Introduction to AsahiKlin AE-3000 Fluorinated Solvents
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• What is Precision Cleaning?
• What is Vapor Degreasing?
• Solvent vs. Aqueous Cleaning
• AE-3000 Products and Specifications
• Industries and Applications
Definition:
Cleaning to very exacting standards, with a very low tolerance for leftover particles or other contaminants. Cleaning agents that leave no residue of their own (NVR). The electronics and aerospace industries commonly use precision cleaning techniques to ensure reliable performance from critical components.\(^{(1)}\)
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What is Vapor Degreasing?

- Solvent cleaning procedure for removing soluble contamination or oils from a variety of metallic and nonmetallic parts.
- Parts are suspended in solvent vapor for the removal of oils and greases.
Vapor Degreasing

Ultronix vapor degreaser

Ultrasonics in the rinse sump

- Cooling condenser coils
- Boil sump
- Spray wand

Your Dreams, Our Challenge
Vapor Degreasing

- Freeboard Chiller Coils
- Primary Condensing Coils
- Super Heat Coils
- Vapors
- Boil Sump
- Rinse Sump
- Distillation through
- Primary Water Separator
- Solvent Condensate Return Loop
- Filter
- Pump
- Water to drain or treatment

Heaters
Ultrasonic Transducers

Your Dreams, Our Challenge
Advantages of Fluorinated Solvents

- Low drying time
- Low/no residue
- Low energy use
- Low surface tension
- Low viscosity
- High density
- Nonflammable
- Flammability suppression: Can be blended with flammable solvents
- Compatibility with plastics and elastomers
- Selective solvency
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Disadvantages of Aqueous Cleaning

- High energy consumption
- Water heating and parts drying
- Chemical costs
- Rinsing difficulties
  - Residue and water spots
- Waste water removal/treatment
- Equipment costs (cleaning and drying)
- Algae, mold and bacteria growth formation
1,1,2,2-Tetrafluoroethyl-2,2,2-Trifluoroethyl Ether
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Introduction to AE-3000 Products

• Environmentally sensible HFE designed to replace CFC, HCFCs, HFC, PFC, nPB, TCE, PCE, other solvents with high ODP and GWP
• Alternative to flammable solvents
• Energy-efficient alternative to aqueous processes
• It has selective solvency, low viscosity and low surface tension, and forms azeotropes
• Ideal for general and precision cleaning
• Acts as a coolant and as a carrier for silicone and halogenated lubricants
## AE-3000 Physical Properties

<table>
<thead>
<tr>
<th>Composition</th>
<th>AE-3000</th>
<th>AE-3000 ATE</th>
<th>AE-3000 AT</th>
<th>AE-3100 E</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Composition</strong></td>
<td>HFE (100%)</td>
<td>HFE (43% – 52%)</td>
<td>HFE (43% – 52%)</td>
<td>HFE (92.5% – 96.5%)</td>
</tr>
<tr>
<td>Boiling Point (°C)</td>
<td>56</td>
<td>42</td>
<td>38</td>
<td>54</td>
</tr>
<tr>
<td>Freezing Point (°C)</td>
<td>-94</td>
<td>-50</td>
<td>-49.3</td>
<td>-86</td>
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<tr>
<td>Specific Gravity</td>
<td>1.48</td>
<td>1.35</td>
<td>1.36</td>
<td>1.40</td>
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<tr>
<td>ODP (CFC-11=1)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>GWP (100-year ITH)</td>
<td>580</td>
<td>257</td>
<td>268</td>
<td>580</td>
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<tr>
<td>KB Value</td>
<td>13</td>
<td>38</td>
<td>32</td>
<td>14</td>
</tr>
<tr>
<td>Surface Tension (dyne/cm, 25 °C)</td>
<td>16.4</td>
<td>18</td>
<td>18</td>
<td>16.1</td>
</tr>
<tr>
<td>Latent Heat of Vaporization (KJ/kg, 39 °C)</td>
<td>163</td>
<td>200</td>
<td>185</td>
<td>187</td>
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</tbody>
</table>
### AE-3000 Products & Packaging

<table>
<thead>
<tr>
<th>AE-3000</th>
<th>AE-3100 E</th>
<th>AE-3000 ATE</th>
<th>AE-3000 AT</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 kg pail</td>
<td>20 kg pail</td>
<td>20 kg pail</td>
<td>20 kg pail</td>
</tr>
<tr>
<td>300 kg drum</td>
<td>250 kg drum</td>
<td>250 kg drum</td>
<td>250 kg drum</td>
</tr>
</tbody>
</table>

1 kg samples available upon request
AE-3000 Solvent Products Benefits

- Nonflammable
- Noncorrosive
- Low GWP
- Zero ODP
- Excellent thermal, chemical and hydrolytic stability
- Low surface tension, low viscosity, high liquid density

- Superior drying property
- Excellent permeability
- Recyclable
- Recoverable by simple distillation
- Can be used with ultrasonics
- No surfactants necessary
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• Defluxing of electronics, electrical components and printed wiring assemblies
• Precision cleaning of metals, alloys, composites and plastics
• Drying agent after cleaning with aqueous solutions, hydrocarbons or alcohols
• Drying after wet plating and for carbide metal before coating
• Particle removal
• Replacement for HCFC, Dupont™ Vertrel® and 3M™ Novec™ solvents
For more information, contact one of our fluorosolvent experts at 800-424-7833