



A Subsidiary of PETRONAS Chemicals Group

Petrolad[®] Lube Oil Additives

Efficiency meets endurance

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From components to packages

The Petrolad® line-up

Based on an innovation strategy of not only addressing the challenges our customers face, but also anticipating their future needs, BRB International continues to develop the forward-looking Petrolad® line-up of gear and engine oil additives. As the need for resource efficiency and tailored solutions becomes increasingly pressing, this fast-forward approach is more relevant than ever.

The Petrolad® range is designed to boost the performance, efficiency and endurance of your gear and engine lubricant systems. The portfolio includes additives for engine, driveline, hydraulic and off-road applications as well as special additives such as sulphonates and fuel additives. We deliver our non-homologated Petrolad® gear and engine oil solutions as individual components or in complete package systems, depending on your needs.

In combination with our Viscotech® viscosity modifiers, the Petrolad® solutions help you formulate exceptionally stable, high-performance and cost-effective oil blends. And if the solution you require for an ideal formulation is not readily available, we'll work with you to co-innovate and develop the answer to your wishes.

On the following pages, you'll find details on additives that will take your products to the next level.



Petrolad[®] 336

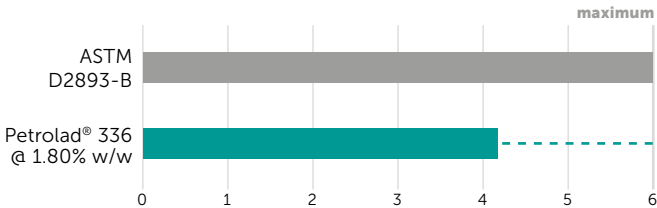


Cost-effective, multi-purpose gear oil additive package

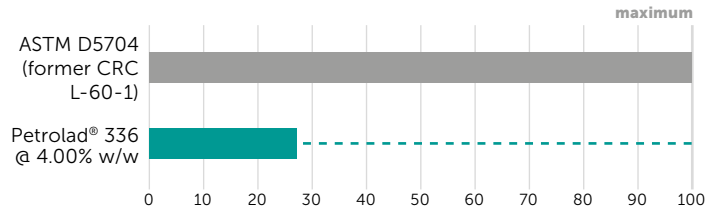
Value for money in a multiuse package

The cost-effective additive package uses a unique sulphur/phosphorus-based technology, making it ideal for clear, low-odour automotive and industrial gear oils. Soluble in various mineral and synthetic base stocks, it meets GL-5 at 4.0% w/w maximum dosage as well as the industrial specifications ISO 12925-1 (L-CKC) and DIN 51517-3 at a very competitive treat rate. It provides an excellent friction coefficient and impressive micro-pitting test results. The package also features key properties for industrial applications like strong water demulsibility/separability, meets AIST 224 standards and exhibits great antioxidation properties and various positive outcomes according to DIN 51517-3.

KV increase @ 100°C (%), oxidation stability test @ DIN 51517-3 specification, VG 220 (500 N + bright stock) oil formulation



KV increase @ 100°C (%) @ 50 h, thermal oxidation stability test @ GL-5 specification, SAE 90 (500 SN + bright stock) oil formulation



Automotive specifications:

- GL-4 @ 1.80–2.00% treat rate
- GL-5 @ 3.80–4.00% treat rate

Industrial specifications:

- DIN 51517-3 @ 1.80% treat rate
- ISO 12925-1 (L-CKC, enclosed gears) @ 2.00% treat rate

You'll find details on the extreme-pressure variant Petrolad[®] 336EP on our website:

www.brb-international.com/lac

Petrolad® 339

Premium multi-purpose gear oil additive package

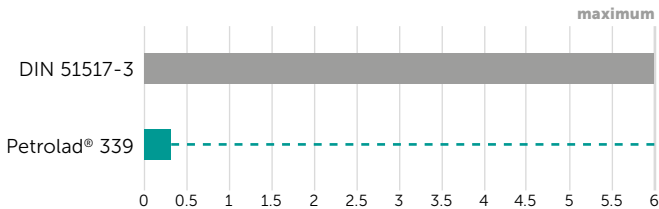


Automotive and industrial solution with an economical treat rate

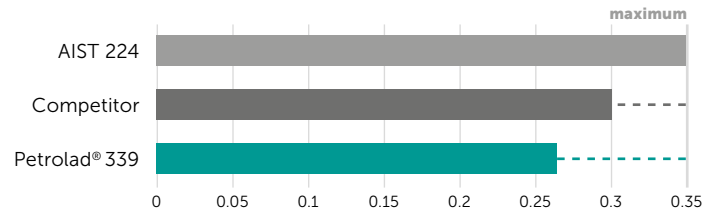
The premium gear oil additive package delivers outstanding results in automotive and industrial gearboxes. Claimed at GL-5 with a 4.0% w/w dosage in mineral base oil, Petrolad® 339 simultaneously meets GL-4. The package passes the FE-8, FVA-54 and Flender foaming tests in a mineral oil-based formulation at low treat rates. It delivers excellent load-carrying capacity, with a fail load stage higher than 14 in the FZG scuffing test.

