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Nye® LubeLetter

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Lubrication



Collaboration



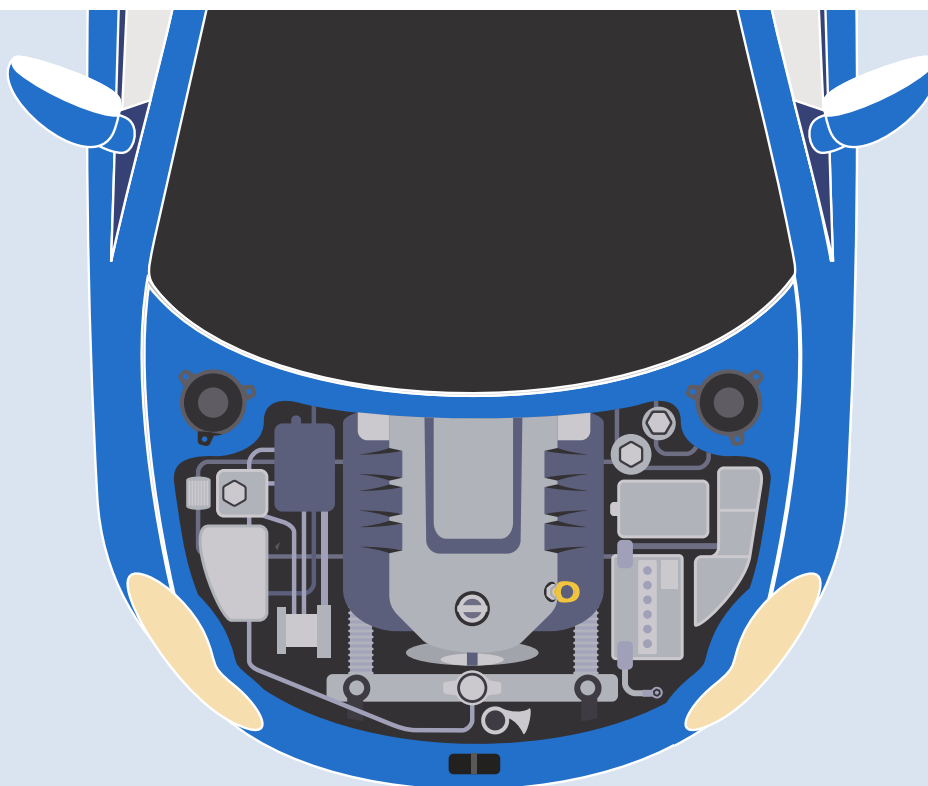
Innovation





Lubricants for Underhood Applications

New and emerging environmental regulations require engineers to design internal combustion engines that comply with strict emission standards without sacrificing performance. As a result, OEMs require engine controls to ensure that both emission and performance requirements are met. Even hybrid vehicles with smaller engines need engine controls to achieve desired performance levels. Flex-fuel vehicles also need engine controls to maintain performance with changing fuel mixes. Actuators, pumps, and valves require lubricants to improve the reliability and extend the life of engine controls. Lubricants for these applications must be carefully selected to withstand the demanding underhood conditions.



Which Factors Can Impact the Performance of Underhood Lubricants?

Chemical Exposure

Lubricants for on-engine applications must be able to withstand the harsh chemicals, fuels, and exhaust present underhood. Perfluoropolyether's (PFPEs) thickened with Polytetrafluoroethylene (PTFE) are recommended for these applications as they are inherently chemically inert and unaffected by corrosive gases and liquids.

Extreme Temperatures

Internal combustion engines are designed to run hot. Lubricants for these applications should be stable at high temperatures to prevent varnishing and breakdown. The ideal lubricant should also remain fluid at low temperatures to provide sufficient lubrication and ensure that engine controls work properly during cold starts.

Fretting Corrosion

Fretting corrosion is the result of micromotion caused by vibration and/or thermal expansion due to heating or cooling cycles. In electrical connector applications these micromovements wear down through the metal coatings into the base material and promote oxidation. The formation of this oxide layer can result in power failure or signal loss. In bearings, fretting can prematurely wear the raceway in the form of hollow dents, also known as false brinelling. In both cases, oxides can lead to premature failure.

