



“The PUR spray foam material chosen for this site had to have a very low global warming potential. With Honeywell Solstice® LBA, we were able to comply with that requirement and even offer better insulation values than other sustainable solutions, like water-blown systems.”

– Thorsten Eschmeier, CEO of Bayer Pearl Polyurethane Systems, Dubai

New Roof System Meets Building Requirements for Masdar City – World’s First Low-Carbon, Eco-City

Covestro’s Spray Foam Using Solstice® LBA Insulates New Office Building Roof

THE CHALLENGE

Install a high performance and cost effective roof on Honeywell’s office building under construction in Masdar City, near Abu Dhabi. The approximately 1,700 square meter roof must provide superior insulating performance and durability in this extremely hot climate. The facility is designed to meet stringent building requirements for Masdar City and Abu Dhabi, which focus on the use of sustainable materials and lowering energy consumption.

THE SOLUTION

The Modern Combo Roofing System (MCRS), which includes a layer of spray polyurethane foam formulated with Honeywell Solstice® Liquid Blowing Agent, was chosen. The system was installed by Water Seal Co. LLC, an experienced roofing specialist, who gave it top marks.

Solstice LBA: Aligns with Region’s Commitment to Sustainability

Masdar City, the world’s first low-carbon, eco-city, is the location of Honeywell’s new office building under construction. The office will showcase the latest in building technology, including Solstice® Liquid Blowing Agent (LBA), used in the polyurethane (PU) spray foam system that insulates the roof.

“It is an exciting project because we are able to supply a very modern spray foam system using Solstice LBA, a 4th-generation blowing agent from Honeywell,” said Thorsten Eschmeier, CEO of Bayer Pearl Polyurethane Systems, Dubai, part of the Covestro group. “This kind of spray foam is new in the Middle East and we are impressed with its extremely good insulating value (Lambda), compressive strength, and mechanical properties in thin layers. We are confident that it will be used on many other buildings being constructed across the region.”

Amir Naqvi, regional marketing leader, Honeywell Fluorine Products, Middle East, Turkey and Africa, agrees that Solstice LBA, which is based on hydrofluoro-olefin (HFO) technology, is an ideal solution for the changing regulatory environment in the region, and around the world. “The Middle East is an Article Five region as per the Montreal Protocol, where 2nd-generation blowing agents like hydrochlorofluorocarbons (HCFCs) and other ozone-depleting substances are being phased out,” said Naqvi. “With the recent Kigali Amendment to the Montreal Protocol, there is a mandate for countries to soon phase down the use of high global warming potential (GWP) HFC blowing agents. Solstice LBA provides a great opportunity for the region to leapfrog directly from HCFC blowing agents to HFO technology that is non-ozone-depleting and offers an ultra-low GWP of one, which is equal to carbon dioxide.”

before



The spray foam system will insulate the concrete roof surface and provide a weather resistant seal around protrusions, parapets, and HVAC equipment.

during



When applied, spray foam creates a seamless, monolithic insulation layer. There are no joints, fasteners and thermal bridges. It is water resistant, durable, and its strong adhesion properties help prevent roof uplift during high winds and extreme weather.

after



The foam is carefully checked after it hardens to ensure that the installation meets high quality standards.

A Successful Collaboration Delivers a Superior Roof System

A strong collaboration between Covestro and Honeywell led to the development of this HFO-based spray foam roof system that delivers superior performance, while meeting changing environmental requirements. Amanullah Abdul Jabbar, head of R&D, Bayer Pearl, Dubai, said, "We had the challenge of optimizing a system that can be used when the ambient temperature is scorching hot. With Honeywell's support, we developed a formulation that remains stable even in this demanding climate." Some of the benefits that Covestro sees with Solstice LBA include:

- An ultra-low GWP of 1, which is 99.9% lower than the GWP of HFCs and equal to CO₂
- A cost-efficient and climate-friendly alternative blowing agent to 141b, with an overall cost per m² of sprayed PU that is lower than a comparative water-blown system
- A better Lambda rating ($\lambda = 10.2 \text{ mW/mK @ } 25^\circ\text{C}$) than any other low GWP alternative, including CO₂
- Nonflammable (ASTM E-681) and VOC-exempt per U.S. EPA

(Source: Bayer Pearl presentation: Environmentally friendly solutions for PU roof insulation)

The Covestro roof system featuring Solstice LBA offers advantages such as:

- A 7-10% improvement in foam yield when compared to HFCs
- Equivalent density (50 kg/m³) and equivalent thermal insulation performance to HCFC-141b blown systems, with U-value of 0.14 W/m²K achieved with a thickness of 0.15m. The equivalent performance using a water-based system would require a thickness of 0.21m, and 0.18m when using HFC-based product
- The same level of material consumption as HCFC-141b to achieve equivalent insulation performance, and much less material than is required by a water-blown product

Top Marks for the Roof System from Building Design to Installation

The system's benefits were very important to Abbas Makki, design division manager, Amar Golden Design, LLC, who worked on the project. AMGD serves as an architectural and engineering consultant that also liaises with authorities on permitting, code and regulatory compliance. "Our challenge is to meet the new building requirements in Abu Dhabi and the region by designing high performance building envelopes with superior roof and wall insulation," Makki said. "Solstice LBA is helping us achieve this performance in a very cost-effective way. At the same time, it is eco-friendly so we can comply with the regulations requiring the use of substances with non-ozone-depletion potential and a GWP less than five. With the Honeywell building, the team tackled the additional challenge of complying with Masdar City's 40% energy saving requirement for new buildings, while also meeting the need for high power consumption to operate the building's computers and air conditioning systems. The new roofing system with Solstice LBA enabled us to meet those needs."



Water Seal Insulation Mat. Cont. Co. LLC, one of the leading spray insulation companies in the UAE, installed the new system. Mohammad Asghar, managing director, Water Seal, is very pleased with the product. "As a contractor, we require high heat insulation, water proofing, and a product that is environmentally-preferred. This system using Solstice

LBA fulfills all three characteristics," he said. "We are seeing excellent quality, a smooth surface finish, and we can easily achieve required insulation targets like K-value, density and compressive strength. The sustainable properties of the system help us to satisfy our client's needs," said Shahid Abbas, deputy manager, business development, Water Seal.

A Vision of Growth

Spray foam for roofing is growing in demand in the Middle East and around the globe because of its superior insulating and waterproofing properties and ability to be monolithically applied to all shapes and types of surfaces. Solstice LBA is a proven blowing agent replacement for HCFCs and HFCs that offers an ultra-low GWP to stay ahead of changing environmental regulations.

Water Seal's Mohammad Asghar is very excited about the future, "Aside from fulfilling the environmental requirements, this new system is also commercially viable and beneficial to us. We will always recommend the new system using Solstice LBA. At this point in time, there is no other system that can match it."

"We anticipate using Honeywell's eco-friendly HFO blowing agent in upcoming projects. It delivers the insulation performance we need, while also helping us respond to sustainability requirements in Abu Dhabi and the surrounding region," Makki added.

Changing Regulations Impact Foam Blowing Agents

- In the UAE, the withdrawal of HCFC-141b will lead to a significant shortfall between the import quota of HCFC-141b and the industry requirements for a suitable blowing agent alternative
- ESTIDAMA building regulations instituted by the Abu Dhabi Urban Planning Council mandate the use of insulation with a U-value of 0.14 W/m²k, zero ODP, and a GWP of <5
- Masdar City has stringent sustainability requirements for building design, including zero emissions of carbon dioxide (CO₂) and a 40% energy saving for new buildings



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— Amir Naqvi

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