



A GUIDE TO CALTEX PRODUCTS

Lubricants, fuels and more

2026/2027



TEXACO



Chevron



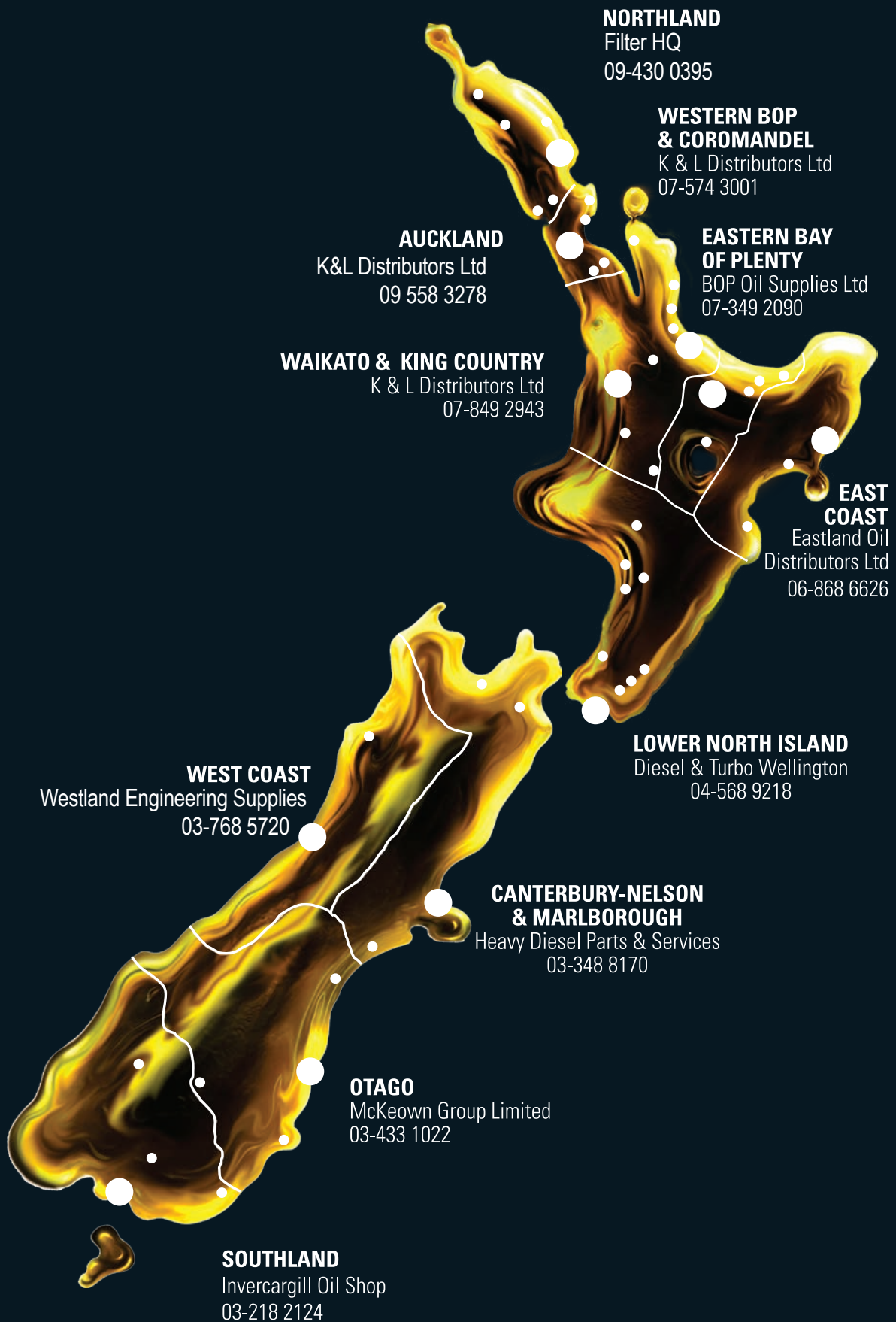
CALTEX

Chevron's Family of Brands

Caltex Oil Shop Network



CALTEX®





Caltex Lubricants – Our Journey

Caltex has been a trusted name in fuels and lubricants for over 80 years, with a heritage dating back to 1936 when it was formed as a joint venture between the Texas Company (Texaco) and Standard Oil of California (now Chevron). Today, as a fully owned Chevron brand, Caltex continues to uphold a legacy of innovation, quality, and performance across a broad range of lubricant solutions.

On 1 June 2016, Chevron New Zealand - who operated the Caltex brand locally - was acquired by Z Energy Ltd. As the licensed authorised distributor of Chevron-branded lubricant products in Aotearoa New Zealand, Z Energy proudly supplies Caltex, Chevron, and Texaco lubricants nationwide. The Caltex brand stands for quality, value, and service. At Z Energy, we are committed to delivering high-quality products that offer exceptional value through reliable business relationships that consistently deliver results and ensure mutual success.

Backed by Chevron's global research, development, and technology platforms, Caltex lubricants are trusted by industries across automotive, industrial, agricultural, construction, marine, transport and more. From premium engine oils and hydraulic fluids to greases and gear oils, Caltex offers a comprehensive range of products designed to perform in demanding conditions and meet OEM specifications.

Caltex lubricants feature Chevron's proprietary ISOSYN® and ISOSYN® ADVANCED technologies - combining premium base oils with advanced additive systems for outstanding protection, longer oil life, and improved fuel efficiency. Every product is rigorously tested to meet or exceed international performance standards, including API and ACEA, and major equipment manufacturers' specifications.

With a strong presence across Asia Pacific, Caltex remains dedicated to helping customers in New Zealand achieve operational reliability, lower maintenance costs, and long-term performance excellence.

Expert Advice. Smarter Lubrication. Better Performance.

At Caltex, we understand that selecting the right lubricant is key to keeping your vehicles and equipment performing at their best. That's why we offer dedicated local technical support to help you make the right choice.

Contact Our Technical Specialist

Whether you need help identifying the correct product or want to troubleshoot a lubrication issue, our knowledgeable technical specialist is just a call or email away.



Technical Helpline: 0800 733 835 (Option 4)



Email: lubricants@z.co.nz



Hours: Monday to Friday, 9:00am – 5:00pm

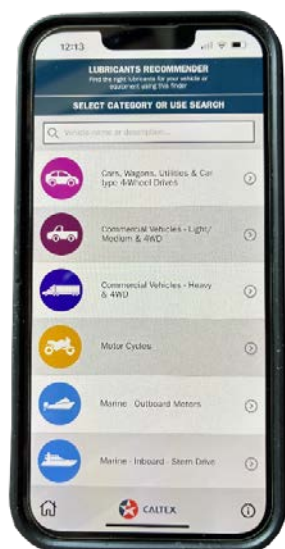
For Product Data Sheets visit: <https://www.caltex.co.nz/products-and-services/at-the-station/product-data-sheets>

For Safety Data Sheets visit : <https://www.caltex.co.nz/products-and-services/at-the-station/safety-data-sheets>

Quick and Easy Product Recommendations

Use the Caltex Netlube Lubricants Recommender Tool

Finding the right lubricant has never been easier. Netlube provides fast and accurate product recommendations based on your vehicle or equipment details.



Mobile App:

Download Netlube Caltex NZ from the Apple App Store or Google Play. For cars and light commercial vehicles, simply enter your licence plate number for instant lubricant recommendations.

Desktop Version:

Prefer using a computer? Visit the Netlube website to search by equipment type, make and model.

For link to the website, visit:

<https://caltex.co.nz/for-businesses/about-lubricants#lubricant-recommender>

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Note: This document is a guide only and was prepared in good faith from the best information available at the time of issue. While the values and characteristics are considered representative, some variation, not affecting performance, can be expected. It is the responsibility of the user to ensure that the products are used in the applications for which they are intended. Please refer to the manufacturers recommendations to confirm.

Individual Product Data Sheets' can be accessed by going on-line

<https://www.caltex.co.nz/products-and-services/at-the-station/product-data-sheets>

For further information contact Caltex Lubricants Technical Department on 0800 733 835 and choose option 4.

For PRODUCT or APPLICATION information, visit website <https://caltex.co.nz/lubricant-recommender> or contact Caltex Lubricants Technical or contact your local Lubricant Distributor Phone - 0800 372 374

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Introduction



The Product Information Guide provides brief information on the technical properties and typical uses of Caltex lubricants, fuels, and special products. Information printed in the Product Information Guide is current at the time of publication.

Product data may change at any time.

For health and safety information, consult the labels and Safety Data Sheets (SDSs) for each product. These can be accessed on-line from the following link:

<https://www.caltex.co.nz/products-and-services/at-the-station/product-data-sheets>

In all instances, you should confirm that the Caltex product selected is consistent with the original equipment manufacturers' recommendation for the equipment operating conditions and customer maintenance practices. It is also essential that you follow all the original equipment manufacturers' instructions and recommendations regarding changing out or replacing one product with another. These recommendations often include completely draining, purging or flushing out the current product before replacement with new product to reduce the risk of compatibility problems.

While the values and characteristics are considered representative, some variation, not affecting performance can be expected. It is the responsibility of the user to ensure that the products are used in applications for which they are intended.

Individual Product Data Sheets can be accessed by going on-line

<https://www.caltex.co.nz/products-and-services/at-the-station/safety-data-sheets>

For further information contact Caltex Lubricants Technical Department on 0800 733 835 and choose option 4.



Caltex Premium with Techron

A highly refined, premium grade unleaded petrol designed for use in all petrol-fuelled spark-ignition engines in mobile, portable and stationary applications. It has an octane rating of 95 minimum, which makes it ideal for vehicles that require unleaded petrol with octane ratings higher than the commonly available 91. It is also ideal for those cars which experience engine knocking or run-on problems when using 'regular' unleaded petrol.

Caltex Premium with Techron contains an advanced, proprietary deposit control additive that cleans up harmful intake and fuel system deposits and can also keep these deposits from forming in new engines to ensure they operate at peak performance and efficiency. Volatility characteristics are carefully adjusted seasonally to ensure easy cold starting and protection from vapour lock and carburettor icing. Caltex Premium with Techron is coloured yellow and meets the New Zealand Engine Fuel Specifications Regulations.

Caltex Regular with Techron

A highly refined regular grade unleaded petrol designed for use in all petrol-fuelled spark-ignition engines in mobile, portable and stationary applications. It contains the same additive system as Caltex Premium with Techron to ensure total fuel system cleanliness so that engines operate at peak performance and efficiency. Volatility characteristics are carefully adjusted seasonally to ensure easy cold starting and protection from vapour lock and carburettor icing. Caltex Regular with Techron has an octane rating of 91 minimum, is coloured Red and meets the New Zealand Engine Fuel Specifications Regulations.

NOTE: Motor petrols are NOT suitable for aircraft use.

Automotive LPG

A premium quality, clean burning, liquefied petroleum gas. It is an unleaded high-octane fuel suitable for all currently available automotive LPG engines or dual fuel LPG/petrol engines. It meets the New Zealand Standard NZS 5435 (specification for LPG), has a gross energy per unit mass of 50 MJ/kg and an octane rating of approximately 99.

Regular Kerosene

Caltex Regular Kerosene is a product intended for use as a general-purpose cleaning solvent and as a fuel in most flued domestic heating appliances employing vaporising or atomizing burners.

Jet-A1

A kerosene-type aviation turbine fuel for civil, commercial and military aircraft use. Manufacture and distribution are closely controlled to ensure that the product meets or exceeds all requirements of the applicable specifications, including DEF STAN 91-091 and the AFQRJOS Joint Fuelling Check List.

Caltex Diesel with Techron® D

A premium performance, deposit control diesel fuel designed for use in diesel engines in automotive and industrial applications. The exclusive Techron® D additive controls deposits, maintains fuel injector cleanliness and protects metal fuel system components against corrosion and has been tested in both the latest and older technology engines and in a range of diesel specifications including biofuel blends.

It is also used in domestic and smaller industrial automatic heating systems equipped with gun type burners.

It meets the requirements of the New Zealand Petroleum Products Specifications Regulations and may be used when EN590, ASTM D975 No. 2D and JISK 2204 No. 1 diesel fuel is specified. It has a net energy per unit volume of approximately 45.9 MJ/kg. Sulphur Content mg/kg = <10.



Fuel Oils

A broad range of residual fuels for marine bunkering, industrial applications, steam and electrical power generation boilers, and large central heating applications. For lighter grades preheating is not normally required for handling and burning; the medium grades may require preheating, depending on climatic conditions, and the heavier grades require heating for both handling and burning. Further details of the range are available upon request.

Typical Characteristics of Caltex Fuels

Product	Density kg/L @ 15°C	Flash Point °C	Freezing, Cloud or Pour Point °C	Research Octane Number	Cetane Index	Sulphur % mass Mg/kg	Lead Mg/L	Colour
Caltex Premium with Techron	0.75	-40	-	95	-	18	<1	Yellow
Caltex Regular with Techron	0.74	-40	-	91	-	41	<1	Red
Automotive LPG	0.53	-60	-	99	-	-	-	-
Regular Kerosene	0.808	41	-	-	40	0.02	-	-
Jet-A1	0.81	43	Freeze-Point -52	-	-	0.02	-	Clear
Diesel	0.835	71	Cloud point (summer) 3	-	55	<10	-	Pale to light green
Fuel Oil Light	0.920	103	Pour Point -11	-	-	1.8	-	Black
Fuel Oil Heavy	0.952	105	Pour Point -1	-	-	2.5	-	Black

Delo® Bumper-to-Bumper Protection for On-Road Trucks



5th Wheel

Delo® Grease ESI®
Starplex® EP 2
Starplex® HD2 M3

Refrigerator Compressor Unit

Same as for Engine Crankcase

Engine Crankcase

Delo® 400 XLE LD SAE 10W-40
Delo® 400 XSP SD SAE 5W-30
Delo® 400 SLK SAE 15W-40
Delo® 400 SLK SAE 10W-30
Delo® Gold Ultra S SAE 10W-40
Delo® Gold Ultra SAE 15W-40

Wheel bearings

Delo® Grease ESI®
Starplex® EP 2

Clutch Bearings

Delo® Grease ESI®
Starplex® EP 2

King Pins & Tie Rods

Delo® Grease ESI®
Starplex® EP 2

Transmissions (manual & automatic)

Delo® Syn-Trans XE SAE 75W-90 (Manual, Eaton)
Delo® Syn-Trans XV SAE 75W-80 (Volvo)
Delo® Syn-MTF XZ SAE 75W-80 (ZF)
Delo® Syn-Trans AMT XV SAE 75W-90 (Volvo)
Delo® Syn-TDL SAE 75W-90 (Manual)
Delo Syn ATF 668 (Automatic, TES 668, 295, 389 & 468)
Delo® Syn-ATF HD (Automatic, TES 295 & 389)
Delo® TorqForce SAE 50 (Manual & AMT)

Differentials & Drive Axles

Delo® Syn-Gear XDM SAE 80W-140
Delo® Syn-Gear XS SAE 75W-140
Delo® Syn-TDL SAE 75W-90
Delo® Gear ESI SAE 80W-90
Delo® Gear EP-5 SAE 80W-90 & 85W-140

Coolant System

Delo® ELC Antifreeze/Coolant
Delo® XLC Antifreeze/Coolant

The product recommendations provide general guidelines for use in on-road trucks. All manufacturers have different coolant and lubricant requirements and recommendations. It is important to contact a Caltex representative at 0800 733 835 or refer to the Original Equipment Manufacturer manual to confirm the proper product is used for the application.

Delo® Bumper-to-Bumper Protection for Construction Equipment



Transmissions

Delo® TorqForce SAE 30 (CAT TO-4)



Hydraulic System

Delo® TorqForce SAE 10W, 30 (CAT TO-4)
Rando® HDZ
Rando® HD
Clarity® AW 46
Clarity® Bio EliteSyn AW 46



Engine Crankcase

Delo® 400 XLE LD SAE 10W-40
Delo® 400 XSP SD SAE 5W-30
Delo® 400 SLK SAE 15W-40
Delo® 400 SLK SAE 10W-30
Delo® Gold Ultra S SAE 10W-40
Delo® Gold Ultra SAE 15W-40



Bearings and Grease Points

- Starplex HD 2 M3
- Ultra-Duty HD 2

Swing Gear and Gear Drives

Delo® Syn-TDL SAE 75W-90
Delo® TorqForce SAE 50 (CAT TO-4)
Delo® Gear EP-5 SAE 80W-90
Delo® Gear ESI SAE 80W-90
Translube LD SAE 80W-90
Starplex® HD 2 M3 (for the swing ring)



Coolant System

Delo® ELC Antifreeze/Coolant & Premixed 50/50
Delo® XLC Antifreeze/Coolant & Premixed 50/50

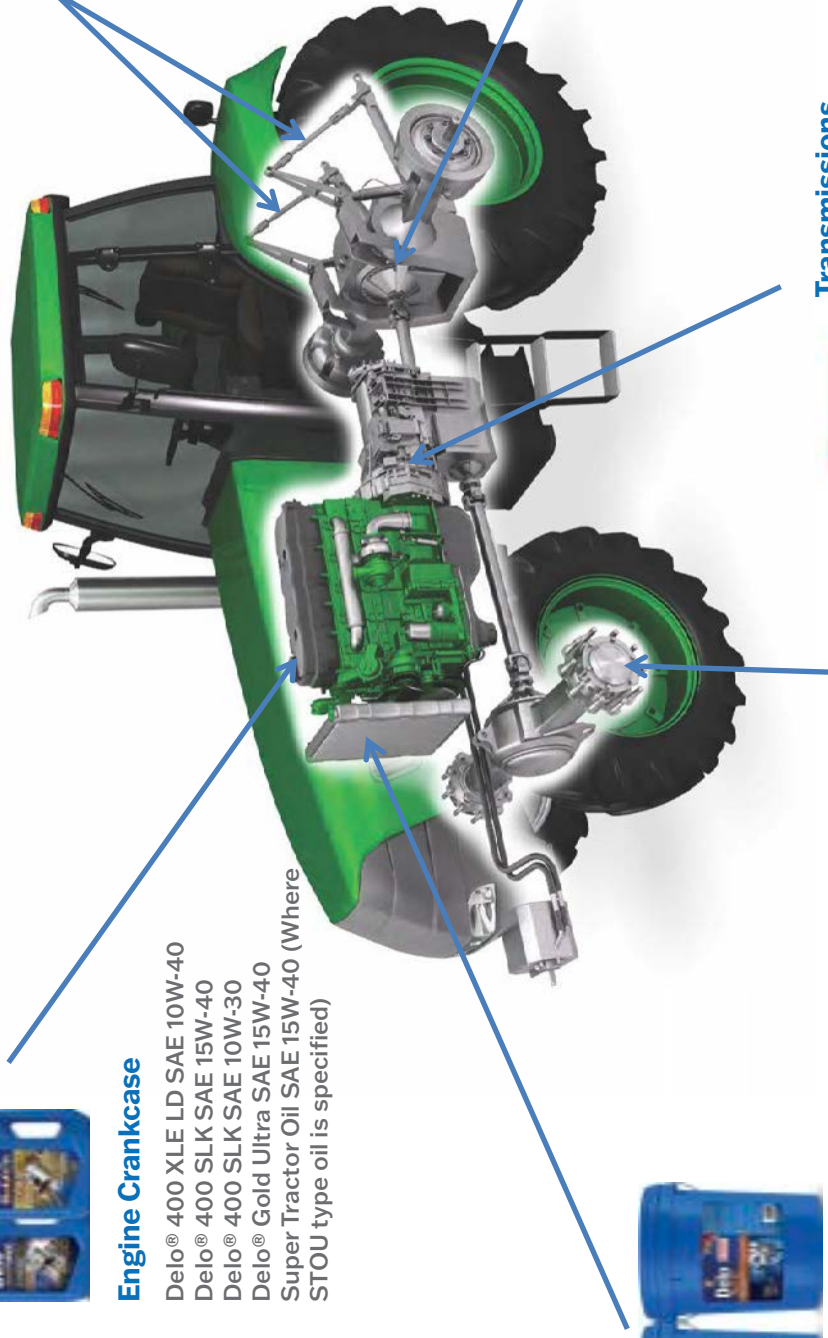


Delo® Protection for Agricultural Equipment



Engine Crankcase

Delo® 400 XLE LD SAE 10W-40
Delo® 400 SLK SAE 15W-40
Delo® 400 SLK SAE 10W-30
Delo® Gold Ultra SAE 15W-40
Super Tractor Oil SAE 15W-40 (Where STOU type oil is specified)



Hydraulic System

1000 THF (For units with common THF reservoirs)
Rando® HDZ
Rando® HD
Super Tractor Oil SAE 15W-40 (Where STOU type oil is specified)



Differentials & Drive Axles

1000 THF (For units with common THF reservoirs)
Delo® TorqForce SAE 50 (CAT TO-4)
Delo® Syn-TDL SAE 75W-90 (API GL-5/MT-1)
Delo® Gear ESI SAE 80W-90 (API GL-5/MT-1)
Delo® Gear EP-5 SAE 80W-90 (API GL-5/MT-1)
Super Tractor Oil SAE 15W-40 (Where STOU type oil is specified)

Transmissions (Manual & Automatic)

1000 THF
(For units with common THF reservoirs)
Delo® TorqForce SAE 30
(For CAT TO-4 and Allison C4 fluid requirements)
Super Tractor Oil SAE 15W-40 (Where STOU type oil is specified)



Bearings

Delo® Grease ESI®
Starplex® EP 2
Starplex HD 2 M3



Coolant System

Delo® ELC Antifreeze/
Coolant
Delo® XLC Antifreeze/
Coolant

The product recommendations provide general guidelines for use in agricultural equipment. All manufacturers have different coolant and lubricant requirements and recommendations. It is important to contact a Caltex representative at 0800 733 835 or refer to the Original Equipment Manufacturer manual to confirm the proper product is used for the application.

Havoline® Protection For Your Vehicle



CALTEX



Power Steering

Texamatic 1888
Havoline Full Synthetic Multi-Vehicle ATF



Coolant System

Havoline Xtended Life Antifreeze/Coolant
Delo XLC Anti-Freeze/Coolant & Premix 50/50



Brake Fluid

Brake & Clutch Fluid 260 DOT 4

Differentials & Axles

Delo Syn-Gear XS SAE 75W-140
Geartex LS SAE 85W-90
Delo Syn-TDL SAE 75W-90 Same oil as for transmission (transaxles)



Fuel System Cleaner

Techron® Concentrate Plus



Automatic Transmission

Havoline Full Synthetic Multi-Vehicle ATF
Havoline ATF-J
Havoline 1888
Havoline Fully Synthetic CVT Fluid

Manual Transmission

Delo Syn-TDL SAE 75W-90
Havoline Fully Synthetic Manual Transmission Fluid



Engine Protection

Havoline ProDS Fully Synthetic ECO SAE 5W-30, 0W-20
Havoline ProDS Full Synthetic Motor Oil SAE 5W-20
Havoline ProDS Fully Synthetic LE SAE 5W-40
Havoline ProDS F SAE 0W-30
Havoline ProDS V SAE 5W-30
Havoline Fully Synthetic C3 SAE 5W-30
Havoline Synthetic Blend SAE 10W-40
Havoline Formula SAE 10W-30, 15W-40, 20W-50
Havoline Motor Oil SAE 20W-50
Havoline SF Engine Oil SAE 20W-40

The product recommendations provide general guidelines for use in vehicles. All manufacturers have different coolant and lubricant requirements and recommendations. It is important to contact a Caltex representative at 0800 733 835 or refer to the Original Equipment Manufacturer manual to confirm the proper product is used for the application.

Havoline
KEEP GOING



Premium Synthetic

Havoline® Fully Synthetic Hybrid SAE 0W-16 *(NEW PRODUCT)* 500742

SAE Grade:	0W-16
Performance Standards:	API: SQ/ Resource Conserving; ILSAC GF-7B.
Description:	Havoline® Fully Synthetic Hybrid is a resource conserving, multigrade petrol engine oil formulated with synthetic base oils and advanced additive technologies for Hybrid car engine applications. It has been specifically designed for use in Hybrid Electric Vehicles (HEV) and Plug-in-Hybrid Electric Vehicles (PHEV) fitted with internal combustion engines, turbocharged or naturally aspirated, direct or indirect injection, where multiple stops and starts of the petrol car engine occur during the different operating phases of the hybrid vehicle.
Application:	Havoline® Fully Synthetic Hybrid SAE 0W-16 is suitable for use in both hybrid and petrol engine vehicles where an API SQ or ILSAC GF-7B SAE 0W-16 lubricant is recommended.
Pack sizes:	200 litre, 4 litre



Havoline® ProDS Fully Synthetic ECO *(UPGRADED PRODUCT)* 500292

SAE Grade:	0W-20
Performance Standards:	API: SQ/ Resource Conserving; ILSAC GF-7A; GM: dexos1™ Gen 3; Ford WSS-M2C962-A1 (compatible with Ford WSS-M2C947-A1/B1); GM 6094M.
Description:	Havoline® ProDS Fully Synthetic ECO is a premium, fully synthetic motor oil with Deposit Shield Technology, a proprietary cleaning booster, designed to provide advanced protection that prolongs the peak performance and efficiency of high-performance engines, particularly under harsh stop-and-go driving conditions, extreme temperatures and heavy loads. It provides outstanding protection for vehicles with direct-injection and turbochargers and outstanding mitigation against Low Speed Pre-Ignition (LSPI) in Gasoline Direct Injection (GDI) engines.
Application:	Passenger cars, pick-up trucks, SUV's and working vans in new or older condition operating in extreme hot or cold or stop and go driving conditions. Recommended for use in FCA, Ford, GM, Honda, Mazda, Mitsubishi, Nissan and Toyota engines for either an SAE 0W-20 or SAE 5W-20 applications.
Pack sizes:	4 litre



Havoline® ProDS Fully Synthetic ECO *(UPGRADED PRODUCT)* 500295

SAE Grade:	5W-30
Performance Standards:	API: SQ/Resource Conserving; ILSAC GF-7A; GM dexos1™ Gen 3; GM 6094M & 4718M; Ford WSS-M2C961-A1 (Compatible with WSS-M2C946 A1/B1)
Description:	Havoline® Fully Synthetic ECO is a premium, fully synthetic motor oil with Deposit Shield Technology, a proprietary cleaning booster, designed to provide advanced protection that prolongs the peak performance and efficiency of high-performance engines, particularly under harsh stop-and-go driving conditions. It provides outstanding mitigation against Low Speed Pre-Ignition (LSPI) in Gasoline Direct Injection (GDI) engines.
Application:	Recommended for use in passenger cars and pick-up trucks, SUVs and working trucks in new and older vehicles. Suitable for Acura, Chrysler, FCA, Ford, GM, Honda, Mazda, Nissan and Toyota engines calling for this grade.
Pack sizes:	200 litre, 18 litre, 4 litre and 1 litre





Havoline Pro-DS Full Synthetic Motor Oil

(Replaced Havoline ProDS F SAE 5W-20)

500277

SAE Grade:	5W-20
Performance Standards:	API: SQ Plus/Resource Conserving; ILSAC GF-7A; Chrysler MS-6395; Fiat 9.55535-CR-1; Ford WSS-M2C960-A1; GM 6094M. Recommended for Ford WSS-M2C945-A1/B1
Description:	Havoline® ProDS Full Synthetic Motor Oil is a premium full synthetic oil with Deposit Shield® Technology, combined with proprietary cleaning booster.
Application:	Recommended for advanced, high power density and performance engines with turbochargers, and gasoline direct injection. recommended for vehicles operating in extreme hot and cold or stop-and-go driving conditions. For use in most domestic and imported conventional or hybrid passenger cars, SUVs, pickup trucks and vans, including new and older vehicles.
Pack sizes:	208 litre and 5 quarts (4.75 litre).



Havoline® ProDS F SAE 5W-20 (Discontinued)

500266

Havoline® ProDS F

500275

SAE Grade:	0W-30
Performance Standards:	ACEA: C2; Ford WSS-M2C950-A; Jaguar Land Rover STJLR.03.5007
Suitable for:	Fiat 9.55535 GS1
Description:	Havoline® ProDS F is a premium performance, synthetic passenger car engine oil formulated with synthetic base oils in combination with an advanced low SAPS additive system and is compatible with diesel particulate filters (DPF) and three-way catalyst (TWC) technologies.
Application:	Specifically designed for use in recent Ford 2.0L Focus diesel engines and Mondeo TDCi diesel engines requiring Ford WSS-M2C950-A. Also suitable for other models such as C-Max, Grand C-Max, Kuga and can also be used in some petrol engine models. It is recommended by Caltex for use in late model Toyota diesel engines where an ACEA C2, SAE 0W-30 viscosity grade oil is required.
Pack sizes:	208 litre, 20 litre and 4 litre



Havoline® ProDS Fully Synthetic LE (Discontinued)

500001

SAE Grade:	5W-30
Performance Standards:	API: SN (licenced); ACEA: C2-16, Meets Renault RN 0700
Description:	Havoline® ProDS Fully Synthetic LE is a premium performance, multigrade motor oil formulated from selected synthetic base fluids and matching additive technology for use in passenger car and light truck petrol and diesel engines under all expected operating conditions.
Application:	Specifically developed for use in low emission passenger car and light duty vehicle engines fitted with the latest catalytic converter (petrol) or diesel particulate filter technology and specifically where ACEA C2 oils are recommended. Not recommended for use in gas-fuelled (CNG or LPG) engines, or in motorcycle engines.
Pack sizes:	200 litre



Havoline® ProDS Fully Synthetic LE

500002

SAE Grade:	5W-40
Performance Standards:	API SP; ACEA: C3; MB Approval: 229.51;; Renault RN 0700/0710 performance;; BMW Longlife-04 approval.
Description:	Havoline® ProDS Fully Synthetic LE is a premium performance, multigrade motor oil formulated from selected synthetic base fluids and matching additive technology for use in passenger car and light truck gasoline and diesel engines under all expected operating conditions
Application:	Specifically developed for use in low emission passenger car and light duty vehicle engines fitted with the latest catalytic converter (petrol) or diesel particulate filter technology and specifically where ACEA C3 oils are recommended. Not recommended for use in gas-fuelled (CNG or LPG) engines, or in motorcycle engines.
Service Considerations:	In December 2012, ACEA amended its some of its definitions such that ACEA C3 has become mutually exclusive with ACEA A3/B3 and A3/B4. The changes were made to emphasise the fact that today, the ACEA A3/B3 and A3/B4 Sequences are primarily intended for applications where lower quality, higher sulphur content fuels are in use. Thus ACEA A3/B3 and A3/B4 claims are no longer made for Havoline ProDS Fully Synthetic LE SAE 5W-40, which is primarily an ACEA C3 oil. However, it remains suitable for use in those applications calling for ACEA A3/B3 or A3/B4 oils where it has previously been used, and where low sulphur fuels are being burned.
Pack sizes:	200 litre, 18 litre, 4 litre and 1 litre



Havoline® ProDS V

500218

SAE Grade:	5W-30
Performance Standards:	API SN; ACEA C3; VW 504 00/507 00 ("Longlife III oil"); BMW Longlife-04; Mercedes Benz 229.31, 229.51; Porsche C30; Chrysler MS-11106.
Recommendations:	VW 502.00/505.01; VW 503.00 and VW 503.01, and applications requiring Fiat 9.55535 S3; May be used where ACEA C2 performance is recommended however user will not receive the fuel economy benefits that an ACEA C2 lubricant can provide.
Description:	Havoline® ProDS V SAE 5W-30 is a premium performance synthetic mid SAPS engine lubricant specially formulated with advanced technology additives to meet demanding OEM specifications including Volkswagen-Audi 504.00/507.00 engine lubrication requirements.
Application:	For use in naturally aspirated and turbocharged petrol and diesel engines in passenger cars and light trucks including those fitted with the latest catalytic converter (petrol) or diesel particulate filter (DPF) technology. Particularly suited for use in the latest Volkswagen and Audi petrol and diesel engines. For applications where VW Standard 508.00/509.00 is recommended, Havoline ProDS V SAE 5W-30 (VW Standard 504.00/507.00) can be used when allowed by VW as indicated in their car manuals/handbooks. Not recommended for use in gas-fuelled (CNG or LPG) engines, or in motorcycle engines.
Pack sizes:	20 litres.

