



# Product Data Sheet

## ESSO XD-3 EXTRA

### PREMIUM HEAVY DUTY ENGINE OIL

February 2009

ESSO XD-3\* EXTRA is Imperial Oil's best universal heavy duty diesel engine oil. It is a premium performance product formulated for severe diesel and gasoline engine service. Esso XD-3 Extra 15W-40 meets API CI-4 PLUS, CI-4, Mack EO-N Premium Plus 03, Cummins CES 20078, Caterpillar ECF-2, DD Power Guard 93K214, ACEA E5, and Volvo VDS-3

- ◆ Esso XD-3 Extra CJ-4 15W-40 for 2007 emission controlled engines is described on the XD-3 Extra CJ-4 15W-40 data Sheet
- ◆ Esso XD-3 Extra 10W-30 meets API CJ-4, Caterpillar ECF-3, Cummins CES 20081, Volvo VDS-4 and is suitable for 2007 emission controlled engines.
- ◆ Esso XD-3 Extra 0W-30 meets Cummins CES 20076, Mack EO-M Plus and is recommended for Caterpillar ECF-3 and uses API CJ-4 technology and is suitable for 2007 emission controlled engines.
- ◆ Esso XD-3 Extra 0W-40 is licensed API CJ-4, and meets Caterpillar ECF-3, Cummins CES 20076, Mack EO-N Premium Plus 03 and is suitable for 2007 emission controlled engines.
- ◆ Esso XD-3 Extra 0W-40 and 0W-30 are synthetic since they use polyalphaolefin (PAO) as the basestock
- ◆ Available in 5 multigrades and 5 monogrades to meet your specific needs

- ◆ A universal oil meeting needs of diesel engines, gasoline engines, transmissions and hydraulics

#### Primary Applications

ESSO XD-3 EXTRA engine oils are recommended for use in gasoline and diesel engines operating in moderate and severe service applications. This includes engines on-highway, off-road, construction, farm, woodlands, marine and stationary power plants. ESSO XD-3 EXTRA is Imperial Oil's primary recommendation for operations using a variety of power sources in mixed fleets.

#### Diesel Engine Service

ESSO XD-3 EXTRA is recommended for most naturally aspirated and high-output turbocharged diesel engines, including Cummins, Mack and Detroit Diesel's latest low-emission 4 stroke designs with exhaust gas recirculation (EGR).

#### Gasoline Engine Service

ESSO XD-3 EXTRA is recommended for use in gasoline engines requiring API SL, SL/CF SJ, SJ/CF, SH, SH/CF, SH/CD or SG/CD performance categories. See Table for grade specific recommendations.

#### Transmissions

ESSO XD-3 EXTRA is recommended for use in powershift transmissions specifying Caterpillar TO-2. XD-3 Extra 30 has Allison C4 performance. For Allison C4 applications requiring a 10W lubricant, Essotrans 10W is recommended.

#### Hydraulics

ESSO XD-3 EXTRA provides excellent hydraulic fluid performance in auxiliary systems on farm and construction equipment. Esso XD-3 Extra 10W has passed the severe Vickers 35VQ25 and consequently all the other higher viscosity grades of XD-3 Extra will also have this quality.

## ***Performance Features***

### **Field Proven**

Esso's commitment to our field test program began in 1970, and has now accumulated over 400 million kilometers in various engines including Cummins, Caterpillar, Detroit Diesel and Mack. These field tests also include the latest low emission technology engines.

The field test program is designed to make ESSO XD-3 EXTRA an industry leading product. This is achieved by rating engine components (pistons, rings, liners, bearings and valve train components) and used oil samples to identify the best performing candidate formulation.

### **Longer Oil Life**

ESSO XD-3 EXTRA has powerful anti-oxidants and inhibitors to handle the stress from increased power ratings and higher combustion temperatures.

Potent oxidation inhibitors reduce the rate of oil breakdown. Powerful dispersants and inhibitors prevent soot related viscosity thickening and ensure slow TBN depletion. Combined, these keep the oil performing better, longer.

