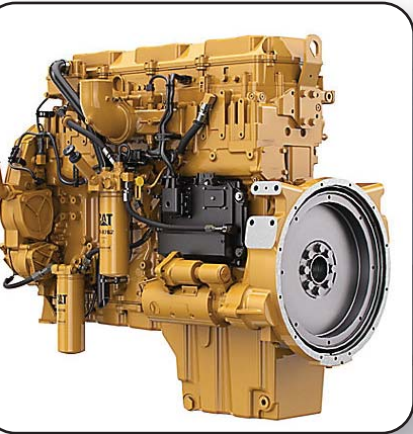


Caterpillar Oil Aeration Test (COAT) (ASTM D8047)



Test Engine

The test engine is a production 2004 Caterpillar 320 kW C13 engine, designed for heavy-duty, on-highway truck use. It is an electronically controlled, turbocharged, after-cooled, direct-injected, six-cylinder diesel engine with an in-block camshaft and a four-valve per cylinder arrangement. The engine uses Caterpillar's ACERT technology featuring multiple injections per cycle and inlet-valve-actuation control.

Test Performance

This test method evaluates engine oil resistance to aeration in automotive diesel engine service. The test is conducted under high-engine-speed (1800 r/min), zero load conditions. This test method was developed as a replacement for Test Method D6894. The aeration measurement system uses the density measurement to calculate the percent entrained air volume within the engine oil at a given pressure and temperature. The system utilizes a Micro Motion Coriolis flow and density meter (FDM) capable of measuring density to less than 1 kg/m³. The calculation of the percent aeration is based on the difference in density between an unaerated oil sample (measured by Test Method D4052) and the density of the aerated oil during the test measured by the FDM. The test fuel required is PC-10 ultra-low sulfur diesel (ULSD) fuel.

Oil Specifications

API: CK-4 and FA-4

Pass/Fail Determination: 11.8% max. Oil Aeration

Parameters	Operating Conditions	Units
Test Duration	50	Hours
Speed	1800	r/min
Load	0	Nm
Oil Sample Flow Rate ^A	1.5	L/min
Temperatures		
Coolant Out	90	DegC
Inlet Air	25	DegC
Intake Manifold	40	DegC
Fuel In	40	DegC
Oil Gallery	90	DegC
Sample Oil ^A	90	DegC
Pressures		
Sample Oil ^A	84	kPaA
Inlet Air	96 ± 1.5	kPaA
Crankcase	103	kPa
Intercooler Delta	15 max.	kPa
Coolant System(Expansion Tank)	99-107	kPa
Exhaust ^B	104	kPaA
Pressure Regulator Controller Output ^D	<50	%
Micropump Controller Output ^{CD}	<50	%

^AMicro Motion quantity.

^BTurbocharger waste-gate fully closed.

^CIf this value is above 50% output for 15W-40 or thinner oils, the test is invalid. Oils of higher viscosity need a statement of validity in the comments section of the report if they exceed 50% output.

^DAverage value over the length of the test.

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