PETROL ENGINE OILS



Havoline® Energy

500210

SAE Grade:	5W-30
Performance Standards:	API: SL/CF; ACEA: A1/B1; A5/B5; Ford: WSS-M2C913-D, M2C913-C, M2C913-B, M2C913-A; Jaguar Land Rover STJLR 03.5003-16; Renault RN 0700; Fiat 9.55535.G1, Volkswagen VWC 53036 and Chrysler MS-50081. Suitable for use: IVECO 18-1811 Class S1.
Description:	Havoline® Energy is a premium performance, friction modified multigrade motor oil formulated from high performance additive technology and fully synthetic base oils, for use in modern passenger car and light truck petrol engines to promote engine durability and improved fuel economy.
Application:	Recommended for naturally aspirated and turbocharged petrol engines where the manufacturer requires a low viscosity multigrade oil or where superior fuel efficiency is desired.
Pack sizes:	208 litre, 4 litre and 1 litre



Havoline® Fully Synthetic C3

500207

SAE Grade:	5W-30
Performance Standards:	API SN; ACEA C3; Mercedes Benz Approval 229.51 or 229.31; GM dexos2TM (license D225AFDD089) performance. May be used where ACEA C2 performance is recommended however user will not receive the fuel economy benefits that an ACEA C2 lubricant can provide.
Description:	Havoline® Fully Synthetic C3 is a premium performance multigrade motor oil formulated from selected synthetic base fluids and matching additive technology for use in passenger car and light truck petrol and diesel engines under all operating conditions. It is optimised to provide complete engine protection plus excellent performance.
Application:	Specifically developed for use in low emission passenger car and light duty vehicle engines fitted with the latest catalytic converter (petrol) or diesel particulate filter technology. Suitable for petrol or diesel engines where ACEA C3, or API SN or earlier API 'S' performance categories are specified, and where GM dexos2. MB 229.31 or MB 229.51 performance categories are specified. Not recommended for use in gas-fuelled (CNG or LPG) engines, or in motorcycle engines.
Pack sizes:	200 litre, 18 litre, 4 litre and 1 litre



Havoline® Ultra R (Discontinued)

501276

SAE Grade:	5W-30
Performance Standards:	ACEA C4; Renault RN 0720; Mercedes Benz 226.51, Fiat 9.55535.S4
Suitable for:	Chrysler MS-11106, Fiat 9.55535.S3
Description:	Havoline® Ultra R is a low SAPS, premium performance engine lubricant formulated with synthetic base stocks and advanced technology additives and is designed to perform under severe operating conditions as defined by the engine manufacturer.
Application:	Recommended for use in high performance naturally aspirated and turbocharged car and light van diesel and petrol engines equipped with modern three-way catalysts (TWC) and diesel particulate filters (DPF) requiring low SAPS oils. Approved to ACEA C4 which is specifically required by Nissan in a range of their late model diesel engines fitted with DPF's.
Pack sizes:	5 litre



PETROL ENGINE OILS



Synthetic Blend

Havoline® Synthetic Blend *with DEPOSIT SHIELD*

500005

SAE Grade:	10W-40
Performance Standards:	API: SN /CF; ACEA: A3/B4; Mercedes-Benz: 229.3; VW 502.00 and 505.00; RN 0710/0700
Description:	Havoline® Synthetic Blend is a high performance, multigrade motor oil formulated from a special blend of selected mineral oils, synthetic base fluids and matching additive technology. It is formulated with Deposit Shield which is an advanced detergent formula that helps prevent deposit build-up for improved oil stability and increased engine durability.
Application:	Suitable for naturally aspirated and turbocharged petrol engines in passenger cars and light commercial vehicles that require SAE 10W-40 viscosity grade oils up to and including API SN or ACEA A3/B4. Not recommended for use in petrol or diesel engines that require ACEA A5/B5 or C-series oils, in gas-fuelled (CNG or LPG) engines or in any motorcycle engines.
Pack sizes:	200 litre, 18 litre, 4 litre and 1 litre



Mineral

Havoline® Formula *with DEPOSIT SHIELD*

500007

SAE Grade :	10W-30
Performance Standards:	API: SP; API Resource Conserving; ILSAC: GF-6A
Description:	Havoline® Formula is a highly shear stable, multigrade petrol engine oil and is formulated <i>with Deposit Shield™</i> which is an advanced detergent formula that helps prevent deposit build up for improved oil stability and increased engine durability. It provides superior viscosity control that helps maintain engine power and preserve fuel economy.
Applications:	Recommended for use in both naturally aspirated and turbocharged petrol engines in passenger cars and light commercial vehicles including those with sophisticated valvetrain mechanisms and variable valve timing. Also suitable for engines fuelled by LPG or CNG or fitted with gas/petrol dual fuel systems including industrial lift trucks where an SAE 10W-30 is required. Also suitable for four-stroke petrol engines in portable power equipment where the manufacturer recommends conventional passenger car motor oils. Not recommended for use in diesel engines or motorcycle engines.
Pack sizes:	200 litre, 4 litre, 1 litre



PETROL ENGINE OILS



Havoline® Formula *with DEPOSIT SHIELD*

SAE 15W-40 500009
SAE 20W-50 500010

SAE Grade : 15W-40 & 20W-50

Performance Standards: API: SP

Description: Havoline® Formula is a highly shear stable, multigrade petrol engine oil and is formulated with Deposit Shield™ which is an advanced detergent formula that helps prevent deposit build up for improved oil stability and increased engine durability.

Applications : Recommended for use in both naturally aspirated and turbocharged petrol engines in passenger cars and light commercial vehicles including those with sophisticated valve train mechanisms and variable valve timing. Also suitable for engines fuelled by LPG or CNG or fitted with gas/petrol dual fuel systems including industrial lift trucks where the manufacturer recommends conventional passenger car motor oils.

Not recommended for use in diesel engines or motorcycle engines.

Pack sizes: SAE 15W-40 - 200 litre, 18 litre, 4 litre, 1 litre, 500 ml.
SAE 20W-50 - 4 litre.



Havoline® Motor Oil SJ

SAE 20W-50 - 500016

SAE Grade: 20W-50

Performance Standards: API: SJ. Suitable for use where API SH, SG, SF or SE oils are specified.

Description: Havoline Motor Oil is a high quality, shear-stable, multigrade engine oil for use in a wide range of passenger car and light duty commercial vehicles where API SJ performance lubricants are required. It provides a high level of protection against starting friction, heat stress and engine deposits.

Application: Suitable for passenger car and light duty commercial vehicle petrol engines and industrial and marine applications where API SJ or lower performance oils are specified.

Not recommended for use in petrol engines that require API SL or higher performance or ACEA-classified oils, or in any gas-fuelled (LPG) engines, diesel engines or motorcycle engines.

Pack sizes: 4 litre.



Havoline® SF Engine Oil

500272

SAE Grade: 20W-40

Performance Standards: Suitable for use where API SF or API SF/CD oils are specified for use in petrol engines.

Description: Havoline SF is an economy petrol engine oil formulated to protect against wear, deposits, rust and corrosion.

Application: Designed for older passenger cars where operating conditions are mild and oils meeting API SF are acceptable.

Not recommended for use in gas-fuelled (LPG) engines, diesel engines or motorcycle engines.

Pack sizes: 4 litre.



PETROL ENGINE OILS



TRACTOR OILS

Super Tractor

500421

SAE Grade:	15W-40
Performance Standards:	API: : CF, CF-4/SF, API: GL-4; ZF TE-ML 06B, 07B Suitable for use where the following are specified: API CG-4; ACEA E3-96; Ford: ESN-M2C159-B; Ford New Holland: FNH 89008903; Massey Ferguson: CMS M1144, M1145; New Holland NH 024C
Description:	A shear stable, multi-viscosity super tractor oil universal (STOU) fluid, designed for use in tractor engine crankcases, transmissions (including wet brakes), final drives and hydraulic systems.
Application:	A multi-functional oil suitable for: • Where the tractor manufacturer specifies the use of an STOU type product. • Mixed fleets of agricultural tractors and associated equipment. • Mobile or stationary diesel engines. • Older style petrol engines. • Automotive manual transmissions and gearboxes. • Mobile hydraulic systems. • Enclosed oil immersed (wet) brakes. • Power take off (PTO) clutches.
Pack sizes:	200 litre, 18 litre.



FOUR-STROKE MOTORCYCLE AND LAWNMOWER

Havoline® Super 4T Semi-Synthetic

500725

SAE Grade:	10W-40
Performance Standards:	JASO MA2 (2016); API SN.
Description:	Havoline Super 4T Semi-Synthetic is a high quality semi-synthetic oil with Havoline C.O.R.E Technology, that delivers four key benefits: Cleans and protects; Oxidation stability; Reduces engine heat damage and enhances accelerations. It is a premium performance, shear stable, multifunctional fluid specifically designed for use in four-stroke motorcycle engines, clutches and gearboxes, and portable power equipment engines requiring JASO MA2 or MA, API SN lubricants, including high specific output engines operating in severe service.
Application:	Air and liquid cooled four-stroke motorcycles engines and particularly suitable for Japanese high-performance motorcycle engines, including Yamaha, Suzuki and Kawasaki. Suitable for motorcycles with catalytic converters and the latest generation four-stroke scooter engines. Motorcycles with and without oil immersed clutches. Recommended for use in ATV and quads that are extensively used in farming applications.
Pack sizes:	4 litre, 800 ml.



PETROL ENGINE OILS



Four Stroke Lawnmower and Stationary Engine Oil

500734

SAE Grade:	30
Performance Standards:	API: SJ, CF.
Description:	A high performance monograde SAE 30 engine oil intended primarily for the lubrication of petrol engines requiring an API SJ performance lubricant and suitable for small diesel engines where an API CF performance is specified.
Application:	Recommended for four-stroke petrol lawn mower engines and for other small four-stroke petrol and diesel stationary engines, such as generator sets and portable power equipment. Suitable for use in Briggs & Stratton 4-stroke lawnmower engines.
Pack sizes:	1 litre



TWO-STROKE ENGINES

Havoline® Super 2T

500676

SAE Grade:	20 (Pre-diluted)
Performance Standards:	JASO: FC (identification No. 061CTC684/5); ISO: EGC; API: TC
Description:	A premium performance, "low smoke", semi-synthetic, two-stroke motorcycle oil formulated with a special low ash additive system and base fluids that provide superior lubricity to reduce wear.
Application:	Air and liquid cooled two-stroke motorcycle engines and particularly Japanese high-performance motorcycle engines. Also suitable for Japanese two-stroke engines fitted to stationary and portable power equipment, lawn mowers etc. Havoline® Super 2T is suitable for use in all types of chainsaw applications as it has been successfully field tested in severe duty forestry operations. Suitable for oil-injected engines and oil-petrol premix engines at petrol-to-oil ratios up to 50:1. <i>It is NOT recommended for use in marine outboard engines, or any LPG fuelled engines.</i>
Pack sizes:	18 litre, 4 litre, 1 litre



Two Stroke Lawnmower Oil

500625

SAE Grade:	20 (Pre-diluted).
Performance Standards:	JASO: FB ; ISO : EGB.
Description:	A two stroke all-mineral motor oil designed for two stroke lawn mower petrol engines. Pre-diluted with a high flash point solvent to facilitate easy mixing with petrol.
Application:	Recommended for two stroke petrol engine lawn mowers and two-stroke lawn and garden tools, including weed-eaters, trimmers, edgers, blowers and portable two-stroke generators, both oil-injected and oil-petrol pre-mix engines at petrol-to-oil ratios up to and including 50:1. <i>Not suitable for two-stroke chainsaw or marine outboard engines.</i>
Pack sizes:	200ml.



PETROL ENGINE OILS



Havoline Super Outboard 3

560321

SAE Grade: 20 (Pre-diluted).

Performance Standards: National Marine Manufacturers Association (NMMA): TC-W3 Certified

Description: A premium performance, two-stroke, marine outboard motor oil formulated with a special ashless additive system that ensures that ash-induced deposits are not formed in the combustion chamber thereby eliminating the risk of destructive pre-ignition from this source. Pre-diluted with a high flash point solvent to facilitate mixing with petrol at all temperatures. Dyed green for easy identification.

Application: Recommended for all water-cooled, two stroke, marine outboard engines including the latest designs under warranty, including Johnson, Mercury, Evinrude, Yamaha etc. Suitable for both oil-injected and oil-petrol premix engines at petrol-to-oil ratios up to and including 100:1.

Pack sizes: 4 litre, 1 litre.



2 STROKE FUEL-OIL MIXTURE CHART

Fuel/oil ratio	ml oil/litre	ml oil/ 5 litres	ml oil/ 10 litres	ml oil/ 15 litres	ml oil/ 20 litres
16:1	62.5	313	625	938	1250
20:1	50	250	500	750	1000
25:1	40	200	400	600	800
30:1	33.3	167	333	500	666
32:1	31.3	157	313	469	626
35:1	28.6	143	286	429	572
37:1	27	135	270	405	540
40:1	25	125	250	375	500
45:1	22.2	111	222	333	444
50:1	20	100	200	300	400
55:1	18.2	91	182	273	364
60:1	16.7	84	167	250	334
100:1	10	50	100	150	200



Typical Characteristics

Product	Code	SAE Grade	Density @ 15°C kg/L	Flash Point °C	Pour Point °C	Viscosity cSt @		Viscosity Index	TBN mgKOH/g	Sulphated Ash %m
						40°C	100°C			
Four Stroke Lawnmower Oil	501601	30	0.867	248	-39	89.9	11.5	118	6.8	0.80
Havoline® Energy	500210	5W-30	0.854	224	-36	51.0	9.5	174	-	1.10
Havoline® Formula SAE 10W-30	500007	10W-30	0.870	228	-40	67.8	10.2	132	8.7	0.96
Havoline® Formula SAE 15W-40	500009	15W-40	0.875	238	-34	117	15.1	136	8.4	0.95
Havoline® Formula SAE 20W-50	500010	20W-50	0.8762	>200	-30	154	18.4	129	7.1	0.70
Havoline® Fully Synthetic C3	500207	5W-30	0.852	>200	-36	69.6	11.8	166	8.0	0.80
Havoline® Fully Synthetic Hybrid SAE 0W-16	500742	0W-16	0.851	>200	-39	37.5	7.2	149		0.72
Havoline® Motor Oil	500016	20W-50	0.880	285	-27	167	19.1	130	5.7	0.88
Havoline® ProDS ECO	500292	0W-20	0.854	228	-47	42	7.9	162	-	0.90
Havoline® ProDS ECO	500295	5W-30	0.850	232	-45	62	10.7	164	-	0.90
Havoline® ProDS Full Synthetic Motor Oil	500277	5W-20	0.846	227	-	43.2	8.0	161	-	0.90
Havoline® ProDS F	500261	0W-30	0.841	220	-52	44.2	9.3	205	-	-
Havoline® ProDS Fully Synthetic LE	500001	5W-30	0.852	236	-42	57.1	10.3	168	7.8	0.80
Havoline® ProDS Fully Synthetic LE	500002	5W-40	0.852	236	-42	84	13.8	168	7.8	0.80
Havoline® ProDS V	500218	5W-30	0.852	236	-47	69	11.9	168	7.0	0.7
Havoline® SF Engine Oil	500272	20W-40	0.872	246	-21	133	15.1	115	6.6	0.80
Havoline® Super 2T	500676	20 (pre-diluted)	0.857	93	-38	59.2	9.4	141	-	0.13
Havoline® Super 4T Synthetic Blend	500725	10W-40	0.862	>215	-36	97.5	14.9	151	7.9	0.97
Havoline® Synthetic Blend	500005	10W-40	0.876	230	-39	91.0	13.7	153	10.9	1.20
Super Outboard 3 [Green]	560321	20 (pre-diluted)	0.874	102	-39	56.2	9.13	125	-	<0.01
Super Tractor	500421	15W-40	0.876	228	-35	113	15.1	139	10.1	1.40
Two-Stroke Lawnmower Oil	500625	F/M 2	0.882	124	-19	67.7	9.05	-	-	0.06



Low SAPS

Delo® 400 XLE HD SAE 5W-30 *(Discontinued)*

500559

Delo® 400 XSP SD *Replaced Delo 400 XLE HD SAE 5W-30*

500867

SAE Grade: 5W-30

Performance Standards: ACEA E6, E7, E8, E9, E11; API: CK-4, SN; JASO DH-2, Caterpillar: ECF-3; Cummins: 20086; DAF PSQL 2.4 LD, Extended drain (Euro IV, V MX engines and VI MX PX engines); Detroit Diesel: 93K222; Deutz: DQC IV-18 LA, DQC TTCD; Ford WSS-M2C213-A1; Mack: EOS-4.5, EO-O Premium Plus, EO-N, EO-M Plus, EO-M; MAN: M3677, M3477, M3271-1; MB

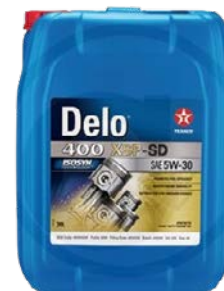
Approval: DTFR 15C110 (previously MB 228.51), DTFR 15C120 (previously MB 228.52), 228.31; MTU: Oil Category 3.1; Renault Trucks RLD-3, RLD-2, RLD, RXD, RGD; Volvo: VDS-4.5, VDS-4, VDS-3; JASO DH-2; LA. Scania LDF-4, Scania Low Ash
Suitable for: Applications requiring Iveco 18-1804 TLS E6; Liebherr LH-00-ENG LA; Renault Trucks RD, RD-2, RLD; Volvo VDS-2, VDS

Description: Delo® 400 XSP SD SAE 5W-30 is a high performance synthetic heavy duty engine oil designed for fuel economy and meets the performance requirements of a wide range of naturally aspirated and turbocharged diesel engines in on-highway, off-highway and construction service.

Application: Recommended for diesel engines meeting Euro I to V and the newest Euro VI emissions requirements where allowed by the OEM and for use in engines with global after treatment systems. This product is also recommended for use in older engines as well as today's most modern low emission designs. It is formulated for high performance with many fuels including ultra-low sulphur diesel fuels, and many biofuel formulations.

It is approved to Scania LDF-4 and is therefore suitable for use at extended oil drain intervals in engines with exhaust aftertreatment devices such as DPF's, with the actual interval being determined by the vehicle type and severity of operation. Refer to Scania documentation for further details.

Pack sizes: 208 litre, 20 litre





Delo® 400 XLE HD *(to be replaced by Delo 400 LD SAE SAE 10W-40)*

500642

SAE Grade:

10W-40

Performance Standards:

ACEA E4, E6, E7, E9; API: CJ-4; Caterpillar: ECF-3; Cummins: 20081; Detroit Diesel 93K218; Deutz: DQC IV-10 LA; ; Mack: EO-O Premium Plus, EO-M Plus, EO-M, EO-N; MAN: M 3477, M 3575, M3271-1; MB Approval: 228.51, 228.31; MTU: Oil Category 3.1, 2.1; Renault RLD-3, RLD-2, RLD; Scania Low Ash; Volvo: VDS-4, VDS-3; Voith Retarder B; JASO DH-2;

Suitable for: Applications requiring Renault VI RGD, RXD, RD, RD-2, RLD; Iveco Euro VI engines; DAF extended drain (Euro III, IV, V & VI engines).

Description:

Delo® 400 XLE HD is a premium performance synthetic heavy-duty diesel engine oil formulated with ISOSYN advanced low SAPS additive technology designed to meet Euro VI emission requirements for Volvo, Daimler, DAF and Iveco engines, and offers backward compatibility with legacy engine technology, meeting both full SAPS and lower SAPS specifications where permitted by OEMs. It is recommended for extended drain intervals and combines ACEA E4, E6, E7 and E9. Specifications, API CJ-4, JASO DH-2 and a range of North American engine manufacturers performance requirements.

Application:

Recommended for diesel engines meeting Euro IV, Euro V and the newest Euro VI emission requirements where permitted by the OEM and is suitable for use in engines with global after treatment systems such as Exhaust Gas Recirculation (EGR), Diesel Particulate Filter (DPF), and Selective Catalytic Reduction (SCR).

Ideal for use in mixed fleets of North American, Japanese and European high-speed four-stroke diesel engines.

Pack sizes:

208 litre, 20 litre



Delo® 400 XLE LD *New Product*

500792

SAE Grade:

10W-40

Performance Standards:

ACEA E6, E9, E7, E8, E11; API CK-4, CJ-4, CI-4, CH-4; JASO DH-2; Caterpillar ECF-3; DAF Extended drain Euro 0 to VI); Mack EO-O Premium Plus, EO-M Plus, EO-M, EO-N; Renault Trucks RLD-2; Volvo VDS-4, VDS-3

Approvals: Cummins CES 20086; Daimler Truck DTFR 15C100 (MB 228.31), DTFR 15C110 (MB 228.51), DTFR 15C120 (MB 228.52); Detroit Diesel DFS 93K222; Deutz DQC-IV-18 LA; Mack EOS-4.5; MAN M 3775; MTU Oil Category 3.1; Renault RLD-3; Volvo VDS-4.5

Suitable for use: Case New Holland CNH MAT 3521; Fiat Powertrain FPL_9.

LUBR001-TLS E9; • Iveco 18-1804-TLS E9 (Euro VI engines); Renault Trucks RD-2, RD; Volvo VDS-2, VDS Suitable for use in tractors and other agricultural machinery from the following manufacturers, which require an engine oil meeting the specifications listed above:

- Case New-Holland; CLAAS; Fendt; Massey-Ferguson; Mc Cormick; SAME; Valtra

Description:

Delo® 400 XLE LD SAE 10W-40 is a premium performance synthetic heavy-duty engine oil formulated with ISOSYN® technology and advanced low SAPS additive technology designed to meet the needs of Euro VI emission requirements for specific engines and provides compatibility with both Full SAPS and Lower SAPS specifications. It is designed for extended drain intervals and meets ACEA E7, E8, and E11, API CK-4, and JASO DH-2 standards. It also meets an extensive range of performance requirements set by North American and European engine manufacturers.

Application:

Recommended for diesel engines meeting Euro IV, Euro V and the latest Euro VI emissions requirements where allowed by the OEM and is excellent for use in engines with global after treatment systems such as EGR, DPF and SCR.

Ideal for use in mixed fleets with high-speed four-stroke diesel engines - both older models and modern low-emission designs - from North American, Japanese, and European manufacturers.

Pack sizes:

208 litre, 20 litre



DIESEL ENGINE OILS



Delo® 400 RDS

(Discontinued)

500369

SAE Grade: 10W-40

Performance Standards: ACEA E6, E7, E8, E9, E11; API: CI-4; Cummins: CES 20077, 20076; Deutz DQC IV-18 LA; Daimler MB Approval: 228.51; Mack: EO-N, EO-M Plus, EO-M; MAN: M 3477, M3271-1; MTU: Oil Category 3.1; Renault RLD-2; RD-2, RD; Volvo: VDS-3, VDS-2, VDS; JASO DH-2

Suitable for: Applications requiring Renault RXD, RLD, RGD; DAF Extended Drain (Euro 0 to VI engines)

Description: Delo® 400 RDS is a high performance semi-synthetic heavy-duty diesel engine oil designed to perform to current ACEA requirements as well as top tier OEM specifications for Euro IV, V and some Euro VI diesel engines. It is designed for modern low emissions diesel engines and is recommended for engines with Diesel Particulate Filters (DPF's) and Selective Catalytic Reduction (SCR).

Application: Formulated for use in severe on-highway naturally aspirated and turbocharged diesel engines and offers extended drain capability. Suitable for bus and truck applications as well as tractors and other agricultural machinery from the following manufacturers where they require an oil meeting these performance requirements:

Case New-Holland	CLAAS	Fendt	Massey-Ferguson
	McCormick	SAME	Valtra

Pack sizes: 208 litre

DIESEL ENGINE OILS



Delo® 400 SLK

SAE 15W-40 505502
SAE 10W-30 505503

SAE Grade: 15W-40 and 10W-30

Performance Standards: API: CK-4, CJ-4, CI-4 PLUS, CI-4, CH-4. API SN; ACEA:E11; Cummins: CES 20086; Detroit Fluids Specification (DFS) 93K222; Renault RLD-3; Volvo: VDS-4.5; Mack: EOS 4.5. Meets specifications: Caterpillar: ECF-3, Daimler DTFR 15C100 (previously MB 228.31); DEUTZ DQC III-18 LA; Ford WSS-M2C171-F1; MAN: M 3775; ; MTU Category 2.1; ZF TE-ML 04C

Meets the Requirements of: DAF Standard Drain (Euro 0-VI) and JASO DH-2.

Description: Delo 400 SLK with ISOSYN® Advanced Technology is a super-premium quality "low-SAPS" heavy-duty diesel engine oil which exceeds industry and engine manufacturers' performance requirements. It is specifically designed to lubricate a wide range of high-speed diesel engines operating under the most severe service conditions.

Application: It is formulated using the most advanced additive technology to provide outstanding protection for on and off-highway applications, including those with the latest low emission diesel engines fitted with Diesel Particulate Filters (DPF) and those fitted with Selective Catalytic Reduction (SCR) and/or Exhaust Gas Recirculation (EGR) emission control technologies.

Ideal for mixed fleets of European, North American and/or Japanese diesel engines of both old and new equipment in applications that include long distance trucking, earthmoving, off-highway, stationary plant, mining and agricultural operations and suitable for vehicles meeting the most recent exhaust emissions standards, including US EPA 2002, 2007 and 2010, 2017 greenhouse gas (GHG 17) Euro IV, V and VI, and Australian ADR 80/02 and ADR 80/03 (for heavy duty).

Pack sizes: SAE 15W-40 : 200 litre, 18 litre
SAE 10W-30 :18 litre



Delo® 400 MGX

(Discontinued)

500634

SAE Grade: 15W-40

Performance Standards: API: CJ-4, CI-4 PLUS, CI-4, CH-4, SM, SL, SJ; ACEA: E9-16, E7; Daimler DTFR 15C100 (previously MB 228.31); Detroit Diesel: 93K218; DEUTZ DQC III-18 LA; Mack: EO-O Premium Plus ; MAN: M 3575; MTU Category 2.1; Renault VI RLD-3; Volvo: VDS-4; ZF TE-ML 04C.

Meets the requirements of: Caterpillar ECF-3, ECF-2; JASO DH-2; Ford: WSS-M2C171-E and DAF Standard Drain (Euro 0-VI). Suitable for use in applications requiring oils meeting Cummins CES 20081 in engines under 50 litres displacement

Description: An API CJ-4 heavy duty diesel engine oil specifically formulated for on-highway and off-highway applications using either High Sulphur or Low Sulphur Diesel fuel operating under the most severe service conditions. Formulated with ISOSYN base oils and the latest low-ash additive technology to provide exceptional soot dispersancy, deposit control and wear protection. It may also be used in four-stroke gasoline engines.

Application: Provides protection for newer compliant low emission diesel engines with Selective Catalytic Reduction (SCR), Diesel Particulate Filter (DPF) and Exhaust Gas Recirculation (EGR).

Suitable for mixed fleets of European, North American and/or Japanese diesel engines of both old and new equipment in applications that include long distance trucking, earthmoving, off-highway, stationary plant, mining and agricultural operations. Suitable for vehicles meeting the most recent exhaust emissions standards, including US EPA 2002, 2007 and 2010, 2017 greenhouse gas (GHG 17) Euro IV, V and VI, and Australian ADR 80/02 and ADR 80/03 (for heavy duty) as well as older engines meeting Euro I, II and III emissions requirements.

Pack sizes: 200 litre, 18 litre, 5 litre, 1 litre.





Mid/High SAPS

Delo® Gold Ultra S

500440

SAE Grade:	10W-40
Performance Standards:	ACEA E4, E7; API: CF; DTFR 15B120 (previously MB 228.5); MAN: M3277; Mack: EO-N; Renault Trucks: RLD-2; Scania: LDF-3, LDF-2; Volvo: VDS-3 Suitable For Use: Renault Trucks: RD, RD-2 and RLD; Volvo: VDS-2; DAF Extended Drain (Euro III and IV engines)
Description:	Delo® Gold Ultra S is a high performance synthetic heavy-duty diesel engine oil designed to conform to current ACEA requirements and the more challenging OEM specifications, including Scania LDF-3 for their latest technology Euro VI diesel engines.
Applications:	Heavy duty, naturally aspirated and turbocharged high speed, four stroke diesel engines operating internationally with long drain intervals and provides oil service levels up to the maximum levels recommended for ACEA E4 oils in Euro IV and Euro V compliant engines NOT fitted with diesel particulate filters (DPF's). Suitable for use in Scania Euro VI emissions diesel engines requiring Scania LDF-3 approved lubricants and is backward compatible and suitable for earlier European heavy-duty diesel engines meeting Euro II to Euro V emission standards.
Pack sizes:	208 litre, 20 litre.



