



Automotive News

September 2020



Lubrication



Collaboration



Innovation

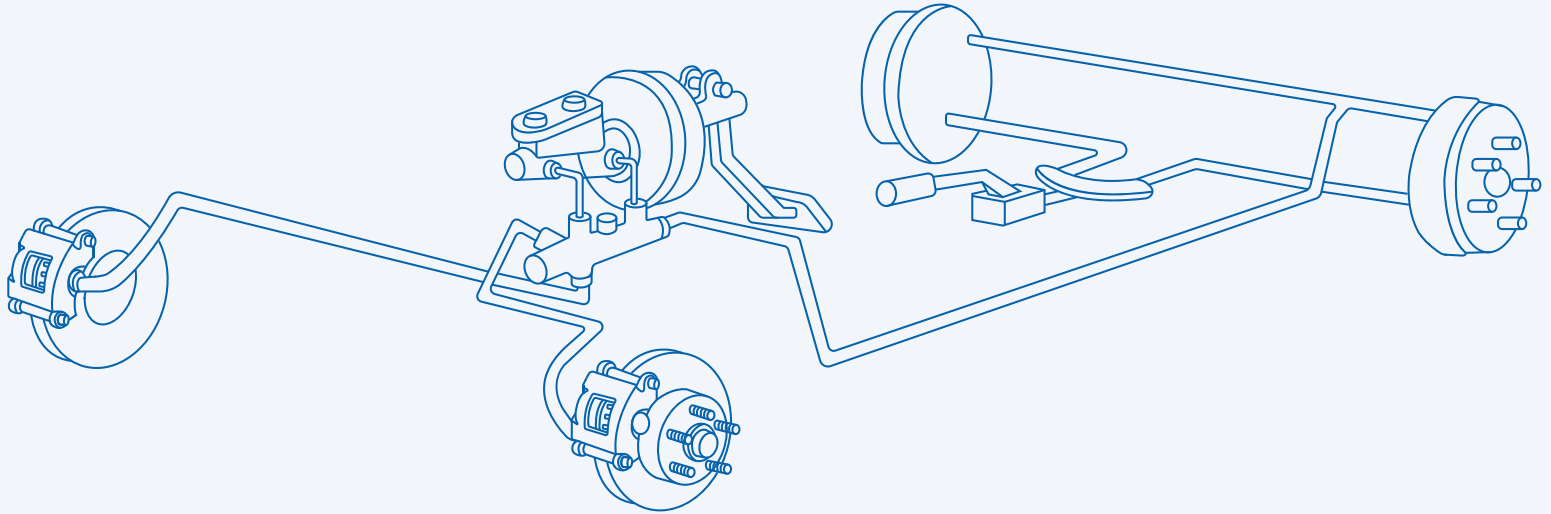




Lubricants for Brake Applications

Why Do Your Brakes Need Specialty Grease?

General purpose automotive lubricants cannot withstand the temperature requirements of braking applications and are not compatible with most braking materials. At elevated temperatures these lubricants will burn or oxidize, adding debris to the braking components which accelerates wear and creates additional noise, vibration, and harshness. Specialty lubricants also last longer than general purpose lubricants which extends the time between service intervals.



What Components Should You Lubricate?

Parking brake cables, brake caliper pins, electronic power brake and brake calipers, and anti-lock braking system bearings and pistons all operate at high-temperatures and should be lubricated using a specialty grease.

ABS Controller

Lubricants for the bearing and piston of the ABS drive unit must be fully compatible with EPDMs and operate at low temperatures of -50 °C. A medium viscosity, fluorinated grease fortified with PTFE is recommended.

Bearing - Uniflor™ 8512R

Drum Brake Wheel Cylinder & Shoe Contact Surfaces

Lubricant prevents contact points from seizing. A high viscosity silicone grease compatible with EPDMs and a wide temperature range of -40 °C to 200°C are recommended to withstand the high temperatures experienced during braking.

Contact Points & Support Plates - Fluorocarbon Gel 880

Piston Dust Boot

Grease reduces the force required to assemble the dust boot and piston assembly. A medium viscosity silicone grease that is compatible with EPDMs and has a wide temperature range of -40 °C is recommended.

Dust Boot - Rheosil 500F

Parking Brake (Electrically Actuated)

EPBs require low temperature performance and advanced wear protection. A light viscosity ester/PAO blend grease fortified with MoS₂ and a temperature range of -50 to 130 °C should be considered.

Lead Screw - Rheolube® 380

Control Cables

Without lubrication cables will wear and seize due to environmental factors. A high viscosity silicone grease allows grease to migrate through the length of the cable for complete protection.

