



Application Notes

NyeTorr™ VACUUM LUBRICANTS

Lubricating Oils & Gels suitable for High Vacuum or Clean Room Environments are designed with materials that have a narrow range of molecular weight. Elimination of light molecular weight fractions provides orders of magnitude reduction in trace outgassing. Outgassing not only leads to depletion of the lubricant itself, but also creates a source of contamination which can be adsorbed on sensitive nearby instruments such as sensors, optics, semiconductor wafers, etc. Low outgassing is quantified by measuring the vapor pressure of the material in a vacuum environment¹. Nye Lubricants has combined the technology for high performance lubrication, with knowhow for selection and processing of low vapor pressure lubrication grade materials. The result is the **NyeTorr™** family of lubricating oils and gels. **NyeTorr™** lubricants are ultrafiltered for removal of microscopic particle contamination which can degrade performance of precision mechanisms or behave as an additional source of volatile material. They are chemically stable, non-toxic, synthetic materials with wide temperature serviceability and are suitable for designs with high reliability and long service life.

Examples of Applications for NyeTorr™ lubricants include:

Semiconductor Manufacturing

ball bearings
turbomolecular pump bearings
lead screws (metal on metal)
lead screws (plastic on metal)
ball screws
actuator shafts, sliding seals
rotatable joints
load lock conveyor slides, tracks
valve stems, threads

Clean Rooms

HVAC actuators
Journal bearings
HVAC motor bearings
lead screws
trolley bearings, tracks
hinges
noise damping gels

Spacecraft

gyro bearings
spin stabilizers
actuators
antenna positioners
damping fluids
anti-backlash gels

Selecting the Best NyeTorr™ Lubricant for Your Application. First determine what mechanical consistency, gel or oil, is best for your application. (Gels are usually best for applications where there is concern that the material stay in place and not migrate out of the lubrication interface. On the other hand, oils provide the lowest possible torque and are capable of slightly lower vapor pressure.) Second, refer to the chart on the following page in order to customize your product selection for your specific device characteristics. Or, you can communicate directly with an applications engineer at Nye by contacting us at tel. 1-508-996-6721, fax. 1-508-997-5285, or email: techhelp@nyelubricants.com.

1. D. Stone and P. Bessette, "*Liquid Lubricants*", Chapter 8 in Space Vehicle Mechanisms: Elements of Successful Design, P. Conley, ed., John Wiley & Sons, Inc., New York, 1998. ISBN # 0-471-12141-X. Order from John Wiley & Sons, Inc., at <http://catalog.wiley.com>.

NyeTorr™ Vacuum Lubricants

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SELECTION CHART FOR VACUUM LUBRICANTS

PARAMETER	SYNTHETIC LUBRICATING GELS			SYNTHETIC LUBRICATING OILS		
	NyeTorr 5100	NyeTorr 5200	NyeTorr 5300	NyeTorr 5101	NyeTorr 5201	NyeTorr 5301
Max. Temp.*	150°C (302°F)	125°C (257°F)	250°C (482°F)	150°C (302°F)	125°C (257°F)	250°C (482°F)
Mechanism materials	Metal on metal	Metal on metal	Plastics or metals, any combination	Metal on metal	Metal on metal	Plastics or metals, any combination
Mechanical Load Limit	Moderate	Heavy	Light to Moderate	Moderate	Heavy	Light to Moderate
Precision positioning	Usually OK	Usually OK	Usually OK	Usually OK	Usually OK	Usually OK
Very Low Torque variation over temp.			yes			yes
Very Low Starting Torque		yes	yes		yes	yes
Compatibility w/ reactive gases or chemicals	Not recommended	Not recommended w/o OEM testing	Usually OK	Not recommended	Not recommended w/o OEM testing	Usually OK
Compatibility w/ plastics and elastomers	May weaken or swell ABS, buna N/S, styrenes, PVC, etc.	May cause some EPDM seals to swell	Usually OK	May weaken or swell ABS, buna N/S, styrenes, PVC, etc.	May cause some EPDM seals to swell	Usually OK
Vapor Pressure (25°C)	8.5 X 10 ⁻¹⁰ torr	1.6 X 10 ⁻⁹ torr	5.0 X 10 ⁻⁹ torr	2.8 X 10 ⁻⁸ torr	4.6 X 10 ⁻⁹ torr	5.2 X 10 ⁻¹⁰ torr
Recommended Clean-Up Solvent	NyeSolv HG with IPA rinse	NyeSolv HG with IPA rinse	Nye Fluorosolvent 504	NyeSolv HG with IPA rinse	NyeSolv HG with IPA rinse	Nye Fluorosolvent 504

For Price and Delivery Information, Technical Service, or to Place an Order:

Contact Nye Lubricants Customer Service at tel. 1-508-996-6721, fax. 1-508-997-5285.

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