Sustainable Foaming Solutions for the FOOTWEAR INDUSTRY
ALVE-ONE® SOLUTIONS FOR THE FOOTWEAR INDUSTRY

ALVE-ONE® SOLUTIONS CHARACTERISTICS

<table>
<thead>
<tr>
<th>Chemical composition</th>
<th>Mineral based, endothermic decomposition</th>
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<tbody>
<tr>
<td>Physical form</td>
<td>Powder, Masterbatch</td>
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<tr>
<td>Resins</td>
<td>Elastomers, linear &amp; crosslinked Polyolefins, rigid &amp; flexible PVC, Rubber</td>
</tr>
<tr>
<td>Granulometry range</td>
<td>Adapted to your process: From 5 µm to 50 µm</td>
</tr>
<tr>
<td>Processing temperature range</td>
<td>Adapted to your process: From 140 °C to 210 °C</td>
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<tr>
<td>Packaging</td>
<td>Supporting your needs</td>
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</tbody>
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LIGHTWEIGHT WITHOUT COMPROMISING ON SUSTAINABILITY

Alve-One® foaming agent solutions are based exclusively on safe raw materials combinations, 100% compliant with REACH regulations, and deliver efficient foaming results:

- **Expansion ratio**
  - Foamed with ADCA: 3.0
  - Foamed with Alve-One® products: 3.0
- **Foam density**
  - Foamed with ADCA: 0.33
  - Foamed with Alve-One® products: 0.33

Fig 2. Characteristics comparison of two crosslinked EVA foams formed with ADCA & Alve-One® solutions

Under the same process conditions, Alve-One® solutions are at least as efficient as the market reference for density reduction & expansion ratio.

Under the same process conditions, the cellular structure of both foams is comparable with similar average cell size.

Fig 3. Cross-linked EVA foam structures

Images obtained with SEM (Scanning electron Microscopy)

A READY-TO-USE FOAM

When foamed with Alve-One® solutions, products do not emit any pungent gas smell (ammonia) and contain negligible quantities of VOC (volatile organic compounds). These foamed products can thus be used or sold right after their production.

Foams manufactured with Alve-One® blowing agent solutions do not emit ammonia.

Fig 4. Gas emitted by crosslinked EVA foams when manufactured using Alve-One® products and ADCA

Chromatography obtained with a GC-MS
USING ALVE-ONE® SOLUTIONS TO FURTHER OPTIMIZE CUSTOMERS’ FORMULATIONS AND PRODUCTION PROCESSES

While Alve-One® solutions can replace the foaming agent used in customers’ formulation without adaptation, the formulation can also be optimized to achieve additional benefits.

<table>
<thead>
<tr>
<th></th>
<th>Temp. (°C)</th>
<th>Time (min)</th>
<th>Foam density (g/cm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOT OPTIMIZED FORMULATION</td>
<td>180*</td>
<td>7*</td>
<td>0.24</td>
</tr>
<tr>
<td>OPTIMIZED FORMULATION</td>
<td>175</td>
<td>5</td>
<td>0.21</td>
</tr>
</tbody>
</table>

*Reference process conditions for Azodicarbonamide

**Fig 5. Comparison of crosslinked EVA foam formulations foamed with Alve-One® products in customer’s mold**

- Alve-One® products do not require kickers to be activated meaning less raw materials are needed while often also achieving improved density reduction & expansion ratio (Fig 6.).

- With a more efficient kinetic process than the market reference’s, Alve-One® solutions can reduce cycle times, leading to potential savings and higher outputs.

**Fig 6. Crosslinked EVA formulation foamed using ADCA with kickers versus Alve-One® product without kickers.**

**Fig 7. Evolution of crosslinked EVA foams’ density during the manufacturing process when using ADCA and Alve-One® products.**

Alve-One® foaming agent solutions, bringing more value for your footwear foamed applications

- Matching the technical performances of the market reference with a cost-competitive solution
- Enhancing sustainability performance for footwear products with a compliant and safe foaming agent
- Simplifying logistics through a safe-to-use foaming agent, delivering foams containing no odor
- Improving competitiveness by optimizing formulations or manufacture processes (if desired)
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Users are responsible for ensuring compliance with local legislation and for obtaining the necessary certifications and authorizations.