Cable - Fluorocarbon Gel 880, Fluorocarbon Gel 990A, Rheosil 500F

Brake Pad Retention Clips

A synthetic grease will prevent a ratting noise between the brake pad and caliper. A medium viscosity calcium sulfonate grease with excellent water washout/sprayoff characteristics should be selected.

Brake Pad - Rheotemp™ 662

Caliper Pins

Lubricants for caliper pins must withstand high temperatures experienced during braking and be compatible with EPDMs. A high viscosity grease with a temperature range of -40 to 200 °C is ideal.

Caliper Pin & Slider Boot Seal - Fluorocarbon Gel 880, Fluorocarbon Gel 990A, Rheosil 500F

E-Brake Controller

A PFPE hybrid grease to provide lubrication of e-brake actuation gears to meet aggressive low temperature and performance requirements of -70 to 225 °C.

Gears - Uniflor™ 8911XP

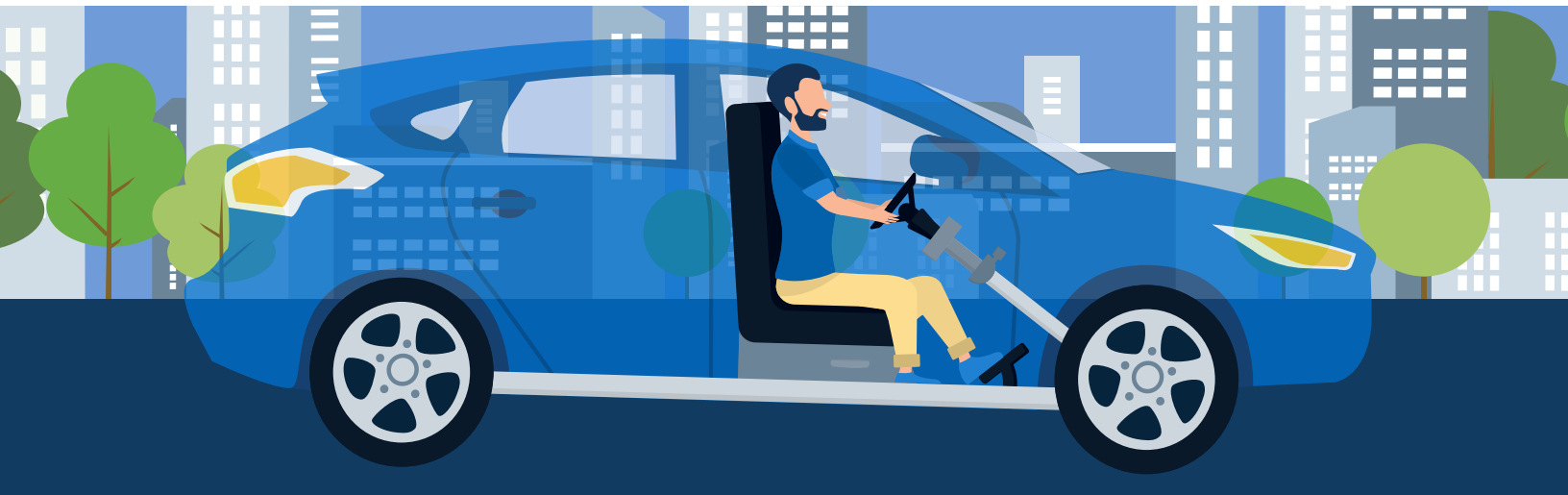
Product	Chemistry	Temperature Range	Product Description	Application Notes
Rheolube® 380	PAO-Ester / Lithium Soap	-50 to 130 °C	Medium viscosity, lithium soap, synthetic hydrocarbon grease fortified with PTFE. Intended for bearings, gears and slides that require low friction.	Lead Screw
Rheosil 500F	Dimethyl Silicone / Lithium Soap	-40 to 200 °C	Lithium soap thickened, light viscosity, synthetic hydrocarbon grease. Fortified with PTFE, tackifier, rust inhibitor and UV tracer.	Dust Boot Caliper Pin & Slider Boot Seal Control Cable
Rheotemp™ 662	PAO/ Calcium Sulfonate	-60 to 175 °C	Multi-purpose calcium sulfinate thickened, light viscosity, synthetic hydrocarbon grease. Superior water resistance.	Brake Pad
Fluorocarbon Gel 880	Dimethyl Silicone/ PTFE	-40 to 200 °C	PTFE thickened, light viscosity, synthetic hydrocarbon grease. Rust inhibited.	Contact Points & Support Plates Caliper Pin & Slider Boot Seal Control Cable
Fluorocarbon Gel 990A	Dimethyl Silicone/ PTFE	-40 to 200 °C	PTFE thickened, heavy viscosity, synthetic hydrocarbon grease. Fortified with EP and rust inhibiting additives.	Contact Points & Support Plates Control Cable
Uniflor™ 8512R	PFPE/PTFE	-50 to 225 °C	Silica thickened, light viscosity, synthetic hydrocarbon grease containing a PTFE additive. Good water resistance and damping qualities.	Bearing
Uniflor™ 8911XP	PFPE/PTFE	-70 to 160 °C	Extremely stiff, silica soap thickened, heavy viscosity, synthetic hydrocarbon grease intended for applications that require a high degree of damping.	Gears



