



# UniFlor™ PFPE LUBRICANTS

*The most complete line of PFPE lubricants  
for extreme environments.*





## ENGINEERED FOR EXTREMES

*UniFlor perfluoropolyether (PFPE) lubricants are designed for applications that require wide temperature service up to 250°C, low volatility, oxygen compatibility, fuel and chemical resistance, non-flammability, or superior compatibility with plastics and elastomers.*

### A unique family of PFPE oils and greases.

While all PFPEs are composed of carbon, fluorine, and oxygen, the molecular structure of each PFPE fluid varies depending on the base materials and polymerization processes used by PFPE manufacturers. These structural differences have an effect on the fluid's pour point, volatility, viscosity, and viscosity Index — all critical factors in lubricant formulation. Some PFPE oils, for example, have a pour point of only -20°C, while others offer pour points as low as -90°C. Similarly, some PFPE oils offer better wear resistance and vapor pressure properties than others. Unlike any other brand of fluorinated lubricants, the UniFlor family incorporates every available PFPE oil — a distinct advantage for the design engineer. UniFlor is the only family of PFPE lubricants that can ensure you get the PFPE lubricant that best matches the operating conditions of your product.

### Formulated for Specific Applications.

Each UniFlor oil and grease line is custom-designed for your application. You'll find economical UniFlor formulations for gears, slides and bearings. Another UniFlor series is engineered for high-speed, high-temperature bearings. Wide-temperature, ultra-viscous UniFlor greases are available for heavy-duty industrial bearings. These products also serve as sealants for vacuum applications. Some UniFlor oils and greases combine wide-temperature, high-load capability and ultra-low volatility for metal-on-metal applications. Still other formulations are designed for delicate precision instruments, sensors, potentiometers and actuators where ultra-low temperature and low starting torque are critical design parameters. UniFlor is never a one-size-fits-all solution. Combining the right PFPE fluid – or blend of fluids – with appropriate thickeners and proprietary additives means you get the best PFPE lubricant for your application.

*UniFlor™. High temperature, chemically inert, oxygen stability and plastic compatibility.*

## HOW DESIGN ENGINEERS



### Anti-lock Brakes

Bearings, pistons and lead screws in anti-lock braking systems require a lubricant that can withstand high temperatures and exposure to brake fluid. At the same time, some lubricants are not compatible with EPDM rubber seals and o-rings. UniFlor successfully addresses all three concerns and is widely used for electronic and hydraulic brakes and traction control systems.



### Electrical Connectors

Multi-pin separable automotive connectors often require significant mating force. By reducing insertion force, UniFlor mitigates the risk of repetitive strain injury for assembly workers. UniFlor also meets USCAR insertion force and circuit resistance standards, survives high temperatures, and prevents contact wear, corrosion and fretting.



### Oven Locks

Oven locks, which automatically lock over doors when temperatures reach 232°C (450°F), use thermoplastic gears. UniFlor delivers the high-temperature tolerance, material compatibility and wear protection that extends oven lock life well beyond warranty requirements.



# ENGINEERS ARE USING NYE'S PFPE LUBRICANTS



## Automotive Sensors

Electromechanical sensors need unimpeded contact because they signal the driver and critical automotive control systems. A thin coating of UniFlor on throttle and fuel sensors reduces wear, ensures good contact in high and low temperatures, and survives aggressive chemical environments.



## Food Production Equipment

Nye's food-grade UniFlor lubricants are NSF-registered. They are suitable for long lasting wear protection on commercial bakery equipment. Nontoxic and odorless, they meet the Nonfood Compound H-1 guidelines for incidental contact and conform to Food and Drug Administration's CFR Title 21.



## Printers & Copiers

Fuser roll bearings in laser printers and copiers see temperatures of 200°C and above. While high heat provides near instant image fixing, it can also destroy a lubricant. An economical UniFlor lubricant withstands the heat and is compatible with the wide range of plastics used in gearing and shells.

## Singlefacer Roll Bearings

Singlefacer rolls press flutes into corrugated paperboard. Operating in an environment of heat, steam and chemicals, the heated roll bearings see continuous temperatures well above 200°C. A UniFlor grease developed for singlefacers ensures the bearing lasts the life of the roll. It also speeds changeovers, reduces downtime and lengthens lubrication service intervals.



