



## NYE AUTOMOTIVE ENGINEERING CHART



Synthetic lubricants designed to add performance,  
life, and value to automotive product.

## SYNTHETIC BASE OILS

Synthetic Oils	Temp Range (°C)	Key Characteristics/Typical Applications
<b>Alkylated Diphenyl Ether (ADE)</b>	-40 to 200	Good cold temperature properties, high thermal and oxidative stability, and good radiation resistance.
<b>Alkylated Naphthalenes (AN)</b>	-30 to 180	Compared to PAO and diesters, offer improved hydrolytic, thermal, and oxidative stability. Good blendstock for polyalphaolefins requiring high stability under extreme conditions.
<b>Polyalphaolefins (PAO)</b>	-60 to 125	Stable, lubricious fluids compatible with most plastics and elastomers. A drop-in replacement for petroleum, it's used in countless applications in many industries.
<b>Polyglycols</b>	-40 to 125	Good load-carrying ability, compatible with most elastomers, non-carbonizing. Often used in arcing switches.
<b>Synthetic Esters</b>	-65 to 150	Excellent wear resistance, stable, affinity for metals, handles heavy loads. Great for loaded bearings.
<b>Silicones</b>	-70 to 200	Stable fluids with good wetting characteristics. Commonly used with plastic gears, control cables, and seals.
<b>Multi-alkylated Cyclopentanes (MAC)</b>	-45 to 125	Highly specialized fluid that combines the low vapor pressure of a PFPE with the lubricity and film strength of a PAO. Typically used in aerospace and critical vacuum applications.
<b>Perfluoropolyethers (PFPE)</b>	-90 to 250	Extremely stable, nonflammable, chemically inert, low vapor pressure fluids. Used in extreme environments and to avoid plastic and elastomer compatibility problems.
<b>Polyphenylethers (PPE)</b>	+10 to 250	Radiation, chemical, and acid-resistant fluids. Traditionally used for noble-metal connectors and high-temperature mechanical components.

## LUBRICANT ADDITIVES

Additive Type	Capabilities
Anticorrosion	Slows corrosion of non-noble metals
Antioxidant	Prolongs life of base oil
Antirust	Slows rusting of iron alloys
Antiwear	Chemically active protection of loaded metal surfaces
Conductive Agent	Thermal/electrical conductivity, special physical properties
Dye	Visual/UV markers as inspection/assembly aids
Extreme Pressure (EP)	Solids burnish into loaded surface under extreme pressures
Friction Modifier	Reduces coefficient of friction, starting torque or stick/slip
Pour Point Depressants	Improves lower temperature limit
Tackifier	Increases ability to adhere to moving parts
VI Modifier	Reduces rate of change of viscosity with temperature

## GREASE STIFFNESS ANALOGS

NLGI Grade	Penetration (worked, 60x)	Analog (unworked)
000	445 - 475	Ketchup
00	400 - 430	Yogurt
0	355 - 385	Brown Mustard
1	310 - 340	Tomato Paste
2	265 - 295	Peanut Butter
3	220 - 250	Margarine Spread
4	175 - 205	Hard Ice Cream
5	130 - 160	Fudge
6	85 - 115	Cheddar Cheese

## COMPATIBILITY OF BASE OILS

G	Good
F	Fair
P	Poor

	Plastics										Elastomers									
	Acetal (POM)	ABS	Polyamide (nylon) (PA)	Polycarbonate (PC)	Polyester	Polyethylene (PE)	Polyimide (PI)	Polyphenylene oxide (PPO)	Polystyrene	PTFE	Polyvinyl chloride (PVC)	Terphthalate (PBT)	Buna S	EPDM, EPR	Nitril	Natural Rubber	Neoprene	Nitrile	Silicone	
<b>Synthetic Hydrocarbon</b> Includes: PAO & AN Viscosity Index (VI) = 125-250	G	G	G	G	G	F	G	G	F	G	F	G	P	P	G	P	G	G	F	
<b>Polyglycol Polyether</b> Viscosity Index (VI) = 160-220	G	P	G	P	P	F	G	P	G	P	G	P	G	G	P	P	F	G	F	
<b>Synthetic Ester</b> Diester, polyolester Viscosity Index (VI) = 120-150	G	P	G	P	P	F	G	P	P	G	P	G	P	F	G	P	P	F	F	
<b>Silicone</b> Dimethyl-, phenyl-, halogenated Viscosity Index (VI) = 200-650	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	P	
<b>Multi-alkylated Cyclopentane</b> Pennzane from Shell Viscosity Index (VI) = 135	G	G	G	G	G	F	G	G	F	G	F	G	P	P	G	P	G	G	F	
<b>Perfluoropolyether</b> PFPE Viscosity Index (VI) = 100-350	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
<b>Polyphenylether</b> PPE Viscosity Index (VI) = 40-60	G	P	G	P	P	F	G	P	P	G	P	G	P	F	G	P	P	F	F	

## GREASE GELLANTS

Organic Soaps	Water Resistance	Salt Water Resistance	Thermal Stability	Low Noise Contribution	Thickening Efficiency	Good Fair Poor		
						Lubricity	Shear Stability	
Lithium	●	○	●	●	●	●	●	●
Sodium	●	○	●	●	●	●	●	●
Sodium Complex	●	○	●	●	●	●	●	●
Calcium	●	○	○	●	●	●	●	●
Calcium Complex	●	●	●	●	●	●	●	●
Calcium Sulfonate	●	●	●	●	●	●	●	●
Aluminum Complex	●	●	●	●	●	●	●	●
<b>Organic Non-Soaps</b>								
Polyurea	●	●	●	●	●	●	●	●
PTFE	●	●	●	●	●	●	●	●
<b>Inorganic</b>								
Bentonite Clay	●	●	●	●	●	●	●	●
Hydrophilic Silica	○	○	●	●	●	○	○	●
Hydrophobic Silica	●	●	●	●	●	○	○	●
Metal Oxide	○	○	●	○	●	○	○	●