DIESEL ENGINE OILS



Delo® Gold Ultra

500574

SAE Grade: 15W-40

Performance Standards: API: CI-4, CH-4/SL; ACEA: E7; Cummins: CES 20078, 20077, 20076; Daimler DTFR 15B110 (previously MB: 228.3); Detroit Diesel 93K215; Mack: EO-N; MTU: Category 2; Renault: RLD-2; Volvo: VDS- 3

Meets the requirements of: API CF-4, CF, CD; ACEA: E5-02; Caterpillar ECF-1-a; Cummins: CES 20072, 20071; Deutz DQC-III-10; MAN: M 3275-1; Mack: EO-M Plus; JASO DH-1; Global DHD-1

Description: A high performance, multigrade, heavy-duty diesel engine oil specifically designed to lubricate a wide range of engines requiring API CI-4 or ACEA E7 performance lubricants, including those fitted with Selective Catalytic Reduction (SCR) and/or Exhaust Gas Recirculation (EGR) emission control technologies. It is formulated with ISOSYN® Technology to provide exceptional soot dispersancy, deposit control and wear protection.

Application: Recommended for mixed fleets of both diesel and petrol engines in the commercial road transport, off-highway vehicles and plant, agricultural tractors and farm machinery, generator sets, and high-speed diesel engines in marine service. May also be used in non-engine applications where an SAE 15W-40 engine oil is specified, such as transmissions and hydraulic systems.

Pack sizes: 200 litre, 18 litre, 5 litre and 1 litre



Delo® Silver Multigrade *(Discontinued)*

500549

Monogrades

Delo® Gold Monograde

500639

SAE Grade: 30

Performance Standards: API: CF/SJ; ACEA: E2-96; Daimler MB Approval: 228.2; MTU Category 2 ; MAN 270 ; Mack: EO-K/2;

Description: A monograde, heavy-duty diesel engine oil formulated with high performance base fluids and the latest additive technology to provide soot dispersancy, deposit control and wear protection.

Application: Recommended for use in both light and heavy duty high-speed four-stroke, turbocharged or naturally aspirated diesel engines as well as four-stroke petrol engines in mixed fleet applications where a monograde oil is preferred. Applications include commercial road transport, off-highway vehicles, agricultural tractors, high speed diesel engines in marine service and generator sets. Also suitable for use in non-engine applications where an SAE 30 engine oil is specified, such as manual transmissions and hydraulic systems.

Pack sizes: 200 litre, 18 litre



DIESEL ENGINE OILS



Delo® 100 Motor Oil *(Replaced Delo 6130 SAE 40)*

502061

SAE Grades: 40

Performance Standards: API: CF, CF-2; Suitable for use in Detroit Diesel Two-Stroke series 53, 71, 92 and 149 engines.

Description: A monograde heavy-duty diesel engine oil designed to lubricate engines requiring API CF-2, CF performance lubricants including heavy-duty two-stroke diesel (Detroit Diesel) engines operating in on- and off-highway service. Formulated with proven quality base stocks detergents, rust and corrosion inhibitors and anti-wear agents.

Application: Designed for:

- Detroit Diesel Corporation (DDC) two-cycle high speed diesel engines in on and off highway applications (Series 53, 71, 92 and 149 engines)
- Commercial road transport
- High speed diesel engines in marine service (e.g., fishing boats, river transport)
- Generator sets
- Agricultural tractors and farm machinery
- Off-highway vehicles including construction and mining applications

Pack sizes: 208 litre, 20 litre

Delo® Silver Monograde

500585

SAE Grade: 10W

Performance Standards: API: CF, CD/SF

Description: A high quality, monograde, low viscosity, diesel engine oil designed primarily for use in hydraulic systems of mobile equipment. Contains effective anti-wear and oxidation inhibitor additives and protects the systems from rust and corrosion

Application: Recommended for hydraulic systems of mobile and stationary equipment where the manufacturer recommends the use of engine-oil type hydraulic fluids. Generally not suitable for engine use unless an SAE 10W viscosity is recommended.

Pack sizes: 200 litre, 18 litre





Typical Characteristics

Product	Code	SAE Grade	Density @ 15°C kg/L	Flash Point °C	Pour Point °C	Viscosity cSt @		Viscosity Index	TBN mgKOH/g	Sulphated Ash %m
						40°C	100°C			
Delo® 100	502061	40	0.889	> 180	- 24	131	14.5	109	7.3	0.80
Delo® 400 MGX	500634	15W-40	0.875	>215	- 35	120	14.6	134	10.1	1.00
Delo® 400 RDS	500369	10W-40	0.864	> 210	- 42	98	14.5	154	10.0	1.0
Delo® 400 SLK	505502	15W-40	0.877	230	-43	107	14.7	141	8.5	1.00
Delo® 400 SLK	505503	10W-30	0.872	> 200	-	77.8	11.7	144	8.5	1.00
Delo® 400 XSP SD	500867	5W-30	0.858	231	-42	73.0	12.2	164	10.0	0.90
Delo® 400 XLE LD	500792	10W-40	0.869	226	-39	102.5	15.0	153	9.8	1.0
Delo® 400 XLE HD	500525	10W-40	0.855	228	-33	92.2	13.8	163	13.0	1.0
Delo® Gold SAE 30	500639	30	0.880	>220	- 18 (max)	93.0	11.5	112	10.0	1.40
Delo® Gold Ultra	500574	15W-40	0.878	235	-35	115	15.1	137	10.2	1.40
Delo® Gold Ultra S	500440	10W-40	0.866	236	-38	89.7	13.6	152	15.5	1.8
Delo® Silver SAE 10W	500585	10W	0.883	225	-30	38.8	6.5	110	9.6	1.1
Delo® Silver SAE 10W	500585	10W	0.883	225	-30	38.8	6.5	105	9.6	1.20



MARINE ENGINE OILS

Delo® 1000 Marine

SAE 30 - 560010

SAE 40 - 560011

SAE Grades: 30, 40

TBN: 12.

Performance Standards: Approved by major manufacturers for use in their medium-speed engines, including MAN diesel and Wartsila.

Description: A lower alkaline reserve trunk piston engine oil (TPEO) providing control of high temperature deposits in areas such as the undercrown of the piston and the piston ring belt area, enabling piston rings to function efficiently. Excellent water separation characteristics enable water to be centrifuged out with essentially no loss of additive.

Application: Designed for:

- Medium-speed trunk piston engines burning distillate fuels with sulphur content up to 1.5% in marine main and auxiliary power plant service
- Medium-speed trunk piston engines burning distillate fuels with sulphur content up to 1.5% in stationary power plant service.

Pack sizes: 200 litres

Delo® 6130 CFO *(Discontinued – Replaced by Delo 100 Motor Oil SAE 40)*

550040

Typical Characteristics

Product	Code	ISO Grade	Density @ 15°C kg/L	Flash Point °C	Pour Point °C	Viscosity cSt @		Viscosity Index	TBN mgKOH/g	Sulphated Ash %m
						40°C	100°C			
Delo 1000 Marine 30	560010	30	0.900	245	-18	96	11.0	99	12	1.6
Delo 1000 Marine 40	501374	40	0.905	250	-12	137	14.0	98	12	1.6



Transmission fluids, especially automatic type fluids, are amongst the most complicated lubricants manufactured today. The properties required of them include: minimal viscosity change with temperature, anti-wear properties, thermal and oxidation stability, anti-corrosion properties, seal compatibility, anti-foam ability and correct frictional properties. With these requirements in mind Caltex transmission fluids are blended from selected base stocks and additives to meet the most severe operating conditions.

AUTOMATIC

Delo® Syn ATF 668

513015

SAE Grade:	10W
Performance Standards:	Allison TES 668 (Approval no. 668-10042020). Allison TES 295, TES 389 and TES 468.
Description:	Delo® Syn ATF 668 is a full synthetic transmission fluid specifically engineered for Allison heavy duty automatic truck and bus transmissions. It is officially approved and licensed by Allison for transmissions requiring TES 668™ and is backwards compatible with applications requiring TES 295®, TES 389® and TES 468® fluids.
Application:	Delo Syn ATF 668 is designed for severe duty and extended drain intervals. It is approved for on highway and vocational Allison transmissions that call for an Allison TES 668 fluid. All Allison 1000, 2000, 3000, and 4000 series transmissions where TES 295 is specified for extended drain intervals. All 1000, 2000, 3000 and 4000 series transmissions where TES 389 is specified (Delo Syn ATF 668 will provide improved oil drain and filter change intervals). All H 40/50 EP™ series parallel hybrid transmissions where TES 468™ is specified. Next generation of Allison transmissions that specify TES 668 fluids.
Pack sizes:	208 litre, 20 litre.

Delo® Syn ATF HD

510419

SAE Grade:	10W
Performance Standards:	MAN 339 Type V1, V2, Z2, Z11 and L1; MB-Approval DTFR 13C170 (previously MB 236.9); Voith:Turbo H55.6336 DIWA 2-6 and DIWA NXT; Volvo: 97341 (AT101), 97342 (AT102); ZF TE-ML 03D, 04D, 14B, 17C, 20B and 25B (Approved: ZF001664) Suitable for use where the following fluid specifications are recommended: Allison: TES-295, TES 389; Allison C-4 (obsolete); Ford MERCON® (obsolete); Ford MERCON® V; GM DEXRON®-III (obsolete).
Description:	A premium performance, multipurpose, anti-wear automatic transmission fluid formulated in ultra high viscosity index base fluid, with Allison Transmission, Mercedes Benz and Voith Turbo approvals. Specially designed for heavy duty automatic truck and bus transmissions operating in severe service.
Application:	Recommended for the automatic transmission systems of passenger cars, trucks, off-highway construction, mining and agricultural equipment, and other applications where the former Dexron-III or and Allison Transmission fluids are specified. Particularly suitable for use in Allison automatic transmissions in severe applications, such as rubbish trucks, where synthetic fluids meeting Allison specification TES-295 are recommended. Also suitable for use in certain manual transmissions, power steering, rotary vane and screw type air compressors and hydraulic systems except where specialist fluids are required.
Pack sizes:	200 litre, 18 litre.



TRANSMISSION FLUIDS - AUTOMATIC



Havoline® ATF-J

510094

SAE Grade: 10W

Performance Standards: Meets JASO M315 Type 1-A
Suitable for use where the following fluid specifications are recommended:

- Honda ATF-Z1
- Mazda ATF M5
- Mitsubishi Diamond SP III
- Nissan Matic J
- Subaru ATF
- Toyota T IV

Description: A high performance, multipurpose, automatic transmission fluid formulated in hydrocracked base oils which provide outstanding oxidation resistance specifically engineered for Japanese passenger car automatic transmissions which require properties different to conventional ATF products.

Application: Suitable for automatic transmissions in many Japanese and Korean design passenger cars and light trucks and as service fill in automatic transmissions requiring DEXRON®-III or MERCON® fluids.

Not recommended for use in CVT transmissions.

Pack sizes: 200 litre, 18 litre, 4 litre and 1 litre



Havoline® Fully Synthetic CVT Fluid

503209

SAE Grade: 10W

Performance Standards Recommended for the following CVT applications:

Daihatsu: AMMIX CVT, CVTF-DC, CVTF-DFE; Dodge/Jeep: NS-2, CVTF+4; Ford: CVT23, CVT30/Motorcraft XT-7-QCFT, MERCON C; GM: CVTF I-Green2, DEX-CVT; Honda/Acura: HMMF, HCF-2; Hyundai/Kia: SP-CVT 1; Mazda: CVTF 3320; Mercedes Benz: 236.20; Mini Cooper: EZL 799, EZL 799A; Mitsubishi: CVTF-J1, CVTF-J4; Nissan: NS-1, NS-2, NS-2C, NS-3; Subaru: Lineartronic CVTF (P/N K0425Y0710), Lineartronic CVTF II (SOA748V0200), CV-30, High Torque CVTF, e-CVTF; Suzuki: TC, NS-2, CVTF 3320, CVT Green 1, CVT Green 2, CVT Green 3; Toyota: TC, FE; Volkswagen/Audi: TL 52180, G 052 180 A2, G 052 516 A2.

Always check your owners manual to determine the proper continuous variable transmission fluid for your vehicle.

Description: Havoline® Fully Synthetic CVT Fluid is formulated with premium synthetic base stocks, long-life friction modifiers, special anti-wear additives and shear stable viscosity modifiers.

Application: It is designed for today's continuously variable transmissions, where good shifting performance and anti-shudder durability is required and covers a broad range of transmission configurations. It is recommended for use in most belt- and chain-driven CVT's.

Havoline® Fully Synthetic CVT Fluid has not been formally evaluated by vehicle or transmission manufacturers, whose specifications are generally not in the public domain. However through comprehensive in-house bench test validation and vehicle fleet testing, it has been proven to offer performance commensurate with certain OEM genuine fluids.

It is not suitable for use in Ford and Toyota hybrid eCVT units.

Pack sizes: 4 litre





Havoline® Full Synthetic Multi-Vehicle ATF

510126

SAE Grade: 10W

Performance Standards: Approved: GM DEXRON®-VI fluid (J-62103)

Havoline Full Synthetic Multi-Vehicle ATF meets the requirements of:

- Allison C-4
- JASO 1A-LV13 (M315)
- Mercedes MB 236.41
- Voith H55.6335.3X

Havoline Full Synthetic Multi-Vehicle ATF is recommended for most late model transmissions manufactured by European, Asian and North American OEMs, including:

- Aisin AW-1, AW-2, JWS 3309, JWS 3324 ATF, ATF-OWS
- BMW Part #83 22 0 397 114, 83 22 0 403 248, 22, 83 22 0 163 514, 83 22 0 142 516, 83 22 0 026 922, 81 22 9 400 272, 83 22 9 407 807, 83 22 7 542 290, 83 22 2 355 601, 83 22 2 355 599, 83 22 2 289 720, 83 22 2 220 438, 83 22 2 152 426, 83 22 0 024 359, AFT 3+, ATF 6
- Daihatsu D3-SP
- FCA US LLC Part #68092912AAAA, 68218925AA (for ZF 8 & 9 speed), 68043742M (for Dodge/Jeep)
- Ford MERCON®, MERCON® V, MERCON® SP and MERCON® LV†
- General Motors Type A Suffix A, 22477466, 9985010, 88900925, 22689186, 19352619
- Honda/Acura ATF Type 3.0, ATF Type 3.1, DW-1 and Z-1, 08200-9001, 08200-9008
- Hyundai/Kia Genuine ATF, SP-II, SP-III, SP-IV-RR, SPH-IV and NWS-9638
- Isuzu Genuine ATF, ATF II, ATF III
- Jaguar Land Rover JLM 20238, JLM 21044, JLM 20292
- Mazda ATF M-III, ATF M-V, Type T-IV, JWS 3309
- Mercedes MB 236.2, 236.7, 236.8, 236.10, 236.12, 236.14, 236.15
- Mitsubishi ATF-J2, ATF-J3, SP-II, SP-III, SP-IV
- Nissan/Infiniti Matic D, Matic K, Matic J and Matic S
- Subaru ATF, ATF-HP, K0140Y0700
- Suzuki ATF 3317, ATF 3314, Matic J, Matic S
- Toyota/Lexus Type T, Type T-II, Type T-III, Type T-IV, Type WS, JWS 3309, JWS 3324, NWS 9638
- Volkswagen/Audi Part #G 055 540 A2, G052 533, G 055 025 A2, G 052 162 A1, G 052 162 A2, G 055 005 A2, G 055 162 A2, G 055 162 A6, G 052 990, G 060 162 A2, G 060 540 A2
- Volvo Part No. 1161521, 1161540/1161640, 31 256 774
- ZF TE-ML 11A, TE-ML 11B
- Hybrid vehicles where the OEM specifies a MERCON LV or a Toyota Type WS fluid.

This product is not suitable for belt- or chain-driven continuously variable transmission (CVT), dual clutch transmissions (DCT) and Ford Type F and Mercon ULV applications.

Description: A premium synthetic transmission fluid with a low viscosity formulation, superior friction control and dependable protection for use in most 6+ speed automatic transmissions. .

Application: All General Motors automatic transmissions and transaxles, including 2006 and later models that require DEXRON®-VI fluids; it exceeds the JASO 1A-LV requirements. Also suitable for many Asian, European and North American automatic transmissions that require low-viscosity and/or anti-shudder type fluids.

Also suitable for use in BTR M85LE and BTR M95LE four speed automatic transmissions fitted to Ford vehicles.

Pack sizes: 18 litre



TRANSMISSION FLUIDS - AUTOMATIC



Texamatic® 1888

510134

SAE Grade: 10W

Performance Standards: Voith Turbo: H55.6335 (G607 list).

Suitable for use where General Motors DEXRON® - III fluids or Ford MERCON® fluids are specified.

Description: A high performance, multipurpose, shear stable, anti-wear automatic transmission fluid formulated with high performance hydrocracked base oils and the latest additive technology to provide exceptional oxidation resistance, extended oil life and outstanding wear protection. (Dyed red).

Application: Recommended for the automatic transmission systems of many passenger cars, trucks, off-highway construction, mining and agricultural equipment, and other applications.

Also suitable for use in certain manual transmissions, power steering, rotary vane and screw type air compressors and hydraulic systems except where specialist fluids are required.

Not recommended for use in automatic transmissions that required anti-shudder or low-viscosity fluids.

Pack sizes: 200 litre, 18 litre, 5 litre and 1 litre



TRANSMISSION FLUIDS - MANUAL & POWERSHIFT



MANUAL & POWERSHIFT

Delo® Syn-Trans XE

510420

SAE Grade: 75W-90
Performance Standards: API: MT-1; Eaton: PS-386 (approved); Eaton: PS-164 Revision 7; Mack: TO-A Plus; Meritor Specification: 0-81; Navistar MPAPS B-6816; Volvo 97305; ZF: Freedomline.

Description: A heavy-duty truck synthetic automated manual transmission (AMT) fluid specially formulated for extended drain and severe service operations, engineered to provide excellent fluid shear stability and superb frictional characteristics to promote smooth, easy shifting. The high performance additives allow for excellent resistance to rust and corrosion and are compatible with various types of ferrous and yellow metals.

Application: Recommended for both factory and service fill of Eaton Ultra Shift Automated Manual Transmissions utilised by the main North American Truck Manufacturers when coupled with Cummins, PACCAR MX or Navistar diesel engines. It is especially suitable where operating conditions are severe or where equipment must operate in extremely hot or cold climates.

Pack sizes: 200 litre, 17 litre



Delo® Syn-Trans XV

510405

SAE Grades: 75W-80
Approvals: Volvo 97305, Volvo 97307, Volvo 97318 (Approval # 11);, Voith RETARDER C
Meets Requirements: API GL-4; DAF (Eaton Gearboxes); Eaton (500,000 kms/3yrs); MAN 341 Type E4.
Suitable for use: MAN 341 Type Z4; Mercedes Benz MB 235.4, 235.11; ZF TE-ML 02L, 02E*

*Note that ZF mandates the use of a product with a formal ZF TE-ML 02E approval during the warranty period. Delo Syn-Trans XV may be used in these applications (400,000 kms/3 years) after the end of the warranty period

Description: A premium synthetic, manual transmission fluid formulated specifically for Volvo iShift and Mack mDrive automated manual transmissions operating under standard conditions. In severe applications **Delo® Syn-AMT XV SAE 75W-90 or Delo® TorqForce 50** should be used. Engineered to provide excellent fluid shear stability and superb frictional characteristics to promote smooth, easy shifting.

Application: Recommended for heavy duty synchronised manual and automated manual transmissions. Suitable for use in a wide range of transmissions constructed by the truck constructors themselves and by ZF, including AS Tronic models and models fitted with intarders.

Pack sizes: 200 litre, 17.5 litre



TRANSMISSION FLUIDS - MANUAL & POWERSHIFT



Delo® Syn-AMT XV

510269

SAE Grades: 75W-90

Approvals: Volvo 97315; Volvo 97319

Performance: API GL-4

Recommendations: Daimler MB 235.11

Description: A premium performance, fully synthetic, transmission fluid designed for extended drain service in heavy duty synchronised manual transmissions.

Application: Specifically introduced for use in Volvo truck manual and automated manual transmissions (AMT) as New Zealand conditions are classified as severe due to the heavy loading (>60 ton) and high HP (750 HP engines).

Volvo New Zealand recommend that only oils meeting Volvo 97315 with a viscosity of **SAE 75W-90** be used in their transmissions here.

Pack sizes: 208 litre, 20 litre

Delo® Syn-MTF XZ *(New Product)*

510740

SAE Grades: 75W-80

Approvals: ZF TE-ML 01L, 02L, 16K; DAF Oil for ZF gearboxes; MAN 341 Type Z4

Meets Requirements: API GL-4; DAF Oil for Eaton gearboxes; Eaton (Europe) Semi-synthetic (300,000 km/3 years); MAN 341 Type E3; Volvo 97307

Description: A high performance synthetic heavy-duty manual transmission fluid approved by ZF and MAN, and formulated for use in heavy-duty truck synchronised manual transmission systems.

Applications: Designed for long drain in heavy duty synchronised manual truck transmissions, including automated models such as ZF AS Tronic and TraXon transmissions. It is suitable for use in transmissions fitted with and without interarders. This product may be used for service fill in ZF transmissions for trucks, buses and light commercial vehicles with "TE-ML 01" or "TE-ML 02" entries on the type plate. It may also be used in off-road activities such as mining where products of this type are permitted.

Pack Sizes: 208 litre, 20 litre





Delo® Syn-THF-XC

510127

Approvals:	Volvo Transmission oil 97304 (WB 102)
Performance:	API GL-4*; John Deere JDM J20C and J20D *Not recommended for on-highway applications
Recommendations:	May also be used in applications requiring Volvo 97303 (WB101)
Description:	A high performance synthetic wet brake transaxle fluid designed for applications where a Volvo WB 102 fluid is required. It is also suitable for use in applications that require a John Deere JDM J20C or J20D fluid.
Application:	Delo Syn-THF XC is designed for use in the axles of off-road and construction machines that are equipped with built-in wet brakes. It contains a higher level of EP additives for enhanced gear protection. Its superior oxidation stability allows for longer service intervals and reliable performance in demanding, high-temperature conditions. The fluid's excellent low-temperature performance reduces machine warm-up times, and its lower viscosity improves efficiency while maintaining component protection.
Pack sizes:	208 litre, 20 litre

Delo® TorqForce

SAE 10W - 510157
SAE 30 - 510158
SAE 50 - 510159

SAE Grades:	10W, 30, 50.
Performance Standards:	Approved For: ZF TE-ML 03C (SAE 10W, 30); ZF TE-ML 07F (SAE 30); Volvo 97305 – 90 (SAE 50).
Meets:	Caterpillar: TO-4; Allison C-4 (SAE 10W, 30) ;Komatsu KES 07.868.1 (SAE 10W, 30, 50)
Recommended For:	Dana Powershift (SAE 10W, 30); Komatsu KES 07.868.1; Komatsu Dresser; Tremec/TTC; Vickers (Eaton) 35VQ25 (SAE 10W); Eaton Fuller Roadranger Manual Transmissions (SAE 50 – standard drain) and Meritor (Rockwell) Manual Transmissions (SAE 50 – standard drain).
Description:	Delo® TorqForce are high performance lubricants designed for use in transmissions, final drives and hydraulic systems requiring a fluid meeting Caterpillar TO-4 or Allison C-4 requirements. They are manufactured using highly refined base oils, detergents, dispersants, oxidation and corrosion inhibitors, anti-wear and extreme pressure agents and a foam suppressant.
Application:	Recommended for the following applications: • Caterpillar and Komatsu powershift transmissions final drives and marine transmissions. • Caterpillar mobile equipment hydraulic and hydrostatic systems – Delo® TorqForce SAE 10W fully meets Caterpillar hydraulic fluid requirements. • Mobile hydraulic systems, hydrostatic transmissions, heavy-duty manual transmissions and final drives for which heavy-duty engine oils are required. • Transmission and hydraulic systems manufactured by Dana Powershift, Komatsu Dresser, Tremec/TTC, Vickers and ZF. The Viscosity grade used will depend on ambient temperature conditions and operating severity.
Pack sizes:	200 litre, 18 litre.



TRANSMISSION FLUIDS - MANUAL & POWERSHIFT



Havoline Fully Synthetic Manual Transmission Fluid

513006

SAE Grades: 75W-90

Performance Standards: Meets API: GL-4 (self-certified)

Description: A fully synthetic, high performance, highly shear stable, multigrade manual transmission fluid (MTF) specifically designed for Asian passenger car manual transmissions and transaxles and also other manual transmissions fitted to modern passenger car and light commercial vehicles.

Application: Recommended for Japanese and Korean passenger car and light commercial transmissions and transaxles and suitable for use in the following makes:

- Hyundai
- Kia
- Mazda
- Mitsubishi
- Nissan
- Suzuki
- Toyota

NOT suitable for use where API GL-5 EP lubricants are required.

Not recommended for use in heavy-duty truck and bus manual transmissions, or in spiral bevel or hypoid drive axles where API GL-4 or GL-5 type gear lubricants are specified.

Pack sizes: 18 litre



Translube LD

(Replaced Translube LD 80W & 90)

510316

SAE Grades: 80W-90

Performance Standards: API: GL-4 (self-certified).

Meets the requirements of: Mercedes-Benz: Sheet 235.5; MAN: 341 Type E2 (suitable for use); MAN 341 Type Z2; ZF: TE-ML 02B, 17A.

Description: A premium performance, mild EP, automotive gear lubricant specifically designed to meet Mercedes-Benz Sheet 235.5 requirements for service in heavy-duty vehicle manual transmissions.

Application: Recommended for manual transmissions and other components of Mercedes-Benz, MAN and other European heavy-duty vehicles, for both normal and long drain service.

Also suitable for other light and heavy-duty manual transmissions, transaxles, planetary hubs and spur gear axles which specifically require mild-EP gear oils meeting API GL-4.

Pack sizes: 18 litre



TRACTOR

Caltex 1000 THF

510082

Performance Standards: John Deere: J20C; ZF TE-ML 03E, 05F, 06K, 17E, 21F (ZF approval number ZF000100); Meets: Hitachi's requirements for aftermarket use in Rigid Dump Trucks (Model Code: EH3500 AC-3, EH4000 AC-3 & EH5000AC-3); Volvo: 97303 (WB101);

Recommended for use: AGGO – improved power fluid 821XL Case Corporation: JIC-143, JIC-145, MS 1206, MS 1207, MS 1209, MS 1210 (TCH); Case New Holland: MAT 3525, MAT 3505; Ford New Holland: ESN-M2C 134-D, FNHA 2 C 201; Caterpillar TO-2; International Harvester: B6; Kubota UDT; Massey Ferguson: MF1135, M1141, M1143, M1145; Minneapolis-Moline: Q-1766, Q-1722, Q-1766B; Oliver: Q-1705; Renk Doromat: 874A and 874B; White Farm Equipment: Q-1826. .

Recommended for use:

- as a multifunctional fluid in many types of farm tractors and equipment
- in non-hypoid API GL-4 applications
- Hitachi mid-sized wheel loader axle applications, transfer case and hydraulics
- ABB Dodge - controlled startup transmissions

Description: 1000 THF is a high quality, multifunctional tractor hydraulic fluid, specially formulated for use in transmissions, final drives, wet brakes and hydraulic systems of tractors and other equipment employing a common fluid reservoir.

Application: For use where tractor manufacturers specify the use of a THF or UTTO type product which includes mixed fleets of agricultural tractors and associated off-road equipment. Particularly suitable for use in enclosed oil immersed (wet) brakes and power take off (PTO) clutches as the special additives used prevent chatter and squawk.

Also suitable for mobile hydraulic systems and many automotive manual transmissions and gearboxes.

Pack sizes: 200 litre, 20 litre



Super Tractor

500421

SAE Grade: 15W-40

Performance Standards: API: CG-4, CF-4/SF, CF, API GL-4; ZF: TE-ML 06B, TE-ML 07B.

Suitable for use where the following are specified: ACEA E3-96; Ford: ESN-M2C159-B; Ford New Holland: FNH, 89008903; New Holland: NH 024C; Massey Ferguson: CMS M1144, M1145

Description: A shear stable, multi-viscosity super tractor oil universal (STOU) fluid, designed for use in tractor engine crankcases, transmissions (including wet brakes), final drives and hydraulic systems.

Application: A multi-functional oil suitable for applications:

- Where the tractor manufacturer specifies the use of an STOU type product.
- Mixed fleets of agricultural tractors and associated equipment.
- Mobile or stationary diesel engines.
- Older style petrol engines.
- Automotive manual transmissions and gearboxes.
- Mobile hydraulic systems.
- Enclosed oil immersed (wet) brakes.
- Power take off (PTO) clutches.

Pack sizes: 200 litre, 18 litre.





Typical Characteristics

Product	Code	SAE Grade	Density @ 15°C kg/L	Flash Point °C	Pour Point °C	Viscosity cSt @		Viscosity Index	TBN mgKOH/g	Sulphated Ash %m
						40°C	100°C			
Caltex 1000 THF	510082	15W-30-	0.89	235	-42	58.4	9.5	145	-	-
Delo® Syn ATF 668	513015	10W	0.851	238	-54	33	6.76	171	-	-
Delo® Syn ATF HD	510404	10W	0.854	216	-49	35.3	7.4	183	-	-
Delo® Syn-Trans XV	510405	75W-80	0.864	244	-54	54.1	9.2	151	-	-
Delo® Syn-AMT XV	510269	75W-90	0.859	252	-48	119.6	17.03	156	-	-
Delo® Syn-MTF XZ	510740	75W-80	0.859	224	-39	58.2	9.85	155	-	-
Delo® Syn-Trans XE	510420	75W-90	0.850-	238	-42	95.1	14.8	163	-	-
Delo® Syn-THF-XC	510127		0.857	226	-48	38.5	7.5	167		
Delo® TorqForce SAE 10W	510157	10W	0.877	220	-33	43.8	6.8	110	-	-
Delo® TorqForce SAE 30	510158	30	0.894	254	-27	87.5	10.9	110	-	-
Delo® TorqForce SAE 50	510159	50	0.905	270	-27	119	18.5	103	-	-
Havoline® ATF-J	510094	10W	0.859	>190	-51	36.9	7.3	165	-	-
Havoline Fully Synthetic MTF	513006	75W-90	0.87	>165	-45	90.9	15.1	175		
Havoline® Full Synthetic Multi-Vehicle ATF	510126	10W	0.849-	217-	-54	30.6	6	147	-	-
Havoline® Fully Synthetic CVT Fluid	503209	10W-	0.849-	>205-	-51	39.1	7.2	179	-	-
Super Tractor	500421	15W-40	0.889	232	-33	113	15.1	139	10.1	1.4
Texamatic® 1888	510134	10W	0.855	>190	-51	35.8	7.2	168	-	-
Translube LD SAE 80W-90	510316	80W-90	0.887-	>224-	-33	134	14.5	107	-	-

AUTOMOTIVE GEAR LUBRICANTS



Automotive Gear Lubricants are blended from high quality base stocks and incorporate specialised additives which improve oxidation resistance, impart strong corrosion prevention properties, minimise foaming and, where required, impart increased lubricity and extreme pressure characteristics.

