The ASAHIKLIN series are environmentally friendly Fluorinated Fluids.

**AGC Chemicals company vision**

Chemistry for a Blue Planet
Creating safe, secure, comfortable and environmentally friendly world with chemical technology.

The ASAHIKLIN series meet AGC Chemicals company vision.

**Chemistry for a Blue Planet**

Creating safe, secure, comfortable and environmentally friendly world with chemical technology.

**Nonflammable**
The ASAHIKLIN series have no flash point, thus does not require explosion proof equipment.

**Stable**
The ASAHIKLIN series are chemically and thermally stable.

**General-Purpose**
The ASAHIKLIN series can be used for a variety of customer applications.

**Reliability**
The ASAHIKLIN series have a broad range of material compatibilities.

**Cost-saving**
The ASAHIKLIN series have energy saving advantages and can reduce waste.

**ODP zero**
The ASAHIKLIN series don’t affect the Ozone Layers.

**Lower GWP**
The ASAHIKLIN series have minimum Global Warming.

**Recyclable**
The ASAHIKLIN series can be recycled with distillation.

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### ASAHIKLIN Product Offerings

<table>
<thead>
<tr>
<th><strong>ASAHIKLIN AE-3000</strong></th>
<th>AE-3000</th>
<th>AC-2000</th>
<th>AC-6000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ASIRAE No.</strong></td>
<td>HFE-347pc-f</td>
<td>HFC-52-13p</td>
<td>HFC-76-13f</td>
</tr>
<tr>
<td><strong>Molecule Structure</strong></td>
<td>CF3CH2OCF2CF2H</td>
<td>CF2CF2CF4</td>
<td>CF2CF3OCF2CH2</td>
</tr>
<tr>
<td><strong>Boiling Point (°C)</strong></td>
<td>56</td>
<td>71</td>
<td>115</td>
</tr>
<tr>
<td><strong>Freezing Point (°C)</strong></td>
<td>-04</td>
<td>-80</td>
<td>-76</td>
</tr>
<tr>
<td><strong>Ozone Depletion Potential</strong></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Global Warming Potential</strong></td>
<td>580 □*1</td>
<td>2,000 □*2</td>
<td>136 □*2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Package</strong></th>
<th>1kg Plastic Bottle</th>
<th>20kg Pail</th>
<th>300kg Drum</th>
</tr>
</thead>
</table>

□*1 Intergovernmental Panel on Climate/technology & Economic Assessment Panel Report in 2007  
□*2 Calculated Value by the National Institute of Advanced Industrial Science and Technology (AIST)  
□*3 ODP – Ozone Depletion Potential  
□*4 GWP – Global Warming Potential  
□*5 ITH – 100yr Global Warming Potential
ASAHIKLIN

Liquid Temperature Range of the ASAHIKLIN series

- Specific Heat - Temperature Curve
- Kinematic Viscosity - Temperature Curve
- Density - Temperature Curve
- Vapor Pressure - Temperature Curve

Heat Transfer Fluids
- Liquid at a wide temperature range
- Thermally and Chemically stable
- High unit heat transportation capacity
- High Electrical Insulation
- Nonflammable
- Reduced pump load

Solvents
- Good coating performance
- Good drying performance
- Good dispersibility
- Nonflammable

Dilution Solvents
- Lubricant for HDDs
- Fluorinated Greases
- Water-Repellant Agents
- Antifouling Agents

Dispersion Agents and others
- Fluoropolymers
- Graphite, Nano-Carbons
- Fireproof Agent
- Reaction Solvent for Fluoropolymers

Other Brines
- Coolant for Computer Server, Condenser, Sensor, Precision and Electronics Devices
- Coolant for Chemical and Medical industrial Equipment
- Temperature control for environmental room
- Heat Transfer Fluid for Thermostat Chamber

Other Applications
- Working Fluid for Heat Pipes
- Coolant for Rectifier, LED and Laser Generator
- Leak Tester for Filter, Bulb
- Reliability test for Electronics

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Application 1

Application 2

Brine for Semiconductor Devices
- Examples
  - Dry Etching Equipment
  - Stepper
  - Plotter
  - CVD Lithography
  - IC Tester

Working Fluids
- Examples
  - Working Fluid for Heat Pipes
  - Coolant for Rectifier, LED and Laser Generator

