

NYETORR® 6350EL & 6370EL

PFPE ULTRA-HIGH-VACUUM AEROSPACE GREASES

The highest load-carrying and life-endurance performance
of any PFPE grease in the Aerospace Industry.





NYETORR® 6350EL & 6370EL

THE AEROSPACE INDUSTRY'S MOST ADVANCED SYNTHETIC PFPE GREASES

GRAPH KEY:



Heritage PFPE



NyeTorr® 6350EL



NyeTorr® 6370EL

Lubricating Space Mechanisms

Nye Lubricants has developed new PFPE ultra-high-vacuum greases, NyeTorr® 6350EL & 6370EL, for the Aerospace Industry. When compared with the top-performing PFPE lubricants on the market, NyeTorr® 6350EL & 6370EL demonstrate a significant improvement in friction, wear and durability, thus extending the life of bearings and other space mechanisms.

NyeTorr® 6350EL & 6370EL have shown greater than a 12x improvement in the life of rolling element bearings over traditional vacuum lubricants, while also demonstrating excellent performance in both boundary and mixed-lubrication regimes. The outgassing of these new greases demonstrates less than half the mass loss when compared with any other available PFPE greases on the market.

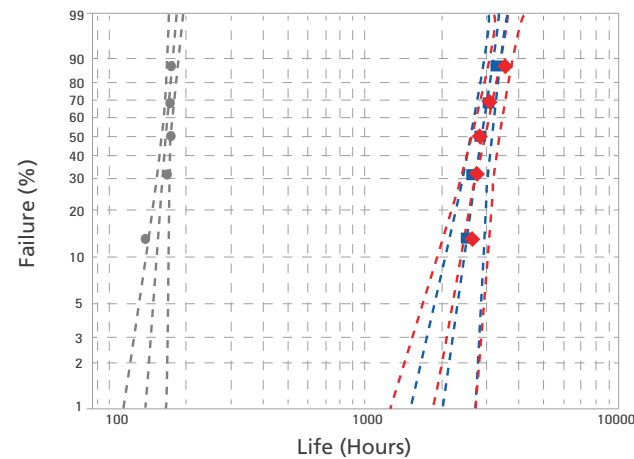
NyeTorr® 6350EL & 6370EL provide:

- excellent low-temperature performance
- the lowest level of outgassing
- the highest load-carrying & life-endurance performance

The introduction of NyeTorr® 6350EL & 6370EL marks a leap forward in PFPE lubricant technology. These greases increase the durability, functionality and reliability of any rolling or sliding space mechanism to prolong the life of components and outlast your mission life requirements as well.

Component Life

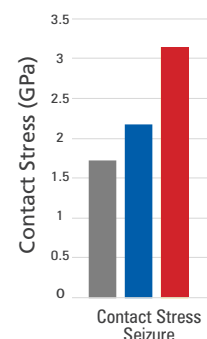
Weibull Life Probability Plot



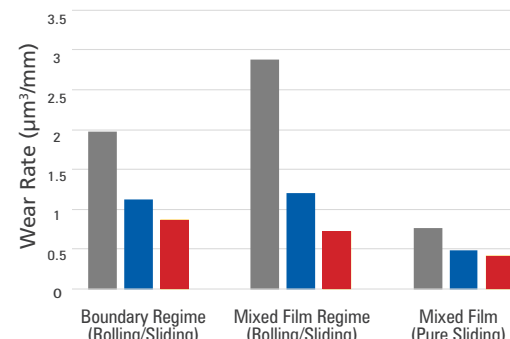
Test Details: R0F+ Deep Groove Ball Bearing Life (Fr = 100N, Fa = 200N, 230 °C, 10,000 RPM)

Load Capacity & Wear

Load Capacity



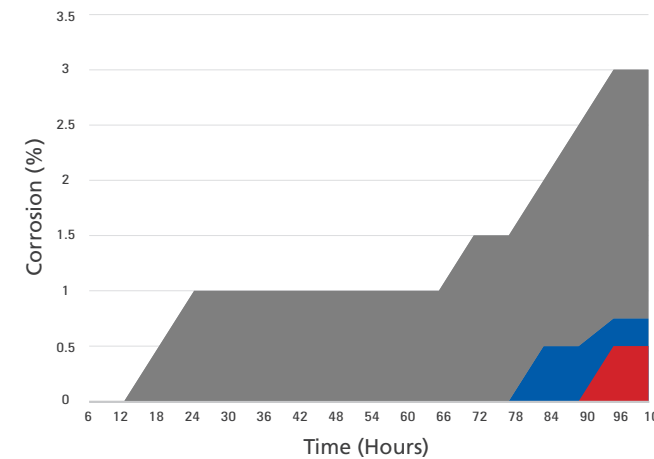
Wear Rate



Test Details: Tested using a SRV Reciprocating Tribometer & Mini Traction Machine