It is compatible with a wide variety of base stocks and requires no dangerous goods classification. Handling and storage are easy.

KV increase @ 100°C (%), D2893-A oxidation stability test



4-ball wear scar diameter (mm) mod. ASTM D2266



Automotive specifications:

- GL-4 @ 2.00% treat rate
- GL-5 @ 4.00% treat rate

Industrial specifications:*

- DIN 51517-3 @ 1.80% treat rate
- AGMA 9005-F16 (AS) @ 1.80% treat rate

*Assessed in specific tests, detailed in the product data sheet

Petrolad[®] 9200

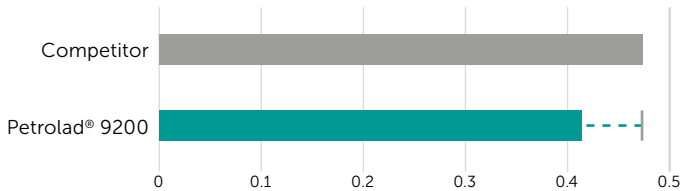
Multi-purpose engine oil additive package



Versatility and cost-effectiveness

The multi-purpose engine oil additive package is designed for cost-effective and reliable petrol and diesel passenger-car lubricants and well as heavy-duty diesel oils using a cascade technology. Suitable for vehicles not requiring API certification, it is also suitable for motorcycle oils meeting JASO T903:2016 specifications. The solution delivers excellent wear and rust protection, deposit control and antioxidation in engines without booster packages. Thanks to optimised performance on a cascade basis and coverage of multiple key application segments for versatile lubricant manufacturers and blenders, the package offers outstanding cost-effectiveness. It also shows strong results as per various requirements of 10W-40 and 10W-30 engine oil blends.

4-ball wear scar diameter (mm) in 10W-40, ASTM D4172



JASO T903:2016 specification	Test limits	10W-30 results	10W-40 results
Dynamic friction index (DFI)	1.50–2.50	1.94	1.95
Static friction index (SFI)	1.60–2.50	1.77	1.69
Stop time index (STI)	1.60–2.50	1.95	1.92

Passenger car specifications (multi-/mono-grade):

- SL/CF @ 6.00% treat rate, SJ/CF-4 @ 5.75% treat rate, SJ/CF @ 4.50% treat rate, among others (cascade basis)

Motorcycle specifications:

- JASO T903: 2016 @ 6.00% treat rate

Petrolad® 5101



Universal tractor transmission oil additive package

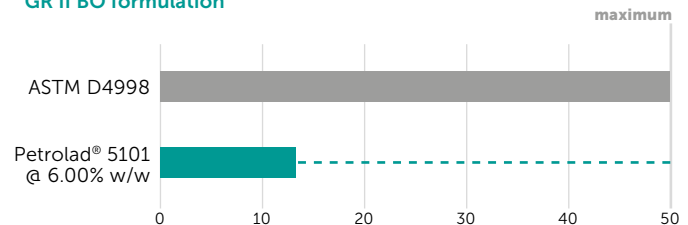
Universal off-road performance

The universal off-road additive package, designed for universal tractor transmission oil (UTTO) fluids, is suitable for transmissions, power steering and hydraulic systems. It meets the needs of traditional vehicles in the largest tractor markets worldwide and is also used in non-agricultural applications with wet brakes, powershift transmissions and hydraulics. The package is proven to work in various base oil formulations with especially favorable qualities in GR II blends, providing economic treat rates. Its outstanding features include superior friction control and minimal foaming, excellent anti-wear properties and protection of drive gears without damage to soft yellow metals in hydraulic pumps. It also provides anti-oxidation and copper corrosion prevention in axial piston hydraulic pumps. What is more, it eliminates chatter in wet brakes and reduces operator fatigue. In addition, it eliminates chatter in wet brakes and reduces operator fatigue.