Particle Size

Any particle that acts like a “speed bump” in the motion of the bearing, no matter how small and subtle, is a source of early failure. These bumps translate into vibration and ultimately wear and noise, so removing the particles is particularly important in precision bearings and instruments. For these reasons, a smooth grease with fewer particles may be required in certain underhood applications.

Which Underhood Applications Require Lubrication?

Lubricants are required to protect connectors, gears, and bearings to extend the life of engine controls and improve performance.

Actuators

- Diesel Engine Smart Remote Actuator
- EGR & Turbocharger Actuators
- Motorcycle EGR Actuator

Pumps

- Fuel Pump
- Water Pump
- Hydraulic Pump

Valves

- EGR Valve
- Idle Air Control Valve
- Coolant/Thermostat Valves

Lubricants for Underhood Applications

Nye Lubricants offers a variety of synthetic greases and oils developed to deliver more engine efficiency, better fuel economy, and a quieter drive. Nye’s Uniflor™ PFPE product line are fluorinated synthetic fluids that are well suited for the demanding underhood environment including the exposure to fuels, exhaust gases and other harsh chemicals.

Features and Benefits.

- Perform well at low & high temperatures
- Resist harsh chemicals, fuels & exhaust
- Protect against fretting
- Protect against wear
- Prevent corrosion
- Extend Component Life
- Compatible with plastics & elastomers

Product	Temperature Range	Fuel & Exhaust Resistant	Prevents Fretting	Prevents Wear	Temperature Range	Prevents Wear
Uniflor™ 8922EL	-65 to 250 °C	✓	✓	✓✓	✓	Gears & Bearings
Uniflor™ 8921	-65 to 250 °C	✓	–	✓	–	Bearings
Uniflor™ 8917	-70 to 225 °C	✓	✓	–	–	Connectors
Uniflor™ 8911	-70 to 225 °C	✓	–	✓	–	Gears, Rheostat
Uniflor™ 8901F	-80 to 200 °C	✓	–	✓	–	Gears
Uniflor™ 8512R	-50 to 225 °C	✓	✓	✓✓	✓	Bearings, Rheostat
Uniflor™ 8512	-50 to 225 °C	✓	–	✓	–	Bearings
Uniflor™ 8511	-50 to 225 °C	✓	✓	✓	–	Rheostat
Uniflor™ 8472	-50 to 225 °C	✓	–	✓	–	Gears
Uniflor™ 8182	-25 to 225 °C	✓	–	✓	–	Valves
Rheotemp™ 769G	-40 to 175 °C	–	✓	✓✓	–	Connectors
Rheotemp™ 768G	-40 to 175 °C	–	✓	✓✓	–	Connectors

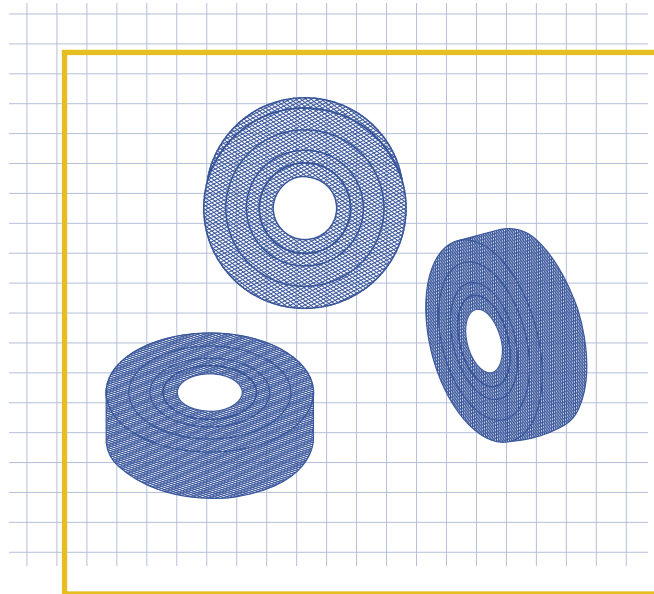


Uniflor™ 8922EL - Precision Bearing Grease

Automotive bearings in underhood applications such as those found in EGR Valves, e-turbo, and electronic throttles, are exposed to aggressive fuel vapors and a wide temperature range. Lubricants for these components must be able to withstand these harsh operating requirements while offering superior protection against wear and corrosion. The grease must also remain fluid at low temperatures and exhibit excellent low temperature torque properties.