Delo® Gear EP-5

SAE 80W-90 – 510411
SAE 85W-140 - 510412

SAE Grades:	80W-90, 85W-140
Performance Standards:	SAE J2360 (formerly MIL-PRF-2105E); API: GL-5, MT-1; Mack: GO-J; ZF Approval TE-ML 05A, 12M, 16B, 17B, 19B and 21A (SAE 80W-90); TE-ML 05A, 12M, 16D and 21A (SAE 85W-140); Volvo 97321 Approval.
Description:	A high performance, multipurpose thermally stable, automotive gear lubricant formulated with “clean gear” technology for applications where API GL-5/MT1 per performance is required.
Application:	Recommended for automotive hypoid gear differentials operating under high speed and/or low speed, high torque conditions. Also suitable for heavy-duty, non-synchronized manual transmissions and transaxles requiring this type of lubricant as well as automotive steering gears. Note: For manual transmissions and transaxles where the manufacturer recommends API GL-4 lubricants and advises against the use of API GL-5 lubricants, then Caltex Havoline Fully Synthetic Manual Transmission Fluid, Translube LD, Delo® Syn-Trans AMT XV SAE 75W-90 or Delo® Syn-Trans XV SAE 75W-80 may be suitable options to consider, depending on the manufacturer's viscosity requirements.
Pack sizes:	200 litre, 18 litre, 4 litre. And 1 litre (SAE 80W-90) 200 litre, 18 litre and 5 litre (SAE 85W-140)



Delo® Gear ESI

SAE 80W-90 - 510226
SAE 85W-140 - 510227

SAE Grade:	80W-90, 85W-140
Performance Standards:	API: GL-4, GL-5; API: MT-1; SAE J2360 (former MIL-PRF-2105E); Meritor: O-95 and O-76* Extended Drain (SAE 80W-90); Mack: GO-J and GO-J Plus Extended drain (SAE 80W-90). *Meritor O-95 supersedes O-76 and is backwards compatible
Description:	A premium performance, multipurpose automotive EP gear lubricant, formulated with ISOSYN technology, a combination of special base oils and unique EP additive system incorporating inorganic borate technology to provide oil life and wear protection far exceeding conventional gear oils under extreme service conditions.
Application:	• Automotive differentials operating in severe service conditions. • Heavy-duty transmissions where the manufacturer recommends the use of API GL-5 or MT-1 gear lubricants. • Extended drain gear oil applications in on and off-road heavy-duty equipment. • Industrial gear sets and bearings where EP type gear lubricants of this viscosity are recommended.





Delo® Syn-Gear XDM

510403

SAE Grades:	80W-140.
Performance Standards:	API: GL-4, GL-5, MT-1; Dana® SHAES 256 Rev A; Meritor: 0-95 and 76* Extended Drain; SAE: J2360 (formerly MIL-PRF 2105E); Mack GO-J *Meritor O-95 supersedes O-76 and is backwards compatible
Description:	A premium performance, synthetic based, extreme pressure gear lubricant meeting API GL-5, GL-4 and MT-1 designed to provide excellent year-round performance and protection in automotive gear applications.
Application:	Provides outstanding thermal and oxidative stability and reduces deposit formation under severe operating conditions. Recommended for the lubrication of both on-road trucks and off-road construction, mining and agricultural equipment axle & differential applications where operating conditions are severe, or where equipment must operate in extremely hot or cold climates. Suitable for extended drain applications and in industrial gear applications where automotive EP gear lubricants are recommended.
Pack sizes:	181 kg (approx. 205 litres), 15.9 kg (approx. 18 litres).



Delo® Syn-TDL

510471

SAE Grades:	75W-90.
Performance Standards:	API: GL-5, API GL-4; MT-1; SAE J2360 (former MIL-PRF-2105E); Mercedes Benz 235.8; Scania STO 1:0, 1:1G & 2:0A FS; Volvo 97312; Detroit Diesel DFS Axle Gear Specification 93K219.01; DAF Axles; DAF (Eaton & ZF gearboxes); MAN 341 Type Z2, 341 Type E3, 342 Type S1, 3343 Type S; ZF TE-ML 02B, 05A, 05B, 7A, 12B, 12L, 12N, 16F, 17B, 19C, 21A & 21B; NATO O-226; Bosch TE-ML 08.
Description:	A premium performance, fully synthetic Total Driveline Lubricant with extended drain capability, suitable for use in both API GL-4 and API GL-5 applications operating in the most severe applications. It allows product rationalisation as it can be used in both the transmission and rear axles in a wide range of vehicles.
Application:	It is designed for use in automotive manual transmissions which require a fluid with API GL-4 or GL-5 performance, and for hypoid drive axles where an oil meeting API GL-5 or MT-1 is required. It's frictional characteristics make the product suitable for use in many synchronised manual transmissions and final drives. The product provides outstanding thermal and oxidative stability making it suitable for use in applications with higher operating temperatures than is possible with mineral gear oils, enabling longer drain intervals. Recommended for the lubrication of both on-road trucks and off-road construction, mining and agricultural equipment axle and differential applications where operating conditions are severe, or where equipment must operate in extremely hot or cold climates. Suitable for extended drain applications and in industrial gear applications where automotive EP gear lubricants are recommended. Delo Syn-TDL SAE 75W-90 is not recommended for use in ZF transmissions fitted with intertarders (this includes some models from constructors such as DAF and MAN).
Pack sizes:	208 litre, 20 litre.





Geartex LS

510328

SAE Grades: 85W-90.

Performance Standards: API: GL-5; ZF: TE-ML 05C, 12C, 16E, 21C

Description: A specially designed oil for use in automotive limited slip differential drive axles. The special friction modifier system provides excellent lubricity characteristics for smooth, non-stick/slip engagement and disengagement of limited slip differential plate clutches.

Application:

- Limited slip differentials in automotive applications including those under high torque, low speed and shock loading conditions.
- Ar vinMeritor limited slip axles.
- ZF limited slip systems.
- Applications requiring a standard API GL-5 gear lubricant such as hypoid drive axles, steering systems, non-synchronized transmissions and transaxles.

Not recommended for use in synchronised manual transmissions and transaxles, and wet brake systems

Pack sizes: 208 litre, 20 litre.

Delo® Syn-Gear XS *(Previously Multigear® S)*

510472

SAE Grade: 75W-140.

Performance Standards: API GL-5; API MT-1; Ford: WSL-M2C192-A; Mack: GO-J; Meritor: 076-M; SAE: J2360; Scania 1:0; US Military: MIL-PRF-2105E; ZF: TE-ML 07A

Approvals: Scania: STO 2:0 A, 1.0; ZF: TE-ML 05A, 12N, 16F, 19C, 21A.

Recommendations: ZF: TE-ML 05B (combined with 05A), 12B (replaced by 12N), 21B (Combined with 21A)

Description: A premium performance fully synthetic automotive gear oil formulated for use in heavy-duty driven axles and differentials in passenger cars and commercial vehicles.

Application: It is approved to Scania STO 2:0A for use in Scania axles both during and after warranty providing extended drain capabilities and fuel economy benefits. Also suitable for use in Scania transmissions operating in New Zealand ambient conditions. Provides outstanding thermal and oxidative stability and reduces deposit formation under severe operating conditions. Recommended for use in applications that require Ford specification WSL-M2C192-A, such as differentials of Jaguar cars and Ford Transit vans.

Pack sizes: 208 litre, 20 litre.





Typical Characteristics

Product	Code	SAE Grade	Density @ 15°C kg/L	Flash Point °C	Pour Point °C	Viscosity cSt @		Viscosity Index
						40°C	100°C	
Delo® Gear EP-5 80W-90	510411	80W-90	0.894	213	-30	140	15.0	108
Delo® Gear EP-5 85W-140	510412	85W-140	0.905	234	-15	344	25.5	97
Delo® Gear ESI SAE 80W-90	510226	80W-90	0.888	210	-33	140	14.2	99
Delo® Gear ESI SAE 85W-140	510227	85W-140	0.901	210-	-15	341	25.0	95
Delo® Syn-Gear XDM 80W-140	510403	80W-140	0.877	136	-42	245	26.52	140
Delo® Syn-Gear XS SAE 75W-140	510472	75W-140	0.867	185	-46	185	26	169
Delo® Syn-TDL SAE 75W-90	510471	75W-90	0.868	202	-54	98	14.7	157
GearTex LS 85W-90	510328	85W-90	0.898	218	-34	170	16.7	103-

ENGINE ANTI-FREEZE/COOLANTS



Delo® XLC Anti-freeze/Coolant Concentrate

510614

Performance Standards: Approved For: Cummins: CES 14439; Detroit Diesel: DFS93K217ELC; Deutz: DQC CB-14; Komatsu: KES 07.892; MAN: 324 Type SNF; MB- Approval 325.3 (Concentrate), 326.3 (Premixed 50/50)

Meets the specifications of: ASTM D3306; ASTM D6210; DAF: 74002; MTU: MTL 5048; TMC: RP 364; DAF 74002; Ford: WSS-M97B44-D; GMW3420 (meeting the GM dexcool® requirements); VW: TL 774F

Description: Delo® XLC is a **non-nitrited** extended life Anti-freeze/Coolant formulation for heavy duty and light duty diesel vehicles and equipment. It is formulated with an aliphatic corrosion inhibitor system inhibitor. (Orange in colour)

Recommended for use in: Deutz Stationary Diesel Engines; GE-Jenbacher Stationary Natural Gas Engines; Hino Truck Diesel Engines; Isuzu Truck Diesel Engines; Kobelco Construction Equipment Diesel Engines; MTU 2000/4000 Diesel Engines; Navistar MAXXFORCE Engines; Scania Truck Diesel Engines; Volvo Construction Equipment (VCE) Diesel Engines; Volvo and Mack Truck Diesel Engines; Wartsila Stationary Diesel Engines; Vestas Wind Turbine Power Electronics External Coolant System; European HD OEMs that require both Phosphate-free and Nitrite-free formulations; Japanese HD OEMs that require Silicate-free formulations.

General Motors vehicles post 1995; Chrysler vehicles post 2003; Ford Vehicles post 2003; European petrol and diesel automobiles; Japanese petrol automobiles, SUVs and Pick-up trucks; Korean petrol automobiles and SUVs

Applications: Delo® XLC is recommended for:

- Heavy duty engines regardless of fuel type or environmental controls being used where the OEM recommends a nitrite free, silicate free coolant.
- Mixed fleets where automobiles, light duty trucks and heavy duty trucks are being serviced and the OEM recommends a nitrite free, silicate free coolant.
- Recreational vehicles where a nitrite free, silicate free product is recommended.
- On-road, Off-road and Marine cooling system applications.

Optimal Service Life: 960,000 kilometers/12,000 hours/ 6 years with no extender needed.

Passenger Car and light Commercial Vehicles – 250,000 kms/5 years of cooling system protection

Does not require the addition of Supplemental Coolant Additives (SCA's).

Pack sizes: 200 litre, 18 litre



Delo® XLC Anti-freeze/Coolant Pre-mixed 50/50

510609

Description: This is identical to the Delo® XLC Antifreeze/Coolant above but is already pre-mixed 50/50 with deionised water and so should be used directly from the container into the cooling system without the addition of any further water.

Application: The same performance standards, applications and service periods as for Delo® XLC above, apply to this product.

Pack sizes: 200 litre, 18 litre.



ENGINE ANTI-FREEZE/COOLANTS



Delo® ELC Anti-freeze/Coolant Concentrate

510626

- Description:** Delo® ELC Antifreeze/Coolant products are single phase, ethylene glycol based, NOAT (Nitrited Organic Additive Technology) products that are based on patented aliphatic carboxylate corrosion inhibitor technology specifically formulated for heavy duty cooling system applications that require nitrite. (Red in colour)
- Performance Standards:** Meets the specifications of: ASTM D6210; ASTM D3306; Caterpillar EC-1; Navistar B1 Type 3; TMC RP 329, 302A, 351.
- Recommended for use in:** Caterpillar Stationary Natural Gas Engines; Cummins QSK, QST, ISX 15, ISX, ISM, ISL, ISC and ISB Diesel Engines; Cummins Westport ISX 12G and ISL G CNG engines; Deutz Stationary Diesel Engines; Freightliner and Western Star Truck Diesel Engines; GE-Jenbacher Stationary Natural Gas Engines; Hino Truck Diesel Engines; Isuzu Truck Diesel Engines; Kenworth and Peterbilt Truck Diesel Engines; Kobelco Construction Equipment Diesel Engines; Komatsu Construction Equipment Diesel Engines; MTU 4000 Diesel Engines; Navistar Truck Diesel Engines; Scania and MAN Truck Diesel Engines; Volvo and Mack Truck Diesel Engines; Wartsila Stationary Natural Gas Engines; Waukesha Stationary Natural Gas Engines; White- Superior Stationary Natural Gas Engines.
- Applications:** Delo® ELC is recommended for:
- Heavy duty engines regardless of fuel type or environmental controls being used where the OEM recommends a silicate free, extended life coolant that contains nitrites.
 - Mixed fleets where both light duty and heavy duty trucks are present.
 - Stationary engine applications regardless of fuel type being used.
 - Marine cooling systems requiring freeze protection and a nitrite containing coolant is recommended.

Recommended maximum service intervals without the addition of an extender are:

- On-road use - 1,250,000 kilometers
- Off-road use - 15,000 hours or 8 years
- Does not require the addition of Supplemental Coolant Additives (SCA's).

Pack sizes: 200 litre, 18 litre.



Delo® ELC Pre-mixed 50/50

510629

- Description:** This is identical to the Delo® ELC above but is already pre-mixed 50/50 with deionised water and so should be used directly from the container into the cooling system without the addition of any further water.
- Application:** The same performance standards, applications and service periods as for Delo® ELC above, apply to this product.
- Pack sizes:** 200 litre, 18 litre.



ENGINE ANTI-FREEZE/COOLANTS



Havoline® Xtended Life Anti-Freeze/Coolant

510563

Performance Standards: ASTM D6210; ASTM D3306; Ford: WSS-M97B44-D; GMW3420 (meeting the GM DEX-COOL® requirements); VW: TL 774F

Description: Havoline® Xtended Life Antifreeze/Coolant is a single phase, ethylene glycol anti-freeze/coolant based on an aliphatic corrosion inhibitor system. It is in a concentrate form and should be mixed at 50% with clean water when adding to a cooling system. (Orange in colour)

Meets the specifications of:

- ASTM D3306
- Ford WSS-M97B44-D
- GMW3420 meeting GM DEX-COOL requirements
- MB 325.3
- VW TL 774F

Applications: **Havoline® Xtended Life Antifreeze/Coolant** is recommended for:

- General Motors vehicles post 1995
- Chrysler vehicles post 2001
- Ford Vehicles post 2003
- European petrol and diesel automobiles
- Japanese petrol cars, SUVs and Pick-up trucks * Korean petrol automobiles and SUVs
- European HD OEMs that require both Phosphate-free and Nitrite-free formulations
- Japanese HD OEMs that require Silicate-free formulations.

Optimal Service Life: Passenger Car and light Commercial Vehicles – 250,000 kms/5 years of cooling system protection

Does NOT require the addition of Supplemental Coolant Additives (SCA's).

Pack sizes: 1 litre.



Delo® XLI Corrosion Inhibitor Concentrate

510636

Description: Delo® XLI is a water based, low toxicity, environmentally friendly nitrite free carboxylate inhibitor. It provides corrosion protection for engine metals including aluminum, iron, copper and solder alloys and provides a very long service life with no regular inhibitor additions required.

Applications: Before use it should be diluted to 5.5%-10% with good quality water and is recommended for the following OEM use as a cooling water inhibitor:

Caterpillar; Detroit Diesel; Deutz (TR0199-99-2091); GEC Alsthom Ruston; Liebherr MD 1-36- 130 (DCA); MaK; MAN 248; MAN Diesel (2-stroke and 4-stroke); MB 312.0; MTU MTL 5049; MWM; Newman-Haas Racing; Scania TI 2-98 0813 TB; Sulzer Diesel ZBS0503; Ulstein Bergen; Volvo; Wartsila 32-9011; Yanmar.

Recommended for use in any OEM equipment recommending a nitrite free, water based carboxylate based corrosion inhibitor.

Service Life: Delo® XLI Corrosion Inhibitor when mixed with clean water at the correct concentration can provide superior protection for a minimum of 960,000 kms, 12,000 hours or 6 years in on-road and off-road engine applications and 32,000 hours or 6 years in stationary engines.

It does not require regular inhibitor additions if proper maintenance practices are used.

It is compatible with glycol-based engine coolants but further dilution of the Delo® XLI inhibitors by more than 25% with other corrosion inhibitor technologies will reduce the effectiveness of these products.

Pack size: 18 litre.



BRAKE & CLUTCH FLUID



Brake and Clutch Fluid 260 DOT 4 (HD Brake Fluid)

511663

Performance Standards: U.S. Federal Motor Vehicle Safety Standard FMVSS No. 116 DOT 4 and DOT 3; SAE J 1704 and SAE J1703; ISO 4925 (Classes 3 & 4); JIS K2233-95 (Types 3 & 4); NATO Specification H-542 (OX-8).

Description: A premium, non-petroleum automotive brake fluid designed for use in conventional hydraulic brake and clutch systems, particularly in severe service conditions or where DOT 4 fluids are recommended. Provides an additional safety margin against "vapour lock".

Application: Recommended for use in the following application:

- All hydraulically operated motor vehicle braking systems (drum and disc types) for which a DOT 4 or SAE J1704 fluid is specified. This may include:
 - Vehicles with anti-lock (ABS) braking systems.
 - Hydraulic clutch systems requiring conventional fluids.
 - Passenger cars, commercial road transport, off-highway vehicles, agricultural tractors and motorcycles.
- Make-up or service fill of braking systems requiring SAE J1703 fluids.
- Make-up or service fill of braking systems requiring DOT 3 unless the OEM specifically recommends against the use of DOT 4 fluids (e.g. certain Toyota models).

Not to be used in systems designed for mineral oil based fluids (LHM), e.g., certain Citroen models and many off-highway vehicles and tractors, or where Silicone DOT 5 fluids are recommended.

Pack sizes: 5 litre, 500ml.



Product Descriptor Key Properties	
FMVSS Grade	DOT 4
Equilibrium Reflux Boiling Pt, °C	275
pH	7.5
Viscosity, - mm ² /s @ - 40°C - Mm ² /s @ 100°C	1347 2.2
Wet Equilibrium Reflux Boiling Pt, °C	183



Industrial oils must provide a complete range of lubricating properties, from economical oils for standard machinery to premium products for the most exacting lubrication of precision equipment. Caltex markets a comprehensive range of industrial oils which reduce friction, minimise wear and corrosion, and carry the loads needed to keep machinery operating at peak efficiency.

TURBINE OILS

Regal® R&O

ISO 46 - 520011
ISO 68 - 520012

ISO Grades:

46 & 68

Description:

An inhibited turbine oil formulated from highly refined base stocks and rust, oxidation and foam inhibitors. They have excellent water separability and air release properties and their oxidation stability resists oil breakdown during exposure to high temperature conditions, ensuring a long service life.

Application:

Suitable for the following applications provided a rust and oxidation inhibited oil is acceptable:

- Steam & hydraulic turbines operating under all service conditions.
- Centrifugal, rotary and reciprocating air compressors, turbo-bowers and centrifugal pumps, requiring a rust and oxidation inhibited oil (not recommended for use in breathing air compressors)
- Bath and circulating systems supplying rolling element bearings of all types, lightly loaded gear sets, vacuum pumps, machine tools (including computer controlled units), conveyors, electric motors, and low to moderate pressure hydraulic pumps where anti-wear properties are not required.
- Regal® R&O 68 is suitable for use in Masport rotary vacuum pump's (RVP's) used in dairy farm milking machine applications. In extreme cold weather conditions, Regal® R&O 46 may be a more suitable alternative.



Suitable for use where the following industry and OEM specifications are requested:

British Standard 489; German Standard: DIN 51515 Part 1; ASTM: D4304 Type I; ANSI/AGMA: 9005-F-16 for R&O inhibited oils; Cincinnati Machine P-55 (ISO 46) and P-54 (ISO 68); Siemens: TLV 901304 (ISO 46); Siemens: MAT 812102 (ISO 46); General Electric: GEK 27070, GEK 28143B, GEK 46506D.

NOT recommended as an industrial heat transfer oil.

Pack sizes:

Regal® R&O 46 – 18 litre.
Regal® R&O 68 – 5 litre.



HYDRAULIC OILS

Rando® HD

520210, 520211, 520212, 520213

ISO Grades:

32, 46, 68, 100

Description:

Rando® HD oils are formulated with premium Group II base oils and anti-wear hydraulic additives and are designed to give robust protection to hydraulic pumps in mobile and stationary systems. The use of Group II base stocks provides higher oxidation test life than solvent extracted hydraulic oil products which helps deliver longer oil service life. Good hydrolytic stability and water separation characteristics promote excellent filterability in the presence of water contamination. Good anti-foam and air release properties help ensure smooth operation and system efficiency.

Application:

For use in the following applications:

- Industrial hydraulic systems.
- Hydraulics of mobile and construction equipment (where a water separating product is required).
- Hydraulic systems with vane, gear or piston pumps.
- Plastic injection molding machines.
- Machine tools.
- Enclosed gear systems (dependant on load)
- Industrial circulating systems

Performance Standards:

Approved against: -Bosch Rexroth RDE 90245 (ISO 32, 46, 68); Eaton E-FDGN-TB002-E (ISO 32, 46, 68); Grob Lubricant Chart (ISO 32, 46, 68); NSF H2 (ISO 32, 46, 68, 100); Parker Hannifin (Denison Hydraulics) HF-0, HF-1, HF-2 (ISO 32, 46, 68); Vickers (Eaton) 35VQ25A (ISO 32, 46, 68); WALDRICH SIEGEN Lubricants for machine tools (ISO 32, 46, 68) and ZF TE-ML 04K (ISO 32, 46) Meets requirements for: AFNOR NF E 48-603 HM (ISO 32); AIST (US Steel) 126, 127 (ISO 32); ANSI/AGMA 9005-E02 R&O (ISO 46, 68, 100); ASTM D6158-HM (ISO 32, 46, 68, 100); David Brown 0A, 1A, 2A, 3A, 4A, 5A (ISO 32, 46, 68, 100); Fives Cincinnati P-68 (ISO 32); Fives Cincinnati P-69 (ISO 68); Fives Cincinnati P-70 (ISO 46); ISO 11158-HM (ISO 32, 46, 68, 100); JCMS JCMS HK (ISO 32); Parker Hannifin (Denison) T6H20C (ISO 32); SAE MS1004-HM (ISO 32, 46, 68, 100); US Steel 126, 127 (46, 68); Vickers (Eaton) I-286-S, M-2950-S (ISO 32, 46, 68). MPI Approved C13 (All animal product except dairy) - all grades.

Pack Sizes:

200 litre, 18 litre (except Rando HD 100 which is 200 litre only).



Rando® HDZ

520251, 520253, 520254, 520255

ISO Grades:

15, 32, 46, 68

Description:

Rando® HDZ is a premium quality, shear stable, multi-viscosity, anti-wear hydraulic fluid designed to give robust protection for hydraulic systems subjected to wide variations in ambient and operating temperatures. Good hydrolytic stability and water separation characteristics help prevent deposit formation and rust in the presence of water contamination. Effective rust and corrosion inhibitors give excellent protection against corrosion of both steel and copper. Good anti-foam and air release properties ensure smooth operation and system efficiency.

Application:

For use in the following applications:

- Industrial hydraulic equipment subject to wide variations in temperatures.
- Hydraulics of mobile, construction and agricultural equipment (where a water separating product is required)
- Hydraulic systems with vane, gear or piston pumps.
- Fork-lift trucks (in refrigerated areas).
- Plastic injection molding machines.
- Marine deck equipment, steering gears, bow thrusters and automatic controls.





Performance Standards:	Approved against: Parker Hannifin (Denison) HF-0 (ISO 32, 46, 68); Eaton-Vickers 35VQ25A, I-286-S (industrial applications), M-2950-S (mobile applications) (ISO 32, 46, 68); MAG Cincinnati, Cincinnati Machine P 68 (ISO 32), P 69 (ISO 68), P 70 (ISO 46); Bosch Rexroth Fluid Rating List RDE 90245 for ISO 32, 46, 68 (Rating Number BR-1010-0114 and BR-1010- 0124) MPI Approved C 13 (All animal product except dairy) – all grades. Meets the requirements of: Auburg (ISO 46 – standard wear requirements); JCMAS HK-1 (ISO 32, 46); ASTM D6158, HV (ISO 32, 46, 68); ISO 6743 (1999) Part 4, Type HV (ISO 15, 32, 46, 68, 100); ISO 11158 (2009), HV (ISO 15,32, 46, 68, 100); DIN 51502 (1990), Type HVLP (ISO 15,32, 46, 68, 100); DIN 51524 (2006-04) Part 3, HVLP (ISO 15,32, 46, 68, 100).
Pack sizes:	Rando HDZ 15 and 32 - 18 litre only. Rando HDZ 46 and 68 - 200 litre and 18 litre.

Clarity Bio EliteSyn AW

(New Product - Replaces Clarity Synthetic EA Hydraulic Oil 46) 520388

ISO Grades:	46
Description:	Clarity® Bio EliteSyn™ AW oils are synthetic renewable, readily biodegradable, high performance hydraulic fluids. They are formulated with synthetic base stock and an ashless, zinc-free additive system that provides exceptional oxidation stability, water separability, foam suppression, and protection against wear, rust and corrosion. It is designed to the performance requirements of conventional antiwear hydraulic oils, while providing an additional benefit in case of leaks or incidental discharge to the environment.
Application:	For use in the following applications: • Mobile and stationary hydraulic vane-, piston-, and gear-type pumps • High performance industrial applications where pressures may exceed 5000 psi
Environmental Sensitivity:	Provides a cost-effective alternative to readily biodegradable hydraulic fluids such as those that are ester-based and vegetable oil-based. It passes the Aquatic toxicity tests (EL/LL50 OECD 201, 202,203) – tested with fingerling fathead minnow, daphnia, algae, using a water accommodated fraction up to 5000 mg/litre (50 times the minimum pass rate of the LL50 test)
Performance Standards:	Approved against : • Parker Hannifin (Dennison) HF-1, HF-6 • Danfoss/Eaton E-FDGN-TB002-E • EU Ecolabel 2018 • Swedish Standard SS 155434 • USDA BioPreferred® Program Meets the requirements of: • ASTM D8324-21 2013 VGP Compliant (water interfacing) • Denison HF-0, HF-2 (Testing requirements of T5D) • Fives Cincinnati M P70 (MAG Cincinnati, Cincinnati Machine, Cincinnati Milacron) • JCMAS HK VG 32, 46 • ASTM D6158 HV • DIN 51524/3 HVLP • ISO 11158 L-HV • ISO 15380 Class HEPR • Volvo 98611
Pack size:	208 litre.



Clarity® Synthetic EA Hydraulic Oil *(Replaced by Clarity Bio EliteSyn AW 46)* 520395

ISO Grades: 46

Description: Clarity® Synthetic EA Hydraulic Oil 46 is a “readily biodegradable” high performance hydraulic oil that meets EPA Vessel General Permit (VGP) requirements for environmentally acceptable lubricants for biodegradation, low toxicity and low bioaccumulation. It will give maximum protection to hydraulic equipment used in environmentally sensitive areas. Its ashless formulation provides excellent protection against wear of hydraulic pumps, provides rust and corrosion protection, hydrolytic stability, water separability, foam inhibition and filterability.

It is designed to meet or exceed the performance requirements of conventional antiwear hydraulic oils, especially in severe, high-output applications such as axial piston pumps where pressures may exceed 5000 psi.

Application: For use in the following applications:

- Hydraulic equipment used in vessels and in both mobile and stationary hydraulic pumps in high-performance industrial applications (Vane-, piston-, and gear-type pumps)

Environmental Sensitivity: In the event of a spill, Clarity® Synthetic EA Hydraulic Oil 46 will biodegrade by more than 60% within 28 days minimising the impact to the environment.

Performance Standards: Meets the requirements of:

- DIN 51524
- ISO 15380 HEPR
- Parker-Denison

Pack size: 208 litres





Clarity AW

(New Product - Replaces Clarity Hydraulic Oil AW 46)

520382

ISO Grades:

46

Description:

Clarity® Hydraulic Oil AW 46 is a high-performance ashless anti wear hydraulic fluid designed to meet the stringent demands of modern OEM designs, where increased performance is required. It gives maximum protection in both mobile and stationary hydraulic equipment applications

It is formulated with premium base oil technology and an ashless ("zinc-free") additive system that provides exceptional oxidation stability, water separability, foam suppression and protection against wear, rust and corrosion. It is designed to meet or exceed the performance requirements of conventional antiwear hydraulic oils, especially in severe, high-output applications such as axial piston pumps where pressures may exceed 5000 psi.



Application:

For use in the following applications:

- Mobile and stationary hydraulic vane-, piston-, and gear-type pumps

Environmental Sensitivity:

Provides a cost-effective alternative to readily biodegradable hydraulic fluids such as those that are ester-based and vegetable oil-based. It passes the Aquatic toxicity (LC-50) OECD 203 requirements

Performance Standards:

Approved against:

- Parker Hannifin (Dennison) HF-0, HF-1, HF-2
- Eaton (Vickers) E-FDGN-TB002-E
- NSF H2 (acceptable as lubricants where there is no possibility of food contact (H2) in and around food processing areas)

Meets the requirements of:

- Cincinnati Machine P70 (MAG Cincinnati)
- Hitachi/John Deere Construction - JCMAS HK VG , 46
- Krauss-Maffei Kunststofftechnik
- US Steel (AIST) 126, 127
- ASTM D6158 HM
- DIN 51524-2 HLP
- ISO 11158 L-HM
- SAE MS1004-HM

MPI Approved C 13 (All animal products except dairy)

Pack sizes:

208 litres and 18.9 litres.



Clarity Hydraulic Oil AW *(To be replaced by Clarity AW 46)*

520267

ISO Grades: 46

Description: Clarity® Hydraulic Oil AW 46 is formulated with premium base oil technology and an ashless ("zinc-free") additive system that provides exceptional oxidation stability, water separability, foam suppression and protection against wear, rust and corrosion.

It is designed to meet or exceed the performance requirements of conventional antiwear hydraulic oils, especially in severe, high-output applications such as axial piston pumps where pressures may exceed 5000 psi.

