

Submitted for recognition as an American National Standard

**TWO-STROKE-CYCLE GASOLINE ENGINE LUBRICANTS
PERFORMANCE AND SERVICE CLASSIFICATION**

1. SCOPE:

This SAE Standard was prepared by Technical Committee 6, Small Engine Lubricants, of the SAE Fuels and Lubricants Division. The intent is to improve communications among engine manufacturers, engine users, and lubricant marketers in describing lubricant performance characteristics. The key objective is to ensure that a correct lubricant is used in each two-stroke-cycle engine.

1.1 Background:

SAE J1510 previewed the cooperative effort of SAE, ASTM, API, and CEC in developing a universal classification for engine performance. SAE J1510 provides a great deal of information on the properties of two-stroke-cycle lubricants.

SAE J1536 is a classification in rheological terms only. SAE J1536 is a companion classification to SAE J2116. By use of both SAE J1536 and SAE J2116, any lubricant can be classified in terms of both rheology and engine performance.

2. REFERENCES:

2.1 Applicable Documents:

2.1.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1510 Lubricants for Two-Stroke-Cycle Gasoline Engines
SAE J1536 Two-Stroke-Cycle Oil Miscibility/Fluidity Classification

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2.1.2 ASTM Publications: Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

- ASTM D 4681-87 Specification for Lubricants for Two-Stroke-Cycle Gasoline Engines (TSC-4)
- ASTM D 4857-88 Test Method for Determination of the Ability of Lubricants to Minimize Ring Sticking and Piston Deposits in Two-Stroke-Cycle Gasoline Engines Other Than Outboards
- ASTM D 4858-88 Test Method for Determination of the Tendency of Lubricants to Promote Preignition in Two-Stroke-Cycle Gasoline Engines
- ASTM D 4859-88 Specification for Lubricants for Two-Stroke-Cycle Spark-Ignition Gasoline Engines - TC
- ASTM D 4863-88 Test Method for Determination of Lubricity of Two-Stroke-Cycle Gasoline Engine Lubricants

3. PERFORMANCE CHARACTERISTICS:

There are a number of engine test rating areas which are indicative of the contribution of a lubricant to the proper performance and durability of a two-stroke-cycle engine. In each category within this classification, the relevant rating areas are given numerical limits which permit assignment of a pass or fail to the performance of a lubricant. These areas include:

- a. Ring sticking
- b. Varnish (which may include piston skirts, lands, and undercrowns)
- c. Preignition
- d. Scuffing
- e. Exhaust system blockage

Table 1 relates these performance characteristics to the critical lubrication requirements of each of the four Performance and Service categories. To assist in understanding the purpose of each category, normal engine service applications are also provided.

4. PERFORMANCE CRITERIA:

Table 2 summarizes the ASTM standard test methods, test engines, and primary performance criteria for each category.

TABLE 1 - Performance and Service Classification
Two-Stroke-Cycle Gasoline Engine Lubricants
Critical Lubrication Requirements and Normal Service Applications

API Letter Designation	Critical Lubrication Requirements	Normal Engine Service Applications
TA	<ul style="list-style-type: none"> • Piston Scuffing • Exhaust System Blocking 	Mopeds and other Extremely Small Engines (Typically <50cc)
TB	<ul style="list-style-type: none"> • Piston Scuffing • Deposit-Induced Preignition • Power Loss due to Combustion Chamber Deposits 	Motorscooters and other Highly Loaded Small Engines (Typically 50cc to 200cc)
TC	<ul style="list-style-type: none"> • Ring Sticking • Deposit-Induced Preignition • Piston Scuffing 	Various High Performance Engines (Not Outboards) (Typically 20cc to 500cc)
TD	<ul style="list-style-type: none"> • Piston Scuffing • Ring Sticking • Deposit-Induced Preignition 	Outboard Engines

TABLE 2 - Performance and Service Classification
Two-Stroke-Cycle Gasoline Engine Lubricants
Test Methods and Primary Oil Performance Criteria

Letter Designation	ASTM ¹ Designation	Test Engine	Primary Performance Criteria
TA	Not yet Assigned	Yamaha CE50S	Tightening - Method in Preparation Exhaust Blocking - Method in Preparation
TB	Not yet Assigned	Vespa 125TS	Tightening - Method in Preparation Preignition - Method in Preparation Power Loss - Method in Preparation

¹ Latest version of the ASTM Designation should be used.

TABLE 2 (Continued)
 Performance and Service Classification
 Two-Stroke-Cycle Gasoline Engine Lubricants
 Test Methods and Primary Candidate Oil Performance Criteria

Letter Designation	ASTM ¹ Designation	Test Engine	Primary Performance Criteria
TC	D 4859-88	-Covers Category TC comprehensively, including	Primary Performance Criteria-
	D 4857-88	Yamaha RD 350B	<u>Ring Sticking/Deposits</u> <u>In two (crossover) test runs</u> Second Ring Sticking, Avg. 0.5 Max below Reference Oil Piston Skirt Varnish, Avg. 0.5 Max below Reference Oil Plug Fouls 2 Max above Reference Oil Preignitions (major) 1 Max per run Exhaust Blocking 10% Max above Reference Oil Scuff/Seizure None <u>In one (without crossover) test run</u> Second Ring Sticking, Avg. 9.0 Min Piston Skirt Varnish, Avg. Absolutely equal or better than Reference Oil Plug Fouls 1 Max Preignition None Exhaust Blocking 5% Max above Reference Oil Scuff or other Lube-related damage None
	D 4858-88	Yamaha CE50S	<u>Preignition</u> Preignitions (Major) 1 Max Other See D 4859, Paras 6.4.2 and 6.4.3
	D 4863-88	Yamaha CE50S	<u>Lubricity</u> Torque Drop No more than reference oil within 90% confidence limit

TABLE 2 (Continued)
 Performance and Service Classification
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Letter Designation	ASTM ¹ Designation	Test Engine	Primary Performance Criteria	
TD	D 4681-87 ²	OMC 90 HP	<u>Outboard Lubrication</u>	
			Accelerated Lubricity	No piston scuff or significant bore damage
			Top Ring Sticking, Avg.	Not more than 1.0 points below reference oil engine
			Piston Varnish, Avg.	Not more than 0.5 points below reference oil engine
			Preignition	No more than in reference oil engine
			Plug Fouling	Max of one more than in reference oil engine
			Exhaust Port Blocking	Max of 10% more than in reference oil engine

¹ Latest version of the ASTM Designation should be used.

² The engine test in this Standard Specification is identical to that in National Marine Manufacturers (NHMA) TC-W (312-84)

RATIONALE:

To improve communications among engine manufacturers, engine users, and lubricant marketers in describing lubricant performance characteristics.

RELATIONSHIP OF SAE STANDARD TO ISO STANDARD:

API letter designations are compatible with ISO nomenclature.

APPLICATION:

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COMMITTEE COMPOSITION:

DEVELOPED BY THE SAE FUELS AND LUBRICANTS TECHNICAL COMMITTEE 6 - SMALL ENGINE LUBRICANTS

SPONSORED BY THE FUELS AND LUBRICANTS DIVISION COMMITTEE