TWO-STROKE-CYCLE GASOLINE ENGINE LUBRICANT EVALUATION
D4858 ASTM TC SEQUENCE III Test Procedure
Title / Validity Declaration Page

VERSION TC3 VERSION 20020115

CONDUCTED FOR

CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

C	I = Invalid
	V =Valid

Non-Reference		
Primary Oil Code:	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC	
Test Number:	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC	
EOT Date:	YYYYMMDD	
EOT Time:	HH:MM	
Alternate Codes:	CCCCCCCCCCCCCCC	CCCCCCCCCCCCCCC

I certify that test number CCCCCCC was conducted to the best of my knowledge, in accordance with the conditions specified in Test Method D4858. The results of this test indicate that the candidate lubricant cccccccccccccccccccccc demonstrated performance equal to or better than that of the reference lubricant within the tolerences specified in Test Method D4858.

SUBMITTED BY: CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

Testing Laboratory

Signature Image

Signature

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Typed Name

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Title

TWO-STROKE-CYCLE GASOLINE ENGINE LUBRICANT EVALUATION
D4858 ASTM TC SEQUENCE III

Objective

This procedure is designed to evaluate the performance of a two-cycle engine lubricant relative to the incidence of deposit-induced engine malfunction. Specifically, the following characteristics are considered:

1. Preignition
2. Spark Plug Fouling
3. Exhaust Blockage

Summary of Procedure

The engine employed is an air-cooled, single cylinder Yamaha CE50S engine with the following general specifications:

Displacement	3.0 cu. in.(49 cm) 3
Cylinder Bore	1.57 in. (40 mm)
Stroke	1.54 in. (39.2 mm)
Compression Ratio	7.2:1

The cylinder head is fitted with a combustion chamber thermocouple to facilitate observation of preigintion frequency and severity (magnitude). The engine is assembled with a new piston, rings, piston pin, gaskets, muffler, and spark plug. Other components are replaced as necessary.

A two-hour cyclic break-in is completed before each test begins. Next, the cylinder head is re-torqued and the engine is run until it is stabilized at test operating conditions. At this time the 50-hour test begins. These are the test conditions:

Engine, r/min	4000 ± 100
Engine Load	W.O.T.
Spark Plug Gasket Temp., °C	392 ± 5
Fuel Oil Ratio	20:1

Test operation is halted whenever any one of three engine malfunctions occur:

1. Major Preignition - a sudden increase in combustion chamber temperature 18°F or greater.

2. Spark Plug Fouling - a rapid decrease in spark plug gasket temperature accompanied by engine speed, torque, and combustion chamber temperature decreases.

3. Exhaust Blockage - a constant torque reading of 10% below nominal torque.

The test is restarted after appropriate correction of malfunction. Correction many consist of cleaning piston and cylinder head, replacement of spark plug, or replacement of muffler.

At the conclusion of the test, the number of occurrences of the above malfunctions is used to rate a non-reference lubricant.

The non-reference oil shall have no more than 1 major preignition in a test period of 50 h.

TWO-STROKE-CYCLE GASOLINE ENGINE LUBRICANT EVALUATION
ASTM TC SEQUENCE III

SUMMARY OF ENGINE TEST RESULTS
YAMAHA CE50S TIGHTENING TEST

Sponsor Code:	ccccccccccccccccccccccc	Test Number:	cccccccccccccccc	Start Date:	YYYYMMDD
Lab Code:	ccccccccccccccccccc	Fuel Oil Ratio:	CCCCC	E.O.T. Date:	YYYYMMDD
Fuel Code:	CCCCCCCCCC	Stand Number:	CCCCC	Hours:	CCCCC
Industry Oil Code:	CCCCCC				

Test Conditions Data

Miscellaneous	Maximum	Minimum	Average
Engine Speed, r/min	S1234	S1234	S1234
Observed Load, hp	S1.12	S1.12	S1.12
Corrected Load, hp*	S1.12	S1.12	S1.12
Fuel Flow, lb/h.	S1.12	S1.12	S1.12
Exhaust Back Press. in. H2O	S1.1	S1.1	S1.1
Barometer, in. Hg	S12.12	S12.12	S12.12
Temperature, °F			
Spark Plug	S123	S123	S123
Combustion Chamber	S123	S123	S123
Exhaust	S123	S123	S123
Fuel	S12	S12	S12
Intake Air, Carburetor	S12	S12	S12
Ambient	S12	S12	S12
Wet	S12	S12	S12
Dry	S12	S12	S12

	Preignition		Spark Plug	Exhaust
	Major	Minor	Change	Change
Totals	S12	S12	S12	S12

Previous Reference Data

Code	Test No.	Date	Preignition Major	Preignition Minor
ccccccccccccccccccccc	ccccccccccccccccccccc	YYYYMMDD	S12	S12
ccccccccccccccccccccc	ccccccccccccccccccccc	YYYYMMDD	S12	S12

[A] Corrected To:
Barometric Pressure - 29.92
Temperature - 60°F

TWO-STROKE-CYCLE GASOLINE ENGINE LUBRICANT EVALUATION
ASTM TC SEQUENCE III

SUMMARY OF ENGINE TEST RESULTS
YAMAHA CE50S TIGHTENING TEST

Sponsor Code: cccccccccccccccccccccccc Lab Code: cccccccccccccccccc Test Number: cccccccccccccccccccccc

Test Conditions Data

Test Hours	Preignition, °F Major	Preignition, °F Minor	Spark Plug Change	Exhaust Change
CCCCC	CCC	CCC	CCC	CCC
CCCCC	CCC	CCC	CCC	CCC
CCCCC	CCC	CCC	CCC	CCC
CCCCC	CCC	CCC	CCC	CCC
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TWO-STROKE-CYCLE GASOLINE ENGINE LUBRICANT EVALUATION
ASTM TC SEQUENCE III