Application: For use in the following applications:

- Mobile and stationary hydraulic vane-, piston-, and gear-type pumps

Environmental Sensitivity: Provides a cost-effective alternative to readily biodegradable hydraulic fluids such as those that are ester-based and vegetable oil-based. It passes the Aquatic toxicity (EL/LL50 OECD 201, 202,203)

– tested with fingerling rainbow trout, daphnia, freshwater algae, and Mysid shrimp using a water accommodated fraction up to 5000 mg/litre (50 times the minimum pass rate of the LL50 test)

Performance Standards: Meets the requirements of:

- Denison HF-0, HF-2 (Testing requirements of T5D)
- Cincinnati Machine P70 (MAG Cincinnati)
- Eaton-Vickers for use in m-2950-S (mobile) and I-286-S (stationary) hydraulic systems.
- Passes Eaton-Vickers 35VQ25 pump test
- DIN 51502:1990, HLP fluid
- DIN 51524 (2006-04) Part 2, HLP fluid
- ASTM D6158 HM
- ISO 6743:1999 Part 4, HM fluid
- ISO 11158:2009, HM.

MPI Approved C 13 (All animal products except dairy)

Pack size: 208 litres and 18.9 litres.





COMPRESSOR OILS

Cetus® PAO

540537

ISO Grades: 68

Description: A premium performance, synthetic compressor oil based on polyalphaolefin technology containing a rust and oxidation inhibitor system and anti-wear additives to provide outstanding oxidation resistance and corrosion protection under severe operating conditions

Performance Standards:

- DIN 51506 Group VDL
- ABB approval for VTR.4 turbochargers with rolling-contact bearings, per VTR.4-4-010, as a specially tested synthetic oil for heavily loaded turbochargers, up to 5,000 hour drains
- Has been used successfully in the lubrication of many types of air compressors, including Atlas Copco units.

Applications:

- Flooded screw compressors
- Reciprocating and Rotary air compressors
- Medium-speed marine diesel engine turbochargers

NOT recommended for use in breathing air compressors

Pack size: 20 litre



Cetus® VDL

(New Product - Replaces Compressor Oil EP VDL 100)

540624

ISO Grades: 100

Description: A high-performance compressor lubricant, formulated with VARTECH Technology, combining high quality paraffinic base oils and an additive system designed to deliver excellent oxidation resistance, corrosion protection and a robust varnish deposit control performance

Designed for air compressors, especially portable and stationary rotary, vane, screw and piston compressors.

Performance Standards: Meets the following:

- DIN 51 506: VDL
- ISO 6743-3: ISO-L-DAA, DAB
- ISO 6743-3: ISO-L-DGA
- ISO 6521-1: ISO-L-DAA, DAB
- GB 12691: L-DAA, L-DAB

MPI Approved C 13 (All animal products except dairy)

Suitable for use in:

- DongHwa Pneutec (ISO 100)
- Hamworthy, air compressors (ISO 100)
- Hatlapa, W-type, L-type, V-line piston compressors (ISO 100)
- Howden, air compressors (ISO 100)
- Sauer, air compressors (ISO 100)
- Sperre, Classic 30 bar reciprocating air compressors (ISO 100)
- Tanabe Pneumatic Machinery, reciprocating type compressors (ISO 100)
- Teikoku, air compressors



Applications:

Recommended for:

- Single-stage and multi-stage reciprocating and centrifugal compressors and oil flooded screw compressors
- Air, compressed natural gas (CNG) and inert gas, single-stage and multi-stage reciprocating compressors
- Stationary, semi-portable and portable units
- Bath and circulating systems supplying rolling element bearings of all types, lightly loaded gear sets, vacuum pumps (including rotary vacuum pumps used in the dairy farming industry), machine tools (including computer controlled units), conveyors, electric motors, and low to moderate pressure hydraulic pumps where anti-wear properties are not required

NOT recommended for use in breathing air compressors

Pack size:

18 litre

Compressor Oil EP VDL 100 *(To be replaced by Cetus VDL 100)*

540588

ISO Grade:

100.

Performance Standards:

- Meets the test requirements of German Standard DIN 51506 Group VDL
- Is recommended for:
 - Tanabe for use in their reciprocating-type compressors
 - Sperre for use in their Classic 30 bar reciprocating air compressors
- Suitable for use in Teikoku air compressors
- Used successfully in Hatlapa and Hamworthy air compressors
- MPI Approved C 13 (All animal product except dairy)

Description:

A high performance, petroleum based compressor oil specifically designed for severe operating conditions. It delivers stable high temperature oxidation resistance with reduced deposit formation on pistons and valves, excellent corrosion protection, foam inhibition and extreme pressure performance.

Application:

Recommended for:

- Single-stage and multi-stage reciprocating and centrifugal compressors and oil flooded screw compressors operating at high temperatures up to 220°C
- Air or inert gas reciprocating compressors
- Stationary, semi-portable and portable units

NOT recommended for use in breathing air compressors

Pack sizes:

18 litre.



REFRIGERATION COMPRESSOR OILS

Capella® A

520435

ISO Grade:	68
Performance Standards:	British Standard BS 2626:1992; DIN 51503; ABB Stal Refrigeration AB Approval; Broedrene Gram Approval; Sabroe Approval
Description:	A premium synthetic compressor oil specifically designed for the lubrication of ammonia refrigeration compressors operating at high discharge temperatures in refrigeration systems with extremely low evaporator temperatures. Formulated from specially formulated synthetic Polyalphaolefin (PAO) base fluids.
Application:	Ammonia refrigeration compressors with minimum evaporator temperatures of -60°C • Refrigeration and air-conditioning system compressors. • Reciprocating and screw ammonia compressors operating at discharge temperatures exceeding 100°C.
Pack sizes:	NOT recommended for use in breathing air compressors 20 litre.

Capella® WF

520404

ISO Grade:	68
Description:	A high quality, essentially wax-free oil for the lubrication of refrigeration and air conditioning compressors when refrigerants other than HFCs (hydrofluorocarbons) are used. Made from special, narrow-cut naphthenic base oils, with an extremely low pour point and Freon Flocc point.
Performance Standards:	British Standard: BS 2626: 1992, Type A Lubricants; APV-Baker; Bitzer Kuhlmaschinenbau; Bock; Gram; Grasso; Linde; McQuay; Sabroe; ABB Stal Refrigeration AB; Sullair; Technofrigo Dell'Osto; York. MPI Approved C 14 (All animal product except dairy).
Application:	• Reciprocating and rotary refrigeration compressors • Air conditioning systems • Refrigeration systems using chlorofluorocarbons (CFCs) • Refrigeration systems using ammonia, hydrochlorofluorocarbons (HCFCs), carbon dioxide, sulphur dioxide or ethylene chloride. For large ammonia refrigeration systems, Caltex Capella® A may provide superior performance. NOT for use in systems containing hydrofluorocarbon (HFC) refrigerants, including HFC 134a. NOT recommended for use in breathing air compressors.
Pack sizes:	18.9 litre



INDUSTRIAL GEAR OILS

Meropa® 530400, 530409, 530401, 530402, 530403, 530404

ISO Grades: 68, 100, 150, 220, 320, 460.

Performance Standards: ANSI/AGMA 9005-E02 EP; AIST 224 (formerly US Steel 224) (ISO 68 to 320); David Brown Table E approved; DIN 51517 Part 3 CLP.

MPI Approved C 13 (All animal product except dairy) – all grades.

Description: High performance, mild EP, industrial gear lubricants formulated with a sulphur-phosphorus additive system, which also provides rust and oxidation inhibition, a corrosion and oxidation inhibitor and a metal passivator. The high thermal stability EP system maintains clean gear and bearing surfaces, minimising deposits. Specifically designed primarily for industrial gear lubrication services where loads and shock loadings are high.

Application:

- Enclosed industrial gear drives
- Spur, bevel, helical, worm and industrial hypoid gear cases.
- Industrial type reduction gearboxes on mining equipment, cement mills, ball and rolling mills, crushers, conveyors, kilns, winches, machine tools and marine equipment.
- Chain drives, sprockets, slide guides and flexible couplings.
- Plain and rolling element bearings
- For bath, splash, circulation or spray lubrication, as applicable to the grade.

Pack sizes: 200 litre – Meropa® 68, 100, 150, 220 and 320.
20 litre – Meropa® 150, 220, 320 and 460.



Meropa® EliteSyn XM

ISO 220 533304
ISO 320 533286

ISO Grade 220, 320

Performance Standards: AIST (formerly U.S. Steel) 224;; ANSI/AGMA 9005-F16-AS; DIN 51517-3 CLP; David Brown S1.53.101 (5E); Fives Cincinnati P-59; Hitachi AC Final Drive Gear; GE OHV motorised wheel gearbox oil specifications D50E35 A-E Categories; ISO 12925-1 CKC, CKD, US Steel 224.

Approved against for:

Flender Rev. 16.1 Helical-Bevel-Planetary Gear Units; Hansen Gear Units Series HP1, HP2, HPP, P4 and M4ACC; Pekrun Werknorm N8053; Rexnord Falk gear drive models: Class V, A, F, J, Planetgear; Rexnord Falk EP + MP resistance; SEW-Eurodrive Rev. 07 004 05 13 Helical-Bevel-Planetary Gear Units: X.e M1..N, ML..2, MC..Series Planetary Gear Units: P..2e, P..2, XP.., P-X.e, PPK.. Series; Sumitomo Drive Technologies Paramax 9000 and ZF TE-ML 27H.

Description: A high performance, fully synthetic gear oil formulated with additives to protect paint coatings and provide compatibility with multiple types of seals to minimise the possibility of seal leakage. Suitable for use over a very wide operating temperature range from -30C to 140C while reducing operating temperatures through its lower coefficient of friction. Delivers maximum micropitting and wear protection with reduced maintenance and increased system uptime.

Application: Recommended for:

- Industrial enclosed gearing where an AGMA EP lubricant is specified
- Marine gearboxes requiring an extreme pressure lubricant

Pack Sizes: 208 litre & 18.9 litre.
20 litre - Meropa EliteSyn XM 220





MARINE GEAR OILS

Pinnacle® Marine Gear Oil 220 *(to be replaced by Meropa EliteSyn XM 220)* 560584

ISO Grade:	220
Performance Standards:	AGMA: 250.04 (5EP); US Steel 224; DIN: 51517/3; Alfa Laval; Lohman-Stolterfoht; Ortlinghaus; Rolls Royce Marine; Westfalia.
Description:	A fully formulated, quality synthetic gear lubricant based on a mixture of polyalphaolefin (PAO) and diesters. It offers excellent oxidation stability at elevated temperatures, extending oil drain life and providing outstanding wear protection.
Application:	Recommended for lubricating plain and roller bearings, and open and closed gears at high temperatures. It can be applied by bath, splash or circulation systems, and is specially targeted for the lubrication of purifier gears and reduction gears.
Pack sizes:	20 litre.

OPEN GEAR AND WIRE ROPE OILS *(also refer to Texclad® 2 in GREASE section)*

Talcor OGP-4 *(replaced Crater® 2X)* 571374

NLGI Grade:	1
Description:	An advanced open gear lubricant consisting of a solvent free blend of synthetic base fluids and hydro-treated mineral oils complexed with new micro ground lubricating solids and plastic-coupling chemical agents that form a thixotropic matrix. Can be dispensed without heating through conventional lubrication systems and the established soft, pliable film provides high compressive strengths and low shear rates, while rheology stabilizers prevent residual build-up.
Application:	For the lubrication of open gears, rack & pinions, dipper sticks, circle rollers and rails and other mechanisms that are found in the mining, steel, cement, sugar and other heavy industries. Gears and pinions that operate at elevated temperatures up to 85 degrees C. Suitable for open gears on log haulers in forestry applications.
Pack sizes:	18 kg.

Crater® Fluid M *(being discontinued)* 530433

Description:	A black, adhesive, residual oil based lubricant, compounded to provide improved water resistance, water displacement and rust protection, and diluted with a high flash point solvent to allow easier application.
Application:	Can include: wire ropes (as the solvent allows the lubricant to creep into the wire rope strands), open gears (e.g., mining, quarrying, construction and dredging equipment), chains and sprockets, flexible couplings and sliding surfaces (e.g., drag lines and shovels). Suitable for application by brushing, swabbing, dipping, spraying, drip cup or spout type can. NOTE: If the solvent is allowed to evaporate from the product it takes on the consistency of Crater 2X which is no longer available.
Pack sizes:	15.9 kg.



SLIDEWAY LUBRICANTS

Way Lubricant X

540473

ISO Grade: 68

Performance Standards: Cincinatti Machine Specification P-47 Heavy-Medium Way Oil, Cincinatti Machine Stick-Slip Procedure.

Description: High quality, machine tool slideway lubricants formulated with a highly refined mineral oil, with EP, friction modifier (to reduce friction and drag which can cause stick-slip and machine tool chatter), rust and corrosion inhibitors and tackiness additives. It also provides good water demulsibility properties for coolant separation.

Application: Recommended for lubricating machine tool slideways and guides:

- Horizontal slideways in light-to-moderate applications (ISO 68)
- Other applications requiring an adhesive, corrosion inhibited lubricant with EP properties.

Pack sizes: 20 litre.



Typical Characteristics

Product	Code	ISO Grade	Density @ 15°C kg/L	Flash Point °C	Pour Point °C	Viscosity cSt @		Viscosity Index
						40°C	100°C	
Capella® A 68	520435	68	0.835	260	-57	68.7	10.6	143
Capella® WF 68	520404	68	0.902	198	-30	65	6.7	24
Cetus® PAO 68	540537	68	0.850	240	-57	68	10.3	136
Clarity® AW 46	520382	46	0.865	238	-38	46.8	7.0	107
Clarity® Bio EliteSyn AW 46	520388	46	0.826	252	-35	46	8.2	165
Cetus® VDL 100	540624	100	0.870	258	-34	100	11.5	103
Meropa® 68	530400	68	0.882	200	-15	68	8.8	101
Meropa® 100	530409	100	0.878	210	-15	100	11.4	100
Meropa® 150	530401	150	0.883	215	-15	150	14.9	99
Meropa® 220	530402	220	0.890	215	-15	220	19.2	98
Meropa® 320	530403	320	0.892	215	-15	320	24.3	97
Meropa® 460	530404	460	0.907	215	-15	439	29.8	96
Meropa® EliteSyn XM 320	533286	320	0.891	239	-39	320	37	165
Pinnacle® Marine Gear Oil 220	560584	220	0.890	250	-45	220	22.7	126
Rando® HD 32	520210	32	0.860	216	-33	30.5	5.4	110
Rando® HD 46	520211	46	0.870	238	-33	44	6.8	110
Rando® HD 68	520212	68	0.870	240	-30	65	8.9	110
Rando® HD 100	520213	100	0.873	240	-21	95.5	10.8	97
Rando® HDZ 15	520251	15	0.889	150	-60	15.7	3.9	144
Rando® HDZ 32	520253	32	0.861	204	-49	33.0	6.4	150
Rando® HDZ 46	520254	46	0.867	216	-47	46.7	8.3	153
Rando® HDZ 68	520255	68	0.874	222	-42	68.7	11.1	154
Regal® R&O 46	520011	46	0.874	224	-9	46	6.7	100
Regal® R&O 68	520212	68	0.879	234	-9	68	8.6	98
Talcor OGP-4 #1	571374	-	-	-	-	1197	-	-
Way Lubricant X 68	540473	68	0.879	215	-21	68	9.8	110



The great majority of grease applications have a parallel where lubricating oils may be used and hence a grease must be able to provide equal performance in all respects. Such applications include:

(a) where the equipment is so designed that there is no way to retain oil for the parts being lubricated, e.g.

open gears, wheel bearings, chassis springs etc.

(b) where the lubricant must act as a seal and

(c) where lubrication is infrequent, e.g. electric motor bearings.

Caltex markets a wide range of greases, of differing hardnesses and base material which exhibit the necessary qualities of heat resistance, shear stability, oxidation resistance, storage stability, water resistance, corrosion prevention and oil viscosity to meet the requirements of the automotive, mining and industrial fields.

LITHIUM BASED

Multifak® EP

(NLGI 2 grade discontinued)

NLGI 0 - 540810

NLGI No.: 0.

Performance Standards: Approved against: Kamome-Propeller Listing ; SMS Group SN 180-1 . DIN 51 502: KPOK-30 ; ISO 6743-9: L-XCCEB 0

Description: A multipurpose extreme pressure (EP) industrial and automotive grease containing highly refined mineral base oils, lithium thickener, EP additives, and rust and oxidation inhibitors.

Applications: Multifak EP can include: Industrial plain and rolling element bearings; general plant lubrication; construction equipment bearings; earthmoving, quarrying and mining; agricultural equipment; automotive wheel bearings; chassis grease point lubrication. Usable temperature range in continuous service for NLGI 0 is from -30oC to 100oC.

Multifak EP 0 is suitable for centralised lubrication systems on commercial vehicles and off-road equipment. Also suitable for industrial gearboxes where an NLGI 0 grease is required.

Pack sizes: 16 kg pail. (Light brown in colour)

Ultra Duty® HD

(old name Ultra Duty® Grease)

510889



NLGI No: 2

Description: Specialty Industrial Grease and also an automotive chassis and bushing grease. A premium, heavy-duty EP grease containing a high viscosity mineral oil, lithium thickener, effective EP additive, rust and oxidation inhibitors and tackiness agent. It has stay-in-place properties that make it particularly suitable for industrial equipment or automotive equipment operating in wet, muddy or dusty conditions.

Application: Its outstanding film strength and effective EP additive protect against component wear under severe conditions and shock loading.

Applications can include: Pulp & paper machinery; mining equipment; logging and forestry equipment; construction equipment; quarry equipment; material handling equipment; marine deck equipment; dredging equipment; heavy-duty transport; off-highway construction; agricultural tractors; general industrial greasing and chassis lubrication (including fifth wheel).

For wheel bearing lubrication of on-highway vehicles, other products that are specifically designed for this application, such as Caltex Delo Grease EP2 or Starplex EP 2, are generally preferred.

Usable temperature range in continuous service for NLGI 2 is from -10oC to 140oC with maximum short term exposure temperature of 165oC.

Pack sizes: 180kg, 50kg, 16kg, 425g cartridges. (Red in colour)



LITHIUM COMPLEX BASED

Delo® Grease ESI EP

540957



NLGI No: 2

Performance Standards: NLGI Service Category: LB; MB 265.1 and Volvo 97720 approved.

Description: A technically advanced, extended service premium grease for a wide variety of on-highway and light duty off-road applications. It is formulated with highly refined base stocks, a lithium complex thickener, rust and oxidation inhibitors, and extreme pressure and tackiness additives. Provides very good resistance to water wash-out and high level of anti-wear protects against component damage by wear and shock loading.

Applications:

- On-highway heavy duty truck wheel bearings
- On-highway heavy-duty truck chassis lubrication including steering drag links, kingpins, transmission cross shaft pins, shackle pins and brake cam shafts.
- Fifth-wheel lubrication.
- General automotive wheel bearing and chassis lubrication.
- Light Duty off-road equipment such as agricultural tractors, cherry pickers.

Operating temperature range: -18°C to 177°C (short term exposure with frequent relubrication)

Pack sizes: 181kg, 54.4 kg, 15.9kg, 425g cartridges. (Red in colour)

Starplex EP 00

(old name Delo Grease EP 00)

510873

NLGI No.: 00

Description: A semi-fluid, multipurpose, extreme pressure, industrial and automotive grease made from lithium complex soap, sulphur phosphorus EP additives, high quality base oils and rust and corrosion inhibitors.

Applications: Its primary application is in centralised lubrication systems on commercial vehicles where an NLGI Grade 00 grease is required. It is also used in track rollers on some earthmoving equipment.

Starplex EP 00 is generally recommended for continuous service between from -40oC to 132oC (with frequent (daily) relubrication).

Pack sizes: 15.9 kg pail. (Red in colour)



Starplex HD 2 M3

(old name Delo® Starplex Moly® 3% EP 2)

510881



NLGI No:

2.

Performance Standards:

ISO 6743-9; ISO-L-XBDEB 2

DIN 51502 KPF2K-30

Meets the requirements of:

- Caterpillar Multipurpose Molybdenum Grease (MPGM) Specification containing 3% molybdenum disulphide (Cat Prime Application Grease NLGI 2)
- Bucyrus SD 4711 MPG - multipurpose grease specifications
- Komatsu Mining Germany Works Standard
- Liebherr GRE-1, GRE-4, GRE-5 grease specification.

Description:

An extreme pressure grease designed for plain and anti-friction bearing applications operating under high stress/high load conditions, coupled with high ambient temperatures typically found in heavy-duty off-road applications. It contains a highly refined mineral base oil with a viscosity of 460 cSt @ 40°C, a lithium complex soap thickener, EP additives, rust and oxidation inhibitors, tackiness additives and 3% molybdenum disulphide. It provides excellent corrosion and wear protection, water resistance in both submerged and direct pressure spray applications and shock load protection.

Application:

Construction equipment such as bulldozers, scrapers, earthmovers and cranes; Backhoes and shovels; Road rollers; Bushings and rolling element bearings; Agricultural tractors, combines and cotton pickers; Mining equipment and Heavy-duty transport.

Usable temperature range in continuous service is -25 to 130°C.

Maximum temperature for short term exposure is 210°C.

Pack sizes:

180 kg, 50 kg, 16 kg, 425g cartridges (Grey/black in colour)

Starplex HD 2 M5

(old name Delo® Starplex Moly® 5% EP 2)

510883



NLGI No.:

2.

Performance Standards:

ISO 6743-9; ISO-L-XBDEB 2

DIN 51502 KPF2K-20

Meets the requirements of:

- Caterpillar Multipurpose Molybdenum Grease (MPGM) Specification containing 5% molybdenum disulphide (Cat Extreme Application Grease NLGI 2)
- Bucyrus SD 4711 MPG - multipurpose grease specifications
- Komatsu Mining Germany Works Standard

Description:

An extreme pressure grease designed for plain and anti-friction bearing applications operating under high stress/high load conditions, coupled with high ambient temperatures typically found in heavy-duty off-road applications. It contains a highly refined mineral base oil with a viscosity of 460 cSt @ 40°C, a lithium complex soap thickener and 5% molybdenum disulphide. It provides excellent corrosion and wear protection, water resistance in both submerged and direct pressure spray applications and shock load protection.

Applications:

- Heavily loaded pin and bush bearings;
- Mining equipment, such as haul trucks, shovels, excavators, loaders, bulldozers, scrapers and graders;
- Backhoes and shovels;
- Road rollers;
- Agricultural tractors, combines and cotton pickers;
- Construction equipment, such as bulldozers, scrapers, earthmovers and cranes;
- Heavy-duty transport.

Usable temperature range in continuous service is -20 to 130°C. Maximum temperature for short term exposure is 210°C.

Pack sizes:

50kg, 16 kg, 425g cartridges (Grey/black in colour)



Delo® Grease ESI HD Moly® 3% EP *(Being Discontinued)*

540956

NLGI No:	2.
Performance Standards:	Mack MG-C; Caterpillar 3%: molybdenum disulphide.requirements
Description:	An extreme pressure grease designed for plain and anti-friction bearing applications operating under high stress/high load conditions, coupled with high ambient temperatures typically found in heavy-duty off-road applications. It contains a highly refined mineral base oil with a viscosity of 320 cSt @ 40°C, a lithium complex soap thickener and 3% molybdenum disulphide. It provides excellent corrosion and wear protection, water resistance in both submerged and direct pressure spray applications and shock load protection.
Application:	Off-Road Construction such as dozers, excavators, backhoes, shovels, articulated loaders haul trucks etc. Surface & Underground Mining and Quarry machinery; Agricultural machinery and Heavy Duty On/Off Highway Road Construction and Maintenance Vehicles.
Pack sizes:	397g cartridges.

Starplex EP 2

(old name Delo Starplex® EP 2)

510882



NLGI No.:	2.
Performance Standards:	NLGI Service Category: GC-LB; ISO 6743-09: ISO-L-XCDHB 2; DIN 51502: KP 2 N-30; Volvo Corporate standard STD 1277.2, lubricating grease 97720
Description:	A premium, multipurpose EP automotive wheel bearing and chassis grease containing an ISO 220 mineral base oil, a lithium complex thickener, EP additives, rust and oxidation inhibitors and tackiness additives. Multipurpose capability allows use in a wide range of automotive and industrial applications, reducing the number of different greases required and eliminating product misapplication.
Applications:	Automotive: • Automotive wheel bearings and chassis lubrication in on and off-highway applications. • Heavy-duty transport. • Construction equipment and agricultural tractors Industrial: • General industrial greasing Usable temperature range in continuous service from -25oC to 130oC with maximum short term exposure to 220oC.
Pack sizes:	180kg, 50kg, 16kg, 425g cartridges. (Dark red in colour)



CALCIUM BASED

Marfak XD 2 M3 *(old name Texclad® 2)* 510887

NLGI No: 2.

Performance Standards: ISO 6743-09: ISO-L-XAAIB2; DIN 51 502: MPF 2C-10 and KPF 2C-10; Masada Approval

Description: A proven performance, adhesive open gear grease based on a water-stabilised calcium thickener and high viscosity mineral oils, fortified with graphite and molybdenum disulphide. Has excellent resistance to water wash out and high pressure environments which minimises loss of lubricant in service.

Applications:

- Open gears in construction, mining and industrial equipment. Dipper sticks on excavating shovels.
- Automotive fifth wheels (tractor-trailer turntables).
- Steel girth gears (girth tyres) on rotary kilns and crushing mills.
- Ball mill gears and large enclosed spur gears where oil leakage is a problem
- Sugar mill plain bearings, and slipper drives when fluid lubricants have shown a tendency to leak.
- Forklifts (rails and wheel-drive gears)
- Wire ropes and general purpose grease points of deck equipment

Usable temperature range in continuous service is -10°C up to 60°C.

Pack sizes: 18kg (Black in colour)

Typical Characteristics

Product	Code	NL GI Grade	Type	Colour	Appear.	Penet. Worked 25°C	Drop Point °C	Oil Vis. cSt @ 40°C	Timken OK Load kg	Additives
Starplex EP 00	510873	00	Lithium complex	Red	Semi-Fluid	415	Semi-Fluid	220	22	EP
Delo® Grease ESI EP	540957	2	Lithium complex	Red	Smooth & tacky	285	266	261	36.2	EP
Starplex HD 2 M3	510881	2	Lithium complex	Grey/black	Stringy	280	230+	460	>25	Moly, EP
Starplex HD 2 M5	510883	2	Lithium complex	Grey/black	Stringy	280	230+	460	>25	Moly, EP
Delo HD Moly 3%	540956	2	Lithium Complex	Grey/black	Stringy	280	265	320	32	Moly, EP
Starplex EP 2	510882	2	Lithium complex	Red	Tacky	280	230+	220	20	EP, Tack
Multifak® EP 0	540810	0	Lithium	Light Brown	Buttery	370	180	208	18	EP
Marfak XD 2 M3	510887	2	Calcium	Black	Smooth	280	106	>1000	-	Graphite, Moly, Tack
Ultra Duty HD 2	510889	2	Lithium	Red	Tacky	280	190	460	32	EP, Tack

CHAIN BAR LUBRICANTS



Chain and Bar Oil *(Discontinued)*

541600

Description:

A tough, tacky lubricant designed for the lubrication of the chain, bar and sprocket of all types of chain saws and chain driven machinery. It is made from highly refined high viscosity index base oils along with a highly effective tackiness agent to resist throw-off.

Applications:

Can include;

- Chain, bar and sprocket on all types of chainsaws, using either hand operated or automatic oilers.
- Chain driven machinery, including lumber carriers and farm equipment.

Pack sizes:

200 litre, 18 litre, 4 litre.



Ampol Chain and Bar Oil

AM5132311

Description:

A tough, tacky lubricant designed for lubrication of the chain, bar and sprocket on all types of chainsaws and chain driven machinery. It is made from highly refined high viscosity index base oils along with a highly effective tackiness agent to resist throw-off

Applications:

Can include;

- Chain, bar and sprocket on all types of chainsaws, using either hand operated or automatic oilers.
- Chain driven machinery, including motorcycles, lawnmowers, lumber carriers and farm equipment.

Pack sizes:

1000 litre, 208 litre, 20 litre, 4 litre.

Rotary Vacuum Pump (RVP) Oils

Regal® R&O 46 & 68

ISO 46- 520011

ISO 68- 520012

Rotary Vacuum Pump Oil 68 (*rebranded Regal R&O 68*)

ISO 68 -571150

Rotary Vacuum Pump Oil 68 is suitable for use in Masport rotary vacuum pumps used in dairy farm milking machine applications.

It is manufactured from high quality base oils and offers oxidation resistance, rust and corrosion protection. It is non-emulsifying (i.e. the water separates out from the oil) and does not contain anti-wear type additives.

It can be used in other types of vacuum pumps where the viscosity and lubricant type are suitable.

Note: In very cold ambient operating temperatures a thinner oil may be required and, in these situations, **Regal R&O 46** (Viscosity Grade - ISO 46) may be a suitable alternative.

Background:

Prior to 2007, Caltex marketed an ISO 68 viscosity grade oil called **RVP Oil HD** (now known as Regal® R&O 68) for Rotary vacuum pumps fitted with non-circulating lubrication systems, and an ISO 46 viscosity grade called **RVP Circulating Oil** (now known as Regal R&O 46) for pumps with recirculating lubrication systems. This was based on historical Masport requirements however in more recent documentation, they indicate that an ISO 68 grade is suitable for both types of systems and the use of the lighter grade is only required when very cold conditions are encountered. Our experience has confirmed that the ISO 68 grade appears suitable for both types of lubrication systems.

For customers wishing to continue using products defined under the earlier recommendations, the option is still there as both products are readily available under the names of Regal® R&O 68 and Regal® R&O 46.

Available Pack sizes:

Regal® R&O 46: 18 litre

Rotary Vacuum Pump Oil 68: 18 litre

Regal® R&O 68: 5 litre





FUEL SYSTEM TREATMENTS

Techron® Concentrate Plus

510722

Description:

Techron® Concentrate Plus is a powerful fuel system treatment that helps to restore lost power and performance caused by deposit build-up in petrol passenger cars and light duty trucks.

Application:

- Spark ignition four-stroke engines fueled with petrol, ethanol and petrol/ethanol blends in passenger cars, vans, and light trucks.
- Gasoline hybrid vehicles
- Four-stroke outboard motors
- Will not harm catalytic converters and oxygen sensors.
- One 355ml bottle treats up to 45 litres of petrol. Use every 5,000km or at every oil change for best results.



Techron® D Concentrate

510728

Description:

Techron® D Concentrate Diesel Fuel System Cleaner, is an ultra-high performance fuel system cleaner, designed for one-tank cleanup and to be used in diesel passenger car (such as SUVs & PPVs) and pickup truck & mini-van engines. It will clean diesel injectors and keep them performing like new.

Application:

- Can be used with all types of diesel fuel, including ultra-low sulphur diesel, biodiesel and biodiesel blends.
- Is effective in older engines and the latest generation common rail diesel engines.

