BRB

A Subsidiary of PETRONAS Chemicals Group

Petrolad®
Lube Oil Additives

Efficiency meets endurance

Contents

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.

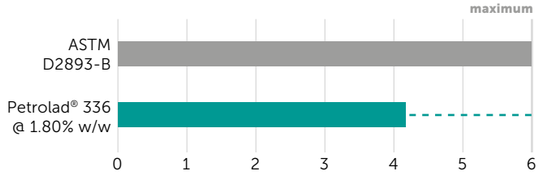
Petrolad® 336

Cost-effective, multi-purpose gear oil additive package

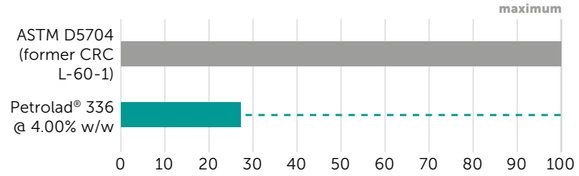
Value for money in a multiuse package

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-CKD) 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 properties and excellent performance 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-CKD, enclosed gears) @ 2.00% treat rate

Benefits:

- Cost-effective package due to its competitive dosage, flexible nature & outstanding long-life performance
- Excellent friction coefficient & micro-pitting test results
- Strong water demulsibility/separability, key for industrial
- Clear pass within the former CRC L-60-1/-42/-37 tests, among others
- Great anti-oxidation properties & seal test outcome (as per DIN 51517-3)
- Unique sulphur/phosphorus-based technology, resulting in clear, low-odour gear oils

You'll find details on the extreme-pressure variant Petrolad® 336EP on our website:
www.brb-international.com/lac

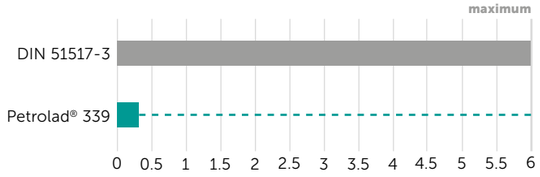
Petrolad® 339

Premium multi-purpose gear oil additive package

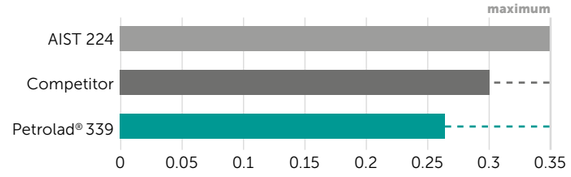
Automotive and industrial solution with an economical treat rate

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

Benefits:

- Outstanding corrosion/oxidation inhibition
- Passes the Flender foaming tests in a mineral oil based formulations
- Excellent clean gear characteristics, such as water separability and oxidation stability for preventing costly industrial gearbox contamination
- Superior gear extreme pressure performance at competitive treat rates
- Flexibility and savings for producers of both automotive and industrial gear oils in different base stocks
- A low-odour solution, not classified as dangerous goods, therefore easier handling and storage

Petrolad® 133LS

Limited Slip (LS) differential axle performance booster

Petrolad® 133 LS is an additive booster intended to work together with the main package in an automotive gear oil blend, which is then able to meet selected axle performance requirements of limited slip (LS) differentials, particularly friction reduction. This product is suitable for use in various mineral and (semi-)synthetic finished formulations.

Benefits:

- Excellent contribution towards friction reduction in SAE 75W-90 & 80W-90 gear oil blends
- A competitive treat rate, leading to a highly favourable net treat cost (NTC)
- No noticeable precipitation with either the individual booster or at the finished fluid level
- Great compatibility with our Petrolad® 339 gear oil additive package

Petrolad® 743EU

Automatic transmission fluid additive package

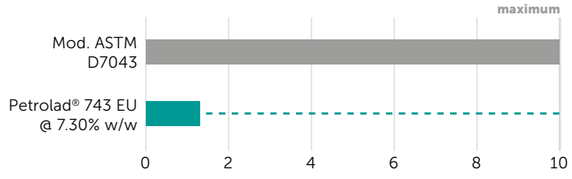
Multi-purpose performance in ATFs

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 F/G/H @ 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



