SINCE 1839 Schaeffer MANUFACTURING COMPANY

ISO 9001 CERTIFIED

TECHNICAL DATA

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#151 MOLY BOND X-200 SAE 15W-40
CI-4/CH-4/SL
CI-4 Plus

Moly Bond X-200 SAE 15W-40 is a premium quality premium quality multi-grade heavy-duty engine oil that is specially formulated to extend engine life, while providing for extended drain capability and improved fuel economy benefits. Moly Bond X-200 SAE 15W-40 is recommended for use in all types of on-highway and off-highway diesel engines, including low-emissions certified engines, diesel engines that are equipped with Exhaust Gas Recirculation (EGR) System, older on-highway and off-highway diesel engines, high performance gasoline engines, especially those that have flat tappet cams and mixed fleet applications.

Moly Bond X-200 SAE 15W-40 is blended from a combination of the finest solvent refined severely hydro-finished and solvent refined, severely raffinate hydroconverted Group II Plus high viscosity index 100% paraffin base oils available. This base oil combination provides the Moly Bond X-200 SAE 15W-40 with the following advantages:

1. **Very Good Cold Cranking and Oil Pumpability at Low Temperatures.**
2. **Excellent Oxidative Stability Especially at High Engine Operating Temperatures.**
3. **Excellent Resistance to Thermal Degradation.**
4. **Very Low Volatility Characteristics That Provide Exceptional Oil Consumption Control and Prevention of the Formation of Deposits on Critical Engine Parts.**
5. **A High Viscosity Index.**

Today's low emission diesel engines generate higher amounts of soot and operate at higher operating temperatures than older diesel engines. In addition current tighter engine designs reduce oil consumption, resulting in less fresh oil make-up to replenish additives. The top piston rings are located higher bringing the oil film closer to the combustion chamber, thus exposing the engine oil to severe thermal stresses. All of these factors require the need for the engine oil to contain an advanced additive system that will enhance the engine oil's ability to protect against soot overloading, high temperature deposit formation, while providing TBN retention and extended drain capabilities.

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Blended into the Moly Bond X-200 SAE15W-40's base stocks is a highly advanced proprietary performance additive package consisting of all calcium based metallic detergents, ashless dispersants, multi-purpose inhibitors and a highly shear stable viscosity index improver. This combination provides Moly Bond X-200 SAE 15W-40 with the following performance benefits:

1. **Excellent Wear Protection of On-Highway and Off-Highway Low Emission Diesel Engines and Pre-1994 Diesel Engines.**
2. **Excellent Deposit Protection of On-Highway and Off-Highway Low Emission Diesel Engines and Pre-1994 Diesel Engines**.
3. **Excellent Wear and Deposit Protection of Off-Highway Diesel Engines that Burn High Sulfur Diesel Fuel.**
4. **Exceptional Thermal Stability, for Outstanding Performance at High Engine Operating Temperatures.**
5. **Excellent TBN Retention, for Effective Acid Neutralization Throughout the Entire Oil Drain Interval.**
6. **High Levels of TBN Reserve for extended Drain Oil Capability.**
7. **Excellent Soot Dispersency for Protection Against Soot Overloading, Increases in Viscosity Due to Soot Thickening and Soot Abrasive Wear.**
8. **Enhanced High Temperature Piston Cleanliness and Protection Against Bore Polishing and Scuffing.**
9. **Increased Engine Cleanliness.**
10. **Excellent Protection against Low Temperature Sludge Build-Up and High Temperature Deposits.**
11. **Reduced High Temperature Carbon Build-Up – Both in Single and Two-Piece Pistons.**
12. **Excellent Ring and Liner Wear Protection That Results in Improved Oil Consumption Control.**
13. **Excellent Shear Stability for Stay-In-Grade Performance throughout the Entire Oil Drain Interval.**
14. **Excellent Cold Weather Startability and Pumpability for Better Cold Temperature Starts.**
15. **Excellent Anti-Foaming Properties to Protect Against Aeration and Foaming.**
16. **Superior Low Volatility Characteristics to Control Oil Consumption.**
17. **Longer Filter Life Especially at High Soot Levels for Better Engine Protection.**
18. **Excellent High Temperature/High Shear Performance to Provide Excellent Oil Film Thickness and Engine Protection at High Operating Temperatures and Shear Rates.**
19. **Superior Valve-Train Wear Protection Especially During High Soot Conditions.**