One 473ml bottle of Techron D Concentrate, Diesel Fuel System Cleaner treats up to 80 liters of diesel fuel. Use every 5,000km or at every oil change for best results.

Techron D Concentrate, Diesel Fuel System Cleaner will not harm after treatment devices such as Diesel Particulate Filters (DPFs) and is effective in conventional as well as biodiesel blend fuels.

Not recommended for petrol engines.



AdBlue

959113997

Description:

AdBlue is a carefully blended aqueous urea solution of 32.5% high purity urea and 67.5% demineralised water.

Application:

AdBlue is suitable for use in diesel vehicles equipped with Selective Catalytic Reduction (SCR) exhaust emission control devices. SCR is a technology that uses a urea based diesel exhaust fluid (DEF) and a catalytic converter to reduce oxides of nitrogen (NOx) emissions to harmless nitrogen and water. It is directly injected into the exhaust gas where it is converted to ammonia. The ammonia subsequently reacts with the nitric oxides in the exhaust catalyst to form harmless nitrogen and water.

SCR is fitted to many diesel engines that meet Euro IV and Euro V and Euro VI emissions standards.

It is manufactured to meet the specifications detailed in ISO22241.

Diesel Exhaust Fluid MUST NOT be added to the diesel tank. The DEF is NOT a diesel additive. It is stored in a separate tank on the vehicle and is injected into the exhaust gas from the engine in a post combustion process.

Pack Sizes

10 litre



SOLUBLE CUTTING OIL

Aquatex® 3180

530710

Description:

A general purpose soluble oil formulated with special base oils, coupling agents and a high level of emulsifiers. Aquatex 3180 will form very stable emulsions, even with relatively hard water. It exhibits high levels of detergency and reserve alkalinity, low foaming tendencies, and contains a biocide to combat a wide spectrum of micro-organisms commonly found in sumps and reservoirs.

Application & Dilution Ratio: General machining: 5 – 10%

Grinding: 5%

Pack sizes:

18 litre.

Emulsion Preparation:

A minimum of two-thirds of water to be used in the emulsion should be charged (at room temperature) into a separate mixing vessel. Slowly add the amount of oil required to obtain the correct emulsion concentration, with thorough mixing. Remember **O I L (Oil In Last)** to avoid forming an invert emulsion and, where possible, **use automatic mixers**. Caltex Aquatex 3180 is formulated to be compatible with water up to 200 mg/L hardness. For best results, water of low hardness should be used in emulsion preparation and make-up. Hard water tends to deplete the emulsifiers, resulting in surface scum and soap formation over extended periods of time.

Note: Water-containing metalworking fluids such as soluble oil emulsions should never be used for machining operations on magnesium or magnesium-containing alloys as a fire or explosion hazard may exist.

Refer to Product Bulletin for specific information regarding system cleaning, emulsion monitoring and removal of tramp oil and other contaminants.





Z Oil Analysis Programme

(Conditions Apply)

A sophisticated, rapid oil analysis early warning system designed to detect potential equipment issues before serious damage occurs. Each sample is analysed to assess equipment wear, oil condition, and identify possible mechanical faults. The results are presented in a detailed report with clear, actionable maintenance recommendations.

Suitable for all types of mechanical equipment with closed lubrication systems, used across a wide range of industries, including marine. It can help prevent major equipment failures, predict potential issues, improve maintenance scheduling, and determine optimal oil change intervals.

All samples are analysed in New Zealand to ensure fast turnaround of results. Test reports are sent by email and are also available online at any time.

Sold in kits of 12 samples. (Price includes all costs involved, including postage if mailed in New Zealand).



SAE VISCOSITY CLASSIFICATION SYSTEMS



Engine Oil Viscosity Classification J300: APR2021

CAUTION: Kinematic viscosity ranges for SAE 8 to SAE 20 viscosity grades partially overlap.

SAE Viscosity Grade	Low-Temperature (°C) Cranking Viscosity ³ , mPa-s Max	Low-Temperature (°C) Pumping Viscosity ⁴ , mPa-s Max with No Yield Stress ⁴	Low-Shear-Rate Kinematic Viscosity ⁵ (mm ² /s) at 100°C	Kinematic Viscosity ⁴ (mm ² /s) at 100°C Max	High Shear Viscosity ⁵ mPa-s at 150°C and 10 ⁶ s ⁻¹
0W	6200 at -35	60,000 at -40	3.8	-	-
5W	6600 at -30	60,000 at -35	3.8	-	-
10W	7000 at -25	60,000 at -30	4.1	-	-
15W	7000 at -20	60,000 at -25	5.6	-	-
20W	9500 at -15	60,000 at -20	5.6	-	-
25W	13000 at -10	60,000 at -15	9.3	-	-
8	-	-	4	<6.1	1.7
12	-	-	5	<7.1	2
16	-	-	6.1	<8.2	2.3
20	-	-	6.9	<9.3	2.6
30	-	-	9.3	<12.5	2.9
40	-	-	12.5	<16.3	3.5 (0W-40, 5W-40 and 10W-40 grades)
40	-	-	12.5	<16.3	3.7 (15W-40, 20W-40, 25W-40 and 40 grades)
50	-	-	16.3	<21.9	3.7
60	-	-	21.9	<26.1	3.7

NOTES:

- 1 mPa-s = 1 cP; 1 mm²/s = 1 cSt
- All values, with the exception of the low-temperature cranking viscosity, are critical specifications as defined by ASTM D3244.
- ASTM D5293: Cranking viscosity – The non-critical specification protocol in ASTM D3244 shall be applied with a P value of 0.95.
- ASTM D4684. Note that the presence of any yield stress detectable by this method constitutes a failure regardless of viscosity.
- ASTM D445 or ASTM D7042 bias corrected to ASTM D445.
- ASTM D4683, ASTM D4741, ASTM D5481, or CEC L-36-A-90.

NR – No requirement * Limit must be met after testing in CEC L-45-T-93 (20 hours)

SAE VISCOSITY CLASSIFICATION SYSTEMS



Axle and Manual Transmission Lubricant Viscosity Classification J306:2019

SAE J306 Standard

SAE Viscosity Grade	Maximum Temperature for Viscosity of 150,000 cP, (°C) ¹	Kinematic Viscosity @ 100°C (cSt) ² Minimum	Kinematic Viscosity @ 100°C (cSt) ² Maximum
70W	-55	3.8	-
75W	-40	3.8	-
80W	-26	8.5	-
85W	-12	11.0	-
60	-	3.8	<5.0
70	-	5.0	<6.5
75	-	6.5	<8.5
80	-	8.5	<11.0
85	-	11.0	<13.5
90	-	13.5	<18.5
110	-	18.5	<24.0
140	-	24.0	<32.5
190	-	32.5	<41.0
250	-	41.0	-

1. Using ASTM D2983

2. Using ASTM D445

Axle and Manual Transmission Lubricants SAE J308

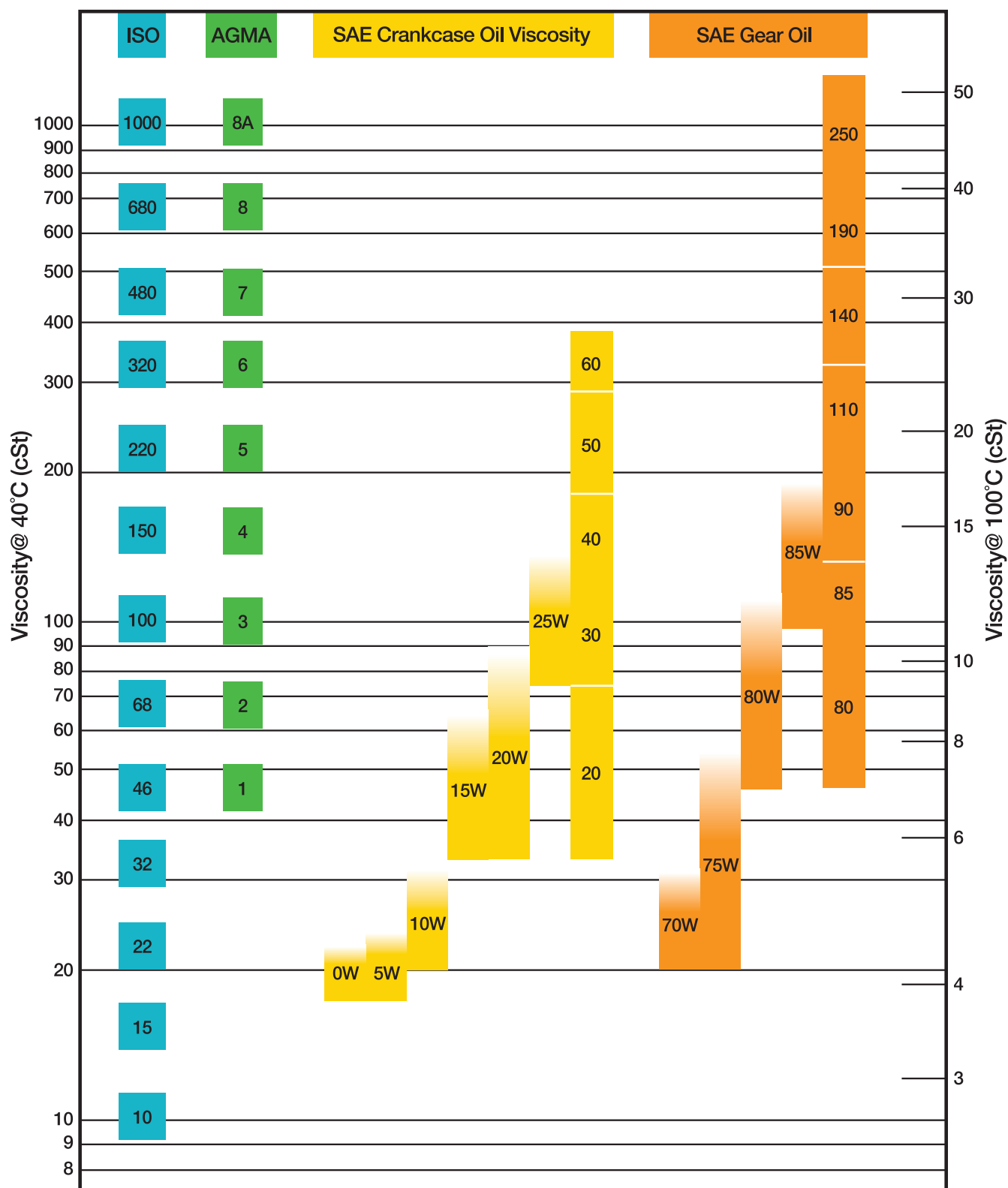
Classification	Type	Typical Application
GL-1*	Straight mineral oil	Some automotive manual transmissions under mild service.
GL-2*	Usually contains fatty material.	Worm drives and some industrial gear boxes.
GL-3*	Contains mild EP additives.	Manual transmissions and spiral bevel final drives under moderate service conditions.
GL-4*	Contains EP additives. Equivalent to MIL-L-2105.	Manual transmissions and transaxles, spiral bevel and hypoid gears in normal service without shock loading.
GL-5*	Contains higher concentration of EP additives. Equivalent to MIL-L-2105 B/C/D.	Hypoid and all other types of gears in the severest service including shock loading. Primary field service recommendation for most passenger cars and trucks. Also may be used in manual transmissions.
GL-6*	Obsolete	Hypoid gears with very high pinion offset.
MT-1	Protection against the combination of thermal degradation, component wear and oil seal deterioration. May or may not contain EP additives.	Non-synchronised manual transmissions used in buses and heavy duty trucks.

* Obsolete

COMPARATIVE VISCOSITY CLASSIFICATIONS



COMPARATIVE VISCOSITY CLASSIFICATIONS



Winter grade (W) viscosities are also defined at low temperatures as well as minimum viscosities at 100°C (shown here). For a complete definition see the SAE J300 and J306 tables.

COMPARATIVE VISCOSITY CLASSIFICATIONS

Viscosity Equivalents at Same Temperature						Approximate Equivalents					
Kinematic (Centistokes)	Saybolt Universal (Seconds)	Redwood No.1 (Seconds)	Engler (Degrees)	Saybolt Furoil (Seconds)	Redwood No.2 (Seconds)	Kinematic (Centistokes)	Saybolt Universal (Seconds)	Redwood No.1 (Seconds)	Engler (Degrees)	Saybolt Furoil (Seconds)	Redwood No.2 (Seconds)
1.8	32	30.8	1.14	-	-	96.8	450	397	12.8	47.0	-
2.7	35	32.2	1.18	-	-	102.2	475	419	13.5	49	-
4.2	40	36.2	1.32	-	-	107.6	500	441	14.2	51	-
5.8	45	40.6	1.46	-	-	118.4	550	485	15.6	56	-
7.4	50	44.9	1.60	-	-	129.2	600	529	17.0	61	-
8.9	55	49.1	1.75	-	-	140.3	650	573	18.5	66	-
10.3	60	53.5	1.88	-	-	151	700	617	19.8	71	-
11.7	65	57.9	2.02	-	-	162	750	661	21.3	76	-
13.0	70	62.3	2.15	-	-	173	800	705	22.7	81	-
14.3	75	67.6	2.31	-	-	183	850	749	24.2	86	-
15.6	80	71.0	2.42	-	-	194	900	793	25.6	91	-
16.8	85	75.1	2.55	-	-	205	950	837	27.0	96	-
18.1	90	79.6	2.68	-	-	215	1,000	882	28.4	100	-
19.2	95	84.2	2.81	-	-	259	1,200	1,058	34.1	121	104
20.4	100	88.4	2.95	-	-	302	1,400	1,234	39.8	141	122
22.8	110	97.1	3.21	-	-	345	1,600	1,411	45.5	160	138
25.0	120	105.9	3.49	-	-	388	1,800	1,587	51	180	153
27.4	130	114.8	3.77	-	-	432	2,000	1,763	57	200	170
29.6	140	123.6	4.04	-	-	541	2,500	2,204	71	250	215
31.8	150	132.4	4.32	-	-	650	3,000	2,646	85	300	255
34.0	160	141.1	4.59	-	-	758	3,500	3,087	99	350	300
36.0	170	150.0	4.88	-	-	866	4,000	3,526	114	400	345
38.4	180	158.8	5.15	-	-	974	4,500	3,967	128	450	390
40.6	190	167.5	5.44	-	-	1,082	5,000	4,408	142	500	435
42.8	200	176.4	5.72	23.0	-	1,190	5,500	4,849	156	550	475
47.2	220	194.0	6.28	25.3	-	1,300	6,000	5,290	170	600	515
51.8	240	212	6.85	27.0	-	1,405	6,500	5,730	185	650	580
55.9	260	229	7.38	28.7	-	1,515	7,000	6,171	199	700	600
60.2	280	247	7.95	30.5	-	1,625	7,500	6,612	213	750	645
64.5	300	265	8.51	32.5	-	1,730	8,000	7,053	227	800	690
69.9	325	287	9.24	35.0	-	1,840	8,500	7,494	242	850	730
75.3	350	309	9.95	37.2	-	1,950	9,000	7,934	256	900	770
80.7	375	331	10.70	39.5	-	2,055	9,500	8,375	270	950	815
86.1	400	353	11.40	42.0	-	2,165	10,000	8,816	284	1,000	855

NLGI GREASE CLASSIFICATION



Grade Number	ASTM Worked Penetration @ 25°C
000	445 – 475
00	400 – 430
0	355 – 385
1	310 – 340
2	265 – 295
3	220 – 250
4	175 – 205
5	130 – 160
6	85 – 115

GREASE COMPATIBILITY CHART

Compatible
 Check Compatibility with Chevron Lubetek®
 Not Compatible - Full Clean Out Required for Change

Table I - Compatibility of Binary Grease Mixtures

	Lithium	Lithium Complex	Aluminum Complex	Calcium	Calcium Sulfonate Complex	Barium Complex	Sodium	Bentone (Clay)	Polyurea
Lithium	Compatible	Compatible	Not Compatible	Compatible	Check Compatibility	Not Compatible	Not Compatible	Not Compatible	Check Compatibility
Lithium Complex	Compatible	Compatible	Not Compatible	Check Compatibility	Check Compatibility	Not Compatible	Not Compatible	Not Compatible	Check Compatibility
Aluminum Complex	Not Compatible	Not Compatible	Compatible	Not Compatible	Not Compatible	Not Compatible	Not Compatible	Not Compatible	Not Compatible
Calcium	Compatible	Check Compatibility	Not Compatible	Compatible	Check Compatibility	Not Compatible	Not Compatible	Not Compatible	Check Compatibility
Calcium Sulfonate Complex	Check Compatibility	Check Compatibility	Not Compatible	Check Compatibility	Compatible	Not Compatible	Not Compatible	Not Compatible	Check Compatibility
Barium Complex	Not Compatible	Not Compatible	Not Compatible	Not Compatible	Not Compatible	Compatible	Not Compatible	Not Compatible	Not Compatible
Sodium	Not Compatible	Not Compatible	Not Compatible	Not Compatible	Not Compatible	Not Compatible	Compatible	Not Compatible	Not Compatible
Bentone (Clay)	Not Compatible	Not Compatible	Not Compatible	Not Compatible	Not Compatible	Not Compatible	Not Compatible	Compatible	Not Compatible
Polyurea	Check Compatibility	Check Compatibility	Not Compatible	Check Compatibility	Check Compatibility	Not Compatible	Not Compatible	Not Compatible	Check Compatibility

Table I should be used only as a guideline for determining compatibility. For the purpose of changing products in the field, the compatibility of the greases in question should be determined by laboratory testing.

As a general rule the mixing of different grease types is NOT recommended

API ENGINE SERVICE CLASSIFICATIONS



S 'Service' classification (primarily for Petrol engines)

Description	Related Specifications
SQ Introduced 31 March 2025. Designed to provide protection against both fresh and aged oil low-speed pre-ignition (LSPI), improved timing chain wear protection, improved high temperature deposit protection for pistons and turbochargers, sludge and varnish control.	ILSAC GF-7
SP Introduced 1st June 2020. Includes new tests for timing chain wear protection, low speed pre-ignition and deposit control.	ILSAC GF-6
SN Plus Introduced in 1st May 2018 supplemental to API SN to address LSPI (Low Speed Pre-Ignition), a severe engine performance issue that affects petrol direct injected (GDI) and turbocharged GDI (T/GDI) engines.	ILSAC GF-5
SN Introduced in 2010 along with the Resource Conserving classification and ILSAC GF-5	ILSAC GF-5
SM Introduced in 2004 to provide improvements in oxidation resistance, deposit control, anti-wear and low-temperature performance.	ILSAC GF-4
SL Introduced in 2001 to provide improvements in high temperature deposit control and oil consumption.	ILSAC GF-3
SJ Introduced in 1997 (First available 15 October 1996) to provide improvements in oil volatility, filterability, gelation, deposits and catalyst compatibility.	ILSAC GF-2, MIL-L-46152E
SH* Introduced in 1994 to provide improvements in deposit control, oil oxidation, wear, rust and corrosion.	ILSAC GF-1
SG* Introduced in 1989 to provide improvements in engine deposits, oil oxidation, and engines wear. Also provides protection against rust and corrosion.	Ford: ESE-M2C-153E GM: 6048M, MIL-L 46152D
SF* Introduced in 1980 to provide improvements in oxidation stability and anti-wear performance. Also provides protection against engine deposits, rust and corrosion.	Ford: ESE-M2C-153 B/C/D GM: 6048M, Chrysler: MS 6395, MIL-L-46152 B/C
SE* Introduced in 1972 to provide improvements in oil oxidation, high temperature engine deposits, rust and corrosion.	Ford: ESE-M2C-101C, GM: 6136M, MIL-L-46152A
SD* Introduced in 1968.	
SC* Introduced in 1964.	
SB* For minimum Duty Petrol Engines. Not suitable for engines built after 1951.	Inhibited oil (non-detergent)
SA* For Utility Petrol and Diesel Engines. Not suitable for engines built after 1930.	Straight mineral oil.

* Obsolete

ILSAC Engine Service Classification

Description	
GF-7A	API SQ performance with improved fuel economy, enhanced emission control system protection, enhanced low temperature pumpability and protection of engines operating on ethanol-containing fuels up to E85. Released 31 March 2025
GF-7B	Same performance as ILSAC GF-7A but restricted to SAE 0W-16 viscosity grade. Released 31 March 2025.
GF-6A	Effectively API SP plus "Resource Conserving" for viscosities SAE 0W-20, 5W-20, 5W-30 & 10W-30. Released May 2020
GF-6B	Is the same performance as GF-6A but restricted to SAE 0W-16 viscosity only. Released May 2020
GF-5	Introduced in 2010 to provide improvements in turbocharger protection, piston cleanliness, compatibility with ethanol blend fuels, fuel economy durability and emission control system durability.
GF-4	Effectively API SM plus the Sequence VI B fuel economy test with tighter limits. Also tightened limits on phosphorus and introduced limits on sulphur. Released in 2004.

API ENGINE SERVICE CLASSIFICATIONS



C 'Commercial' classification (primarily for Diesel engines)

	Description	Related Specifications / Tests
CK-4	Introduced Dec 2016 for high-speed, 4-stroke diesel engines providing improved, oxidation resistance, emission control system durability, wear protection, shear stability and soot related viscosity increase. May be used in place of CF-4, CG-4, CH-4, CI-4, CI-4 plus and CJ-4 oils.	Cummins CES 20086, Mack EOS 4.5 Volvo VDS 4.5
FA-4	Introduced Dec 2016 for use only in specific make/model, high-speed, 4-stroke diesel engines manufactured after 2016. API FA-4 oils are blended to a HTHS viscosity range of 2.9cP-3.2cP to assist in reducing GHG emissions by reducing internal fluid friction. They are NOT backward compatible and so cannot be used in place of any other API category.	Cummins CES 20086 Mack EOS 4.5 Volvo VDS 4.5
CJ-4	Introduced in 2006 for high-speed, 4-stroke diesel engines designed to meet U.S. 2007 model year on-highway exhaust emission standards as well as for previous model years. Especially effective at sustaining emission control system durability where DPF's and other advanced after-treatment systems are used.	Cummins CES 20081, Mack EO-O Premium Plus 07
CI-4 PLUS	Introduced 2004 as a sub-category of API CI-4 and includes more severe shear stability requirements and a pass in the Mack T-11 test with limits as defined in Mack EO-N Premium Plus. May be used in place of CD, CE, CF-4, CG-4, CH-4 and CI-4 oils.	Cummins CES 20078, Mack EO-N Premium Plus 03
CI-4	Introduced in 2002 for four-stroke heavy-duty diesel engines meeting 2004 exhaust emission standards implemented in 2002 and to provide improvements in engine durability where exhaust gas recirculation (EGR) is used. May be used in place of CD, CE, CF-4, CG-4 and CH-4 oils.	Cummins CES 20078 Mack EO-N Premium Plus
CH-4	For 4-stroke diesel engines designed to meet 1998 emission standards. May be used in place of CD, CE, CF-4 and CG-4 oils.	Cummins M11, Mack EO-M, EO-M Plus, Caterpillar 1P
CG-4*	Introduced in 1994 for 4-stroke heavy-duty diesel engines meeting 1994 U.S. exhaust emission standards. May be used in place of API CD, CE and CF-4.	Caterpillar 1N, Mack EO-L
CF-4*	For 4-stroke heavy-duty engines manufactured since 1990. CF-4 oils may be used in place of CC, CD or CE oils.	Caterpillar 1K
CF-2*	Introduced in 1994 for 2-stroke diesel engines requiring improved control of cylinder and ring-face scuffing and deposits. May also be used in place of CD-II oils. CF-2 oils do not necessarily meet the requirements of CF or CF-4.	Caterpillar 1M-PC, Detroit Diesel 6V-92TA
CF*	Introduced in 1994 for indirect injected diesel engines. CF oils can be used when CD is recommended.	Caterpillar 1M-PC
CE*	For 4-stroke heavy-duty diesel engines manufactured since 1983. Can be used when previous API diesel engine category oils are recommended.	MIL-L-2104 D/E, MIL-L-45199
CD-II*	For severe duty two stroke diesel engines. CD-II oils meet all of the performance requirements of CD.	MIL-L-2104 D, Detroit Diesel: 6V-53T
CD*	For n/a, t/c or s/charged diesel engines. Introduced in 1955.	MIL-L-2104 C/D, MIL-L-45199
CC*	For moderate duty diesel and petrol engines. Introduced in 1961.	MIL-L-2104 B
CB*		MIL-L-2104A Supp. 1
CA*		MIL-L-2104A

* Obsolete

ACEA ENGINE SERVICE CLASSIFICATIONS



ACEA is an acronym for the “Association des Constructeurs Europeen d’Automobiles” and is the European equivalent to the North American API and they develop and maintain their own engine oil performance rating system, referred to as “sequences”.

The members of ACEA are: BMW; General Motors; Renault; DaimlerChrysler; MAN; Scania; DAF Trucks; Porsche; Volkswagen; Fiat; PSA; Volvo and Ford of Europe. The first Sequences (ACEA 96) were released for use from Jan 1, 1996.

The current range of performance ratings for the various petrol and diesel engines are as follows:

FOR LIGHT-DUTY ENGINE SERVICE-FILL OILS

A/B: Gasoline and Diesel Engine Oils – “High SAPS”

Description	
A1/B1	Category is removed with these Oil Sequences.
A3/B3	Category withdrawn with these Oil Sequences. Stable, stay-in-grade engine oil intended for use in passenger car and light-duty gasoline & diesel engines and/or for extended oil drain intervals where specified by the engine manufacturer.
A3/B4	Stable, stay-in-grade engine oil intended for use at extended oil drain intervals in passenger car and light-duty gasoline & DI diesel engines, but also suitable for applications described under A3/B3.
A5/B5	Stable, stay-in-grade engine oil intended for use at extended oil drain intervals in passenger car and light-duty gasoline & DI diesel engines designed for low viscosity engine oils with HTHS viscosity of 2.9 to 3.5 mPa.s. These engine oils are unsuitable for use in certain engines - consult vehicle- OEM's owner's manual/handbook in case of doubt.
A7/B7	Stable, stay-in-grade engine oil intended for use at extended oil drain intervals in passenger car and light-duty gasoline & DI diesel engines designed for low viscosity engine oils with HTHS viscosity of 2.9 to 3.5 mPa.s. Relative to A5/135 these engine oils provide also low speed pre-ignition- and wear protection for turbocharged gasoline DI engines as well as turbocharger compressor deposit (TCCD) protection for modern DI diesel engines. These engine oils are unsuitable for use in certain engines - consult vehicle-OEM's owner's manual/handbook in case of doubt.

C: Catalyst & GPF/DPF compatible Engine Oils for Gasoline & Diesel Engines – “Low SAPS”

Note: These Oils will increase the DPF/GPF and TWC life and maintain the Vehicle's Fuel Economy.

Warning: Some of these Categories may be unsuitable for use in certain Engine Types – consult the vehicle OEM's owner's manual/handbook in case of doubt.

Description	
C1	Category is withdrawn with these Oil Sequences.
C2	Stable, stay-in-grade engine oil with mid-SAPS Level, for aftertreatment system compatibility. Intended for use at extended oil drain intervals in passenger car and light-duty gasoline & DI diesel engines designed for low viscosity engine oils with a minimum HTHS Viscosity of 2.9 mPa.s.
C3	Stable, stay-in-grade engine oil with mid-SAPS Level, for aftertreatment system compatibility. Intended for use at extended oil drain intervals in passenger car and light-duty gasoline & DI diesel engines designed for engine oils with HTHS viscosity of minimum 3.5 mPa.s.
C4	Stable, stay-in-grade engine oil with low-SAPS Level, for aftertreatment system compatibility. Intended for use at extended oil drain intervals in passenger car and light-duty gasoline & DI diesel engines designed for engine oils with HTHS viscosity of minimum 3.5 mPa.s.
C5	Stable, stay-in-grade engine oil for improved fuel economy, with mid-SAPS Level, for aftertreatment system compatibility. Intended for use at extended oil drain intervals in passenger car and light-duty gasoline & DI diesel engines designed and OEM-approved for engine oils with HTHS viscosity of minimum 2.6 mPa.s.
C6	Stable, stay-in-grade engine oil for improved fuel economy, with mid-SAPS Level, for aftertreatment system compatibility. Intended for use at extended oil drain intervals in passenger car and light-duty gasoline & DI diesel engines designed and OEM-approved for engine oils with HTHS viscosity of minimum 2.6 mPa.s. Relative to C5 these engine oils provide also low speed pre-ignition- and wear protection for turbocharged gasoline DI engines as well as turbocharger compressor deposit (TCCD) protection for modern DI diesel engines.

