

# Applied Seals N.A., Inc.

## Sealing Excellence that Drives Uptime and Reliability



Dalia Vernikovskiy,  
CEO

**A**re perfluoroelastomer (FFKM) seals the ideal solution for harsh semiconductor manufacturing environments? FFKM seals are widely adopted for their exceptional resistance to gases like nitrogen trifluoride and tetrafluoromethane, commonly used in plasma etching, ashing and deposition processes in semiconductor manufacturing. Despite their chemical durability, they remain susceptible to mechanical damage. In environments where even the slightest leak can compromise yield, effective sealing demands more than just chemical resistance.

Applied Seals N.A., Inc (ASNA) takes a fundamentally different approach to FFKM sealing. Rather than simply providing general-purpose FFKM parts, ASNA equips toolmakers and process engineers with deep engineering insights. It identifies what's truly needed, not just what's requested, and educates customers on how FFKMs behave under real-world thermal, chemical and mechanical stress.

"We don't just sell seals, we teach the science behind them. That's how we change the outcome," says Dalia Vernikovskiy, CEO.

### Engineering the Right Seal for Every Fab

ASNA Calculated Engineering (ACE®), its proprietary engineering platform, is designed to optimize the key conditions for reliable sealing performance. With ACE®, engineers can validate groove dimensions, environmental variables and hardware configurations to ensure proper fit and function.

Building on this foundation, ASNA employs realistic data-based on finite element analysis (FEA) to optimize seal performance by minimizing physical stresses, as well as surface exposure to heat and chemicals. Its world-class engineering team analyzes stress and strain across specific applications to recommend the most suitable compounds and custom geometries. This integrated, data-driven approach enhances sealing integrity, extends component lifespan and enables predictability of reliable performance under real fabrication facility (fab) conditions.

A cornerstone of ASNA's strategy is its proprietary PERFREZ® line of FFKM compounds, engineered specifically for the harshest semiconductor processes. PERFREZ® materials are optimized for high-energy plasma, thermal cycling and aggressive wet chemicals such as HF, SC1 and sulfuric acid. Their formulation offers exceptional erosion resistance and low particle shedding—key for protecting wafer integrity in ultra-clean environments. Combined with ASNA's precision molding capabilities, PERFREZ® seals retain their shape, resist compression set and maintain mechanical strength under the high-vacuum, high-temperature conditions, typically seen in most advanced semiconductor tools.

Developed under AS9100D, ISO 9001 and ISO 13485 certifications, PERFREZ® compounds are manufactured under tightly controlled, fully traceable processes to meet the demands of high-reliability applications. Each formulation undergoes rigorous validation, including plasma exposure testing with NF<sub>3</sub>, oxygen and other aggressive chemicals in fab-simulated conditions.

ASNA was among the first to treat the coefficient of thermal expansion (CTE) as a mechanical property, a critical factor in seal reliability during thermal cycling. Internal testing shows that ASNA materials consistently outperform competitors in thermal resilience, resulting in products with a lower risk of CTE-related seal failures such as extrusion. ASNA is also working to educate the industry that CTE values are one of the true key parameters that should be used for sealing solutions, as new guidelines (another area ASNA pushes as a leader in the industry) must be established for these special sealing elements.



This solution-driven mindset underscores ASNA's broader commitment to industry education. It offers customized training workshops that cover everything from proper seal installation techniques to plasma-induced failure mechanisms. The workshops are supplemented by whitepapers, webinars and best-known method (ASNA BKM®) guides that address critical, often-overlooked, factors like groove tolerances, torque specs and sealing parameters not found in ISO standards nor established for this industry.

"When people understand why failures happen, and the methodology is there to demonstrate them, they can finally prevent them," says Ms. Vernikovsky.

ASNA also plays a leadership role in defining industry standards that will work towards the concept of truly defining the right parameters, the methodology to measure them and tracking them for true defect mitigation. Dalia co-leads the SEMI SCIS committee alongside major chipmakers and OEMs, helping to establish benchmarks for sealing reliability.

### Zero-Defect Culture, Fab-Grade Results

ASNA's manufacturing excellence is deeply rooted in its parent company, GMORS, which has supported the aerospace and automotive industries since the 1980s. That heritage instills a zero-defect culture and high-precision tooling discipline into every ASNA product. While many FFKM suppliers overlook surface finish, ASNA understands its critical importance. For instance, the molds used to produce O-rings are finished to a 4 Ra  $\mu\text{m}$  surface roughness standard, which directly translates to superior sealing surfaces.

"The quality is inherently born into the process itself," says Ms. Vernikovsky. "Our mission isn't to defend quality but to help customers understand why it matters."

A commitment to quality goes well beyond the factory floor. When one of the world's largest chipmakers sought to audit sealing performance across a critical tool, they turned to ASNA. The team conducted a complete audit, mapping every seal's location and configuration, and provided optimized prototypes for each application.

Once deployed, ASNA conducted failure and finite element analyses to understand how each seal performed under real conditions. This analysis revealed which seals, like those in isolation

valves, were more likely to fail prematurely and which still had useful life. Based on those insights, the fab shifted from fixed preventive maintenance (PM) intervals to wear-based maintenance schedules.

This enabled the client to extend the life of seals farther from the chamber while minimizing defectivity in plasma- and RF-exposed seals. ASNA also introduced a practice change. Instead of automatically discarding all seals after PMs, the fab began reclaiming them for further analysis, boosting yield and efficiency. The result was a dramatic improvement in tool performance and cost savings.

"What sets us apart is our passion for delivering solutions grounded in deep technical expertise. We don't just meet industry standards - we aim to redefine them. Our most meaningful breakthroughs happen through our close partnerships with our customers, where collaboration drives innovation and performance to new levels" states Ryan Dulany, Global Sales Director of ASNA.

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### Future-Proofing Seals for Fab Innovation

Building on its commitment to reliability and reach, ASNA has expanded its manufacturing footprint. Its new production facility in Thailand improves lead times and availability for fabs across Southeast Asia while maintaining strict quality standards. This investment enhances global supply chain resilience without sacrificing precision.

The company is also expanding its R&D footprint by doubling the size of its design center in Fremont, California. The facility will accelerate material development, boost validation capabilities, and offer hands-on customer training in a fab-replicated environment. This investment aligns with ASNA's growing number of joint development programs with leading semiconductor OEMs. The collaborations ensure its materials remain fully compatible with future tool architectures, chamber designs and process conditions.

ASNA is equally proactive on the regulatory front. As scrutiny around PFAS and surfactants intensifies, it is developing reduced-surfactant FFKM formulations and helping clients understand what can be safely removed, without compromising performance. Few sealing providers combine this level of innovation with regulatory expertise.

In an industry where failure isn't an option and uptime is everything, ASNA is a partner delivering what's needed to ensure performance, prevent failure and prepare for what's next. 