TWO-STROKE-CYCLE GASOLINE ENGINE LUBRICANT EVALUATION

D4858 ASTM TC SEQUENCE III Test Procedure
Title / Validity Declaration Page

VERSION 20020115 BETA

CONDUCTED FOR

	V = VALID
	I = INVALID

Non-Reference
Primary Oil Code:
Test Number:
EOT Date:
EOT Time:
Alternate Codes:

I certify that test number _____ 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 _____ demonstrated performance equal to or better than that of the reference lubricant within the tolerences specified in Test Method D4858.

SUBMITTED BY: _____
Testing Laboratory

_____
Signature

_____
Typed Name

_____
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 retorqued 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:	Test Number:	Start Date:
Lab Code:	Fuel Oil Ratio:	E.O.T. Date:
Fuel Code:	Stand Number:	Hours:
Industry Oil Code:		

Test Conditions Data

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

	Preignition		Spark Plug	Exhaust
	Major	Minor	Change	Change
Totals				

Previous Reference Data

Code	Test No.	Date	Preignition Major	Preignition Minor

[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: _____ Lab Code: _____ Test Number: _____

Test Conditions Data

Test	Preignition, ˚F		Spark Plug	Exhaust
Hours	Major	Minor	Change	Change

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

SUMMARY OF ENGINE TEST RESULTS
YAMAHA CE50S TIGHTENING TEST

Sponsor Code: _____ Lab Code: _____ Test Number: _____

Engine Inspection

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

TWO-STROKE-CYCLE GASOLINE ENGINE LUBRICANT EVALUATION

ASTM TC SEQUENCE III Test Procedure

Test Oil Code:	**Test Number:**	**EOT Date:**

Total Number of Remarks or Deviations

Remark or Deviation

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

SUMMARY OF ENGINE TEST RESULTS

Lab:	**EOT Date:**	**End Time:**
Stand:	**Run Number:**	
Oilcode:		
Formulation / Stand Code:		
Supplier:	**Batch Identifier:**	

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