

Caterpillar 1N Test Method

SPECIFICATIONS

This test is part of API category CG-4 and proposed for PC-9.

OBJECTIVE

The objective of this test is to evaluate the performance of crankcase lubricants with respect to piston deposits, ring sticking, piston, ring and liner scuffing, as well as oil consumption, with lower sulfur fuel.

FIELD SERVICE SIMULATED

High speed turbocharged on-highway heavy-duty diesel engine service prior to 1998 with low sulfur fuel is simulated.

TEST FIXTURE

A Caterpillar 1Y540 single-cylinder direct-injection diesel test engine with a four-valve arrangement having a 5.4 in. bore and a 6.5 in. stroke resulting in a displacement of 148.8 cubic inches is used for this test. Compression ratio is 14.5:1. A keystone top ring and rectangular second ring are used.

TEST PARAMETERS

Test parameters: 2100 rpm, 70 bhp, 1800 bmep, 7990 btu/min fuel input, 200°F coolant temperature, 225°F oil temperature, 260°F inlet air temperature at 71" hg and 125 grains/lb, 29:1 air fuel ratio for 252 hours.



TEST PARTS

Test parts include: liner (143998), piston (1Y0727), and ring set (1Y0728) all meeting Caterpillar's "3L" quality specifications.

TEST FUEL

Haltermann reference fuel with a sulfur specification of 0.03 - 0.05 mass % and an API gravity specification of 33 - 35° is used.

TEST PARTS EVALUATED

Piston, rings and liner are evaluated. The piston is rated by the CRC (Coordinating Research Council) demerit procedure.

LUBRICANT ANALYSIS

Lubricant analysis includes viscosity, TBN, wear metals, and a check for fuel dilution.

PASS/FAIL CRITERIA

For CG-4: Based on reference oil 1004, the following acceptance limits apply.

	1st Test	2nd Test	3rd Test
WDK (Demerits)	286.2	311.7	323
TGF (%)	20	23	25
TLHC (%)	3	4	5
BSOC Avg. g/kW-hr	≤0.5	≤0.5	≤0.5

No piston, ring, or liner distress and no stuck rings are allowed.

Based upon the time period in which a test completed, an appropriate severity adjustment factor may be added to the test result. For a first test, the adjusted results are compared to the above first test limits. For a two- or three -test program, the average of the adjusted test results is compared to the appropriate pass limits.

