

## PFOA-COMPLIANT REPLACEMENT GREASE

**INDUSTRY:**  
Semiconductor

**APPLICATION:**  
Wafer Handling Robotics

**COMPONENT:**  
Angular Contact Bearings

**LOCATION:**  
USA



### BACKGROUND

New environmental regulations surrounding perfluorooctanoic acid (PFOA) have led many engineers and manufacturers to reconsider the materials they source in every aspect of their design. Nye was approached by a leader in the production of state-of-the-art vacuum robots that are designed specifically for tool automation in semiconductor wafer processing and other complex manufacturing environments. The customer needed to replace a grease that was discontinued by the manufacturer due to its inability to meet REACH-PFOA requirements. They needed a compliant vacuum grease that would promote long bearing life and reduce downtime costs.

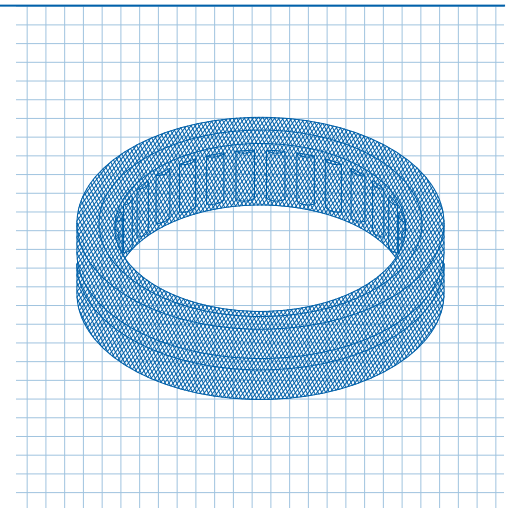
### CHALLENGE

- Can the replacement grease meet life 10 million cycle requirements under vacuum, high load, and high temperatures?

### SOLUTION NYECLEAN® 5057

A completely fluorinated grease thickened with PTFE formulated for vacuum environments.

- Complies with REACH PFOA regulations
- Offers minimal outgassing, particle generation, & vapor pressure
- High temperature serviceability up to 250 °C
- Reduces friction & wear
- Extends bearing life



### RESULTS

Nye formulated a new product for this customer, NyeClean® 5057. Nye provided the customer with validation data and on-demand technical support throughout the entire qualification process to prove that NyeClean® 5057 has performed as well or better than the competitor's product, with the additional benefit of NyeClean® 5057 being PFOA-compliant. After providing outgassing, vacuum stability, vapor pressure, and other test data and continuing to perform well as it quickly approaches the 10 million cycle target, NyeClean® 5057 was chosen as the customer's replacement grease. The grease has since generated interest from several bearing, linear guide, and ball screw/lead screw manufacturers, including those who supply the automotive and medical industries.

Base Oil Properties	Conditions	NyeClean® 5057	Test Method
Chemistry		PFPE / PTFE	
Temperature Range		-50 to 250 °C	
Kinematic Viscosity	40 °C	192 cSt	ASTM D445
	100 °C	35 cSt	
NLGI Grade	–	2	ASTM D1403
Oil Separation	24 h, 100 °C	6 wt%	ASTM D6184
Evaporation	24 h, 100 °C	0 wt%	CTM*
4-Ball Wear	1 h, 1200 rpm, 75 °C	20 kgf = 0.44 mm 40 kgf = 1.15 mm	ASTM D2266
Microscopic Particulate Contamination	10-34 µm 35+ µm	< 250 particles/mL 0 particles/mL	FED-STD-791 Method 3005.4
Knudsen Vapor Pressure	150 °C	1.24E-08 Torr	CTM*
	200 °C	2.66E-08 Torr	

\*CTM: Nye Company Test Method

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Nye Lubricants is a leader in the innovation, formulation and provision of synthetic lubricants, enabling and improving breakthrough products and critical new technologies. We bring proven experience, deep technical knowledge and customer focus to solve our customers' toughest challenges, adding tangible value to products in a wide range of industries and applications.

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