Benefits:

- Great seal compatibility (with e.g. polyacrylate, nitrile & more)
- Exceptional oxidation control & anti-wear results
- Optimal friction performance & torque spread, resulting in minimal transmission shudder
- Outstanding low-temperature properties (for cold starts)
- Global coverage of the leading transmission type's key fluid needs & specs
- Suitable for GR I, II & Ill base oil blends

Petrolad® 750
ATF additive package

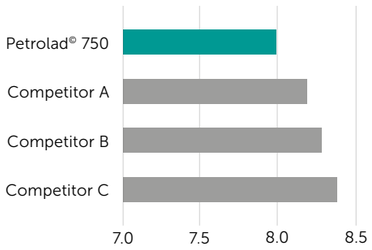
ATF additive package with an economical treat rate

The automatic transmission fluid (ATF) additive package Petrolad® 750 is the result of our decades of experience in ATF formulations. It delivers matching or even better performance than many known competing solutions at lower dosage. Blenders can achieve an exceptionally favourable net treat cost (NTC), while at the same time surpassing performance-level demands for Dexron IIIH (GM) and TES-389 (Allison). The package is also suitable for various other specifications and applications, including power steering fluids.

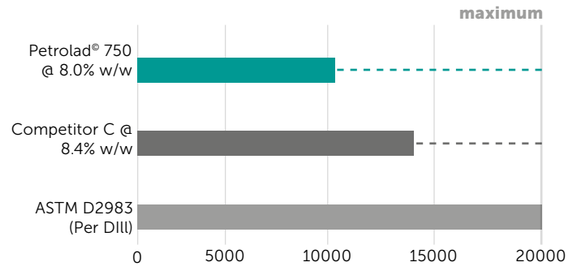
Benefits:

- Cost-effective and reliable
- Outstanding seal compatibility e.g. with polyacrylate nitrile
- Exceptional 192-hour oxidation control and 3-hour copper results
- Excellent low-temperature properties
- Global coverage of leading transmission fluid types' specs and needs
- Suitable for GR I, II and III base oil blends

Efficiency Superiority (% w/w) @ Dexron IIIH Specification



Brookfield Viscosity @ -40 °C; GR II ATF Blends' Results (cP)



Petrolad® 1846
Multi-purpose, ashless hydraulic oil additive package

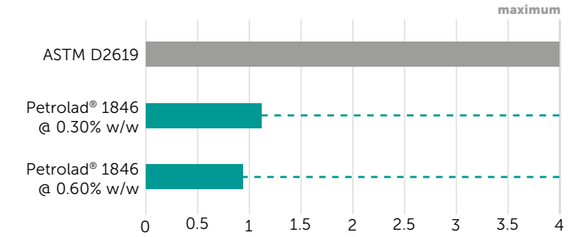
For synthetic and mineral-based hydraulic fluids

The additive is specially designed for ashless hydraulic fluids, 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

Hydrolytic stability: acidity of water layer (mg KOH/25g), GR III BO, ISO VG 32



Benefits:

- Outstanding anti-wear (AW) results
- Minimised hydraulic system contamination
- Cost savings and reduced environmental impact thanks to low treat rate
- Good steel and copper protection
- Excellent filterability
- Extended fluid and equipment life

Petrolad® 5101

Universal tractor transmission oil additive package

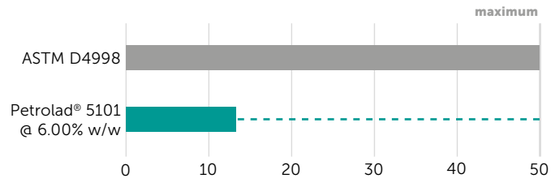
Universal off-road performance

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.