Uniflor™ 8922EL is a high-performance low volatility precision bearing grease that provides extended performance across a wide temperature range and offers corrosion protection in chemically aggressive environments as well.

Uniflor™ 8922EL contains a high-performance additive package for enhanced wear and corrosion protection, providing greater protection and longer life than the legacy PFPE-based bearing greases.



Advantages:

- Prevent corrosion
- Extend bearing life
- Reduce low temp torque
- Improve bearing efficiency
- Protection at high temperatures
- Protection from aggressive chemicals

Typical Properties

Uniflor™ 8922EL is a PFPE, PTFE-thickened grease with a wide operating temperature range. Base oil and grease properties are for reference only and are not to be used for the final design and specification of a lubricant.

Properties	Test Conditions	Typical Value	Test Method
Temperature Range	–	-65 to 250 °C	–
Kinematic Viscosity	40 °C 100 °C	150 cSt 45 cSt	ASTM D445
Viscosity Index	–	338	ASTM D97
Color/Appearence	–	White/Smooth	Visual
Penetration	25 °C, 0.1 mm	P60 269 P10,000 271	ASTM D1403 FED–STD–791
Dropping Point	–	216 °C	ASTM D2265
Oil Separation	24 h, 100 °C	5.2%	ASTM D6184
Evaporation	24 h, 100 °C	1.62%	ASTM D2595
Density	25 °C	1.89 g/ml	CTM*

*CTM: Nye Company Test Method

Application Specific Tests

Nye's application testing services can provide you with data to help qualify your design. BeQuiet testing of Uniflor™ 8922EL shows significantly lower noise readings compared to the Legacy PFPE grease (84.5%), indicating increased bearing life.

Properties	Test Conditions	Typical Value	Test Method
4 Ball Wear	1 h, 75 °C, 1200 rpm, 40 kg	0.784 mm	ASTM D2266
SRV OK Load	75 °C, 50 Hz	75 N	ASTM D5606
Hegman Particle Measurement	–	< 5 µm	ASTM D1210
Low Temperature Torque	-60 °C	Start – 2050 gf·cm 60 min – 424 gf·cm	ASTM D1478
Oxidation Stability	99 °C, 168 h	1 psi	ASTM D942
EMCOR	Distilled water	0,0	ASTM D6138
Bearing Corrosion	–	Pass	ASTM D1743
MTM Boundary Regime	150 °C, 2.43 nm film thickness	0.87 µm ³ /mm	CTM*
MTM Mixed Regime	150 °C, 20.98 nm film thickness	0.05 µm ³ /mm	CTM*
BeQuiet+	1800 rpm, Ambient, 30 N	BQX 22.3%	CTM*

*CTM: Nye Company Test Method

Packaging Options

Uniflor™ 8922EL is a double density formulation. A 5-gallon pail can be filled completely (75 lb) or halfway (35 lb).

- 1 kg jar
- 35 lb pail
- 75 lb pail

Want to learn more or request a sample? [Click here](#) to contact an engineer.



Case Study: Chemical-Resistant Grease for EGR Valves

Background

Vehicle emission control systems such as exhaust gas recirculation (EGR) systems play an important role in ensuring vehicles comply with safety and emission regulations. To ensure optimum performance, EGR valves and other components must operate reliably under harsh underhood conditions. To do this, these applications require lubricants that can withstand extreme temperatures and exposure to fuels and emissions. A leader in EGR design approached Nye to find a lubricant for their EGR valve bearings and plastic actuator gears that would pass durability testing.

