DaltoPIR® Insulation Technology
Fire-rated PIR based foam insulation for composite panels

A SOLID STORY
The story of Huntsman’s DaltoPIR® fire-rated insulation products is a strong and solid one. It’s not ‘just’ about solid products though. For us, it goes much further than that. It’s also about the solid production process that leads to these products, and the solid results enabled by our approach over the long-term.

With excellent thermal properties, our patented DaltoPIR® insulation technology delivers optimal fire and smoke properties, without compromising on processing performance or durability. In this way, as a panel producer, you can ensure you are using the right systems available to create solid performance, in the most efficient way possible.

In a few simple steps, this brochure will guide you through the levels of solidness available through our DaltoPIR® insulation technology platform, with a special focus on DaltoPIR® XHFR foam systems, the latest addition to our range of DaltoPIR® products.

Discover how our DaltoPIR® insulation technology can make your life easier…
SOLID PROCESS

Combining the performance of PIR with the processability of PUR

The processing of PIR has never been a simple task, particularly when compared to PUR. That's why, from the start, making our DaltoPIR® insulation technology as processable as PUR, while still offering all the performance advantages of PIR, was one of the main goals of our insulation experts and foam technologists.

With a reaction profile optimized to allow easy and consistent foam processing at high production speeds, our leading-edge, fire-rated, DaltoPIR® XHFR foam technology offers you the flexibility to quickly and efficiently manufacture different panel types, of varying thicknesses.

**Using our DaltoPIR® XHFR insulation products, you can achieve:**
- Improved foam wave stability
- Better panel planarity
- Increased line speed

**Considerations:**
Foams based on DaltoPIR® XHFR foam technology have low friability; the required minimum conveyor temperature is 60°C. The use of a primer (DaltoPIR® PRIM primer) is needed to deliver excellent bottom adhesion and long-term durability. Lambda values can be further improved through the use of specific blowing agents.
Combining desired fire ratings with excellent foam properties

Our DaltoPIR® XHFR foam technology offers a Bs1d0 rating in Single Burning Item (SBI) tests when combined with a suitable panel design. With a panel thickness of just 100 mm, a fire resistance of 30 minutes can be achieved.

If desired, the already low thermal conductivity of our DaltoPIR® insulation systems can be reduced further. Additionally, our DaltoPIR® insulating foam technology meets all required physical properties at low competitive densities.

Using our DaltoPIR® XHFR insulation technology, you can benefit from:
• Low smoke and low heat release
• Low thermal conductivity
• Good physical properties and low lambda values at competitive densities

Our DaltoPIR® foam products are the material of choice for securing certifications:

Our DaltoPIR® foam grades are the ideal candidate for certified panel applications where fire resistance performance is essential or where large-scale fire test approval is required.

The 14001 certifications of our production sites allow panel producers to score credit points under BREEAM Responsible Sourcing criteria.
Combining the advantages of PIR technology with long-term aesthetics and durability

RESULTS

Our DaltoPIR® foam insulation technology has been extensively tested for long-term durability. With excellent results in prominent durability tests – even at the highest temperatures – our DaltoPIR® insulation systems are designed to remain aesthetically pleasing over the long-term.

In a nutshell, panels based on our DaltoPIR® insulation technology offer:
- Long-term durability
- Product quality even in extreme temperatures
- Safety and sustainability

Applications
- Commercial and industrial buildings
- Roofs and walls
- Commercial and residential entry and garage door panels
- Commercial refrigeration
Our DaltoPIR® fire-rated PIR insulation technologies have been optimized to meet stringent international fire safety requirements and satisfy the needs of composite panel producers worldwide. With a full range of products, we offer a solid solution for every requirement.

**Our DaltoPIR® insulation technology range consists of:**
- DaltoPIR® FR foam
- DaltoPIR® HFR foam
- DaltoPIR® XHFR foam with low smoke emissions

In addition to our range of DaltoPIR® foam insulation products, we have a full range of DaltoPUR® foam insulation products including fire-rated and non-fire-rated PUR-based foam systems.