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



Benefits:

- Superior friction control & minimal foaming
- Outstanding (low-speed) anti-wear qualities to protect the final drive gears, without damaging the soft, yellow metals in many hydraulic pumps
- Oxidation & copper corrosion prevention in axial piston hydraulic pumps
- Eliminated chatter in wet brakes & reduced operator fatigue
- Economic treat rate, especially with the wide spec coverage, making it a desirable offering for cost-conscious customers

Petrolad® 5201

Super tractor oil universal additive package

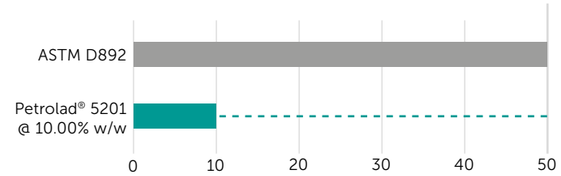
Designed for the global tractor market

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



Benefits:

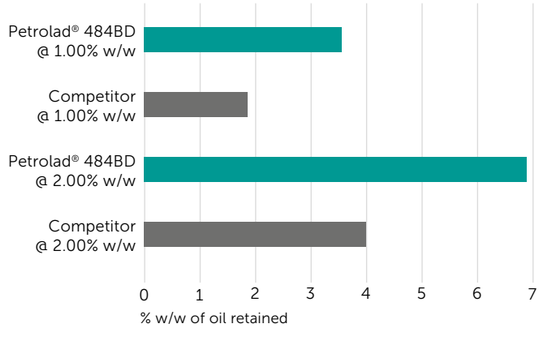
- Boosted soot control for a reduced viscosity increase
- Superior anti-wear results, leading to limited pitting & scoring in final drives
- Excellent friction performance in transmission clutches
- Desirable 10W-30 & 15W-40 results in GR I STOU Formulations

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.

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



Benefits:

- Quickly and easily dissolves in natural vegetable oils, including rapeseed oil & synthetic esters
- All components are biodegradable (90% by OECD 301B)
- Petrolad® 484BD is FDA-approved
- It enhances biodegradable vegetable oils to have superior tackifying properties
- Typically used at a treat rate of 1.00–3.00% w/w

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 ditridecyl 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)

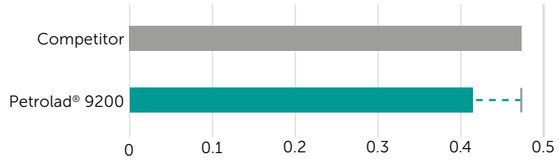
Petrolad® 9200

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 as 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

Benefits:

- Excellent wear and rust protection, deposit control and anti-oxidation
- Cost savings thanks to optimised performance on a cascade basis and versatility
- Strong results regarding requirements for 10W-40 and 10W-30 engine oils

Product overview

Petrolad®*

Engine oil additives	
Passenger car motor oils (PCMO) and heavy duty diesel oils (HDDO)	Petrolad® 8770
	Petrolad® 8771SC
Passenger car motor oils (PCMO)	Petrolad® 9200(G)
Driveline additives	
Gear oil	Petrolad® 336
	Petrolad® 336EP
	Petrolad® 339
	Petrolad® 133LS
Automatic transmission fluids (ATF)	Petrolad® 743EU
	Petrolad® 750
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)
Coolants	
	Petrolad® 3550
	BRB Long-life coolant

Viscotech®*

Viscosity modifiers		
Olefin copolymer (OCP) types	Solid	Viscotech® 6540
		Viscotech® 6640
		Viscotech® 6545
		Viscotech® 6550
		Viscotech® 6073
	Liquid VIRG BO	Viscotech® 6540L
		Viscotech® 6540LP
		Viscotech® 6545L
	Liquid RR BO	Viscotech® 6540LR
		Viscotech® 6640LR
		Viscotech® 6073LR
Styrenic types	Solid	Viscotech® 483
		Viscotech® 593
	Liquid VIRG BO	Viscotech® 483L
		Viscotech® 494L
		Viscotech® 494LD
		Viscotech® 533L
		Viscotech® 535L
		Viscotech® 536L
		Viscotech® 593L

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

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
RR = re-refined
SSI = shear stability index
TE = thickening efficiency
TR = treat rate (referring to additive dosages)
VG = viscosity grade
VI = viscosity index
VIRG = virgin

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