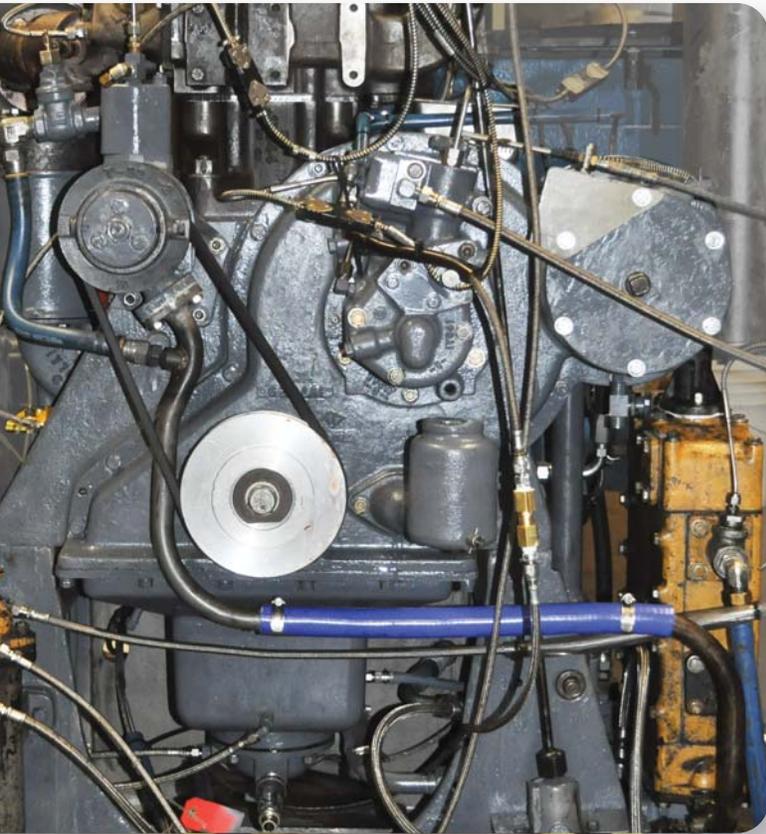


Caterpillar 1K and 1N Test



Test Engine

The test is a Caterpillar 1Y540 mechanical direct fuel injection, single cylinder diesel engine with a four- valve cylinder head, 2.4 L aluminum piston engine. The test requires an independent compressed inlet air system with controlled temperature and humidified air.

Test Operation

Engine operates for 252 hours steady state operating conditions at 2100 RPM to evaluate the oils performance towards oil consumption, piston deposits, ring sticking, and piston, rings, and liner distress. Specified 1K test fuel is 0.4% mass fuel sulfur. 1N test fuel is 0.04% mass fuel sulfur.

Oil Specifications

API: 1K, CF-4, CH-4 & CI-4

API: 1N CI-4 (optional), CJ-4, CK-4, FA-4, Caterpillar ECF-3

Pass/Fail Determination 1K Limits *

	1 Test	2 Test	3 Test
Oil Consumption (g/k Wh max)		0.5	
Top Land Carbon (% max)	4	5	5
Top Groove Carbon (% max)	24	27	29
Weighted Total Deposits (demerits max)	332	347	353
Piston Rings and Liner Scuffing		None	

Pass/Fail Determination 1N Limits *

	1 Test	2 Test	3 Test
Oil Consumption (g/k Wh max)		0.5	
Top Land Carbon (% max)	3	4	5
Top Groove Carbon (% max)	20	23	25
Weighted Total Deposits (demerits max)	286.2	311.7	323.0
Piston Rings and Liner Scuffing		None	

*As specified by ASTM D4485

**For more information,
please contact:**

Intertek Automotive Research Services
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Caterpillar 1K and 1N Test



Engine Test	Cat 1K and 1N	
Manufacturer	Caterpillar Inc. Bore X Stroke, 137.2mm x 165.1mm 2.4L, Single Cylinder Aluminum Alloy Piston	
Total Piston Height	138.15mm	
Top Crown to Center Pin Bore	88.5mm	
Crownland Configuration	Radial Crownland to Liner Clearance 1.02mm	
Piston Rings	Type	Groove Widths
Top Ring	Keystone	3.85mm
Second Ring	Positive Twist Rectangular w/ Inside Step	2.45mm
Oil Ring	Rectangular	3.20mm
Land Widths		
Crownland	12.00mm	
Second	7.75mm	
Third	8.74mm	

Parameters	Operating Conditions		Units
Test Duration	252		Hours
Speed	2100 ± 10		r/min
Power	52		kW
BMEP	1240		kPa
Fuel Flow	185 ± 1		q/min
BSFC	0.213		kg/kWh
Humidity	17.8 ± 1.7		g/kg
Temperatures			
Coolant Out	93 ± 2.5		DegC
Coolant In	88		DegC
Coolant Delta	5 ± 1		DegC
Oil to Bearing	107 ± 2.5		DegC
Oil Cooler Inlet	110		DegC
Inlet Air	127 ± 2.5		DegC
Exhaust	550 ± 30		DegC
Fuel at Injector Housing	57 ± 3		DegC
Pressures			
Oil to Bearing	482 max.		kPa
Oil to "P" Tube	360 ± 13		kPa
Inlet Air	240 ± 1		kPaA
Exhaust	216 ± 1		kPaA
Fuel at Filter	210 ± 20		kPa
Crankcase Vacuum	0.7 ± 0.1		kPa
Coolant at Cylinder	50		kPa
Flows			
Blowby	23		L/min
Coolant Flow	65 ± 2		L/min
Air/Fuel Ratio	29		

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