UpTime® Sub-Atmospheric Delivery System
A safe, cost-effective dopant gas delivery system for ion implanters

Increase productivity with the UpTime® delivery system - OEM qualified and production proven

The UpTime® sub-atmospheric dopant gas delivery system is designed as an alternative to existing adsorbent-based technology used in ion implanters. Compared to the existing technology, the UpTime system offers industry leading product capacity, higher product purity and a lower cost of ownership.

The UpTime system is comprised of an internal vacuum actuated valve in series with a specially designed internal flow restrictor. The UpTime device is designed for safety, with two different types of safeguards: a mechanical actuator and a flow restrictor.

UpTime Product Family
• Enriched $^{72}$Germanium Tetrafluoride
• Germanium Tetrafluoride
• Silicon Tetrafluoride
• Arsine
• Phosphine
• Isotopically Enriched $^{11}$Boron Trifluoride.*

Features
• Sub-atmospheric delivery
• Internal flow restrictor limits flow to 20 sccm
• SEMI® S2 and S8 compliant
• Highest equivalent-cylinder product capacity
• High product utilization
• Robust safety features
• Ultra-high purity gas

Dual-port cylinder valve
Tamper-resistant fill valve and port
1/4" VCR outlet port
Excess pressure valve
TPED/DOT certified compressed gas cylinder

Enriched $^{72}$Germanium Tetrafluoride ($^{72}$GeF$_4$)
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Enabling next-generation technology
Praxair specializes in developing high performance and cost-effective products to serve next-generation semiconductor manufacturing.

About Praxair
Praxair is dedicated to helping semiconductor manufacturers lower costs, improve productivity, enhance technology and reduce environmental impact by serving as a single, integrated source for a variety of process gases, materials, and related equipment and services.

Praxair’s commitment to materials science and gas technology includes:

Process Consumables
• Ultra-high purity semiconductor process gases
• Sputtering targets
• ALD/CVD precursors

Fab Infrastructure and Services
• Bulk and on-site gas production
• Analytical systems and services
• Process gas delivery systems
• Total gas and chemical management services
• Integrated supply chain management services

Enriched $^{72}$Germanium Tetrafluoride ($^{72}$GeF$_4$) Specification, 4.0 grade
• Liquid vapor pressure 205 psig
• Internal flow restrictor limits flow to 51 sccm

Component Value (ppm)

<table>
<thead>
<tr>
<th>Component</th>
<th>Value (ppm)</th>
</tr>
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<tbody>
<tr>
<td>Germanium-72</td>
<td>&gt;50% to</td>
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<tr>
<td>Isotopic Enrichment</td>
<td>&lt;52%</td>
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<tr>
<td>Argon + Oxygen</td>
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</tr>
<tr>
<td>Carbon Dioxide</td>
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</tr>
<tr>
<td>Carbon Monoxide</td>
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</tr>
<tr>
<td>Nitrogen</td>
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</tr>
<tr>
<td>Sulfur Dioxide</td>
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</tbody>
</table>

Shelf life: 24 months

Gas Stick Recommendations
• 1/4” FVCR cylinder connection
• Vacuum required at cylinder connection between 100 and 610 torr
• Low pressure transducer (ideally 0-1000 torr range)
• Vacuum pressure mass flow controller
• Normally closed pneumatic isolation valve suitable for ≥205 psig service that automatically closes if pressure exceeds working pressure of low-pressure components
• All components not protected by an isolation valve are suitable for ≥205 psig service

Gas Box Recommendations
• Toxic gas monitoring of the gas box exhaust
• Gas box exhaust interlocked and abated

Cylinder Specification

<table>
<thead>
<tr>
<th>Cylinder Size</th>
<th>Overall Height</th>
<th>Height to Connection</th>
<th>Cylinder Body Height</th>
<th>Diameter</th>
<th>Content Fill Weight</th>
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<tbody>
<tr>
<td>UT-5</td>
<td>18.0”</td>
<td>15.3”</td>
<td>13.25”</td>
<td>4.4”</td>
<td>150g</td>
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<td>457mm</td>
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