Specifications:

- John Deere J20C/J20D @ 6.00% treat rate
- Case New Holland MAT 3505, 3525/3526 @ 6.00% treat rate
- Massey Ferguson CMS M1135/41/43/45 @ 6.00% treat rate

FZG low-speed tractor gear wear: mass loss (mg)
GR II BO formulation



Petrolad[®] 5201

Super tractor oil universal additive package



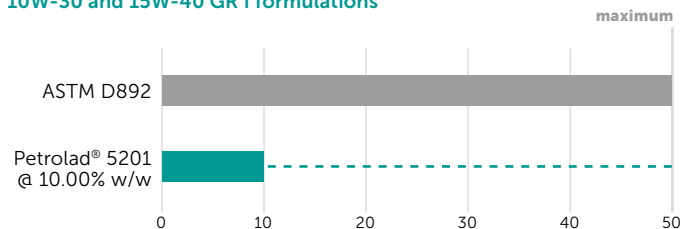
Designed for the global tractor market

The universal off-road additive package is designed specifically for super tractor oil universal (STOU) applications for traditional tractor equipment common in global markets. It is suitable for crankcases, transmissions, power steering and hydraulic systems. The solution also covers several universal tractor transmission oil (UTTO) specifications, making it a flexible package ideal for blenders seeking cost-effective solutions. Its outstanding features include boosted soot control for reduced viscosity increase, superior anti-wear results for limited pitting and scoring in final drives and excellent friction performance in transmission clutches. It offers favourable 10W-30 and 15W-40 outcomes in GR I STOU formulations.

Specifications:

- ZF TE ML 06/A/B/C/D, 07B (STOU)
@ 10.00% w/w treat rate
- John Deere J27 (STOU)
@ 10.00% w/w treat rate
- Caterpillar TO-2, MIL-L-2104D (UTTO)
@ 10.00% w/w treat rate

Foaming volume (ml) @ end of 5-minute blowing period,
ASTM D892 foaming tendency sequence II @ 93°C,
10W-30 and 15W-40 GR I formulations



Petrolad[®] 1846

Multi-purpose, ashless hydraulic oil additives package

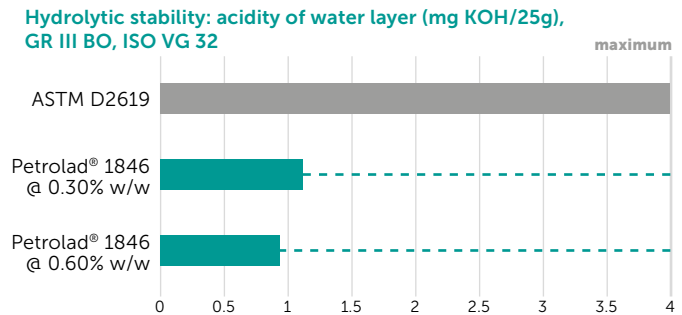


For synthetic and mineral-based hydraulic fluids

The additive is specially designed for ashless hydraulic fluids and compressor fluids and other industrial oils. A single-source, highly versatile package offers significant cost savings. Thanks to outstanding corrosion protection, good filterability, demulsification and excellent anti-wear properties, it helps extend fluid and equipment service life. It features low treat rates and offers exceptionally high oxidation stability. With appropriate base oil types and quantities, Petrolad[®] 1846 enables biodegradable hydraulic oil formulations (see product data sheet).

Specifications:

- Hydraulic: DIN 51524 Part 1 (R&O) @ 0.30% treat rate
- Turbine: AIST 120 @ 0.30% treat rate
- Compressor: DP 6521 @ 0.30% treat rate
- Gear: DIN 51517 Part 2 @ 0.30% treat rate



Petrolad[®] 743EU



Automatic transmission fluid additives package

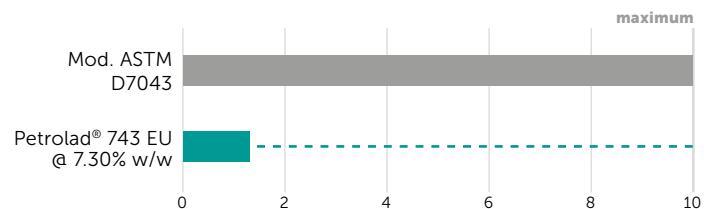
Multi-purpose performance in ATFs

The multi-purpose low-ash additive package enables the formulation of automatic transmission fluids (ATFs) that meet the requirements of a wide variety of automotive transmission and power steering applications. It supports blenders in fulfilling the standards of Dexron IIIH (GM) and Mercon (Ford). The solution is also suitable for use in Dexron IID and various other applications at economical treat rates. It offers ideal friction performance and torque spread as well as excellent low-temperature properties.

