



**Krytox™**

Performance Lubricants

# Performance Under Pressure:

Krytox™ High-Performance Lubricants Play a  
Critical Role in Semiconductor Fabrication



**Chemours™**

The semiconductor industry is undergoing a dynamic transformation, with projections of hitting the \$1 trillion mark by as early as 2030.<sup>1</sup> The increasing demand for more powerful chips and record levels of investment, brought on by the adoption of AI and advanced connectivity, brings with it new challenges in chip manufacturing. How can device makers maximize chip yields while improving performance and preventing contamination? The stringent manufacturing requirements demand the ultimate reliability in processing equipment, which in turn, relies heavily on high-performance materials such as Chemours™ Krytox™ high-performance oils and greases.

### Chemours Unique Capabilities:

**Specialty portfolio:** 180+ PFPE oil and grease formulations ranging from general purpose lubricants to small batch specialty fluids

**Rapid innovation:** Subject matter expertise to support rapidly evolving application requirements

**World-class technical support:** Application specific testing, failure analysis, and tribology lab expertise

**Global presence:** Established global presence with extensive network of global technical sites, sales, and tech service

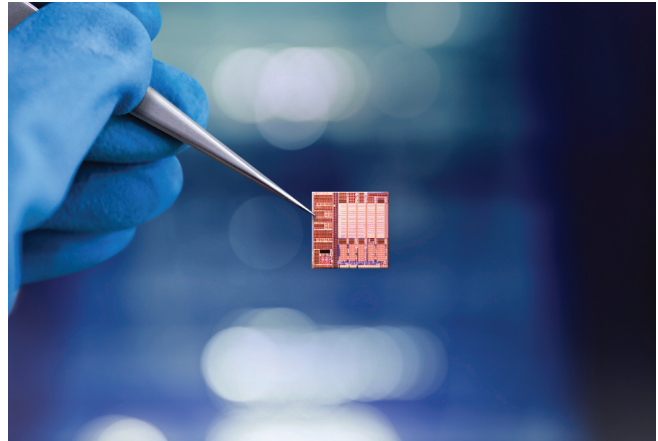
**Supply security:** Backward integrated supply chain

### Proper Lubrication Selection is a Make-or-Break Decision

In an industry in which downtime is costly and productivity is pushed to the limits, equipment reliability is crucial for enabling high chip yields. From essential vacuum pumps to robotic systems that are used to accurately position wafers during critical process steps—proper lubrication is a key component of equipment reliability.

With the multitude of reactive chemicals used across the semiconductor manufacturing process, the

**High-performance Krytox™ lubricants are trusted throughout the semiconductor manufacturing process with a proven track record of extreme temperature performance and low outgassing.**



near-universal chemical compatibility of Krytox™ high-performance lubricants ensures the reliability of critical wafer handling components.

### Krytox™ High-Performing Lubricants Offer the Ideal Solution

Krytox™ high-performance oils and greases are specifically designed to achieve exceptional performance across a wide range of applications; capable of withstanding the harsh environments found throughout the semiconductor manufacturing process:

**Chemically Inert / Non-Reactive:** Among the most chemically resistant lubricants on the market and are 100% oxygen safe, non-flammable, and cannot form tars, lacquers, or sludges

**Material Compatibility:** Compatible with all common elastomers and polymers used in semiconductor manufacturing environments containing strong acids, oxidizers, caustics, reactive gas radicals, pyrophoric gases, and more

**Temperature Stability:** Performance and protection in extreme environments and operating temperatures from -70°C to +400°C, with vapor pressures as low as  $1 \times 10^{-13}$  mmHg at 20°C (wide temperature envelope)

**Low Outgassing:** Best-in-class performance in semiconductor applications and trusted by military and aerospace industries for applications where outgassing performance is mission-critical

**Broad Application Range:** Widely used by the semiconductor industry across various process tools used in CVD, diffusion, etch, ion implantation, and lithography

<sup>1</sup> Source: IDC report issued in December 2023 to Semiconductor Industrial Association (SIA)

## Unparalleled Benefits Through Every Step of the Semiconductor Manufacturing Process

Because these versatile lubricants can withstand extreme temperatures and pressures, reduce contaminants and outgassing, and are safe for handling, Krytox™ high-performance oils and greases can be used effectively throughout the entire semiconductor manufacturing process.

Krytox™ multi-purpose, high-temperature, anti-corrosion lubricants (greases, oils, and vacuum pump fluids) are used in a variety of production line processes, including:

- Photolithography
- Etching
- Deposition
- PCB Assembly

## Delivering Exceptional Performance in Key Applications

Major vacuum pump manufacturers and OEM suppliers rely on the performance of Krytox™ lubricants across a wide range of applications. Krytox™ high-performance oils and greases deliver a unique combination of unparalleled properties in the most stringent environments, enabling consistent performance and increased uptime of process tools.