ACEA ENGINE SERVICE CLASSIFICATIONS



FOR HEAVY-DUTY ENGINE SERVICE-FILL OILS

E: Heavy Duty Diesel Engine Oils

	Description
E4	Stable, stay-in-grade oil providing excellent control of piston cleanliness, wear, soot handling and lubricant stability. It is recommended for highly rated diesel engines meeting Euro I, Euro II, Euro III, Euro IV and Euro V emission requirements and running under very severe conditions, e.g. significantly extended oil drain intervals according to the manufacturer's recommendations. It is suitable for engines without particulate filters, and for some EGR engines and some engines fitted with SCR NOx reduction systems. However, recommendations may differ between engine manufacturers so driver manuals and/or dealers shall be consulted if in doubt.
E6	(Replaced by E8; claims valid till 1 May 2024). Stable, stay-in-grade oil providing excellent control of piston cleanliness, wear, soot handling and lubricant stability. It is recommended for highly rated diesel engines meeting Euro I, Euro II, Euro III, Euro IV, Euro V and Euro VI emission requirements and running under very severe conditions, e.g. significantly extended oil drain intervals according to the manufacturer's recommendations. It is suitable for EGR engines, with or without particulate filters, and for engines fitted with SCR NOx reduction systems. E6 quality is strongly recommended for engines fitted with particulate filters and is designed for use in combination with low sulphur diesel fuel. However, recommendations may differ between engine manufacturers so driver manuals and/or dealers shall be consulted if in doubt.
E7	Stable, stay-in-grade oil providing effective control with respect to piston cleanliness and bore polishing. It further provides excellent wear control, soot handling and lubricant stability. It is recommended for highly rated diesel engines meeting Euro I, Euro II, Euro III, Euro IV and Euro V emission requirements and running under severe conditions, e.g. extended oil drain intervals according to the manufacturer's recommendations. It is suitable for engines without particulate filters, and for most EGR engines and most engines fitted with SCR NOx reduction systems. However, recommendations may differ between engine manufacturers so driver manuals and/or dealers shall be consulted if in doubt.
E8	(Represents performance upgrade over E6). Stable, stay-in-grade oil providing excellent control of piston cleanliness, wear, soot handling and lubricant stability. It is recommended for highly-rated diesel engines meeting Euro I, Euro II, Euro III, Euro IV, Euro V and Euro VI emission requirements and running under very severe conditions, eg significantly extended oil drain intervals according to the manufacturer's recommendations. It is suitable for EGR engines, with or without particulate filters, and for engines fitted with SCR NOx reduction systems. E8 quality is strongly recommended for engines fitted with particulate filters and is designed for use in combination with low-sulphur diesel fuel. However, recommendations may differ between engine manufacturers, so driver manuals and/or dealers must be consulted if in doubt.
E9	(Replaced by E11; claims valid till 1 May 2024). Stable, stay-in-grade oil providing effective control with respect to piston cleanliness and bore polishing. It further provides excellent wear control, soot handling and lubricant stability. It is recommended for highly rated diesel engines meeting Euro I, Euro II, Euro III, Euro IV, Euro V and Euro VI emission requirements and running under severe conditions, e.g. extended oil drain intervals according to the manufacturer's recommendations. It is suitable for engines with or without particulate filters, and for most EGR engines and for most engines fitted with SCR NOx reduction systems. E9 is strongly recommended for engines fitted with particulate filters and is designed for use in combination with low Sulphur diesel fuel. However, recommendations may differ between engine manufacturers so driver manuals and/or dealers should be consulted if in doubt.
E11	(Represents performance upgrade over E9) Stable, stay-in-grade oil providing effective control with respect to piston cleanliness and bore polishing. It further provides excellent wear control, soot handling and lubricant stability. It is recommended for highly rated diesel engines meeting Euro I, Euro II, Euro III, Euro IV, Euro V and Euro VI emission requirements and running under severe conditions, eg extended oil drain intervals according to the manufacturer's recommendations. It is suitable for engines with or without particulate filters, and for most EGR engines and for most engines fitted with SCR NOx reduction systems. E11 is strongly recommended for engines fitted with particulate filters and is designed for use in combination with low-sulphur diesel fuel. However, recommendations may differ between engine manufacturers so driver manuals and/or dealers should be consulted if in doubt.

SAPS	Sulphated Ash, Phosphorus, Sulphur.
DPF	Diesel Particulate Filter
TWC	Three-Way Catalyst
HTHS	High Temperature / High Shear rate viscosity
DI	Direct Injection
GPF	Gasoline Particle Filter

TWO CYCLE PETROL ENGINE OIL PERFORMANCE CLASSIFICATION

The performance level of two cycle oils is classified into three grades FB, FC and FD according to test results in four engine tests (a lubricity test, a detergency test, a smoke test and an exhaust system blocking test); and three properties (kinematic viscosity at 100°C, flash point and sulfated ash).

FA	was an earlier classification that is now obsolete
FB	is the base grade
FC	is superior to FB is exhaust smoke and exhaust system blocking
FD	is superior to FC is high temperature detergency

FOUR STROKE MOTORCYCLE PETROL ENGINE OIL CLASSIFICATION

Oils are classified into four grades (MA, MA1, MA2, MB) according to their performance in a clutch friction test. Additionally, oils must meet one of the following performance categories: API SG, SH, SJ, SL, SM, SN, or ILSAC GF-1, GF-2, GF-3, ACEA A1/B1, A3/B3, A3/B4, A5/B5, C2, C3, C4 and must meet certain limits on sulphated ash, phosphorus content, evaporative loss, foaming, shear stability and high temperature high shear viscosity.

JAPANESE AUTOMOTIVE DIESEL ENGINE OIL CLASSIFICATION

The JASO DH-1, DH-2, DH-2F, DL-0, DL-1 and DL-2 classifications are defined in the Automotive Four-Cycle Diesel Engine Oil Standard "JASO M 355: 2021".

The JASO DH-1 and DL-0 classifications were developed for four stroke automotive diesel engines subject to the Japanese long-term exhaust emission regulations.

The DH-1 classification stipulates wear prevention, corrosion prevention, high-temperature oxidation stability, and soot control etc. DH-1 oils are targeted at the suppression of deterioration of piston detergency, formation of deposits at high temperature, foaming, oil consumption due to evaporative loss, viscosity decrease by shear, deterioration of oil seals, etc. Such oils may also be used in engines which predate the Japanese long-term exhaust emission regulations.

When the appropriate engine manufacturers' recommendations on drain interval are followed, DH-1 and DL-0 oils can also be used for engines predating the long-term emission control regulations (Euro 4 emission control regulations), and they are applicable to cases where diesel fuels of which the sulphur content exceeds 0.05%.

The JASO DH-2, DH-2F, DL-1 and DL-2 classifications were developed for four stroke automotive diesel engines equipped with after-treatment devices such as Diesel Particulate Filters (DPF) and catalysts in compliance with exhaust emission regulations subsequent to the Japanese new short-term regulations.

DH-2 and DL-1 oils are eminently suitable for DPF and catalyst equipped vehicles and provide the same performance level as the DH-1 classification.

Because the requirements of truck and bus differ from those of passenger cars in engine durability, service interval, fuel economy, etc., the DH-2 and DH-2F classifications were designed for heavy-duty use by trucks and buses while the DL-1 and DL-2 classifications were designed for light-duty use by passenger cars.

DH-2 Oils, DH-2F Oils, DL-1 Oils and DL-2 Oils are used only in an environment where low sulphur fuels of which a sulphur content of not more than 0.005% are used and the intervals for oil replacement as recommended by the engine manufacturer are observed.

More information is available at http://www.jalos.or.jp/onfile/pdf/DH_E2105.pdf

Fire Safety

All petroleum products will burn if conditions are suitable. For instance, petrol will catch fire more readily than lubricating oil. It is essential that they are stored, transferred and handled sensibly, adopting adequate precautions to avoid a fire hazard.

Petroleum products are classified in accordance with NZS 5433 into flammable liquids.

Flammable liquids are defined by the New Zealand Code for the Transport of Dangerous Substances on Land as Class 3 liquids which are subdivided into the following packaging groups:

Packaging Group	Flash Point (Closed Cup)	Initial Boiling Point	Products Include
I	-	<35°C	Volatile Solvents
II	< 23°C	>35°C	Petrol, Toluol, Medium Volatility Solvents
III	>23°C to <61°C	>35°C	Kerosines, Mineral Turps, Jet-A1, Most Low Volatility Solvents.

Combustible Liquids are defined as any liquid, other than flammable liquids, that has a flash point less than its boiling point. They are divided into two classes as follows:

Class	Flash Point (Closed Cup)	Products Include
C1	<150°C	Heating Oil, Diesel, Diesel Fuel, Furnace Oil. Some Low Volatility Solvents.
C2	Above 150°C	Lubricating Oils, Greases, Cutting Oils, Bitumen.

Particular care must be exercised when working with products from Packaging Groups I, II, III.

All sources of ignition must be rigorously excluded and the work areas must be well ventilated.

All petroleum products should be stored in the prescribed manner and away from sources of heat, flame and strong oxidising agents. Plastic containers should not be used for storing fuels and solvents unless specifically designed for this purpose.

Care must be exercised in transferring flammable products, for example, filling or discharging road tank wagons, fuelling aircraft and filling drums, because static electricity can build up and lead to sparks. Products must be pumped at prescribed flow rates and storage tanks and containers must be earthed.

Health Guide

Petroleum products are not dangerous to health provided they are handled correctly with particular emphasis on personal hygiene. However, misuse or accident can give rise to health hazards with some products. The following outlines these potential hazards and the first aid steps which should be taken.

Health hazards can arise in four different ways:

- Ingestion (swallowing)
- Inhalation (breathing in)
- Aspiration (liquid entering lungs)
- Skin and eye contact

All such hazards may be avoided by wearing the appropriate protective clothing, providing a proper working environment, and using the correct handling aids. Also, as a matter of course, all petroleum products should be stored out of reach of children and away from food preparation/consumption areas. Specific questions relating to the health and handling aspects of Caltex products should be directed to your Caltex representative. For guidance a general classification of products and their potential hazards is given in the table on the following page.

Personal Hygiene

Personal hygiene is not only desirable – it is essential. The following is a guide to good practice in handling petroleum products.

1. Wash hands thoroughly before and after working with petroleum products using soap and water or an approved hand cleanser. Do not use petrol or solvents to wash hands. Apply a restorative cream after washing at the end of the day's work.
2. Wash hands thoroughly before eating. Do not eat on the job.
3. Wear appropriate protective clothing. Keep it clean and in good condition and keep it separate from street clothing.
4. If clothing is contaminated with a spill, wet it down with water and then change it.
5. Give prompt first aid attention to cuts and sores and protect adequately.
6. Avoid breathing vapours, fumes or dusts.

FIRST AID GUIDE



Group	Product	Potential Hazard		First Aid Treatment
Volatile Fuels and solvents	Petrol, Volatile Solvents, Degreasers	Ingestion	Moderately toxic to adults, can be extremely toxic to children. Will irritate mouth and intestines.	Do not induce vomiting. Give water to drink and get medical aid.
		Inhalation	Extremely hazardous; use only in properly ventilated areas.	Move to fresh air. Keep warm and rested. If unconscious give oxygen. If breathing stops give artificial respiration
		Aspiration	Extremely hazardous, can occur during vomiting.	Get medical aid immediately.
		Skin	Primary irritants which may cause dermatitis	Wash with soap and warm water. Drench contaminated clothing with water and then remove it. Wash before re-use.
		Eyes	Can severely irritate the eyes. Some solvents can damage the eyes.	Wash with copious volumes of water for at least fifteen minutes. Seek medical advice immediately.
Non-volatile Fuels and solvents	Kerosines, Diesel	Ingestion	Moderately toxic. Fuels and solvents can irritate the mouth and intestines.	Do not induce vomiting. Give water to drink and seek medical advice.
		Inhalation	No significant risk because of low volatility.	
		Aspiration	Extremely hazardous, can occur during vomiting.	Get medical aid immediately.
		Skin	Primary irritants which may cause dermatitis.	Wash with soap and water. Remove contaminated clothing and wash before re-use
		Eyes	Will irritate the eyes.	Wash with copious volumes of water. Seek medical advice.
Oils	Lubricating Oils, Cutting Oils	Ingestion	Low toxicity. Particular additives may cause moderate toxicity.	Do not induce vomiting. Give water and seek medical advice.
		Inhalation	No significant risk because of low volatility.	
		Aspiration	Moderate risk due to high viscosity.	Get medical aid.
		Skin	Prolonged and repeated contact with oils may cause dermatitis. Prolonged or repeated contacts with aromatic extracts and some naphthenic oils may cause skin cancer.	Wash with soap and warm water. Remove contaminated clothing and wash before re-use.
		Eyes	Oils may give slight irritation.	Wash with copious volumes of water. Seek medical advice.
Greases		Ingestion	Very low toxicity with the exception of special greases containing metal additives.	
		Skin	May cause slight irritation to sensitive skins.	Wash with soap and warm water. Grease gun injuries require immediate hospital treatment.
		Eyes	May cause slight irritation.	Wash with copious volumes of warm water. Seek medical advice.

CONVERSION TABLES



MEASUREMENT CONVERSION FACTORS			
	MULTIPLIERS		
UNIT	←	→	UNIT
Length:			Length:
inch, in	0.03937	25.400	millimetre, mm
foot, ft	3.2808	0.30480	metre, m
yard, yd	1.0936	0.91440	metre, m
statute mile, mi - 5280 ft	0.62137	1.6093	kilometre, km
nautical mile, Int	0.5399	1.852	kilometre, km
Area:			Area:
square inch, in ²	0.15500	6.4516	square centimetre, cm ²
square foot, ft ²	10.764	0.09290	square metre, m ²
square yard, yd ²	1.1960	0.83613	square metre, m ²
square mile, mi ²	0.38610	2.5900	square kilometre, km ²
	0.00386	259.00	hectares, ha
Volume:			Volume:
cubic inch, in ³	0.06102	16.387	cubic centimetre, cm ³
cubic foot, ft ³	35.315	0.02832	cubic metre, m ³
	0.13368	7.4805	gallon (US), gal
	0.16054	6.2288	gallon (Imp), gal
cubic yard, yd ³	1.3079	0.76456	cubic metre, m ³
fluid ounce (US), fl oz	0.03381	29.574	cubic centimetre, cm ³
pint (US), liq pt (16 oz)	2.1134	0.47317	litre, L (1000.0 cm ³)
quart (US), qt (32 oz)	1.0567	0.94635	litre, L
gallon (US), gal (128 oz)	1.2009	0.83268	gallon (Imp), gal (160 imp oz)
(231 in ³)	0.26417	3.7854	litre, L
	42.00	0.02381	barrel (US), bbl
barrel (US), bbl	6.29	158.99	litre, L
gallon (Imp), gal (227.4 in ³)	0.21998	4.5461	litre, L
	34.973	0.02859	barrel (US), bbl
Mass & Weight:			Mass & Weight:
avdp ounce, oz	0.03527	28.350	gram, g
avdp pound, lb (16 oz)	2.2046	0.45359	kilogram, kg
short ton, t (200 lb)	1.1200	0.89285	long ton, lt (2240 lb)
	1.1023	0.90718	metric ton, tonne (1000 kg)
long ton, lt (2240 lb)	0.98421	1.0160	metric ton, tonne (1000 kg)

CONVERSION TABLES



MEASUREMENT CONVERSION FACTORS			
	MULTIPLIERS		
UNIT	←	→	UNIT
Density & Concentration:			Density & Concentration:
lb/in, lb/ft ³	0.03613 0.06243	27.680 16.018	g/cm ³ kg/m ³
lb/gal (US)	8.3454	0.11983	kg/L
lb/gal (Imp)	10.022	0.09978	kg/L
lb/1000 bbl (PTB)	0.35052	2.8529	mg/L
Pressure (force/area):			Pressure (force/area):
lb-force/in ² , psi	0.00694	144.00	lb-force/ft ² , psf
	14.696	0.06805	atmosphere, atm
	0.19337	5.1715	cm Hg at 0°C
	0.03613	27.673	in H ₂ O at 4°C
	0.14504	6.8948	kilopascal, kPa
	0.01450	68.948	- millibar, mbar
atmosphere, atm	1.0333	0.96784	kg-force/cm ² , kgf/cm ²
	0.01316	76.000	cm Hg at 0°C
	9,99246	406.79	in H ₂ O at 4°C
	0.00987	101.32	kilopascal, kPa
cm Hg at 0°C	73.556	0.01360	kg-force/cm ² , kfg/cm ²
	0.18683	5.3525	in H ₂ O at 4°C
	0.075008	1.3332	kilopascal, kPa
in H ₂ O at 4°C	0.03937	25.399	kg-force/m ² , kfg/m ²
	4.0147	0.24908	kilopascal, kPa
millibar, mbar	10.000	0.10000	kilopascal, kPa
Power:			Power:
Btu/hour, Btu/hr	3.4122	0.29307	watt, W
kilocalorie/hour, kcal/hr	0.85985	1.163	watt, W
foot-pound/sec, ft.lbf/s	0.73757	1.3558	watt, W
	542.48	0.00184	horsepower, hp
horsepower, hp	1.3410	0.7457	kilowatt, kW

CONVERSION TABLES



MEASUREMENT CONVERSION FACTORS			
UNIT	MULTIPLIERS		UNIT
	←	→	
Velocity & Flow:			Velocity & Flow:
foot/second, ft/s	3.2808	0.3048	metre/second, m/s
	0.05468	18.288	metre/minute, m/min
	0.91134	1.0973	kilometre/hour, km/hr
	1.4667	0.68182	mile/hour, mph
	1.6889	0.5921	knot, K (nautical mph)
mile/hour, mph	0.62137	1.6093	kilometre/hour, km/hr
	1.1516	0.86839	knot, K (nautical mph)
knot, K (nautical mph)	0.53959	1.8532	kilometre/hour, km/
ft ³ /min	2.1190	0.47195	litres/second, L/s
gal (US)/min	15.851	0.06309	litres/second, L/s
Viscosity (Kinematic):			Viscosity (Dynamic):
centistokes, cSt (mm ² /second), mm ² /s	1/d	d	centipoise, cP (millipascal-seconds), mPa.s
	d = Density in kg/L at same temp		
Fuel consumption:			Fuel consumption:
miles per gallon, mpg	282.5 ÷ x		litres per 100 kilometres, L/100 km
	where x = mpg or L/100 km		

GLOSSARY OF LUBRICATION TERMS



ACEA	Association des Constructeurs Europeen d'Automobiles.
Acid Number (AN)	Milligrams of KOH required in tests to neutralise all the acidic constituents present in a 1 gram sample of petroleum product. Also formerly called the Neutralisation Number. This property is often used to indicate the extent of contamination or oxidation of used oils.
Additive	Any material incorporated into a lubricant to provide new properties or enhance existing properties.
Air Release	The ability of a fluid to allow the escape of entrained air.
Anhydrous	Devoid of water.
Aniline Point	The minimum temperature for complete miscibility of equal volumes of aniline and the sample under test. Products containing aromatics or naphthenes have lower aniline points than products containing paraffins.
Anti-foam Agent	An additive included in some lubricants to suppress foam formation.
Anti-oxidant	An additive included in some lubricants to inhibit the chemical breakdown of the base oil and some additive constituents by reaction with oxygen.
Anti-wear Agent	An additive, either physical or chemical in nature, included in some lubricant formulations to reduce friction and wear.
API	American Petroleum Institute.
API Gravity	Arbitrary scale expressing, in degrees API, the specific gravity of liquid petroleum products.
API Service Classification	System of letter designations agreed on by API, SAE and ASTM to define broad classes of engine oil service. Also a system of service classifications for automotive gear lubricants.
Apparent Viscosity	Measure of the viscosity of a non-Newtonian fluid under specific temperature and shear rate conditions.
Aromatic	A hydrocarbon derived from, or characterised by, the presence of the benzene ring.
Ash	Metallic deposits formed in the combustion chamber and other engine parts during high-temperature operation.
Ash (Sulphated)	see Sulphated Ash
ASTM	American Society for Testing and Materials.
Bactericide	A chemical compound which has the property to kill bacteria.
Base Number (BN)	Quantity of hydrochloric (ASTM D974) or perchloric (ASTM D 2896) acid expressed in milligrams of KOH equivalent that is required to neutralise all the basic constituents of a 1 gram sample of petroleum product. This property is used to indicate the capacity of an oil to counter the corrosive effects of acidic products or combustion.
Biodegradable	The capacity of a substance to decompose by the biological action of living organisms.
Bore Glazing	A phenomenon that results in loss of oil consumption control. Bore glazing, as contrasted to bore polishing, is characterised by a deposit or coating on the bore/liner of the engine. Bore glazing is believed to occur at low speed and light load operations.
Bore Polishing	Characterised by a clearly defined area of bright mirror finish on the cylinder bore. It is caused by local mechanical wear of the surface, resulting in loss of oil consumption control. Believed to be brought about by the build-up of carbon deposits in the ring area.
Boundary Lubrication	Lubrication between two rubbing surfaces without the development of a full lubricating film. It occurs under high load and low speed and requires the use of anti-wear or extreme pressure additives to prevent metal-to-metal contact.
BP	Abbreviation for British Pharmacopoeia usually used in reference to a purity standard for medicinal white oils, or white oils that will come into contact with foods.
Bright stock	Refined, high viscosity lubricating oils usually made from residual stocks by suitable treatment, such as a combination of acid treatment or solvent extraction with dewaxing or clay finishing.
Brookfield Viscosity	Measure of the apparent viscosity of a non-Newtonian fluid as determined by a Brookfield viscometer at a controlled temperature and shear rate.
Carbon Residue	Standardised test which measures the amount of carbon left behind after pyrolysis under standard conditions.

GLOSSARY OF LUBRICATION TERMS



Cetane Index	A value calculated from the density and distillation mid-point temperature of a fuel, used as an alternative to cetane number to indicate relative diesel ignition quality.
Cetane Number	A number that expresses the ignition quality of a diesel fuel. The minimum cetane number for automotive diesel is 45. A high number indicates short ignition delay which affords easy starting and quiet running.
Cetane Number Improver	Additive which improves the Cetane Number of a diesel fuel.
Cleveland Open Cup (COC) Tester	Apparatus used to determine the flash and fire points of most petroleum products with flash points above 79°C.
Centipoise (cP)	A unit of absolute viscosity. 1 centiPoise = 0.01 poise.
Centistoke (cSt)	A unit of kinematic viscosity. 1 centiStoke = 0.01 stoke.
Cloud Point	The temperature at which wax in an oil or fuel begins to crystallise giving a cloudy appearance.
CNG	Compressed natural gas.
Cold Cranking Simulator (CCS)	An intermediate shear rate viscometer that predicts the ability of an oil to permit satisfactory cranking speed in a cold engine.
Complex Grease	Lubricating grease thickened by a complex soap consisting of a normal soap and a complexing agent. Use of soap complexes gives products which have higher dropping points than similar lubricants made from normal soaps.
Consistency	A basic property describing the hardness or softness of a grease, i.e. the degree to which a grease resists deformation. It is usually indicated by NLGI number.
Corrosion Inhibitor	An additive included in some lubricants and coolants to help to protect against metal corrosion.
Defoamant (Foam Inhibitor)	Additive used in lubricating oils to assist the collapse of surface layers of foam caused by agitation or the release of entrained or entrapped air.
Demulsibility	The ability of a lubricant to separate from water.
Density	The mass of a unit volume of a substance. Its numerical value varies with the units used, generally kg/L, and with temperature.
Deposits	Oil insoluble materials that result from oxidation and decomposition of lubricating oil and contamination from external sources and engine blow-by. Examples are sludge, varnish, lacquer and carbon.
Detergent	An additive included in most engine oils to inhibit deposit formation and keep lubricated surfaces clean.
Detonation	Uncontrolled burning of the last portion of the air/fuel mixture in the cylinder of a spark ignition engine. Also known as “knock” or “ping”.
Dielectric Strength	Measure of the insulating value of an electrical insulating medium. The value depends to some extent on the test method used.
Dispersant	An additive included in most engine oils to disperse and suspend insoluble contaminants so that they can be removed from the system when the oil is drained.
Distillate Fuel	Fuel composed mainly of materials evaporated during the distillation of crude oil.
DN Factor	Old reference to define bearing speed. Corresponds to bearing bore in millimetres (D) multiplied by the speed in rpm (N). Current terminology is ndm.
Drop Point	The temperature at which the first drop of oil separates from a grease when it is heated under prescribed conditions.
Emission Control System	Any of several systems intended to reduce the amount of atmosphere pollutants released by automotive vehicles.
Emulsibility	The ability of a non-water soluble fluid to form an emulsion with water. Emulsifiers are used to promote the formation of emulsions.
Emulsion	A mixture of two insoluble liquids such, as oil and water, consisting of droplets of one liquid dispersed throughout the other.
End Point	The highest vapour temperature recorded during the distillation test of a petroleum product.

GLOSSARY OF LUBRICATION TERMS



EP Additive	See Extreme Pressure (EP) Additive.
Exhaust Gas Recirculation (EGR)	System to reduce automotive emission of nitrogen oxides (NOx). It introduces exhaust gases into the intake manifold where they dilute the air/fuel ratio. This reduces peak combustion temperatures, lessening the tendency for nitrogen oxides to form.
Extreme Pressure Additive	Chemical compound imparting extreme pressure characteristics to a lubricant with the aim of reducing wear under conditions where rubbing or sliding accompanies high contact pressures, as in heavily loaded gears, particularly of the hypoid type.
Flash Point	The lowest temperature at which vapors rising from a sample will ignite momentarily on application of a flame under specified conditions.
Gaseous Fuels	Hydrocarbon gases (methane, ethane, propane, butane) which are used as internal combustion engine fuels. There is also an increase in interest in gaseous fuels gathered from landfills and sewage treatment plants for the purposes of power generation.
HDDO	Heavy duty diesel engine oil.
HDEO	Heavy duty engine oil
HDEOCP	Heavy Duty Engine Oil Classification Panel.
HTHS	High temperature high shear rate viscosity. Measures the viscosity of an engine lubricant at 150°C and simulates the narrow tolerances and high speeds between moving parts in a hot engine. In particular, the bearings, the camshaft, the piston rings and liner. The HTHS value provides information about the fuel efficiency properties of an engine oil and the potential fuel savings that can be achieved with the oil.
IDI	Indirect diesel injection
ILSAC	International Lubricant Standardization and Approval Committee
Insolubles	Contaminants found in used oils due to dust, dirt, wear particles or oxidation products. Often measured as pentane, toluene or benzene insolubles to characterize the nature of the insoluble material.
JAMA	Japanese Automobile Manufacturers Association
JASO	Japanese Automobile Standards Organization
Kinematic Viscosity	Measure of a fluid's resistance to flow through a capillary tube under gravity at a specific temperature (usually 40°C or 100°C).
KOH	Chemical symbol for the alkaline compound, potassium hydroxide.
LFG	Landfill gas
LFGE	Landfill gas engine oil
Metal Deactivator	Organic type of additive having the property of suppressing the catalytic action of metal surfaces and traces of metallic materials exposed to petroleum products. The most important catalytic action is the promotion of oxidation.
MIL	Prefix designation for U.S. Military Specifications.
Multigrade	An oil that meets the low temperature viscosity limits of one of the SAE W numbers as well as the 100°C viscosity limits of one of the high temperature numbers.
Multiviscosity	See Multigrade
MVMA	Motor Vehicle Manufacturers Association (USA) now AAMA (American Automobile Manufacturers Association)
Naphthenic	Having the characteristics of naphthenes, which are saturated hydrocarbons containing molecules with at least one closed ring of carbon atoms.
Newtonian Flow	Flow in a fluid where the shear rate (flow rate) is directly proportional to the shearing force (pressure).
NGEO	Natural gas engine oil
Non-Newtonian Flow	Flow in a fluid where the shear rate (flow rate) varies in relationship to the shear force (pressure). Oils containing viscosity index improvers exhibit non-Newtonian flow.
Nitration	Process whereby nitrogen oxides attack petroleum fluids at high temperatures, often resulting in viscosity increase, corrosion and deposit formation.

GLOSSARY OF LUBRICATION TERMS



OEM	Original equipment manufacturer
Oxidation Stability	Ability of a lubricant to resist oxidation and deterioration resulting from high temperatures and/or exposure to air.
Paraffinic	Having the characteristics of paraffins, saturated hydrocarbons of open chain structure.
PCEOCP	Passenger Car Engine Oil Classification Pane
PCMO	Passenger car motor oil
PCV System	Abbreviation for Positive Crankcase Ventilation system, a system for internal combustion engines designed to provide positive scavenging of crankcase vapors and return them to the intake system.
PIB	Polyisobutylene
Pour Point	Lowest temperature at which a liquid petroleum product will flow when it is cooled under the conditions of the standard test method.
Pour Point Depressant	An additive which lowers the pour point of petroleum products containing wax by reducing the tendency of the wax to collect into a solid mass.
PPD	Pour point depressant
Residual Fuel	Fuel composed mainly of materials remaining after distillation of crude oil. Also referred to as "Fuel oil".
Ring Sticking	Sticking of the piston ring in its groove, usually due to heavy deposits in the piston ring zone.
Rust and Oxidation (R&O)	Additives used to enhance the rust and oxidation resistance of oils and greases.
SAE	Society of Automotive Engineers, Inc
SAE Grade	Grade indicating the viscosity range of a crankcase, transmission or rear axle lubricant, according to systems designed by SAE.
SAPS	An acronym, and it stands for Sulphated Ash, Phosphorus, and Sulfur. Low SAPS oils are oils with low contents of sulphated ash (SA), phosphorus (P) and sulphur (S). It is a requirement in any diesel vehicle fitted with a DPF (diesel particulate filter) to use a 'low SAPS' engine oil.
Series 3	Abbreviation for the discontinued Caterpillar Tractor Company crankcase oil specification "Superior Lubricants (Series 3)".
Shear Stability	Ability of a lubricant such as a grease or VI improved oil to withstand mechanical shearing without being degraded in consistency or viscosity.
SHPD	Super high performance diesel (oil)
SI	Spark ignition (engine), or Systeme International d'Unites (International System for Units)
Sludge	Soft deposits, usually dark colored, formed in lubrication systems, mainly consisting of oxidised lubricating oil components, water and, in internal combustion engines, carbonaceous residues from fuel combustion.
Solvent Neutral Oil (SNO)	Base oil manufactured from solvent refined paraffinic lube distillates.
Sulphated Ash	Residue that remains after a sample of oil has been oxidised under prescribed conditions and the resulting residue reduced to a constant weight by heating with sulfuric acid. Used as a measure of the amount of metallo-organic additives present in new oils. In used oils, the determination may be affected by the presence of incombustible contaminants such as lead alkyls, dust and wear metals.
Supplement 1	Abbreviation for obsolete military specification US Army 2-104B (Supplement 1).
Synthetic Lubricant	Lubricant made chemically by reacting materials of a specific chemical composition to produce a compound with planned and predictable physical and chemical properties.
Top dead center (TDC)	Position of the piston at its highest point in the cylinder, where the piston stops and turns around.
Typical Test	Test results that are characteristic of a product, normally mean values obtained from analysis of several production batches of that product.
VHVI	Very high viscosity index
VI	Viscosity index
VII	Viscosity index improver

GLOSSARY OF LUBRICATION TERMS



Viscosity	Measure of the resistance to flow, or internal friction, of a fluid. Viscosity changes with temperature so the temperature at which the measure was made must always be specified. See also Apparent Viscosity and Kinematic Viscosity.
Viscosity Index (VI)	An arbitrary scale used to show the relative magnitude of viscosity changes with temperature. Higher VI oils have less change in viscosity with temperature.
Viscosity Index Improver (VII)	Lubricant additive, usually a high molecular weight polymer, that reduces an oil's tendency to change viscosity with change of temperature.
Wear	The attrition or rubbing away of the surface of a material as a result of mechanical action.
Wet Clutch	A clutch where the clutch plates operate immersed in oil.
ZDDP	Zinc dialkyl dithiophosphate. Widely used as an antiwear agent in motor oils to protect heavily loaded parts, particularly the valve train mechanisms (such as the camshaft and cam followers) from excessive wear. It is also used as an antiwear agent in hydraulic fluids and certain other products.

THE ULTIMATE GUIDE TO ENGINE OILS: WHICH ONE IS RIGHT FOR YOUR CAR?



Engine oil might not be the most glamorous topic, but it's one of the most important aspects of vehicle maintenance. Think of it as the unsung hero that keeps your engine running smoothly, reduces friction, and prevents wear and tear. With so many options available, choosing the right type of engine oil can feel overwhelming. A modern, high-performance vehicle manufacturer may specify a fully synthetic oil, while an older, low-performance vehicle manufacturer may recommend a mineral oil. To simplify things, let's break down the three main types of engine oils: conventional, synthetic, and synthetic blend. By understanding their uses, advantages, and disadvantages, you'll be able to make an informed decision for your vehicle.

