

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

VERSION TC3 VERSION 20020115

CONDUCTED FOR
TSTSPON1
TSTSPON2

LABVALID	I = Invalid
	V =Valid

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

I certify that test number OPVALID 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 TESTNUM 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 preignition 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**

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

Test Conditions Data

<u>Miscellaneous</u>	<u>Maximum</u>	<u>Minimum</u>	<u>Average</u>
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	XFUEL	IFUEL	AFUEL
Intake Air, Carburetor	XIAIRT	IIAIRT	AIAIRT
Ambient	XAMBT	IAMBT	AAMBT
Wet	XWETTMP	IWETTMP	AWETTMP
Dry	XDRYTMP	IDRYTMP	ADRYTMP

	<u>Preignition</u>	<u>Spark Plug</u>	<u>Exhaust</u>
	<u>Major</u>	<u>Minor</u>	<u>Change</u>
Totals	TPREIG	TMPREIG	TSPKPC
			TEXHC

Previous Reference Data

<u>Code</u>	<u>Test No.</u>	<u>Date</u>	<u>Preignition</u>	<u>Preignition</u>
			<u>Major</u>	<u>Minor</u>
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		Spark Plug Change	Exhaust Change
	Major	Minor		
TESTR001	PREGR001	MPRER001	SPKCR001	EXHCR001
TESTR002	PREGR002	MPRER002	SPKCR002	EXHCR002
TESTR003	PREGR003	MPRER003	SPKCR003	EXHCR003
TESTR004	PREGR004	MPRER004	SPKCR004	EXHCR004
TESTR005	PREGR005	MPRER005	SPKCR005	EXHCR005
TESTR006	PREGR006	MPRER006	SPKCR006	EXHCR006
TESTR007	PREGR007	MPRER007	SPKCR007	EXHCR007
TESTR008	PREGR008	MPRER008	SPKCR008	EXHCR008
TESTR009	PREGR009	MPRER009	SPKCR009	EXHCR009
TESTR010	PREGR010	MPRER010	SPKCR010	EXHCR010
TESTR011	PREGR011	MPRER011	SPKCR011	EXHCR011
TESTR012	PREGR012	MPRER012	SPKCR012	EXHCR012
TESTR013	PREGR013	MPRER013	SPKCR013	EXHCR013
TESTR014	PREGR014	MPRER014	SPKCR014	EXHCR014
TESTR015	PREGR015	MPRER015	SPKCR015	EXHCR015

**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

<u>Test Hours</u>	<u>Preignition, °F</u>		<u>Spark Plug Change</u>	<u>Exhaust Change</u>
	<u>Major</u>	<u>Minor</u>		
TESTR016	PREGR016	MPRER016	SPKCR016	EXHCR016
TESTR017	PREGR017	MPRER017	SPKCR017	EXHCR017
TESTR018	PREGR018	MPRER018	SPKCR018	EXHCR018
TESTR019	PREGR019	MPRER019	SPKCR019	EXHCR019
TESTR020	PREGR020	MPRER020	SPKCR020	EXHCR020
TESTR021	PREGR021	MPRER021	SPKCR021	EXHCR021
TESTR022	PREGR022	MPRER022	SPKCR022	EXHCR022
TESTR023	PREGR023	MPRER023	SPKCR023	EXHCR023
TESTR024	PREGR024	MPRER024	SPKCR024	EXHCR024
TESTR025	PREGR025	MPRER025	SPKCR025	EXHCR025
TESTR026	PREGR026	MPRER026	SPKCR026	EXHCR026
TESTR027	PREGR027	MPRER027	SPKCR027	EXHCR027
TESTR028	PREGR028	MPRER028	SPKCR028	EXHCR028
TESTR029	PREGR029	MPRER029	SPKCR029	EXHCR029
TESTR030	PREGR030	MPRER030	SPKCR030	EXHCR030

**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

<u>Test Hours</u>	<u>Preignition, °F</u>		<u>Spark Plug Change</u>	<u>Exhaust Change</u>
	<u>Major</u>	<u>Minor</u>		
TESTR031	PREGR031	MPRER031	SPKCR031	EXHCR031
TESTR032	PREGR032	MPRER032	SPKCR032	EXHCR032
TESTR033	PREGR033	MPRER033	SPKCR033	EXHCR033
TESTR034	PREGR034	MPRER034	SPKCR034	EXHCR034
TESTR035	PREGR035	MPRER035	SPKCR035	EXHCR035
TESTR036	PREGR036	MPRER036	SPKCR036	EXHCR036
TESTR037	PREGR037	MPRER037	SPKCR037	EXHCR037
TESTR038	PREGR038	MPRER038	SPKCR038	EXHCR038
TESTR039	PREGR039	MPRER039	SPKCR039	EXHCR039
TESTR040	PREGR040	MPRER040	SPKCR040	EXHCR040
TESTR041	PREGR041	MPRER041	SPKCR041	EXHCR041
TESTR042	PREGR042	MPRER042	SPKCR042	EXHCR042
TESTR043	PREGR043	MPRER043	SPKCR043	EXHCR043
TESTR044	PREGR044	MPRER044	SPKCR044	EXHCR044
TESTR045	PREGR045	MPRER045	SPKCR045	EXHCR045

**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

	<u>Merit Number</u>
Piston Varnish	PSIMTOT
Thrust	PSEMTOT
Anti-Thrust	PCDTOT
Average	
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
<u>Remark or Deviation</u>		
OCOMR001		
OCOMR002		
OCOMR003		
OCOMR004		
OCOMR005		
OCOMR006		
OCOMR007		
OCOMR008		
OCOMR009		
OCOMR010		
OCOMR011		
OCOMR012		
OCOMR013		
OCOMR014		
OCOMR015		

**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
<u>Remark or Deviation</u>		
OCOMR016		
OCOMR017		
OCOMR018		
OCOMR019		
OCOMR020		
OCOMR021		
OCOMR022		
OCOMR023		
OCOMR024		
OCOMR025		
OCOMR026		
OCOMR027		
OCOMR028		
OCOMR029		
OCOMR030		

**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
<u>Remark or Deviation</u>		
OCOMR031		
OCOMR032		
OCOMR033		
OCOMR034		
OCOMR035		
OCOMR036		
OCOMR037		
OCOMR038		
OCOMR039		
OCOMR040		
OCOMR041		
OCOMR042		
OCOMR043		
OCOMR044		
OCOMR045		

**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	
Formulation / Stand Code: FORM		
Supplier: FUELSUP	Batch Identifier: FUELBTID	

Measurement	Specs.	Analysis	Test Method
Gravity, °API		APIGRNEW	
Color		FUELCOL	
Doctor Test		FUELDRT	
Copper Corrosion, 3h @ 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 Stability, 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