### **Soot Control**

Oil soot loading has increased significantly with low-emission heavy duty diesel engines. ESSO XD-3 EXTRA has a carefully balanced dispersant inhibitor additive package that controls soot-induced viscosity increase, therefore extending the useful life of the oil. Soot can also cause wear of diesel engine roller-follower bushings and cross-over linkages. XD-3 EXTRA 15W-40 has been formulated to exceed the requirements of the API CI-4 PLUS engine tests designed to load the oil with soot: the Cummins M-11EGR, the Mack T-10 and the Mack T-11. Also, field testing has proven that ESSO XD-3 EXTRA provides excellent soot wear protection.

### **Deposit Control**

In order to protect against high oil consumption, bore polishing, ring sticking and liner scuffing, ESSO XD-3 EXTRA is formulated with a powerful detergent-dispersant additive package which has demonstrated industry leading deposit control.

### **Wear Protection**

ESSO XD-3 EXTRA has shown excellent wear protection in severe field testing. It is formulated to minimize corrosive wear and acid build-up from acidic combustion gases. Potent anti-wear additives protect heavily loaded cam and lifter assemblies in modern diesel and gasoline engines.

### **Total Base Number (TBN) Retention**

ESSO XD-3 EXTRA has excellent TBN retention during operation. This ensures excellent corrosive wear protection and longer, useful oil life.

### **Viscosity Control**

ESSO XD-3 EXTRA is formulated to offer the best balance between viscosity loss due to shearing, and viscosity increase due to oil degradation, contamination and soot loading. Excellent low temperature stay-in-grade performance helps improve cold starting.

### **Filterability**

ESSO XD-3 EXTRA is filterable even in the presence of moisture or coolants.

Good filtration is necessary for long engine life. A plugged filter diverts oil through the bypass circuit. This allows unfiltered oil to be pumped through the engine resulting in high wear and shortened engine life.

### **Longer Bearing Life**

Powerful corrosion inhibitors minimize the corrosive attack on copper-lead or bronze bearings. Multigrades also contribute to reduced bearing wear. In many instances, there is so little wear that the cavitation erosion pattern remains in the overlay. Some operators interpret this to be a problem when, in fact, it is the result of reduced wear.

### **Foam Control**

An anti-foam additive controls foaming and air entrainment while in operation. Both problems can be critical, particularly with hydraulic systems, transmissions and engines equipped with hydraulically-actuated electronic unit injectors (HEUI).

### Low Temperature Fluidity

ESSO XD-3 EXTRA is available in winter grades: 10W-30, 5W-30, and the synthetic (PAO) 0W-30 and 0W-40 grades. These grades provide a full range of protection. At low temperatures, the oil demonstrates good fluidity for fast start-up lubrication of critical parts (including bearings, valve trains and turbochargers), while at operating temperatures, the oil has sufficient viscosity to maintain the protection of these components.

### Extended Seal Life

ESSO XD-3 EXTRA is formulated to be compatible with commonly used elastomers. This leads to extended seal, gasket and clutch component life.

### Glycol Negativity

During colorimetric glycol testing, some new oils will show positive results. This can be confusing and expensive for conscientious operators. ESSO XD-3 EXTRA is glycol negative meaning that if there is no coolant in the oil, the test will not give you a false indication that it is present.

### Oil Drain Intervals

The preferred oil drain interval (ODI) is recommended by the original equipment manufacturer (OEM) and is typically specified for severe service. Variables controlling the ODI recommendation include the duty cycle and the operating conditions of the engine. Optimization of the ODI to either extend or shorten the interval for a particular application should be based on careful consideration of the service severity.

ESSO XD-3 EXTRA has the performance capability for extended oil drains. However, the benefits and potential risks of oil drain extension need to be carefully considered and endorsed with an appropriate equipment operation review and oil analysis program. A special Esso lubrication guide outlining all the advantages and disadvantages of extending ODI is available from your Esso representative.

