Aromatic and Mannich polyols from Cardanol
ExaPhen for rigid PUR Insulation

Typical Applications

Rigid PUR Spray Foam & Incontinuous panels or blocks.
Excellent for cold temperature adhesion to walls and roofing. Improves significantly fire-resistance and compressive strength (see case studies on page 3). Maximises closed-cells content percentage and improves dimensional stability — ideal for a long-lasting and efficient insulation. Offers hydrophobicity. Products: XFN 150 and 425 Mannich.

For the Insulation of entire buildings, roofing and flooring, air barriers, posts and beams construction, sealants, cavity walls, door & wall panels, refrigeration units, maritime structures, spas/tubs/showers and tanks and pipes.

Rigid PUR Pour in place foam & In-discontinuous panels or blocks.

For the Insulation of entire buildings, wall exteriors and cavities, door & wall panels, refrigeration units, maritime structures, and tanks and pipes.

PIR Panels or Blocks and In-place foam:
Maximises closed-cells content percentage and improves dimensional stability — ideal for a long-lasting and efficient insulation. It brings to the plasticisation of the final foam (lowers the stiffness and increases ductility) and reduces the resulting foam-dust. Hydrophobicity. Products: XFN 10 and 50 aromatic.

For the Insulation of roofing and flooring, air barriers, posts and beams construction, exterior walls, SIP construction panels, refrigeration units, maritime structures, and residential sheathing.

Polycard XFN is a family of aromatic multifunctional polyols and amine polyols used in polyurethane based rigid foams, in durable coatings, adhesives and sealants, as well as a hardener for castings.

Elmira Industrial Supplies proudly distributes ExaPhen™, a family of resins sourced from non-edible bio-feedstock for the polyurethane market. ExaPhen™ includes raw materials supply such as polyols or formulated PUR foam systems (insulation or structural reinforcement). The ExaPhen™ technology is devoted to the responsible re-use of agricultural byproducts, extracting(exa) phenolic(phen) resins from biomasses while retaining the special properties which nature has already engineered. The unique chemical structure gives our resins a high degree of formulation versatility, enhanced moisture absorption and flame resistance, low exothermic reactions, lower density and increased dimensional stability.

ExaPhen™ has been pioneered by Composite Technical Services.
General Properties

- High Dimensional Stability
- Low exotherm
- Increased flame and temperature resistance
- Excellent adhesion to most substrates from minus °C
- Low Density
- Lambda from 0.22 mW/msq
- Increased moisture absorption
- High miscibility with traditional polyols, isocyanates, surfactants, catalysts, and blowing agents
- Wide range of formulations
- High Bio-content

<table>
<thead>
<tr>
<th></th>
<th>Aromatic Multifunctional</th>
<th>Mannich</th>
<th>Specialty</th>
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<tbody>
<tr>
<td><strong>Physical-Chemical</strong></td>
<td><strong>PolyCard XFN50</strong></td>
<td><strong>PolyCard XFN 53</strong></td>
<td><strong>PolyCard XFN 150M</strong></td>
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<tr>
<td><strong>Colour</strong></td>
<td>Amber</td>
<td></td>
<td></td>
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<tr>
<td><strong>Hydroxyl Value (mg KOH/g)</strong></td>
<td>175—190</td>
<td>175—190</td>
<td>510—540</td>
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<tr>
<td><strong>Functionality</strong></td>
<td>4—5</td>
<td>6—8</td>
<td>3</td>
</tr>
<tr>
<td><strong>Viscosity 25°C (cps)</strong></td>
<td>900—1,300</td>
<td>30,000—40,000</td>
<td>5,000—8,000</td>
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<tr>
<td><strong>Density (g/ml)</strong></td>
<td>0.95</td>
<td>0.99</td>
<td>1.04</td>
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<tr>
<td><strong>Water Content (%)</strong></td>
<td>&lt;0.1</td>
<td></td>
<td></td>
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<tr>
<td><strong>Bio-Content (%)</strong></td>
<td>95</td>
<td>95</td>
<td>73</td>
</tr>
<tr>
<td><strong>Global Warming Potential (kg CO2/kg)</strong></td>
<td>-5.8</td>
<td>-5.6</td>
<td>-3.1</td>
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1 Biobased Determination using C-14 test ASTM-D6866-08. *CALCULATED
2 GWP is the total amount of equivalents of Carbon Dioxide released. Determined through a cradle to gate LCA following ISO 14040 Series Standards.
Case Studies

Spray Foam for Walls Insulation

Polycard XFN50 and XFN53 [ratio 1:0.26]
Polyether-Polyol | Halogenated polyether-polyol.
Blowing Agent | TCPP | Catalysts (tin-based and tertiary amine).
Cream time: 5—7 sec
String time: 22—24 sec
Specific Gravity (Part B): 1103 g/l
Density (sprayed): 45—48 kg/m³

Improvement in mechanical, & Bio properties:
Compressive strength at yield: 350 KPa (107 KPa, ↑44%)
Dimension Stability:
0.0 at -20°C / 0.7 at 90°C
Water Absorption:
0.037
Foam Bio-content:
20.5% (calculated)
Case Studies

Spray Pipe insulation Polycard XFN-150

40 parts Polycard XFN-150 | 60 parts polyether-polyol/glycerol-based polyols.
10—20 parts phosphate ester flame retardant | 1.5—25 parts water 3—5 parts catalyst (tin-based and tertiary amine) | 10—14 parts blowing agent.

Cream time:
4—7 sec

String time:
12—18 sec

Density (sprayed):
56 kg/m³

Density (free rising):
35 kg/m³

Improvement in mechanical, FR & Bio properties:

Compressive strength at yield:
392.3± 3.86 KPa (0.4 MPa) (↑ 24%)

Strain at yield:
3.7±0.5 (↓ 32%)

Modulus:
11.66±1.82 MPa (12 MPa) (↑ 25%)

FR Test DIN4102:
B1(difficult to ignite/often self extinguishing)

Foam Bio-content:
13.5% (calculated)

DIN4102/BS 476

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XFN-150 formulation

Original formulation
High Functionality Aromatic Polyols
XFN 50 is a medium viscosity polyol with a functionality of 4 that can replace aromatic polyether and polyester polyols. It is recommended for both PIR and PUR rigid foams.
XFN 53 is a high viscosity, high functionality polyol that can be used as an additive for increased flame resistance, dimensional stability and low exothermic release in rigid foam formulations.

Mannich Amine Polyols
XFN 150 is bio renewable version of the common 530-OH# mannich. Designed primarily for spray foam formulation, it offers very fast cream time and improved cell structure, thanks to its surfactant effect. Improves fire-resistance and compressive strength.
Features a high degree of moisture resistance and is especially for 2k foam system. XFN 425 is a replacement with lower viscosity and OH# of the 150 mannich.
Other uses include amine catalyst replacement in urethane formulations.

Specialty Polyols
XFN 10 is a polyol surfactant/plasticizing with an aromatic content of about 30%.
The XFN 10 is used primarily for PIR applications for thermal insulation thanks to its plasticizing effect. Benefits are: enhanced water resistance and low brittleness.
A plus is its very high Bio-Content.
Elmira Industrial Supplies U.G.
2 Charlottenstraße, The RainMaking Loft 10969, Berlin, Germany
Office: +44(0)2032899494
Mobile: +4915218701699
www.exaphen.com
sales@elmirasupplies.com