMANCE

F-Gas Regulations require a ban of HFC blowing agent use as January 2023, so manufacturers of commercial refrigeration equipment and water heaters are investigating alternative rigid polyurethane foam systems that combine exceptional thermal performance and energy efficiency with low environmental impact.

Solstice® LBA yielded measurable improvements in insulation performance, good de-molding times and adhesion capabilities, excellent dimensional stability and compressive strengths at low densities, compared to the water-based foam system. stability and good compressive strength at lower density levels.



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“When our first customer switched to our new insulation solution, it proved that the polyurethane system was a drop-in replacement for HFC-variants or water-blown systems without any need to change the machinery set up.”

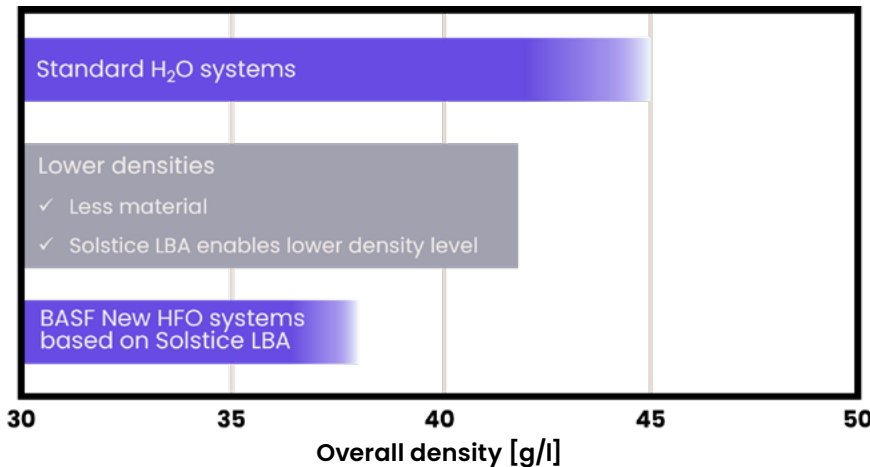
THE BASF APPLIANCE TEAM

HENDRIK WAGNER,
GROUP LEADER PRODUCT
DEVELOPMENT PU RIGID FOAMS

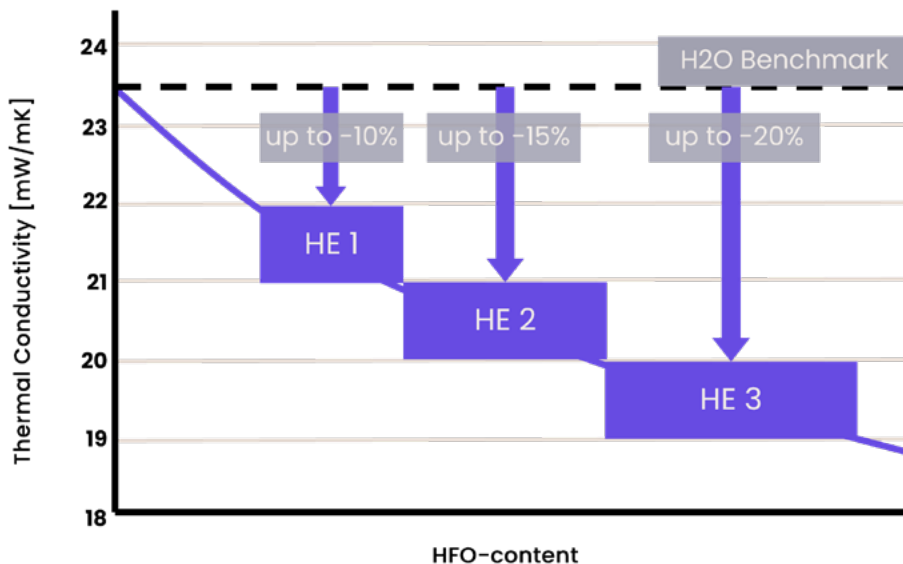
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Thermal Connectivity as a Function of HFO-content



Today, BASF’s Elastopor H2070 HE and Elastopor H2270 HE series are available to commercial refrigeration and water heater equipment manufacturers. They offer their customers a range of thermal performance classes from 19-22 mW/mK (HE 1, HE 2 and HE 3).





Solstice Liquid Blowing Agent (LBA)

THE SOLSTICE® LBA ADVANTAGE

- Solstice® LBA is the latest advance in blowing agent technology. It is an ultra-low GWP, non-flammable, energy-efficient blowing agent ideally suited to PU foaming for insulation applications.
- The energy efficiency benefits of Solstice® LBA, combined with its low environmental impact and non-flammability, make it the ideal choice as a replacement for HFCs and HCFCs for use as a foam insulation blowing agent
- When substituted for HFC-245fa and HFC-365mfc, the use of Solstice® LBA can yield substantial improvements in the environmental impact of foam blowing agents. With a GWP equal to 1-99.9 % lower than HFCs - its widespread adoption could save about 60 million metric tons per year of CO₂ equivalent, comparable to eliminating carbon dioxide emissions from more than 11.8 million cars every year*.

* Source: GHG Equivalencies Calculator:

<http://www.epa.gov/cleanenergy/energyresources/calculator.html>



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