TWO-STROKE-CYCLE GASOLINE ENGINE LUBRICANT EVALUATION

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

VERSION 20011213

CONDUCTED FOR

TSTSPON1
TSTSPON2

LABVALID	V = VALID
	I = INVALID

Non-Reference		
Primary Oil Code:	OILCODE	
Test Number:	TESTNUM	
EOT Date:	DTCOMP	
EOT Time:	EOTTIME	
Alternate Codes:	ALTCODE1	ALTCODE2

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

SUBMITTED BY: SUBLAB
Testing Laboratory

SUBSIGIM
Signature

SUBNAME
Typed Name

SUBTITLE
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: OILCODE	Test Number: TESTNUM	Start Date: DTSTRT
Lab Code: LABOCODE	Fuel Oil Ratio: FUELOILR	E.O.T. Date: DTCOMP
Fuel Code: FUEL	Stand Number: STAND	Hours: TESTLEN
Industry Oil Code: IND		

Test Conditions Data

Miscellaneous	Maximum	Minimum	Average
Engine Speed, r/min	XRPM	IRPM	ARPM
Observed Load, hp	XLOAD	ILOAD	ALOAD
Corrected Load, hp*	XCLOAD	ICLOAD	ACLOAD
Fuel Flow, lb/h.	XFFLO	IFFLO	AFFLO
Exhaust Back Press. in. H2O	XEXHBKP	IEXHBKP	AEXHBKP
Barometer, in. Hg	XBAROP	IBAROP	ABAROP
Temperature, ˚F			
Spark Plug	XSPKGT	ISPKGT	ASPKGT
Combustion Chamber	XCOMBUS	ICOMBUS	ACOMBUS
Exhaust	MEXHGT	IEXHGT	AEXHGT
Fuel	XFUELT	IFUELT	AFUELT
Intake Air, Carburetor	XIAIRT	IIAIRT	AIAIRT
Ambient	XAMBT	IAMBT	AAMBT
Wet	XWETTMP	IWETTMP	AWETTMP
Dry	XDRYTMP	IDRYTMP	ADRYTMP

	Preignition		Spark Plug	Exhaust
	Major	Minor	Change	Change
Totals	TPREIG	TMPREIG	TSPKPC	TEXHC

Previous Reference Data

			Preignition	
Code	Test No.	Date	Major	Minor
ROILCOD1	RTSTNUM1	RDTCOMP1	RTPREIG1	RTMPREG1
ROILCOD2	RTSTNUM2	RDTCOMP2	RTPREIG2	RTMPREG2

[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: OILCODE Lab Code: LABOCODE Test Number: TESTNUM

Test Conditions Data

Test Hours	Preignition, ˚F Major	Minor	Spark Plug Change	Exhaust Change
TESTR001	PREGR001	MPRER001	SPKCR001	EXHCR001

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

SUMMARY OF ENGINE TEST RESULTS
YAMAHA CE50S TIGHTENING TEST

Sponsor Code: OILCODE Lab Code: LABOCODE Test Number: TESTNUM

Engine Inspection

	Merit Number
Piston Varnish	
Thrust	PSIMTOT
Anti-Thrust	PSEMTOT
Average	PCDTOT
Top Ring Land	LTMTOT
Second Ring Land	L2MTOT
Undercrown	UCMTOT
Ring Sticking	
Top Ring	PSRST
Second Ring	PSRS2
Cylinder Liner Varnish	CYLVTOT
Wristpin Varnish	WPINVTOT
Wristpin Bearing Varnish	WBRGVTOT
Deposits	
Piston Crown	PCMTOT
Cylinder Head	CHMTOT
Exhaust Port Clogging	EXHPTOT
Piston Scuffing	
Thrust	PSISTOT
Anti-Thrust	PSESTOT
Cylinder Linder Scuffing	CYLSTOT
Total CRC Demerit	
Top Ring Land	LTCRCTOT
Second Ring Land	L2CRCTOT

TWO-STROKE-CYCLE GASOLINE ENGINE LUBRICANT EVALUATION

ASTM TC SEQUENCE III Test Procedure

Test Oil Code: OILCODE	**Test Number:** TESTNUM	**EOT Date:** DTCOMP

Total Number of Remarks or Deviations OPROCR

Remark or Deviation

OCOMR001

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

SUMMARY OF ENGINE TEST RESULTS

Lab: LAB	**EOT Date:** DTCOMP	**End Time:** EOTTIME
Stand: STAND	**Run Number:** ENRUN	
Oilcode: OILCODE		
Formulation / Stand Code: FORM		
Supplier: FUELSUP	**Batch Identifier:** FUELBTID	

Measurement	Specs.	Analysis	Test Method
Gravity, ˚API		APIGRNEW	
Color		FUELCOL	
Doctor Test		FUELDRT	
Copper Corrosion, 3 h @ 212 ˚F	1 Maximum	FUELCU	D 130
Reid Vapor Pressure, psig		FUELREID	
Research Octane Number		ROCTANEN	
Motor Octane Number		MOCTANEN	
(Research + Motor) / 2		RMOTOR2	
Total Sulfur, % Weight	0.04 - 0.05	FUELSNEW	D 2622
Gum, mg/100 mL		FUELGUM	
Oxidation Stablility, min		FUELOXS	
Lead, g/gal		FUELPB	
Distillation, ˚C			
IBP	Report	FUELIBP	D 86
10%	Report	FUEL10	D 86
50%	Report	FUEL50	D 86
90%	282 - 338	FUEL90	D 86
EP	Report	FUELEP	D 86
Recovery, %		FUELRECO	
Pona, % vol			
Paraffins + Napthenes		FUELPN	
Olefin	Report	FUELOLEF	D 1319
Aromatics % Vol.	28 - 33	FUELAROM	D 1319