### Our full fire-rated and non fire-rated product range:

<table>
<thead>
<tr>
<th></th>
<th>DaltoPUR® STD</th>
<th>DaltoPUR® FR</th>
<th>DaltoPIR® FR</th>
<th>DaltoPIR® HFR</th>
<th>DaltoPIR® XHFR</th>
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<tbody>
<tr>
<td><strong>Reaction to fire</strong></td>
<td>F</td>
<td>min. Cs3d0</td>
<td>Bs2d0</td>
<td>Bs2d0</td>
<td>Bs1d0</td>
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<tr>
<td><strong>Fire resistance (100 mm)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Conveyor temperature (°C)</strong></td>
<td>40</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td><strong>Iso / Polyol ratio (°C / 100)</strong></td>
<td>155-165</td>
<td>165-180</td>
<td>185-210</td>
<td>250-265</td>
<td>250-280</td>
</tr>
<tr>
<td><strong>DaltoPIR® PRIM</strong></td>
<td>Not required</td>
<td>Not required</td>
<td>Recommended</td>
<td>Required</td>
<td>Required</td>
</tr>
<tr>
<td><strong>Overall density (kg/m³)</strong></td>
<td>38-39</td>
<td>39-41</td>
<td>38-42</td>
<td>38-42</td>
<td>38-42</td>
</tr>
<tr>
<td><strong>Initial lambda (mW/mK at 10°C)</strong></td>
<td>18-21</td>
<td>18-22</td>
<td>18-21</td>
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As a trusted polyurethane partner for panel producers, we also offer a number of complementary solutions for panel producers:
- DaltoPIR® PRIM primer for fire-rated PIR cores
- DaltoSTICK® adhesive for all types of solid insulating cores

### DaltoPIR® foam insulation technology: striving for sustainability

All 17 of the 2030 UN Sustainable Development Goals are important to our business – with three of particular relevance to the construction sector:

- **Self-supporting panels providing fast-erecting, highly insulated buildings and fire safe designs.**
- **Superior processability and long-term panel durability to minimize the extraction of natural resources.**
- **Excellent thermal performance to reduce reliance on fossil fuels and CO₂ emissions.**
PARTNER

Committed to our customers

Working from a technical center in Ternate, Italy, that’s dedicated to insulation innovation, our team ensures that our foam insulation solutions are constantly optimized to anticipate customer needs and meet the legislative requirements of the composite panel sector.

With deep knowledge and expertise in sustainable construction, lifecycle analysis and building fire safety, we are a recognized leader in the polyurethane-based insulation market. Our research experts, foam technologists and adhesive specialists are strongly committed to driving progress in panel production and performance, by offering ever more solid solutions to make your life easier.

About Huntsman:
Huntsman Corporation is a publicly traded global manufacturer and marketer of differentiated and specialty chemicals with 2017 revenues of approximately $8 billion. Our chemical products number in the thousands and are sold worldwide to manufacturers serving a broad and diverse range of consumer and industrial end markets. We operate more than 75 manufacturing, R&D and operations facilities in approximately 30 countries and employ approximately 10,000 associates within our four distinct business divisions.

For more information about Huntsman, please visit the company’s website at www.huntsman.com.
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For more information on DaltoPIR® systems:
Contact a Huntsman representative in your region or visit our website at www.huntsman.com/DaltoPIR

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Products may be toxic and require special precautions in handling. The user should obtain Safety Data Sheets from Huntsman Polyurethanes and Huntsman Performance Products containing detailed information on toxicity, together with proper shipping, handling and storage procedures, and should comply with all applicable safety and environmental standards.

Harms, toxicity and behavior of the products may differ when used with other materials and are dependent on the manufacturing circumstances or other processes. Such hazards, toxicity and behavior should be determined by the user and made known to handlers, processors and end users.

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