### Low Emission Engines With EGR

Low emission on-highway engines tend to put more stress on the oil by adding increased levels of soot and acidic material to the oil. The oil needs to keep this soot dispersed to minimize its abrasiveness and neutralize the acidic material. To prevent the accumulation of harmful high

levels of soot in the oil, the oil must be changed at a suitable drain interval.

### Low Temperature Recommendations

ESSO XD-3 EXTRA is available in five monogrades and five multigrades satisfying a full range of low and high temperature performance requirements. To ensure good lubricant fluidity during critical warm-up periods, selection of the proper viscosity grade is essential.

The following table summarizes the minimum start-up temperatures recommended by grade to provide adequate lubrication after startup:

<b>Grade</b>	<b>Expected Low Ambient Temperature</b>
15W-40	-29°C
10W-30	-35°C
5W-30	-40°C
0W-40	-46°C
0W-30	-48°C

### Performance Features

In the family of 10 ESSO XD-3 EXTRA products, at least one of the products will be recommended for applications requiring the following performances:

API CJ-4, CI-4 PLUS, CI-4, CH-4  
API CG-4, CF-4, CF-2, CD-II, CF, CD/SJ, SH  
ACEA E7, E5 and E3, Global DHD-1  
Cummins CES 20071, 20076, 20077, 20078, 20081  
Mack EO-N Premium Plus 03, EO-M Plus, EO-M,  
Detroit Diesel Power Guard 93K214  
Caterpillar ECF-1, 1a, 2, 3  
Volvo VDS-4, VDS-3, VDS-2, VDS  
Caterpillar TO-2

See table for the specific grades that meet the above performance standards.

### Precautions

ESSO XD-3 EXTRA is manufactured from high quality petroleum and synthetic base stocks depending on the grade, and then carefully blended with selected additives. As with all petroleum products, good personal hygiene and careful handling should always be practiced. Avoid prolonged contact to skin, splashing into the eyes, ingestion or vapour inhalation. Special care is also recommended in handling used motor oils. An ESSO Service Data Sheet entitled "Safe Handling of Used Motor Oils" is available on request from your ESSO Representative. Please refer to our ESSO

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Material Safety Data Sheet for further information.

Note: This product is not controlled under Canadian WHMIS legislation.

### Grade Specific Recommendations <sup>1</sup>

SERVICE	0W-40	0W-30	5W-30	10W-30	15W-40 CJ-4*	15W-40	10W	20W-20	30	40	50
CJ-4	R	R	---	R	R	---	---	---	---	---	---
CI-4 PLUS	R	R	---	---	R	R	---	---	---	---	---
CI-4, CH-4	R	R	---	R	R	R	---	---	---	---	---
CG-4, CF-4	R	R	R	R	R	R	---	---	---	---	---
CF-2, CD-II	---	---	---	---	R	---	---	---	R	R	R
CF, CD	R	R	R	R	R	R	---	R	R	R	R
SM	R	R	---	R	R	---	---	---	---	---	---
SL, SJ	R	R	---	R	R	R	---	R	R	R	
SH	R	R	R	R	R	R	---	R	R	R	R
ACEA E7	---	---	---	---	R	R	---	---	---	---	---
ACEA E5,E3, Global DHD-1	---	---	---	---	R	R	---	---	---	---	---
Mercedes-Benz 228.3	---	---	---	---	R	R	---	---	---	---	---
Mack EO-O Premium Plus	---	---	---	---	R	---	---	---	---	---	---
Mack EO-N Premium Plus 03	R	---	---	---	R	R	---	---	---	---	---
Mack EO-M Plus, M, L	R	R	---	R	R	R	---	---	---	---	---
Mack EO-K/2	R	R	---	R	R	R	---	---	R	R	R
Cummins CES 20081	R	R	---	R	R	---	---	---	---	---	---
Cummins CES 20077	---	---	---	---	R	R	---	---	---	---	---
Cummins CES 20078	R	R	---	R	R	R	---	---	---	---	---
Cummins CES 20076, 71	R	R	---	R	R	R	---	---	---	---	---
Caterpillar ECF-3	R	R	---	R	R	---	---	---	---	---	---
Caterpillar ECF-1, 1a, 2	R	R	---	R	R	R	---	---	---	---	---
DDC 7SE 270 (4 Stroke)	R	R	---	R	R	R	---	---	---	---	---
DD Power Guard 93K218	---	---	---	---	R	---	---	---	---	---	---
DD Power Guard 93K214	---	---	---	---	R	R	---	---	---	---	---
Volvo VDS-4	---	---	---	R	R	---	---	---	---	---	---
Volvo VDS-3, VDS-2,	R	R	---	R	R	R	---	---	---	---	---
Volvo VDS	R	R	---	R	R	R	---	---	---	---	---
Caterpillar T0-2	R	R	R	R	R	R	R	R	R	R	R
Allison C4	---	---	---	---	---	---	---	---	R	---	---
Vickers 35VQ25	R	R	R	R	R	R	R	R	R	R	R