Challenge

- Can the lubricant meet low temperature safety requirements and withstand high underhood temperatures?
- Can the lubricant resist hydrocarbon emissions, exhaust fuels, and other chemicals?
- Can Nye provide a grease that is compatible with the plastics and elastomers of the application?

Solution

Uniflor™ 8921 & Uniflor™ 8472

Chemically inert, PFPE lubricants thickened with PTFE.

- Consistent performance at low & high temperatures
- Resists chemicals, fuels, and exhaust
- Compatible with plastics & elastomers
- Prevents wear, extends component life



Product	Temperature Range	NLGI Grade	Viscosity Index
Uniflor™ 8921	-65 to 250 °C	2	334
Uniflor™ 8472	-50 to 225 °C	2	221

Results

Uniflor™ 8921 and Uniflor™ 8472 both have a high viscosity index which means that the grease maintains its viscosity as temperature changes. Lubricants with a high VI are more stable, last longer, and require less lubricant per part. Ultimately, Nye recommended that the OEM use Uniflor™ 8921 for their valve bearings and Uniflor™ 8472 for their actuator gears after our products passed their durability testing. The customer was pleased with our technical support and range of products and now considers Uniflor™ 8472 their “go-to” grease for plastic gearing.

Want to learn more or discuss solutions for your application? [Contact Us.](#)



Meet Nye - Brian Kinkade

Meet Brian Kinkade, Nye's Market Development Manager. Brian works closely with the Sales and R&D teams to identify our customers most pressing needs and communicate the solutions that will effectively solve their problem. Prior to Nye, Brian worked for many years marketing and selling engineered products to original equipment manufacturers. Brian holds a Bachelor of Science in Electrical Engineering from Rensselaer Polytechnic Institute and a Masters in Business Administration from Clark University.



Brian Kinkade
Market Development Manager

◆ How have new and emerging emission regulations affected the design of engine controls?

In addition to controlling engine performance, engine control systems have been responsible for controlling emissions. In the beginning, regulations did not require the emissions controls to have high resolution or a fast reaction time. Today, emissions regulations from around the world, typically focused on reducing NO_x and particulate emissions, require engine control systems to react quickly to changes in engine operation with more precision. As before, these engine control systems must work well at cold-start conditions when combustion emissions may be the trickiest to control, or at high temperatures caused by combustion exhaust gases. Today the design demands for reliable and consistent operation are even greater. This is where lubricants help the most, by extending component life and protecting against corrosion that can cause component failure.

◆ Why are PFPE lubricants typically recommended for underhood applications?

Perfluoropolyether's (PFPEs) are by nature inert, which means they do not affect other materials nor are affected by other materials. This means they are compatible with virtually every plastic and elastomer used in today's automotive sensors and actuators. Furthermore, PFPE lubricants are not degraded from exposure to fuels, chemicals, or exhaust gases. This is very important for underhood applications that control emissions. PFPE lubricants also have the wide operating temperature range needed to assure both cold-start actuator performance and high-temperature operation.

◆ **Why should underhood connectors be lubricated?**

The connection between the engine sensors, the actuators and the electronic control unit are extremely important for safety, vehicle performance, and emission control. Unfortunately, these connections experience micro-vibration from the engine operation and road conditions. They also experience heating and cooling cycles much greater than other connectors on the vehicle. These micro-movements cause the electrical contacts to wear away via fretting; exposing the copper substrate that can become oxidized or corroded from contact with the air. Corroded contacts have a higher resistance and can create signal or power loss in the connection. So, while all connectors in a vehicle should be lubricated, the underhood connectors are the most vulnerable due to their location.

◆ **What is your favorite part about working at Nye?**

First my colleagues are great people who are always looking to find the best solution for the customer. Beyond that, I enjoy learning about all the applications where Nye Lubricants is able to solve a customer’s problem usually from our comprehensive portfolio of lubricant formulations, but always from working side-by-side with the customer.



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more updates
next month!**

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