

PROTECK™

Premium Protection for Today's Engines

**EXTRA
PROTECTION
AND VALUE.**

**PROTECK™ ELITE K
SYNTHETIC BLEND ENGINE OIL**

PROTECK™ ELITE K SYNTHETIC BLEND 10W-30 AND 15W-40 CK-4 ENGINE OIL PROVIDES EXTRA PROTECTION AND VALUE, AT A PRICE COMPARED TO CONVENTIONAL ENGINE OIL.

INNOVATIVE LUBRICANT TECHNOLOGY FOR EXTRA ENGINE PROTECTION AND VALUE

OEMs continue to advance and change engine designs. Proteck™ Lubricants are engineered to provide premium protection for today's engines. Plus, extra engine protection is provided with a Heavy Duty Synthetic Blend formulation, along with an improved opportunity for extended drain intervals, better fuel economy, especially with HD 10W-30, and outstanding overall value, compared to conventional engine oils.

Only the most advanced engine oils meet the difficult challenges of endurance, fuel economy, extending drain intervals and reduced emission. So, our most technologically advanced engine oil formulations, **Elite K Synthetic Blend 10W-30** and **15W-40 API CK-4**, were created to address the following challenges, and deliver the unsurpassed benefits:

- **Value** – extra protection and performance from Synthetic Blend, at a price comparable to premium conventional engine oils
- **OEMs** – Meets or exceeds the requirements of major engine OEMs
- **Endurance** – extend oil drain interval with proper oil analysis
- **Fuel Economy** – many customers say they experience fuel savings of 1-3% with HD Synthetic Blend 10W-30 CK-4, compared to Conventional HD 15W-40 CK-4 Engine Oil
- **Shear Stability** – to help prevent oils falling out of viscosity grade within their useful service life
- **Thermal management** – newer engines run hotter
- **Oxidation control** – to deal with increased sump and turbo temperatures
- **Improved aeration control** – improved performance to help protect engines from bearing wear and operability issues
- **Compatibility** – backward compatible with API CJ-4 and older service categories

OUR NEW API CK-4 FORMULA IMPROVES ENGINE PROTECTION, COMPARED TO THE OLDER CJ-4

	New <i>CK-4</i> Formula	Old <i>CJ-4</i> Formula
Wear Protection	✓	✓
Deposits and Sludge Protection	✓	✓
Better Oxidation Protection	✓	
Hotter Engine Protection	✓	
Better Aeration Control	✓	

ENGINEERED TO OFFER OUTSTANDING PROTECTION, IMPROVED FUEL ECONOMY AND EXTENDED DRAIN INTERVALS

PROTECK™ Elite K Synthetic Blend 15W-40 CK-4 and 10W-30 CK-4 Engine Oils provide outstanding performance. Our formula actually improves oil properties over time, retaining viscosity, friction and anti-wear benefits, even in today's hotter engines.



PROTECTION

- Extra protection and performance from Proteck Synthetic Blend, at a price comparable to premium conventional engine oil.
- Up to 53% better wear protection.¹



POWERFUL

- Outstanding control of friction and wear more than 65% better than the latest API requirements.²
- The latest generation API CK-4 engine oils provide increased protection against harmful engine and bearing wear due to cavitation because they improve oil aeration.



ENDURANCE

- Up to 83% better oxidation control and 63% better deposit control.¹
- Stands up to high heat and stress to help protect as well on the last day as it does on the first day.
- Formulated with higher starting TBN [10]. Provides added oxidation control and protection against acid buildup that can cause rust and corrosion.

¹ Compared to new limits of API CK-4 requirements.

² To measure friction reduction benefits, engineers used the ball-on-disk traction test.



Approved Industry/OEM Specifications

API CK-4	Approved
API CJ-4	Approved
API SN PLUS	Approved
Cummins 20086	Meets Requirements
Cummins CES 20086	Meets Requirements
Detroit Diesel 93K222	Meets Requirements
Mack EOS-4.5	Meets Requirements
Renault RLD-4	Meets Requirements
Volvo VDS-4.5	Meets Requirements
ACEA E9, E7, E4, E2	Meets Requirements
API CI-4 Plus, CI-4, CH-4, CG-4, CF-2, CF	Meets Requirements
API SH, SG, SF, SE, SD, SC	Meets Requirements
API SL, SM	Meets Requirements
CAT ECF-3, ECF-2, ECF-1-a	Meets Requirements
Chrysler/Fiat MS-10902	Meets Requirements
CID A-A-52306, MIL-PRF-2104G	Meets Requirements
Detroit Diesel 93K218, 93K215, 93K214	Meets Requirements
Ford WSS-M2C171-E	Meets Requirements
Ford WSS-M2C171-F1	Meets Requirements
Global DHD-1	Meets Requirements
JASO DH-2	Meets Requirements
Mack EO-O Premium Plus, EO-N Premium Plus O3, EO-M Plus, and prior	Meets Requirements
MAN 3275, 270	Meets Requirements
MAN 3575	Meets Requirements
MB 228.3, 228.31	Meets Requirements
MTU 2.1	Meets Requirements
MTU Type I, Type II	Meets Requirements
Volvo VDS-4, 3, 2	Meets Requirements
CAT TO-2	Suitable for Use
Allison C-4	Suitable for Use