<sup>1</sup>- R = recommended for applications requiring indicated service level

\* Details of product described on XD\_3 Extra CJ-4 data sheet

**Typical Properties\***

	0W-40	0W-30	5W-30	10W-30	15W-40	15W-40 CJ-4**	10W	20W-20	30	40	50
Density kg/m <sup>3</sup>	843	842	868	873	882	873	877	884	888	890	894
Kinematic Viscosity, cSt											
@ 40°C	87	69	65	79	116	110	39	66	102	137	203
@ 100°C	15.2	12.2	11.0	12.0	15.4	15.0	6.5	9.0	12.0	14.3	18.3
Viscosity Index	186	176	163	148	140	142	120	111	108	102	99
CCS Viscosity, P											
@ -35°C	57	58	---	---	---	---	---	---	---	---	---
@ -30°C	---	---	63	---	---	---	---	---	---	---	---
@ -25°C	---	---	---	67	---	---	42	---	---	---	---
@ -20°C	---	---	---	---	65	63	---	---	---	---	---
@ -15°C	---	---	---	---	33	---	---	38	---	---	---
@ -10°C	---	---	---	---	---	---	---	---	---	---	---
MRV LPT, (°C at 60,000 cP)	-46	-48	-40	-35	-30	-30	-38	-31	---	---	---
MRV Viscosity, P											
@ -40°C	213	149	---	---	---	---	---	---	---	---	---
@ -35°C	93	68	238	---	---	---	303	---	---	---	---
@ -30°C	---	---	---	255	---	---	111	541	---	---	---
@ -25°C	---	---	---	---	330	290	---	202	---	---	---
@ -20°C	---	---	---	---	---	---	---	---	---	---	---
Pour Point, °C	-45	-45	-36	-33	-30	-30	-39	-30	-24	-15	-9
Flash Point, COC, °C	215	215	200	215	215	215	214	228	238	242	246
Colour, (ASTM)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
TAN (D 664)	2.4	2.4	2.8	2.8	2.5	2.8	1.2	1.2	1.2	1.2	1.2
TBN (D 2896)	7.8	7.7	8.6	8.6	12.2	8.6	8.2	8.2	8.2	8.2	8.2
Sulphated Ash, wt. %	.99	0.99	0.99	0.99	1.49	0.99	1.0	1.0	1.0	1.0	1.0
Elementals											
Calcium	0.234	0.234	0.236	0.236	0.378	0.236	0.255	0.255	0.255	0.255	0.255
Phosphorus	0.111	0.111	0.111	0.111	0.137	0.111	0.100	0.100	0.100	0.100	0.100
Zinc	0.121	0.121	0.122	0.122	0.150	0.122	0.112	0.112	0.112	0.112	0.112

\* The values shown above are representative of current production. Some are controlled by manufacturing and performance specifications while others are not. All may vary within modest ranges and are subject to change without notice.

\*\* Additional information for XD-3 Extra CJ-4 15W-40 are given on the XD-3 Extra CJ-4 data sheet