Lubricants for Steering Systems

Steering systems are becoming increasingly more advanced as OEMs designing the next generation of electric and autonomous vehicles prioritize safety, efficiency, and precision. Lubricants play an important role in increasing the life, performance, and reliability of the entire steering system. Lubricants reduce friction which in turn reduces heat and the amount of power draw on assist motors, extending the drivable range of the vehicle. Grease also protects and prolongs the life of components, making them less susceptible to failure, warranty claims, and safety related issues.

Nye's lubricants for steering systems were designed to lengthen operating life and improve the reliability of various components, including bearings, bushings, gears, housings, seals, shafts, and more.



Steering Column

If not properly lubricated, ball bearings located at the end of the steering column can negatively impact steering responsiveness and transfer noise and vibration through the steering column up to the driver. In addition, couplings within the steering column must be free to move but must produce no noise or vibration as it would lower the perceived quality of the end vehicle. Greases can effectively quiet these applications while also providing durability and wear protection. As each system is different, load should be considered when selecting a grease. Heavily loaded designs require a heavy viscosity grease to ensure the proper wear prevention and mechanical damping properties.

Telescope & Tilt Steering Column

Steering column mechanisms call for motion control greases, which are engineered to prevent wear and inhibit unwanted motion, noise and vibrations. These greases provide reliable, smooth, low-friction motion for high-shear mechanisms. Motion control greases provide lifetime lubrication within the gearbox and other pivoting and sliding components.

Electric Power Steering

With the heavy push from automakers towards electric and electric-hybrid vehicles, every milli-amp of power that can be saved translates into extended driving range. Light weight synthetic hydrocarbon greases with advanced additive packages greatly reduce frictional torque between the gearing components within the EPS system. This allows for lower current draw over extended periods of use. Additionally, these products improve low temperature torque performance, while also providing wear protection and vibrational damping. These synthetic hydrocarbon greases can also be used as an environmental seal due to their superior water washout/spray-off characteristics, corrosion protection, and wear mitigating capabilities.

Intermediate Shaft

Intermediate shafts, sometimes known as spline shafts, are a popular method used to enable telescoping steering columns to function while absorbing vibration and shock. For plastic-to-metal interfaces, a medium-viscosity, synthetic hydrocarbon grease enhanced by PTFE ensures good slip and low "stiction." For metal-to-metal interfaces, a heavier synthetic hydrocarbon grease is recommended. A lighter grease designed for sliding surfaces is recommended for tight tolerances between telescoping shafts.

Product	Chemistry	Temperature Range °C	Product Description	Application Notes
RHEOLUBE 363F	PAO/Lithium Soap	-50 to 125 °C	Medium viscosity, lithium soap, synthetic hydrocarbon grease fortified with PTFE. Intended for bearings, gears and slides that require low friction.	Steering Column Bearings EPS worm gears
RHEOLUBE 462CF	PAO/Lithium Soap	-54 to 130 °C	Next generation technology in a lithium soap thickened synthetic hydrocarbon grease.	EPS Gear
RHEOTEMP 662	PAO/ Calcium Sulfonate	-60 to 175 °C	Multi-purpose calcium sulfinate thickened, light viscosity, synthetic hydrocarbon grease. Superior water resistance.	EPS Housing Environmental Seal
RHEOLUBE 362HB	PAO/Lithium Soap	-40 to 125 °C	Lithium soap thickened, light viscosity, synthetic hydrocarbon grease. Fortified with PTFE, tackifier, rust inhibitor and UV tracer	Telescoping Steering Column
FLUOROCARBON GEL 868MS-X	PAO/PTFE	-40 to 80 °C	PTFE thickened, medium viscosity, synthetic hydrocarbon grease. Additives for EP and rust prevention.	Tilt Steering Column
NYOGEL 774VLF	PAO/Silica	-50 to 120 °C	Silica thickened, light viscosity, synthetic hydrocarbon grease containing a PTFE additive. Good water resistance and damping qualities.	Column Shaft/Seals
PG-44A	Polybutene/Silica	20 to 120 °C	Extremely stiff, silica soap thickened, heavy viscosity, synthetic hydrocarbon grease intended for applications that require a high degree of damping.	Steering Gear Shaft
FLUOROCARBON GEL 866	PAO/PTFE	-54 to 125 °C	PTFE thickened, light viscosity, synthetic hydrocarbon grease. Rust inhibited.	Intermediate Shaft Spline, telescope bushings
FLUOROCARBON GEL 875MS	PAO/PTFE	-20 to 125 °C	PTFE thickened, heavy viscosity, synthetic hydrocarbon grease. Fortified with EP and rust inhibiting additives.	Steering Gear/Yoke