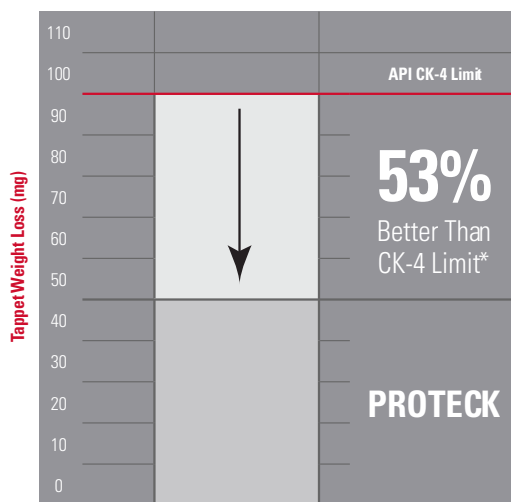
WEAR PROTECTION AND TOUGHNESS THAT EXCEED API CK-4 REQUIREMENTS

OUTSTANDING SLUDGE AND DEPOSIT CONTROL

In engine wear tests, our formulation was 53% better than the API CK-4 requirement for the Cummins ISB Engine Test (ASTM D7484). That's a lot of extra protection for your engines.

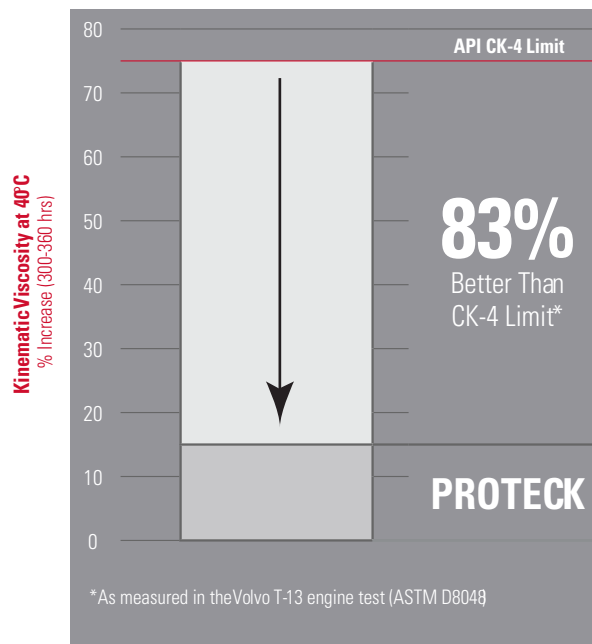
These charts show how PROTECK™ Elite K Synthetic Blend Engine Oils performed better than API limits under the newest CK-4 requirements and rigorous tests.

WEAR PROTECTION



*As measured in the Cummins ISB engine test (ASTM D7484)

OXIDATION CONTROL

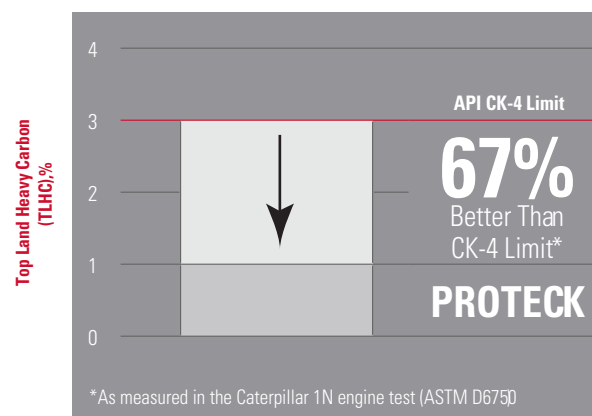


*As measured in the Volvo T-13 engine test (ASTM D8049)

TYPICAL PROPERTIES

Typical Properties	Test Method	SB 10W-30 CK-4	SB 15W-40 CK-4
Calcium, wt. %	ASTM D5185	0.105	0.105
Cold Cranking Simulator at (°C), cP	ASTM D5293	4500 (-25)	5398 (-20)
Color	ASTM D1500	2.5	3
Gravity, °API	ASTM D287	31.39	30.51
High Temperature / High Shear Vis at 150°C, cP	ASTM D5481	3.5	4.3
Magnesium, wt. %	ASTM D5185	0.1	0.1
Molybdenum, wt. %	ASTM D5185	0.0066	0.0066
Nitrogen, wt. %	ASTM D4629	0.105	0.105
Noack Volatility, % loss	ASTM D6375	13	10
Phosphorus, wt. %	ASTM D5185	0.115	0.115
Pour Point °C (°F)	ASTM D5950	-39°C (-38°F)	-36°C (-33°F)
Pumping Viscosity at (°C), cP	ASTM D4684	23,000°C (-30)	21,600°C (-25)
Specific Gravity @ 60°F (15.6°C)	ASTM D4052	0.8687	0.8734
Sulfated Ash, wt. %	ASTM D874	0.99	0.99
Sulfur, wt. %	ASTM D4951	0.32	0.32
TBN, mgKOH/g	ASTM D2896	10	10
Viscosity @ 100°C cSt	ASTM D445	12.21	15.66
Viscosity @ 40°C cSt	ASTM D445	82.06	116.1
Viscosity Index	ASTM D2270	145	143
Zinc, wt. %	ASTM D5185	0.127	0.127