Bearing Corrosion

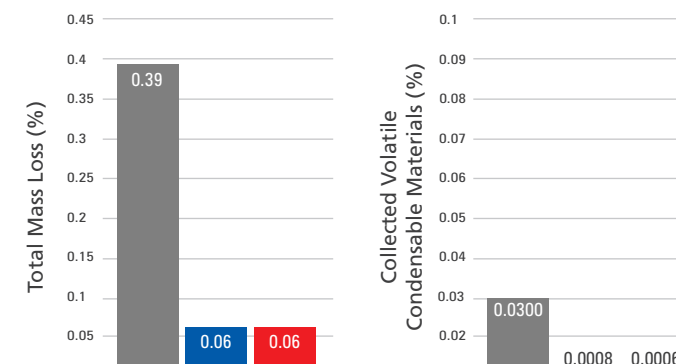
Corrosion Performance (ASTM D-1743)



Test Details: 52°C in Distilled Water

Outgassing

Vacuum Stability (ASTM E-595)



Test Details: 125 °C, 24 h, 8.0 x 10⁻⁶ Torr

The Future of Space

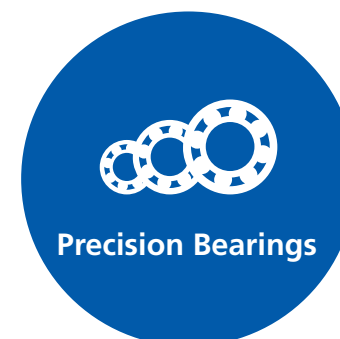
The future of space exploration and the mechanisms that make it possible will require even more protection from the exposure to a variety of extreme conditions. The durability and reliability of all the mechanisms, including the lubrication, will need to be improved for long range space exploration missions to be possible. These missions will include exposure to ultra-high vacuum, radiation and temperature extremes (both hot & cold); thus making higher performance and extended life lubricants a requirement.

First and foremost, the future of lubricants for space mechanisms will require a longer expected life and reliability, as the ability to service or replace components during extended voyages will be very limited or non-existent. Low outgassing materials to prevent contamination of any critical system on the vessel will also be a requirement. Finally, the environmental durability of a lubricant will be important for the extreme temperatures of deep space, as well as possible exposure to ozone, radiation, or other corrosive gasses.

Whatever trials lie ahead, Nye Lubricants and our Research & Development team is ready to meet the challenges on planet Earth, new unexplored planets, and the deep regions of space in-between.

What can NyeTorr® 6350EL & 6370EL do for your application?

- Extend functional life of components
- Reduce friction & wear
- Increase load-carrying capabilities
- Improve durability and reliability of mechanisms
- Ensure extremely low outgassing
- Provide excellent corrosion protection



Properties of Heritage PFPE and NyeTorr® 6350EL & 6370EL

LUBRICANT PROPERTIES		Heritage PFPE	NyeTorr® 6350EL	NyeTorr® 6370EL	Test Method
Base Oil		PFPE	PFPE	PFPE	
Temperature Range		-80 to 204°C	-80 to 250 °C	-90 to 250 °C	
Kinematic Viscosity	40 °C	148 cSt	200 cSt	362 cSt	ASTM D445
	100 °C	45 cSt	48 cSt	103 cSt	
Worked Penetration (P60)		288	281	285	ASTM D1403
Oil Separation (24h, 100°C)		6.24%	6.30%	4.73%	ASTM D6184
Particulate Count (10 - 34 microns)		<1,000/cc	<400/cc	<400/cc	FED-STD791D
4 Ball-Wear (40-kg load, 1200RPM, 1 hr, 75°C)		0.91 mm	0.74 mm	0.67 mm	ASTM D2266
Vacuum Stability	TML	0.39	0.06	0.06	ASTM E595
	CVCM	0.0300	0.0008	0.0006	NASA SP-R-0022A
ROF+ Bearing Life L ₅₀ (Fr=100N, Fa=200N, 230°C, 10,000RPM)		167 h	>2,400 h	>2,200 h	CTM*
Bearing Corrosion (96 h, 52 °C, Distilled Water)		Fail	No Corrosion	No Corrosion	ASTM D1743
Knudsen Vapor Pressure	25 °C	5.28 E ⁻⁰⁸	7.05 E ⁻¹⁶	6.29 E ⁻¹⁶	CTM*
	200 °C	2.12 E ⁻⁰⁵	2.92 E ⁻⁰⁶	2.96 E ⁻⁰⁶	
Dynamic Particle Generation		ISO 5	ISO 4	ISO 4	CTM*

*CTM: Nye Company Test Method

Nye Today: Our performance is reflected in the value we bring to our customers.

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 intense customer focus to solve our customers' toughest challenges, adding tangible value to products in a wide range of industries and applications.

We have been designing high-quality, synthetic lubricants for leaders in the Aerospace industry for more than 65 years. Nye works with design engineers in the private, government, and defense sectors to formulate new synthetic lubricants that will take off with next-generation spacecraft. From the Mercury Mission, to the Mars Curiosity Rover and the International Space Station, Nye's space heritage includes lubricating important applications that must survive the severe conditions of the space environment and the mission requirements.

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