Case Study: Protecting Battery Terminals Against Corrosion

Background

Commercial vehicles are operated for extensive periods of time under a variety of environmental conditions and depend on reliable components that require shortened and/or infrequent servicing. These vehicles are continuously exposed to road spray, which in the winter contains corrosive salts and chemicals. If a battery or starter terminal were to become corroded, it could cause unwanted downtime as the driver would be unable to start the vehicle or the electronics controls would fail to operate properly. A Commercial Vehicle OEM specializing in Class 6, 7, and 8 trucks approached Nye in search of a lubricant with the right water spray resistance properties to extend the life of their battery, starter & alternator terminals, and ground straps to protect them from corrosion.



Challenge

- Can we provide a lubricant that stays in place and exhibits limited oil separation?
- Can we provide a lubricant that exhibits excellent water spray resistance while also protecting the terminals from road salt, humidity, and water?

Solution

NyoGel® 760G

A silica thickened, medium viscosity, synthetic hydrocarbon grease.

- Superior corrosion protection
- OEM Specifications: Ford: WSB-M1C239-A, GM: 9986087, & FCA: MS-9496
- Low oil separation
- Excellent water spray resistance
- Provides lifetime lubrication for lasting connections

Product	Chemistry	Temperature Range	Water Washout (1 h @ 80 °C)	Salt Spray Resistance (48 h, MIL-G-81827A)
NyoGel® 760G	PAO/Silica	-40 to 135 °C	2.2%	No Corrosion