SUMMARY OF ENGINE TEST RESULTS
YAMAHA CE50S TIGHTENING TEST

Sponsor Code: ccccccccccccccccccccccc Lab Code: ccccccccccccccccccc Test Number: ccccccccccccccccccccc

Test Conditions Data

Test Hours	Preignition, °F Major	Preignition, °F Minor	Spark Plug Change	Exhaust Change
CCCCC	CCC	CCC	CCC	CCC
CCCCC	CCC	CCC	CCC	CCC
CCCCC	CCC	CCC	CCC	CCC
CCCCC	CCC	CCC	CCC	CCC
CCCCC	CCC	CCC	CCC	CCC
CCCCC	CCC	CCC	CCC	CCC
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TWO-STROKE-CYCLE GASOLINE ENGINE LUBRICANT EVALUATION
ASTM TC SEQUENCE III

SUMMARY OF ENGINE TEST RESULTS
YAMAHA CE50S TIGHTENING TEST

Sponsor Code: ccccccccccccccccccccccc Lab Code: ccccccccccccccccc Test Number: ccccccccccccccccccccccc

Test Conditions Data

Test Hours	Preignition, °F Major	Preignition, °F Minor	Spark Plug Change	Exhaust Change
CCCCC	CCC	CCC	CCC	CCC
CCCCC	CCC	CCC	CCC	CCC
CCCCC	CCC	CCC	CCC	CCC
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TWO-STROKE-CYCLE GASOLINE ENGINE LUBRICANT EVALUATION
ASTM TC SEQUENCE III

SUMMARY OF ENGINE TEST RESULTS
YAMAHA CE50S TIGHTENING TEST

Sponsor Code: ccccccccccccccccccccccc Lab Code: ccccccccccccccccc Test Number: ccccccccccccccccccccccc

Engine Inspection

	Merit Number
Piston Varnish	
Thrust	S1.1
Anti-Thrust	S1.1
Average	S1.1
Top Ring Land	S1.1
Second Ring Land	S1.1
Undercrown	S1.1
Ring Sticking	
Top Ring	S1.1
Second Ring	S1.1
Cylinder Liner Varnish	S1.1
Wristpin Varnish	S1.1
Wristpin Bearing Varnish	S1.1
Deposits	
Piston Crown	S1.1
Cylinder Head	S1.1
Exhaust Port Clogging	S1.1
Piston Scuffing	S1.1
Thrust	S1.1
Anti-Thrust	
Cylinder Linder Scuffing	S1.1
Total CRC Demerit	S123.123
Top Ring Land	S123.123
Second Ring Land	

TWO-STROKE-CYCLE GASOLINE ENGINE LUBRICANT EVALUATION
ASTM TC SEQUENCE III TEST PROCEDURE

Test Oil Code: ccccccccccccccccccccccccccccccccccccc	Test Number: ccccccccccccccccccccccccccccccc	EOT Date: YYYYMMDD

Total Number of Remarks or Deviations S12

Remark or Deviation

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TWO-STROKE-CYCLE GASOLINE ENGINE LUBRICANT EVALUATION
ASTM TC SEQUENCE III TEST PROCEDURE

Test Oil Code: cccccccccccccccccccccccccccccccccccccc	**Test Number:** cccccccccccccccccccccccccccccc	**EOT Date:** YYYYMMDD

Total Number of Remarks or Deviations S12

Remark or Deviation

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TWO-STROKE-CYCLE GASOLINE ENGINE LUBRICANT EVALUATION
ASTM TC SEQUENCE III TEST PROCEDURE

Test Oil Code: cccccccccccccccccccccccccccccccccccccc	Test Number: cccccccccccccccccccccccccc	EOT Date: YYYYMMDD

S12

Total Number of Remarks or Deviations

<u>Remark or Deviation</u>

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TWO-STROKE-CYCLE GASOLINE ENGINE LUBRICANT EVALUATION
ASTM TC SEQUENCE III

SUMMARY OF ENGINE TEST RESULTS

Lab: CC	**EOT Date:** YYYYMMDD	**End Time:** HH:MM
Stand: CCCCC	**Run Number:** CCCC	
Formulation / Stand Code: CC-CCCCCCCCCC-C-C-CCCCCC-CC-CC-CCCCC		
Supplier: CCCCCCCCCCCCCCCCCCCC	**Batch Identifier**: CCCCCCCCCC	

Measurement	Specs.	Analysis	Test Method
Gravity, °API		S1.1	
Color		CCCCCCCC	
Doctor Test		CCCCCCCC	
Copper Corrosion, 3h @ 212 °F	1 Maximum	XXXX	D 130
Reid Vapor Pressure, psig		S.1	
Research Octane Number		S1.1	
Motor Octane Number		S1.1	
(Research + Motor) / 2		S1.1	
Total Sulfur, % Weight	0.04 - 0.05	S1.12	D 2622
Gum, mg/100 mL		S.1	
Oxidation Stability, min		S1234	
Lead, g/gal		S1.123	
Distillation, °C			
IBP	Report	S1234	D 86
10%	Report	S1234	D 86
50%	Report	S1234	D 86
90%	282 - 338	S1234	D 86
EP	Report	S1234	D 86
Recovery, %		S12.1	
Pona, % vol			
Paraffins + Napthenes		S12.1	
Olefin	Report	S12.1	D 1319
Aromatics % Vol.	28 - 33	S12.1	D 1319