1. Conventional Engine Oil

Conventional engine oil is the most basic type of motor oil, refined directly from crude oil. It's been around for decades and remains a popular choice for many drivers.

When to Use Conventional Oil

Conventional oil is 100% mineral oil that is obtained by refining crude oil and is best suited for older vehicles. It's also a good choice for cars with low to average mileage, particularly for standard vehicles that do not require high-performance engine protection. If you stick to regular oil change intervals, conventional oil is a reliable and cost-effective option. However, it's not ideal for severe driving conditions or high-performance engines. To further explain, if you live in an area with a cooler climate, conventional oil will tend to thicken and not lubricate the engine well. This thicker oil takes longer to circulate through the engine, potentially leading to reduced lubrication during cold starts, which can cause increased friction and wear on engine components. Similarly, in a hotter climate, conventional oil will tend to break down faster and need more oil changes to maintain engine protection.

Advantages:

- **Affordable:** It's the least expensive type of engine oil.
- **Widely available:** You can find it at virtually any gas station or auto shop.
- **Sufficient for basic engines:** Works well for older or less complex engines that don't need high-performance lubrication.

Havoline Formula SAE 15W-40



2. Fully Synthetic Engine Oil

Synthetic engine oil is engineered in a lab to provide superior performance and protection compared to conventional oil. It's designed to meet the demands of modern, high-performance engines and offers outstanding protection against sludge and deposit buildup as well as wear and tear.

When to Use Synthetic Oil

Synthetic oil is ideal for high-performance, or turbocharged vehicles that require advanced lubrication. It's also highly recommended for severe driving conditions, such as very hot summers or freezing winters, where conventional oil might struggle to perform. Additionally, synthetic oil is an excellent choice for vehicles with high mileage, as it provides extra protection to keep the engine running smoothly. While it is a bit pricier, it is worth it if you have a high-performance engine and want to extend the time between oil changes and improve fuel efficiency, synthetic oil is the way to go.

Advantages:

- **Superior protection:** Reduces engine wear and tear more effectively than conventional oil.
- **Longer lifespan:** Lasts longer between oil changes, saving you time and money in the long run.
- **Improved fuel efficiency:** Reduces friction, which can potentially lead to better gas mileage.
- **Excellent performance in different climates:** Works well in both hot and cold climates.

Havoline ProDS Fully Synthetic ECO SAE 5W-30



3. Synthetic Blend Oil

Synthetic blend oil combines conventional and synthetic oils, offering a middle ground between performance of synthetic oil and affordability of conventional oil.

When to Use Synthetic Blend Oil

Synthetic blend oil is perfect for drivers who want better performance than conventional oil but aren't ready to invest in full synthetic. It's particularly well-suited for vehicles that operate under moderate to heavy loads. If you live in an area with fluctuating temperatures and need an oil that can handle varying driving conditions without the premium price tag of full synthetic, a synthetic blend is an excellent choice.

Advantages:

- **Better performance than conventional oil:** Offers improved protection and durability.
- **More affordable than full synthetic:** A cost-effective option for drivers who want some of the benefits of synthetic oil.
- **Versatile:** Performs well in a range of temperatures and driving conditions.

Havoline Synthetic Blend SAE 10W-40



Engine oil plays a crucial role in keeping your car's engine healthy and performing at its best. Whether you choose conventional, synthetic, or synthetic blend oil, the most important thing is to stick to regular oil change intervals and use the type of oil that's best suited for your vehicle. By doing so, you'll extend the life of your engine and enjoy a smoother, more reliable driving experience. Your owner's manual will tell you which type and grade of oil the manufacturer recommends for your vehicle. At Caltex Lubricants, we've made choosing the recommended oils easy with our Product Selector tool. For high-quality lubricants that deliver exceptional performance and protection, choose Caltex lubricants. Designed to meet the needs of modern engines and driving conditions, Caltex offers a range of products that keep your engine running at its peak, no matter the road ahead.

Source: Chevron Technology

LEARNING TO NAVIGATE LUBRICATION CHALLENGES FOR HYBRID VEHICLES



For hybrid vehicles, compared to conventional engines, many unique challenges exist. These struggles occur because hybrid vehicles have distinct operational features. Adding to it is the fact that hybrids need a blend of combination of an internal combustion engine (ICE) and an electric motor which can exert multiple demands on the lubricants. In this blog, we will examine these challenges while exploring possible solutions to combat it.

Obstacles that hybrid vehicle lubricants face

The continuous start-stop cycle of hybrids is one that can lead to persistent low engine temperature. This in turn causes condensation inside the engine which can amass and result in water buildup, corroding the cylinder walls and piston rings.

Then there is the cooler operating condition of hybrid engines. This can cause the oil to thicken due to increased viscosity and compromise its lubricating properties. The denser oil with its inability to circulate effectively, will be unable to fully lubricate the engine components thus reducing overall engine efficiency.

Hybrid vehicles are no exception to experiencing fuel dilution. Moreover, with the tendency to occur more frequently in hybrids due to their lower average operating temperatures from irregular engine use, it can result in reduced oil viscosity, increased wear, and potential engine damage, if not detected early.

Another challenge is the formation of sludge due to oxidation. Water contamination in hybrid engine oil can escalate the oxidation process, leading to the degradation of the oil which can result in accumulation of sludge, ultimately resulting in below par fuel efficiency, and reduced oil pressure.

Where there is a challenge, Caltex presents a solution

With hybrid vehicles' unique challenges that require specialized solutions for engine maintenance, it is imperative to turn to lubricants that can address it. **This is where Caltex Havoline® Fully Synthetic Hybrid SAE 0W-16 and Caltex Havoline® PRO-DS Fully Synthetic ECO SAE 0W-20**, are game changers.

It uses the latest fully synthetic base oils and advanced additive technologies including special antioxidants and friction modifiers to provide outstanding protection and performance. It exhibits outstanding protection against heat, pressure, corrosion, and wear while providing excellent oxidation protection and volatility control, and superior cold temperature performance compared to mineral motor oils.

To conclude, while finding the right hybrid vehicle lubricant is key, it is equally important to keep in mind not all hybrids require specialised oil. There are some that use the same range of lubricants as non-hybrid vehicles. Using the wrong oil grade or type can compromise the efficiency and durability of the hybrid system, causing damage to the engine. Additionally, remember to adhere to the recommended oil change intervals and specifications mentioned in your car's owner's manual to ensure optimal performance and longevity of the engine.

**Havoline Fully Synthetic Hybrid SAE 0W-16 and
Havoline ProDS Fully Synthetic ECO SAE 0W-20**



Source: Chevron Technology

ENGINE LUBRICANTS: SYNTHETIC OR MINERAL? THE BETTER CHOICE DEPENDS ON VEHICLE USAGE.



There seems to be a lot of uncertainty over what type of lubricants one must use in vehicular engines, transmission, and gears. While synthetic lubricants have a longer usability and fuel efficiency than the usual mineral-based lubricants, there are technical nuances to keep in mind while choosing them for your vehicle.

Engines

If the concerned engine is of an off-highway vehicle that is involved in intermittent driving, that requires the shutting and starting of the engine at short intervals, then, that increases the water content in your engine lubricant, leading to its weaker performance over time. This requires you to change your engine lubricant more frequently, which directly undermines the need for long-term synthetic lubricants. Thus, in these cases, using mineral-based lubricants is sensible. Off-highway vehicles are those that usually used in agriculture, mining, and construction, and include tractors, cranes, backhoes, forklifts, certain SUVs, and the like.

In the opposite case, on-highway vehicles that are involved in longer, continuous driving, do not have engines that suffer from too much water contamination and, hence, don't require too many lubricant changes. These engines need lubricants with longer drain intervals, better fuel efficiency, and, therefore, less changes, which contribute to reducing the costs of maintenance. That's why synthetic lubricants are used for the majority of vehicles, and that's why they are priced higher than mineral-based ones.

Gear & Transmission

The same principle applies to lubricants for gear and transmission. If the system is intermittent instead of continuous, it will have more water dilution, and you will need cheaper mineral-based lubricants that are changed quickly. If the system is the other way around, you will benefit from synthetic ones.

Other advantages of synthetic lubricants

Synthetic lubricants are artificially created as per certain manufacturer requirements, and therefore are purer, refined versions of simple, mineral-based lubricants. As such, their performance is more uniform and controlled, and they can operate well in extreme temperatures. They maintain viscosity and resist oxidation at higher temperatures, and are fluid enough in cold temperature environments, helping with start-up and wear protection. Synthetic lubricants are also effective in inefficient worm gear sets, as they deliver better frictional performance and energy efficiency. This better frictional performance and efficiency is due to their superior viscosity film strength and higher base numbers.

Source: Chevron Technology

A GUIDE TO CALTEX DELO ENGINE COOLANTS



Since time immemorial, vehicle owners have been using water to cool down their engines. A survey among Nigerian and Asian car owners revealed that 69% of them used water over coolant. Now this may be due to a variety of factors ranging from coolant not being readily available to the cars not coming with coolant on purchase. However, it is notable that 62% car users were opposed to the view that water is functionally better than engine coolant.

So, what makes coolant a critical part of engine care and what kind of coolants must you invest in?

Coolants or anti-freeze as they are popularly known, are specially formulated liquids designed to regulate the temperature of your engine. If you run low on coolant, be it in summer or winter, your car can overheat causing you to be potentially left stranded in the middle of nowhere.

A coolant's essential components are water, glycol and additives. Different types of engine coolants are engineered for different vehicles. Some of them are Inorganic Additive Technology (IAT), Organic Acid Technology (OAT), etc.

If you have seen or see the inverted key-like symbol light up blue or red on your vehicle's dashboard sometime during your driving, it is an indication of coolant running low and the engine overheating.

Why choose engine coolant?

1. It keeps your radiator and engine from freezing in the winters.
2. It prevents the radiator and engine from overheating in the summers.
3. It works as a corrosion prevention lubricant for the engine's working components.
4. It aids heat transfer, cooling down the engine even in demanding conditions.
5. It enhances the life and efficiency of your engine

How to choose the right coolant for your vehicle

Selecting the right coolant depends on the vehicle make, model and place of manufacture. Begin by reading your vehicle's manufacturing manual to understand which coolant is compatible with it.

Which are the best coolants for your diesel vehicles?

It is necessary to use high-quality coolants at the recommended service intervals to keep your vehicle in good working order.

Delo coolants are made of patented Carboxylate corrosion inhibitors that increase heat transfer and protect cooling systems.

Delo® XLC Antifreeze/Coolant

A nitrite-free, heavy-duty, ethylene glycol based engine coolant which incorporates patented organic corrosion inhibitor technology called aliphatic carboxylates. It aids optimal service life of 960,000 kms / 12,000 hours / 6 years with no extender needed. It also provides excellent protection against pitting, corrosion and erosion on hard protect metals, requires no regular testing eliminating the need for supplemental additives, aids maximum hardware life and saves on costs, is compatible with conventional antifreeze and can be used in all heavy-duty engines using reduced emission protocols including or combining EGR, DPF or ACERT technologies. This product is recommended for mixed fleet applications.

Delo ELC Antifreeze/Coolant

These are single phase, ethylene glycol-based products available in various dilutions that are based on patented aliphatic carboxylate corrosion inhibitor technology specifically formulated for heavy duty cooling system applications that require nitrite. They help manage costs of supplemental coolant additives, have a long service life providing 1,250,000 kms of on-road use (8 Years or 15,000 hours of off-road use) or 1,600,000 kilometers/20,000hours/8 years with Delo Extender addition at 800,000 kilometers/10,000 hours/4 years. The silicate free formula improves heat transfer when compared to silicate containing formulations. They aid maximum water pump life, long-term corrosion protection and are compatible with other coolant formulations (not to be diluted by more than 25%) and are biodegradable in their unused form.

Delo® XLI Coolant Corrosion Inhibitor

A water-based low toxicity, environmentally-friendly, nitrite-free carboxylate inhibitor, it provides long life corrosion protection for cooling system metals and components including hard to protect aluminum. It provides superior protection for a minimum of 960,000 kms, 12,000 hours, 6 years in on-road and off-road engine applications and 32,000 hours or 6 years in stationary engines and doesn't require regular inhibitor additions with proper maintenance. It makes for reduced overall maintenance costs and is readily biodegradable

Whether you're an experienced mechanic reading this or a vehicle or fleet owner, you should know what works best for your vehicle. Hence, don't let coolant selection and maintenance take a backseat. Choose Caltex Delo Coolants for reduced maintenance costs, wide temperature application, corrosion protection, improved fuel economy and to keep your vehicle or fleet running more efficiently.

Source: Chevron Technology

GREASY BEGINNINGS: SELECTING THE RIGHT GREASE FOR YOUR APPLICATION!



Selecting the right grease depends on many factors and can save you time and money!

While most people might assume that grease is a rather simple all-purpose product, there's a whole world of factors that you would want to consider when picking grease.

Quite a common misconception is that the function of grease is denoted by colours. A common conversation between customers and sales reps transcripts clients asking for a particular colour of grease. From a technical point of view, the only role played by the colour of the grease is its tendency to wear out faster than other properties of the lubricant.

So by that standard, other than telling you that the grease has started to wear out, it is safe to assume that colour is more of a marketing approach used by manufacturers to clearly distinguish the different types of grease within their product range.

With an increasing demand for grease, the market would surely benefit from an increased knowledge of the 'right grease' for their needs. So let's take a look at the five most vital attributes to selecting the appropriate grease for the job.

1. NLGI Rating:

The first indicator of what grease would work for a particular region is a rating denoted by the consistency of the lubricant by the National Lubricant Grease Institute (NLGI). Since the rating denotes the thickness of the grease, a higher number means thicker grease. Technically, the thickness of the grease is dependent on the oil content in the product, so grease with high oil content will get a lower rating such as 00 or 000 in the case of a semi-fluid grease.

2. Viscosity:

By far the most crucial feature of any grease product or any lubricant for that matter is its viscosity. Viscosity of lubricants is denoted by the ISO grade on the packaging. Different applications will require different grades to perform adequately. Most high-speed applications will use grease with a lower viscosity grade. For example, heavy industrial machinery might require use 460 while heavy-duty applications such as tractors might need a 320 grade. Trucks that usually require a high-speed application would use ISO 220 to keep bearings and axles working optimally.

3. Thickener:

Thickener is the most vital additive in grease as it acts a sort of soapy sponge that holds the lubricant in place and then allows it to flow out to components. Greases use different sorts of additive to provide for features such as corrosion, anti-wear, rust protection and oxidation but it is important to choose the grease with the same thickener as the one previously used or matching the needs of the application to ensure compatibility.

4. Dropping Point:

Typically, the dropping point refers to the operating temperature at which the grease liquefies and therefore stops performing optimally. Therefore is crucial to pick a grease keeping in mind its dropping point depending on the nature of the application. A common tip amongst OEMs (Original Equipment Manufacturers) is to use greases for applications that will keep it up to a 40 degrees lower than the dropping point. To provide perspective, if the temperature for a particular application is around 130 degrees, it is recommended by OEMs to use grease with a 170 degree dropping point.

5. EP Additives:

You have probably seen the 'EP' label on some grease products, the label stands for 'Extreme Pressure' and is a type that can be used for most applications. It is important to note however, that EP greases should not be used for electric motor bearings, as they are more likely to cause corrosion in the case that the motor windings are over-greased.

Keeping these factors in mind will go a long way in helping you choose the right lubricant for the application at hand. However, it is imperative that you take the OEMs recommendations for selecting grease products having given the exact details of your operating environment and application to ensure your equipment runs optimally at all times. Choosing the right lubricants for your equipment might take a little bit of research but will save you large amounts of capital, whether human or financial in terms of maintenance and safety.

IN-SERVICE OIL ANALYSIS – WHAT, WHY AND HOW



The Importance of In-Service Oil Analysis: Protecting Your Equipment

What started as a practice on locomotive engines over a century ago has now become an irreplaceable part of equipment maintenance. In-service oil monitoring is part of condition-based maintenance to gather data on lubricant / oil health to determine maintenance schedules. Lubricants are the lifeblood of industrial machinery and it is imperative to analyse these fluids for contamination to prevent billions of dollars in repair or maintenance, improving performance and reliability.

Understanding Oil Contamination

Contamination is a major culprit in lubricant degradation. It can come from various sources.

Solid contaminants

These include dirt, dust, metal wear particles, and combustion by-products. They can enter the system through seals, vents, or inadequate filtration.

Liquid contaminants

Water, fuel, or coolant can find their way into the lubricant, leading to corrosion, emulsion formation, and decreased lubricant performance. Condensation too, due to temperature changes between day and night or between equipment operation and shut off, can get water into the system and increase the risk of wear.

Gaseous contaminants

Air, combustion gases, or other vapours can dissolve in the oil, altering its properties and leading to oxidation.

Varnish

High-operating temperatures and oxidation can cause the formation of varnish, which degrades the effectiveness of the lubricant and, in combination with particulate matter, can create abrasive surfaces within the equipment. Across different assets, one common contaminant is the accidental use of an incorrect lubricant while topping off old oil.

The Role of Oil Analysis

Oil analysis is a diagnostic tool that examines the condition of the lubricant in service. It involves a series of tests to assess various parameters, including:

Viscosity

Measures the oil's resistance to flow. Changes in viscosity can indicate degradation, oxidation or contamination.

Contaminants

Identifies the presence and quantity of solid and liquid contaminants, helping to pinpoint the source of contamination.

Wear metals

Analyses the concentration of metal particles to detect abnormal wear in machine components.

Additives

Evaluates the depletion of essential additives that provide specific performance properties.

Oxidation and nitration

Measures the degree of oil degradation due to exposure to heat and oxygen.

The Benefits of In-Service Oil Analysis

Regular oil analysis offers numerous advantages:

Early detection of problems

By identifying issues before they escalate, you can prevent costly equipment failures and downtime.

Optimised maintenance

Oil analysis helps determine optimal oil change intervals, reducing waste and costs.

Extended equipment life

Early detection of wear and contamination allows for corrective actions, prolonging the lifespan of machinery.

Improved reliability

By maintaining lubricant quality, you enhance the overall reliability of your equipment.

Predictive maintenance

Oil analysis enables a proactive approach to maintenance, shifting from reactive repairs to planned interventions.

Cost savings

Early detection of problems prevents costly repairs and reduces overall maintenance expenses.

Implementing an Oil Analysis Program

To maximise the benefits of oil analysis, it's essential to establish a systematic program. This includes:

Selecting appropriate tests

Determine the specific tests required based on equipment type, operating conditions, and potential failure modes. For solid contamination like particles, best-practice monitoring involves sampling oil at regular intervals and sending them to a lab for particle count testing. A simple test you can perform at your facility is a patch test, in which an oil sample is run through a filter membrane and observed through a microscope. Commercial patch test kits are widely available. For water contamination, a "crackle" test conducted by a lab is an easy check. In this method, oil is placed on a hot plate and if it starts to bubble and pop, it means moisture is present in the oil. The more-involved Karl Fischer titration test will quantify the percentage or parts per million of water present. To check the presence of varnish, the standard ASTM-approved way to test is the Membrane Patch Colorimetry or MPC Test. This is usually a lab test but can be performed using MPC test kits for onsite testing.

Establishing sampling points

Identify optimal locations for oil sampling to accurately represent the lubricant's condition.

Developing a sampling schedule

Determine the frequency of oil analysis based on equipment criticality and operating conditions.

Analysing and interpreting results

Work with qualified professionals to analyse the data and understand its implications.

Implementing corrective actions

Take prompt action to address any identified issues.

By investing in in-service oil analysis, you can significantly improve the reliability and lifespan of your equipment while reducing maintenance costs and downtime. It's a proactive strategy that pays dividends in the long run. Talk to Caltex Lubricants' representatives to find a suitable Oil Analysis programme.

Source: Chevron Technology

Compressor Oils

Q: Is it acceptable to Regal® R&O in a reciprocating compressor that is in contact with highly corrosive gas content?

A: It depends on the type and percentage of gas that comes in contact with the lubricant.

Q: Can I switch from a diester compressor oil to a petroleum compressor oil?

A: The switch can be made only if the seals are changed. Diester-based oils swell seals, whereas, petroleum oils do not. So, if the seals are not changed when the oils are changed, the equipment would leak after the change-out.

Gear Oils

Q: The oil in my conveyer gearbox is foaming. What could be causing this issue?

A: Typically, foaming occurs because the anti-foam depressant additive has depleted. When is the last time your oil has been changed? Foaming can also be the result of water contamination, or overfilling the gear box, to name a few root causes.

Hydraulic oils

Q: All hydraulic oils are the same aren't they?

A: While hydraulic oil standards are commonly agreed to and well established, the relative performance of hydraulic oil varies. This is due to variations in approaches and experience in formulating products, variations in the base oils used (hydraulic oils are in excess of 98 percent base oil) and different target applications and performance. Additionally, there are hydraulic oils that emulsify water, and those that demulsify water. Demulsifying and emulsifying hydraulic oils are typically not compatible due to the nature of their chemistries. For the purpose of this FAQ, we are addressing demulsifying hydraulic oils.

Q: What are the key differences in hydraulic oils?

A: Variations in the base oil and performance additives used are the primary differences in hydraulic oils. To manage costs, some lubricants manufacturers use a variety of base oils and additives. This can lead to performance differences in these areas: oxidation, water handling ability, sludge formation, filter life, productivity, fuel efficiency, anti-wear/extreme pressure (EP), cold temperature pumpability. Consistent performance standards are important to help ensure risk-free equipment operation, and higher quality hydraulic oils meet or exceed these standards. The use of different types of performance additives in the formulation can make a big difference. The approaches can vary, including the use of more or less zinc (an element in a key anti-wear additive), or the use of no zinc at all, such as in ashless hydraulic oils.

Q: Why should I care about higher quality hydraulic oils?

A: Variations in the base oil and performance additives used are the primary differences in hydraulic oils. To manage costs, some lubricants manufacturers use a variety of base oils and additives. This can lead to performance differences in these areas: oxidation, water handling ability, sludge formation, filter life, productivity, fuel efficiency, anti-wear/extreme pressure (EP), cold temperature pumpability. Consistent performance standards are important to help ensure risk-free equipment operation, and higher quality hydraulic oils meet or exceed these standards. The use of different types of performance additives in the formulation can make a big difference. The approaches can vary, including the use of more or less zinc (an element in a key anti-wear additive), or the use of no zinc at all, such as in ashless hydraulic oils.

Q: What do the original equipment manufacturers (OEMs) say about higher quality hydraulic oils?

A: OEMs are very specific about the quality of lubricant used in their equipment and for very good reason. If the lubricant fails, so does their equipment. It is important to follow OEM guidance for warranty and for the extended life of your equipment. Off-highway emission standards are becoming stricter—leading to a need to improve fuel efficiency. In mobile equipment such as excavators, fuel economy is linked to engine performance and hydraulic system efficiencies. By improving hydraulic system efficiencies, equipment can use less fuel per hour and increase production per hour—leading to improved utilization. Hydraulic system pressures are also increasing, thus resulting in higher operating temperatures, which causes increased demands on the hydraulic fluids. In combination with these systems-related demands, equipment builders are moving to extended service intervals for fluids. Due to higher hydraulic system pressures and the need for extended service life, OEM recommendations are moving to higher performance products.

Q: What is the difference between Rando® HD, and Rando HDZ?

A: Rando HD is a straight grade and Rando HDZ is a high viscosity index ('multi-grade') lubricant made from Group II base oils. Rando HDZ 32, 46 and 68 viscosity grade oils are approved by major pump manufacturers. The high viscosity index can provide minimal viscosity change over a wide range of operating temperatures. Fast water separation and excellent filterability ensure the product performs well in systems with close tolerances. Rando HDZ hydraulic oil also provides excellent oxidation stability at high operating temperatures, potentially allowing for extended service life and cleaner performance.

Q: What does industry standard, three times the life and six times the life mean?

A: One way of comparing the oxidation performance of different oils is through a laboratory test called the TOST test (ASTM D943) where the results are given in hours. This test has a relationship to the performance capability in field applications. Actual life of the oil in an actual hydraulic system will depend on the operating environment. The products that have historically been called hydraulic oils would generally meet a TOST life of around 1,500 hours or less. We call this the 'industry standard.' Rando® HDZ provides a TOST life of more than 5,000 hours, thus three times the 'industry standard.' Clarity® AW and Clarity® Bio EliteSyn AW provides a TOST life in excess of 10,000 hours, thus, six times the life of an industry standard product. TOST testing, while not the only measure of hydraulic oil performance, does show a good correlation to relative oil life in field use.

Q: How do I change over from my current hydraulic oil to one of the newer ones?

A: If you are currently using Rando HDZ, you do not have to flush before using the new and improved Rando HDZ. If you are currently using an emulsifying hydraulic oil, you will have to drain, change filters, flush and fill with our demulsifying hydraulic oils due to incompatibility. If you are not aware of the properties of the in-use hydraulic oil, then drain, change filters, flush and fill with our hydraulic oil. If you intend to use a Clarity® (ashless/zinc-free) hydraulic oil where previously an oil containing zinc had been used, then a drain, filter change, flush and refill is required. Zinc and non-zinc formulations are often not compatible. Generally, there is no need to drain and refill products when products are fully compatible, however, to maximize performance, tanks must be drained, filters changed and tanks refilled with the new, clean product to receive the full benefit of the new, clean product. We always recommend following OEM recommendations and keeping the filtration, hoses, breathers and seals in good condition to ensure optimum performance.

Q: My hydraulic oil is dark and very thick after only 5 years, is it still good?

A: Oils do oxidize over time, in hydraulic and circulating systems; a sample of the oil should be taken every 6 months or annually to determine condition.

Q: Is there an antifoam agent in your hydraulic oils?

A: Yes, all our hydraulic oils would have an antifoam additive.

Q: Can I extend my drain intervals using the new Rando® HDZ?

A: Rando HDZ provides improved shear stability performance, with the use of a new viscosity index improver. Since the correct viscosity is maintained over a wider temperature range, pump efficiencies result. These efficiencies often can manifest themselves in lower pump temperatures and potentially extending the life of the pump and oil. There are a number of factors that impact drain interval decisions. Some of these are operating conditions, system cleanliness, OEM drain recommendations, etc. In general, Rando HDZ, along with a used oil analysis program can provide the best product / programme combination to help a customer determine how far they can actually extend their drain intervals safely.

Q: What does FZG mean in relation to hydraulic oils?

A: FZG is a test normally reserved for gear oils to measure gear performance. It is a test reflective of combined EP/ AW performance in gear sets. Some companies include the FZG result in published data. Some hydraulic oil products with gear performance can indeed be used in lightly loaded gearboxes, but often their use is limited to smaller high-speed gearboxes because of the lower viscosities used in hydraulic oils. FZG results are given on a scale of 1-12 with 12 being the highest performance. For example, Clarity® AW 32, 46, 68 has an FZG rating of 12, whereas, Rando HDZ 15 has a rating of 11, and Rando HDZ 32, 46, 68 have a rating of 12.

Q: What does the term "ashless" mean when referring to hydraulic oils and how do ashless hydraulic oils differ from standard hydraulic oils?

A: For many years Zinc Dithiophosphate (ZDDP), a metallic additive has been used in hydraulic oils as an approach to provide good anti-wear performance. The anti-wear performance of the ZDDP has been shown to give good protection in vane type pumps where vane tip wear was problematic. The use of ZDDP, however, does have its challenges, most notably with both the performance in the presence of water and contributing to degradation of metals, most notably that in piston pumps. There are a number of factors that impact drain interval decisions. Some of these are operating conditions, system cleanliness, OEM drain recommendations, etc.

Q: I have a reciprocating compressor that is in contact with highly corrosive gas content and using I am using Regal® R&O product is that ok?

A: It depends on type & percentage of gas coming into contact with the lubricant.

Q: Can I switch from a diester compressor oil to a petroleum compressor oil?

A: The switch can be made only if the seals are changed. Diester-based oils swell seals, whereas, petroleum oils do not. So, if the seals are not changed when the oils are changed, the equipment would leak after the change-out. Modern formulations have improved in this area and continue to meet industry requirements. Specially designed premium hydraulic oils that do not contain Zinc have demonstrable advantages in these areas. Chevron ashless hydraulic oils, such as Clarity AW and Clarity Bio EliteSyn AW can be used in both vane and piston pumps.

Q: Are there any other advantages to ashless formulations?

A: Properly formulated ashless formulations have a high FZG rating making them suitable for light gear service. Also, the technology employs base oils with a higher viscosity index. This improves low-temperature start performance and better film thickness at elevated temperatures. This can provide an opportunity to rationalize the number of products in use at a certain location while improving pump efficiency.

Q: Can I mix Clarity hydraulic oil with AW hydraulic oil?

A: No, Clarity hydraulic oils utilize acidic additives, many other AW hydraulic oils utilize alkaline additives, so they are not compatible.

Q: What viscosity grade is 1000 THF?

A: 1000 THF is a multi-grade 10W30 viscosity oil.

Q: Can I top off with hydraulic AW in place of 1000 THF in my hydraulic system?

A: AW Hydraulic Oils are designed for system with pressures over 1,000 PSI.

Q: I am looking for a non-conductive hydraulic oil for my bucket truck that works on power lines. Does Chevron make such a product?

A: Rando® HDZ 32 or 46 has a dielectric strength of 35 KV. Drain, flush, and refill. We do not supply an EDM fluid which is a true 100% non-conductive oil.

Q: Can I use hydraulic AW 32 in my CAT equipment?

A: No, Caterpillar requires a product that contains 900 ppm zinc. We recommend Delo® TorqForce SAE 10W.

Q: My old tractor requires a 303 fluid for the hydraulics? What does Chevron recommend?

A: 303 is an obsolete John Deere recommendation, 1000 THF is a good option.

Q: Do you have a product for Ford's ESN M2C134?

A: Chevron 1000 THF is recommended for this specification.

Q: Do you have a product to replace Kubota UDT fluid?

A: 1000 THF.

Q: Do you have a product that meets Volvo WB102 specification?

A: Yes, Delo Syn-THF XC is a product that meets this requirement. It can also be used in applications requiring 97303 (WB101).

Industrial greases

Q: Does Chevron have a cross reference to Mobil grease 28?

A: Chevron does not have any low-temp/low viscosity (below ISO 100) in our grease product line.

Q: Are all greases compatible with each other?

A: No, they are not. We recommend purging each time you change out any grease.

Q: What is the difference between an NLGI 00 and an NLGI 2?

A: NLGI 00 are semi-fluid, pourable products. NLGI 2 greases are not pourable & much more consistent.



CALTEX

Z Energy Limited

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