Specifications:

- GM Dexron II D @ 7.30% w/w treat rate
- GM Dexron III G/H/F @ 10.00% w/w treat rate
- Allison TES-389 @ 10.00% w/w treat rate
- ZF TE-ML 09/11A/14A @ 10.00% w/w treat rate

Total weight loss (mg), modified ASTM D7043 wear resistance test GR I-based formulation



Petrolad[®] 484BD

Biodegradable tackifier additive

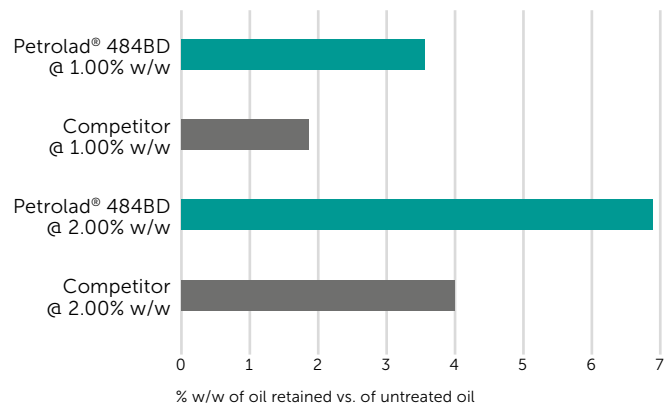


The efficient, biodegradable tackifier additive is specifically formulated to dissolve easily in natural vegetable oils. It can be used for various applications, including steel cable and chain lubricants, rust protection, chainsaw and slideway lubricants, rock-drilling oils, rail curve and other greases, sealants and anti-misting agents for neat metalworking fluids.

Benefits:

- Quickly and easily dissolves in natural vegetable oils, including rapeseed oil and synthetic esters
- All components are biodegradable (90% according to OECD 301B)
- FDA-approved
- Enhances biodegradable vegetable oils to have superior tackifying properties
- Typically used at a treat rate of 1.00–3.00% w/w

Cling test results for biodegradable tackifier additive based on rapeseed oil in Brookfield viscometer no. 1 set-up



Petrolad® 484FT and 485FT

Tackifier additives



Efficiency and easy handling

Two extremely efficient, easy-to-handle tackifier additives specifically formulated for mineral oil-based lubricants for various applications like chain lubricants, rust protection, chainsaw and slideway lubricants, rock-drilling oils, rail curve greases, sealants and anti-misting agents for neat metalworking fluids. Petrolad® 484FT is characterised by low viscosity for easy handling, while Petrolad® 485FT is a concentrated tacky resin solution. It is a clear liquid even at low temperatures (> 5 °C) and can be easily dissolved in a large range of base oils.

Benefits:

- Significantly more efficient than known competitor products, enabling lower treat rates to achieve equivalent tackiness
- Low viscosity for easy handling (484FT)
- Quickly and easily dissolves in mineral oil lubricant formulations. It is soluble in paraffinic and naphthenic oils, PAOs, polyisobutylenes and some esters, e.g. trimellitates, and ditiidecyl adipate (DTDA)
- Excellent properties relating to clingability and stringiness
- Can typically be used at a treat rate of 0.25–1.00% w/w (Petrolad® 484FT) and 0.15–1.00% w/w (Petrolad® 485FT)

Abbreviations

BO = base oil

CCS = cold-cranking simulator

EP = extreme pressure

FM = friction modifier

HTHS = high-temperature, high-shear

KV = kinematic viscosity

PPD = pour point depressant

SSI = shear stability index

TE = thickening efficiency

TR = treat rate (referring to additive dosages)

VG = viscosity grade

VI = viscosity index

Product overview

Petrolad®*

Engine oil additives

Passenger car motor oils (PCMO)	Petrolad® 8770
and heavy duty diesel oils (HDDO)	Petrolad® 8771SC
Passenger car motor oils (PCMO)	Petrolad® 9200(G)

Driveline additives

Gear oil	Petrolad® 336
	Petrolad® 336EP
	Petrolad® 339

Automatic transmission fluids (ATF)	Petrolad® 743EU
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Off-road

Universal tractor transmission oil (UTTO)	Petrolad® 5101
Super tractor universal (STOU)	Petrolad® 5201
	Petrolad® 8134

Hydraulic additives

Ashless	Petrolad® 1846
Zinc-containing	Petrolad® 9530
	Petrolad® 9533

Sulfonates

Overbased calcium sulfonate detergent	Petrolad® 6779(A)
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Coolants

Petrolad® 3550
BRB Long-life coolant

Viscotech®*

Viscosity modifiers

Olefin copolymer (OCP) types	Solid	Viscotech® 6540
		Viscotech® 6640
		Viscotech® 6545(L)
		Viscotech® 6550
	Liquid	Viscotech® 6073
		Viscotech® 6073LR
		Viscotech® 6540L
Styrenic types	Solid	Viscotech® 6540LP
		Viscotech® 483
	Liquid	Viscotech® 483L
		Viscotech® 494L
		Viscotech® 494LD
		Viscotech® 533L
		Viscotech® 535L
Viscotech® 536L		

*Please note that this is an excerpt only. To find out more, visit our Website www.brb-international.com/lac



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