DEPOSIT CONTROL



*As measured in the Caterpillar 1N engine test (ASTM D6750)

PROTECK™ ELITE K SYNTHETIC BLEND ENGINE OIL IS AS GOOD OR BETTER THAN OTHER TOP TIER BRANDS

THE FACTS ARE IN THE EXTENSIVE TEST NUMBERS.

Typical Properties	Test Method	Proteck Synthetic Blend SAE 15W-40 CK-4	Shell Rotella® T4 Synthetic Blend SAE 15W-40 CK-4 (Conventional)	Chevron® Delo® 400 SDE SAE 15W-40 CK-4 (Conventional)
TBN, mgKOH/g	ASTM D2896	10.0	10.1	10
Viscosity @ 40°C cSt	ASTM D445	116	118	112
Viscosity @ 100°C cSt	ASTM D445	15.6	15	14.6
Viscosity Index	ASTM D2270	143	133	134
Pour Point °C (°F)	ASTM D5950	-36 °C (-33 °F)	-36 °C (-33 °F)	-43 °C (-45 °F)
Sulfated Ash, wt. %	ASTM D874	0.99	1.0	1.0
High Temperature/High Shear Vis at 150°C, cP	ASTM D5481 ASTM D4683*	4.3	Not Published	4.2
Source/Date		Company Website 08-15-18	Company Website 08-15-18	Company Website 08-15-18

RIGOROUS TESTING FOR PROTECK™ ELITE K SYNTHETIC BLEND ENGINE OIL REQUIRED BY THE API TO OBTAIN A CK-4 LICENSE

	Test	Performance Parameters
Legacy Tests	Caterpillar C13	Piston Deposits, Oil Consumption
	Caterpillar 1N	Aluminum Piston Deposits, Oil Consumption
	Cummins ISB	Valve Train Wear
	Cummins ISM	Valve Train Wear, Filter Plugging, Sludge
	Roller Follower Wear Test	Roller Follower Pin Wear
	Mack T-11	Soot Induced Viscosity Increase
	Mack T-11A	Sooted Oil Low Temperature Pumpability
	ASTM D892	Foaming
New Limits	ASTM D7216	Elastomer Compatibility
	HTCBT	High Temperature Corrosion
	D874, D4951, D4951	Chemical Limits (S, P, and Ash)
	Mack T-12	Ring/Liner Wear, Oil Consumption
	Kurt Orbhan 90 Cycle	Shear Stability
	NOACK (D5800)	Volatility
	HTHS (D4683)	High Temperature/High Shear Limit
New Tests	Mack T-13	Oxidation Control, Pb Corrosion
	Caterpillar C13 Aeration	Aeration

OUTSTANDING WEAR PROTECTION AND CLEANLINESS IN REAL WORLD SERVICE WAS DEMONSTRATED

Test Engines:

2014 Cummins ISX15 450 HP: 533,000 miles on engine

2013 Detroit Diesel DD15 505 HP: 824,000 miles on engine

WEAR PROTECTION

Cummins Rollers - Low wear after 533k miles of engine use



Cummins - Cam Lobes Trace wear, no pitting, after 533k miles of engine use



DD15 - Main Bearings

Low wear, avg. 92.9% coating remains after 842k miles of engine use with low viscosity oil



SLUDGE AND DEPOSITS CONTROL DELIVERS CLEANLINESS

Cummins Cylinder Head Deck - Clean of sludge, rated 9.38/10 merits after 533k miles of engine use



DD15 - Cylinder Head Deck - Very clean of sludge, rated 9.63/10 merits after 842k miles of engine use



Cummins - Cam Gear Cover - Clean of sludge, rated 9.55/10 merits after 533k miles of engine use



DD15 - Piston Ring Belt - Good deposit control after 842k miles of engine use



BROAD LINE OF PROTECK™ LUBRICANTS AVAILABLE

Heavy Duty Engine Oils

Full Synthetic
Synthetic Blend
Natural Gas
Conventional
Monograde

Passenger Car Motor Oils

Full Synthetic dexos1™
Full Synthetic
Full Synthetic European
Synthetic Blend

Transmission and Driveline Fluids

All Popular Passenger Car ATF Fluids
Heavy Duty Trans Fluid SAE 50
Universal Tractor Fluid
TO-4 Fluids

Industrial

Anti-Wear Hydraulic
EP Hydraulic
R&O Hydraulic
Spindle Oil
Way Lube Oil
Rock Drill Oil
Other Industrial Oils

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