## Disk Drives

Computer disk drives require lubricants with low viscosity and low volatility. Their shrinking size and faster speeds demand a resilient lubricant even under boundary lubrication conditions. A custom formulated UniFlor — with its high temperature tolerance, high viscosity index — helps ensure drive reliability.



## Jet Engine Actuators

UniFlor is specified for F-15 and F-16 jet engine thrust actuators. Thrust vectoring allows jets to direct engine power for maximum maneuverability, short take offs and landings. The actuator physically redirects jet propulsion, requiring a lubricant that survives the engine's hot exhaust.



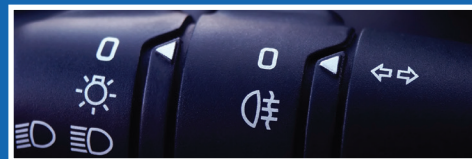
## Precision Aerospace Applications

From oxygen valve bearings in space suits to a variety of mechanisms in communication satellites spinning in orbit, UniFlor lubricants are specified because they are highly inert and their unique low outgassing property prevents molecular contamination of sensitive instruments and optics in the high vacuum of space.



## EGR Valves

An "EGR valve" is the main emissions control component in an Exhaust Gas Recirculation system. It is located on or near the engine and is exposed to extreme temperatures and exhaust fumes. UniFlor provides durable wear protection to extend EGR service to the 100,000 mile range.



## Multi-Function Switches

UniFlor prevents wear and corrosion of high-temperature switch contacts — without increasing circuit resistance. They also minimize fretting corrosion caused by normal vibration during travel.



## Semiconductor Manufacturing

The highly sensitive process of manufacturing semiconductor wafers demands a clean, vacuum environment. Robotic arms, platforms, and linear slides used in vacuum chambers need a lubricant with low volatility — to ensure long component life and curtail outgassing, which can contaminate chips. UniFlor has exceptionally low vapor pressure and provides life extending lubrication for semicon equipment.



# THE EXPANDING UNIFLOR UNIVERSE

In 1966 W.H. Gumprecht published "A New Class of High-Temperature Fluids," a paper that introduced the first perfluoropolyether (PFPE) fluid to the world of lubrication. By the late 1960s, Nye Lubricants became one of the first companies to formulate and commercialize its own PFPE oils and greases, known today as UniFlor™.

Early UniFlor applications included oxygen service valves and military ordnance fusing. Working with NASA led to UniFlor's use in oxygen sensors in astronaut space suits. Soon, UniFlor found many applications in the aerospace industry, from fighter jets to satellites.

## ***UniFlor™. Another innovative solution in Nye's family of synthetic lubricants.***

Gradually, the advantages of UniFlor chemistry solved a broad range of challenging lubricant problems. UniFlor entered the automotive world on throttle position sensors, components subjected to fuel vapors and temperatures of 150°C. Soon after, it was specified for exhaust gas recirculation sensors that required lubricant integrity at 200°C. Today, UniFlor is specified for anti-lock braking systems, idle air actuators, fuel sensors, separable electrical connectors, multifunction switches and other automotive applications where high heat, aggressive chemicals, and material compatibility require highly stable, non-reactive lubricants.



UniFlor then found a home in industrial maintenance, especially in heavy duty bearings subjected to high heat and other extreme environments. UniFlor's thermo-oxidative stability extended lubrication intervals, decreased downtime, and reduced maintenance. Food-grade UniFlor products have also been introduced to commercial bakeries that need long-life, odorless lubricants for chains and other mechanical devices, such as those in ovens that continually cycle baked goods.

In 21<sup>st</sup> century, UniFlor began improving life cycles and the functionality of consumer products. Inert, plastic-compatible UniFlor is the choice of leading manufacturers of cell phones and computer printers, where it reduces wear without cracking, crazing or degrading even the most economical plastics.

For over forty years UniFlor lubricants have improved performance, lengthened life cycles, cut design costs and survived extreme environments. Call Nye to find out how UniFlor may solve your design challenge.

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ISO/TS-16949:2009