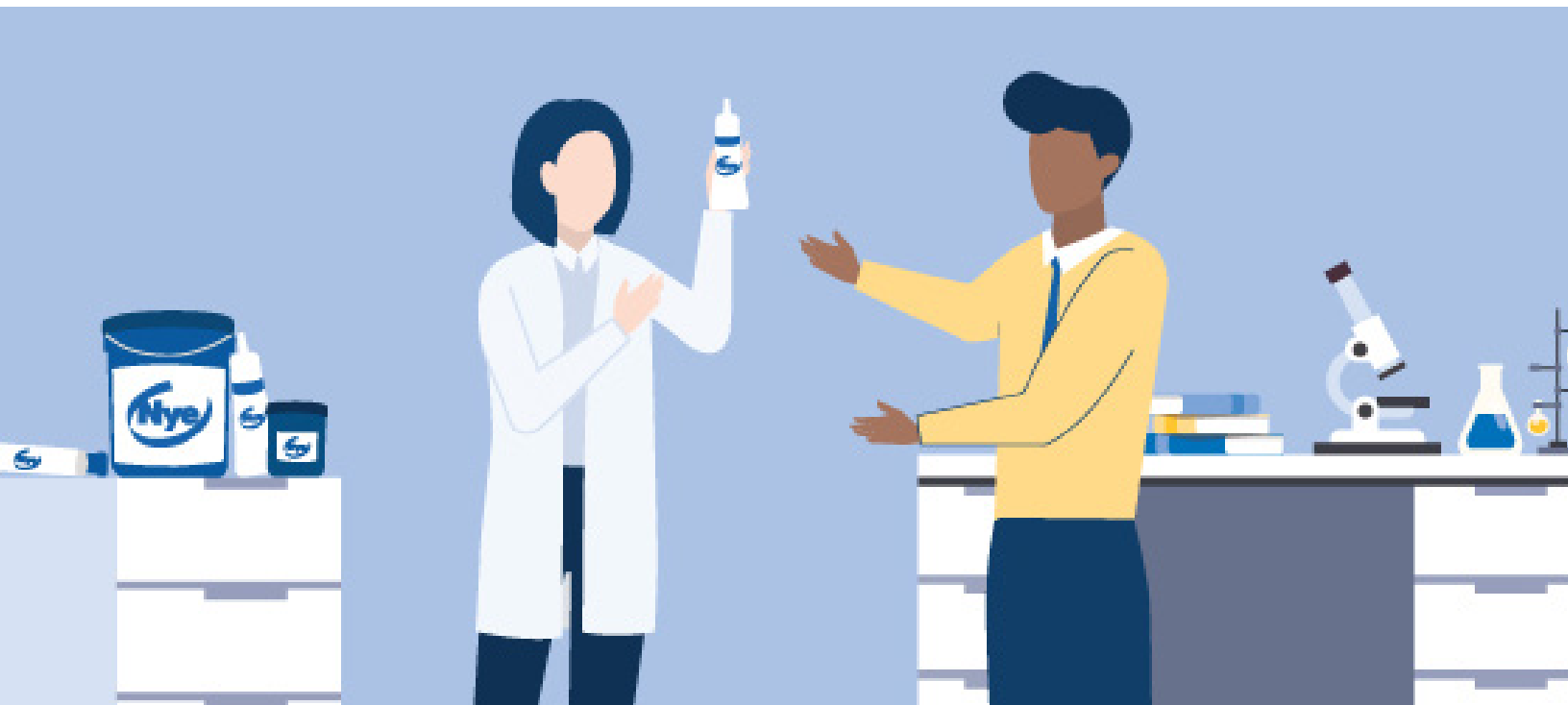
Results

Nye completed 30-day salt spray and cyclic corrosion testing on both nickel brass and tin copper terminals. After testing several greases in our line of connector lubricants, the customer decided to go with [NyoGel® 760G](#) as it passed their corrosion and water spray requirements at an appropriate price point.



Advanced Test Methods for Motion Control Applications

Grease is often used to control motion, provide a quality feel, reduce noise and vibration; friction and wear reduction come as an added benefit. Many automotive OEMs can struggle to find a non-silicone lubricant that performs consistently over a wide temperature range. Chemists at Nye Lubricants have developed a series of test methods to quantify the reliability of our [motion control lubricants](#) under various temperature and shear conditions to ensure your application has the same feel, every time, at any temperature.



Consistency Over Wide Temperature Range

A hand-operated component, such as a shifter or sun visor, must provide the same actuation force regardless of temperature to give the user the same quality feel. Nye's custom rheological test evaluates the ability of a grease to maintain its viscosity at extreme temperatures. During this test, the grease is sheared from -40 to 120 °C. The viscosity of the grease is recorded at each temperature point and is used to create a viscosity ratio (VR).

The VR shows the viscosity consistency of a grease from -40 to 120 °C; a VR of 1 would be ideal. If a grease has a smaller VR it means that the grease is more likely to maintain the same quality feel when sheared over a wide temperature range. Nye has the capability to measure the shear response at different strains to

simulate a customer's application. For example, the strain ratio can demonstrate how a grease will behave in a dial; rotating a dial should feel the same, regardless of the turning speed.

Dynamic Wear Performance

Mechanisms operating under dynamic conditions, like seat tracks, will wear at a different rate than applications operating at a constant speed or duration. The mini-traction machine (MTM) wear test simulates how a lubricant will perform within the different [lubrication regimes](#): boundary, mixed or hydrodynamic. The wear scar is analyzed through profilometry and a wear rate is calculated. This allows us to compare oils or greases within the same lubrication regime and rank their performance. The smaller the wear rate, the better protected your components are in dynamic conditions.



[Download Nye's Guide To Motion Control Lubricants](#)

Low-Temperature Torque

This industry standard test is a useful measurement of how grease affects start-up and running torque at low temperatures. The test quantifies the amount of force required to rotate a bearing at the initial start-up and then after 60 minutes of running at -40°C . This test is used to indicate the degree to which grease inhibits motion and can be particularly important for low-powered mechanisms such as those found in automotive interiors.

Consistency Over Repeated Motion

A mechanism must provide a reliable feel or actuation even if the mechanism is used frequently over a short period of time. If a grease loses its structure after repeated motion, tolerance could be affected. In these applications, you want the lubricant to shear and recover its structure as quickly as possible so that the next actuation feels the same. Nye's custom rheological test method measures the percent recovery of the grease to quantify the stability of its structure after repeated use; if a grease cannot recover its structure, the performance will be inconsistent. A 100% recovery percentage is ideal.



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