Krytox™ lubricants are used throughout the semiconductor manufacturing process and are compatible in a wide range of chemicals such as acids, oxidizers, caustics, reactive gas radicals, and pyrophoric gases. Applications range from vacuum pumps to other components like bearings, valves, seals, O-rings, chains, compressors, gear boxes, linear guides and ball screws, and mechanical pumps. A selection of Krytox™ products used in the semiconductor industry include but are not limited to:

Krytox™ Greases <sup>1</sup>				
Product	Estimated Useful Range, °C (°F)	Base Oil Viscosity, cSt at 40°C (104°F)	Vapor Pressure, Torr	ASTM E595 <sup>2</sup>
Krytox™ 240 AA	-51 to 177 (-60 to 350)	33	1 x 10 <sup>-4</sup> mmHg at 38°C (100°F)	—
Krytox™ 240 AB	-40 to 232 (-40 to 450)	76	5 x 10 <sup>-6</sup> mmHg at 38°C (100°F)	—
Krytox™ EG 2000	-34 to 288 (-30 to 550)	240	8 x 10 <sup>-8</sup> mmHg at 38°C (100°F)	Pass
Krytox™ EG 3000	-29 to 316 (-20 to 550+)	440	6 x 10 <sup>-9</sup> mmHg at 38°C (100°F)	Pass
Krytox™ LVP	-15 to 300 (5 to 572)	749	1 x 10 <sup>-13</sup> mmHg at 20°C (68°F)	Pass
Krytox™ XHT-BD	300 to 400 (572 to 752)	599	≤1 x 10 <sup>-9</sup> mmHg at 20°C (68°F)	Pass
Krytox™ XHT-BDX	300 to 400 (572 to 752)	738	≤3 x 10 <sup>-14</sup> mmHg at 20°C (68°F)	Pass
Krytox™ XHT-BDZ	300 to 400 (572 to 752)	1023	≤4 x 10 <sup>-15</sup> mmHg at 20°C (68°F)	Pass

Krytox™ Vacuum and Clean Room Oils <sup>1</sup>			
Product	Estimated Useful Range, °C (°F)	Base Oil Viscosity, cSt	Vapor Pressure, Torr
Krytox™ VPF 1525	TBD	250 at 20°C (68°F)	1 x 10 <sup>-7</sup> mmHg at 20°C (68°F)
Krytox™ VPF 1531	TBD	310 at 20°C (68°F)	1 x 10 <sup>-7</sup> mmHg at 20°C (68°F)
Krytox™ XHT-500	-20 to 300 (-4 to 572)	500 at 40°C (104°F)	≤1 x 10 <sup>-9</sup> mmHg at 20°C (68°F)
Krytox™ XHT-750	-15 to 350 (5 to 662)	738 at 40°C (104°F)	≤3 x 10 <sup>-14</sup> mmHg at 20°C (68°F)
Krytox™ XHT-1000	-5 to 360 (23 to 680)	1023 at 40°C (104°F)	≤4 x 10 <sup>-15</sup> mmHg at 20°C (68°F)

<sup>1</sup>Note: These values are typical properties and not specifications.

<sup>2</sup>E595 criteria to pass is <1% for Total Mass Loss and <0.1% for Collected Volatile Condensable Material.

Please contact us at <https://www.krytox.com/en/contact> to connect with our technical service team or visit [Krytox.com](https://www.krytox.com) to learn more about our offerings.

## Chemours Remains Steadfastly Committed to Sustainability and Responsible Manufacturing

At Chemours, we realize our products play a critical role in our daily lives, the global economy, and a better future for our world. That's why the protection of the planet and everyone on it is one of our core values. By providing longer-lasting lubrication, our products lower the frequency of lubrication, reducing the use of materials and waste—important steps in helping to reduce product impact on the planet. In addition to improving product impact, we're working to reduce production impact on the planet through responsible manufacturing. We take a holistic, environmental approach to the invention,

production and use of these high-performance materials that are essential to societal advancement. We have set aggressive emissions reduction targets and, as of the end of 2023, have already achieved a 52% reduction in Scope 1 & 2 greenhouse gas emissions on a path to net-zero by 2050. Beyond emission reduction, we strive to enrich the communities we serve and call home. Our Krytox™ manufacturing site is Gold Certified by the Wildlife Habitat Council and contains a pollinator garden, nature trails used as field classrooms by local elementary schools, and is home to over 175 bird species. The site actively engages with the local community through the Community Advisory Panel and ChemFEST, our middle school partnership program.

Krytox™ Performance Lubricants have properties that reduce impact on the environment:

- Krytox™ products are fully synthetic—not petroleum-based—and unlike other lubricants, at temperatures under 350°C (662°F), Krytox™ oil does not oxidize.
- Krytox™ oils and greases are not considered hazardous as manufactured under the U.S. EPA Resource and Recovery Conservation Act guidelines. However, treatment, storage, transportation, recycling, and disposal of these products must be in accordance with applicable federal, state/provincial, and local regulations.
- By providing longer-lasting performance, Krytox™ lubricants lower the frequency of lubrication, reducing the use of materials and waste—important steps in helping to reduce product impact on the planet.

## We Believe in the Power of Chemistry

At Chemours, we create collaborative relationships. Our priority is to help you meet and exceed your goals by delivering exceptional products, dedicated service, and innovative solutions that make a positive impact on the industry, the community, and the world around us.

To learn more about Krytox™ high-performance lubricants for the semiconductor industry, please visit <https://www.krytox.com/en/industries/electronics-semiconductors>.

To find out more about the Chemours commitment to sustainability and how our advanced performance materials can help you meet and exceed your goals, contact us today at <https://www.krytox.com/en/contact>.



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