Huntsman Corporation is a publicly traded global manufacturer and marketer of differentiated chemicals with 2016 revenues of approximately $10 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 100 manufacturing and R&D facilities in approximately 30 countries and employ approximately 15,000 associates within our 5 distinct business divisions including the Pigments and Additives division that we intend to IPO or spin-off as Venator Materials Corporation. For more information about Huntsman, please visit the company’s website at www.huntsman.com.

About Huntsman

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Fire-rated PIR-based foam technology

DaltoPIR® HFR
AN EASY-TO-PROCESS, FIRE-RATED PIR-BASED FOAM TECHNOLOGY
Demonstrating progress in panel production and performance

Insulation experts and foam technologists at Huntsman have developed DaltoPIR® HFR – a fire-rated PIR-based insulation technology designed to improve the manufacture and performance of composite sandwich panels.

Offering a minimum Bs2d0 rating in Single Burning Item (SBI) tests, across a variety of panel joint designs and thicknesses, DaltoPIR® HFR-based insulating foam is lightweight and has good thermal conductivity and moisture resistance properties. With a reaction profile optimized to allow easy foam processing and high production speeds, our DaltoPIR® HFR foam technology can give panel producers the flexibility to quickly and efficiently manufacture different panel types, of varying thicknesses.

Using our DaltoPIR® HFR insulation technology, panel producers can achieve:

- Improved foam processing through foam wave stability and flat panel surfaces
- Increased process speeds
- A minimum result of EI 30 in 100 mm panel fire resistance tests and minimum Bs2d0 in SBI tests
- All required physical properties and low lambda values at very competitive densities
- Very good results in commonly known durability tests – even at the highest temperatures tested

DaltoPIR® HFR foam technology is suitable for use by panel producers looking to pass factory mutual (FM) and loss prevention council (LPC) insurance tests.

Foams based on DaltoPIR® HFR technology have low friability. The required minimum conveyor temperature is 60°C. The use of a primer (DaltoPIR® PRIM) is required to deliver excellent bottom adhesion and long-term durability. Lambda values can further be improved through the choice of specific blowing agents.

DaltoPIR® HFR foam technology is part of a wider family of DaltoPIR® fire-rated PIR insulation technologies that have been optimized to meet stringent international fire safety requirements and satisfy the needs of composite panel producers worldwide. The range includes:

- DaltoPIR® FR (medium index PIR)
- DaltoPIR® HFR (high index PIR)
- DaltoPIR® XHFR (high index PIR) with low smoke emission

We also offer panel producers a family of fire-rated and non fire-rated PUR-based foam systems (DaltoPUR®), a range of fire-rated PIR core panel primers (DaltoPIR PRIM®) and adhesives (DaltoSTICK®) for all types of solid insulating cores.

### 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>
</tr>
</thead>
<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>
</tr>
<tr>
<td><strong>Fire resistance (100 mm)</strong></td>
<td>EI 15</td>
<td>EI 30</td>
<td>EI 30</td>
<td></td>
<td></td>
</tr>
<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</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>
<td>18 – 21</td>
<td>18 – 21</td>
</tr>
</tbody>
</table>

### A trusted polyurethane partner for panel producers

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.

A long-established supplier and a trusted partner to the composite panel industry, our research experts, foam technologists and adhesive specialists have a strong commitment to driving progress in panel production and performance.

Working from a technical center in Ternate, Italy, which is dedicated to insulation innovation, our team ensures that our foam and adhesive products are optimized to meet the ever-evolving needs and legislative requirements of the fast-paced composite panel sector, and the global construction industry that it serves.