Specific Heat × Density × Heat Transfer Ratio

- AE-3000
- AC-2000
- AC-6000

Water

Specific Heat - Temperature Curve

Heat Transfer Ratio

Vapor Pressure - Temperature Curve

Density - Temperature Curve
**Application 3**

**Cleaning**
- Good cleaning performance in tight spaces
- Reduced drying temperature and drying time
- No spots after drying
- Broad range of material compatibilities
- Nonflammable

**Co-Solvent**
- Dewatering
- Alcohol Drying

**Neat Cleaning**
- [Examples]
  - Particle Removal (Image sensors, Crystal Oscillator Devices, Wafers, Plastic Molds)
  - Cleaning for Refrigeration Cycle
  - Cleaning for Fluorinated Oils and Greases
  - Dry Cleaning

**Dewatering, Alcohol Drying**
- [Examples]
  - Drying after Aqueous Cleaning (Glass Lens, Glass Substrates, Quartz)
  - Drying after Wet Plating
  - Drying for Carbide Metal before coating

---

**Physical Properties**

<table>
<thead>
<tr>
<th>Items</th>
<th>Unit</th>
<th>AE-3000</th>
<th>AE-3100E</th>
<th>AC-2000</th>
<th>AC-6000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling Point</td>
<td>°C</td>
<td>56</td>
<td>54</td>
<td>71</td>
<td>115</td>
</tr>
<tr>
<td>Freezing Point</td>
<td>°C</td>
<td>-29</td>
<td>-48</td>
<td>-45</td>
<td>-29</td>
</tr>
<tr>
<td>Density (25°C)</td>
<td>kg/l</td>
<td>1.470</td>
<td>1.400</td>
<td>1.675</td>
<td>1.506</td>
</tr>
<tr>
<td>Surface Tension (25°C)</td>
<td>mN/m</td>
<td>16.4</td>
<td>16.1</td>
<td>13.4</td>
<td>15.5</td>
</tr>
<tr>
<td>Viscosity (25°C)</td>
<td>mPa·s</td>
<td>0.65</td>
<td>0.60</td>
<td>0.81</td>
<td>1.08</td>
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<tr>
<td>Kinematic Viscosity (25°C)</td>
<td>μf/s</td>
<td>0.44</td>
<td>—</td>
<td>0.49</td>
<td>0.71</td>
</tr>
<tr>
<td>Weight Change</td>
<td>g/m³</td>
<td>1.28</td>
<td>—</td>
<td>1.10</td>
<td>1.19</td>
</tr>
<tr>
<td>Thermal Conductivity (25°C)</td>
<td>mW/(m·K)</td>
<td>89</td>
<td>—</td>
<td>90.9</td>
<td>66.8</td>
</tr>
<tr>
<td>Latent Heat of Vaporization (boiling point)</td>
<td>kJ/kg</td>
<td>163</td>
<td>—</td>
<td>123</td>
<td>76</td>
</tr>
<tr>
<td>Relative Evaporation Rate</td>
<td>Ether 100%</td>
<td>67</td>
<td>66</td>
<td>57</td>
<td>11</td>
</tr>
<tr>
<td>Critical Temperature</td>
<td>°C</td>
<td>190</td>
<td>—</td>
<td>198</td>
<td>245</td>
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<td>Critical Pressure</td>
<td>MPa</td>
<td>2.7</td>
<td>—</td>
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<tr>
<td>Solubility of Water</td>
<td>ppm</td>
<td>900</td>
<td>5,300</td>
<td>200</td>
<td>10</td>
</tr>
<tr>
<td>Solubility in Water</td>
<td>ppm</td>
<td>700</td>
<td>—</td>
<td>—</td>
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<tr>
<td>Flash Point</td>
<td>°C</td>
<td>—</td>
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<td>—</td>
<td>—</td>
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<tr>
<td>Range of Inflammability</td>
<td>%</td>
<td>—</td>
<td>—</td>
<td>—</td>
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<td>Dielectric Constant (25°C)</td>
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<td>3.3</td>
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<td>Electrical Resistivity</td>
<td>Ω·m</td>
<td>1.3×10¹⁰</td>
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<td>3.4×10¹⁰</td>
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<td>Electrical Conductivity (21°C)</td>
<td>μS/m</td>
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<td>kV</td>
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- [Examples]
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  - Drying after Wet Plating
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**Material Compatibility**

**Effect for Metals**
No detrimental effects are found when cleaning Stainless Steel, Aluminum, Copper, Brass or other metals with ASAHIKLIN series.

**Effect for Plastics and Elastomers**
Samples were immersed for 3 days into AE-3000, AE-3100E, AC-2000 at boiling point, and into AC-6000 at 50℃.

**Effect for Solvents**

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