20. **A Substantial Reduction in Ring Sticking and Breaking.**
21. **Excellent Protection against Soot Overloading.**
22. **Superior Soot Handling Control.**
23. **Excellent Low Temperature Pumpability Protection**
24. **Reduced Bearing Wear and Increased Bearing Life.**
25. **Exceptional Wear Protection to Critical Wear Surfaces.**
26. **Excellent Resistance to Corrosion.**
27. **Excellent Gasket and Seal Life.**
28. **Excellent Component Compatibility.**
29. **Improved Fuel Economy.**
30. **Longer Drain Intervals, for Lower Overall Maintenance Costs.**
31. **Increased Engine Life for and Reduced Maintenance Costs Due to Downtime.**
32. **Improved Engine Durability to Keep Equipment in as New Condition.**
33. **Exceptional Value by Providing a Contribution to Reducing the Total Cost of Operation.**

Further blended into these 100% paraffin base fluids, the highly advanced proprietary performance additive package and shear stability viscosity index improver are two proven frictional modifiers, Micron Moly®, a liquid soluble type of Moly and Schaeffer Mfg's own proprietary additive Penetro®. These two proven frictional modifiers once plated, the Moly forms a long lasting slippery tenacious lubricant film, which prevents the metal surfaces from coming into contact with each other. By preventing metal-to-metal contact, damaging frictional wear is prevented from occurring. This prevention of metal-to-metal contact and reduction in wear results in:

*** Increased fuel economy**
*** A low coefficient of friction**
*** Significantly less bearing, ring, piston, cylinder and valve-train wear.**
*** Increased engine efficiency**
*** Increased engine durability**
*** Increased engine life**
*** Less down-time**
*** Reduced maintenance costs**

Moly Bond X-200 SAE 15W-40 meets and exceeds the following manufacturers' specifications and requirements: Military Specifications MIL-PRF-2104G and A-A-52306A, API Service Classification CI-4 Plus and CI-4/CH-4/SL, Global Specification DHD-1, JASO DH-1, Mack EO-N Premium Plus-03, Caterpillar, ECF-1-a, ECF-2, Cummins CES 20076, CES 20077, CES 20078;

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Detroit Diesel 7SE 270, Detroit Diesel Power Guard Oil Specification 93K214, Detroit Diesel 2000/Series 4000 Category 1, International Harvester, Navistar, John Deere, JI Case, Komatsu Dresser, ACEA A3/B3-04, ACEA E-7-08; Duetz, Mercedes MB228.1 and MB228.3; IVECO, Renault RVI RLD-2, Scania, Volvo VDS-2 and VDS-3 specifications, MAN 271, MAN 3275, MTU Oil Category Type 2

TYPICAL PROPERTIES

SAE Grade	15W-40
Viscosity @ 100°C, Cst (ASTM D-445)	14.00-16.00
Cold Cranking Viscosity @ -20°C, cP (ASTM D-5293)	6,000
Mini Rotary Viscosity – TP 1 @ -25°C, cP (ASTM D-4684)	24,000
High Temperature High Shear Viscosity, cP @ 150°C (ASTM D-4683)	4.08
Viscosity Index (ASTM D-2270)	140
Flash Point °F/°C (ASTM D-92)	442°/227.78°
Fire Point °F/°C (ASTM D-92)	485°/251.67°
Stable Pour Point °F/°C (FTM 7916 Method 203)	<-41°/<-42°
Scanning Brookfield Gelation Index @ -26°F/-32°C	4.5
Volatility % loss @700°F (ASTM D-2887)	7.3%
NOACK Volatility (ASTM D-5800)	
% Evaporation Loss @ 250°C	13.37
Sulfated Ash Content % weight (ASTM D-874)	1.5%
Total Base Number (ASTM D-2896)	12
Shear Stability % Viscosity Loss 90 Passes (ASTM D-7109)	9.9%
Foam Test (ASTM D-892)	
Sequence I	0/0
Sequence II	0/0
Sequence III	0/0
High Temperature Foam Test (ASTM D6082 Option A)	0/0
Cummins Bench Corrosion Test	
Copper increase, ppm	8
Lead increase, ppm	57
Tin increase, ppm	<1
Copper Strip Corrosion (ASTM D-130)	1a

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Typical Properties Continued

MHT-4 TEOST (ASTM D- 6335) Deposit Weight, mg	27.1
Engine Rusting Ball and Rust Test (ASTM D-6557) Average Gray Value	133
Sequence IIIF % Viscosity Increase @ 40°C	35%