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SURFACE VEHICLE STANDARD

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An American National Standard

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

***Foreword*—**This Document has also changed to comply with the new SAE Technical Standards Board format.

1. ***Scope*—**This SAE Standard was prepared by Technical Committee 6, Small Engine Lubricants, of 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 Publications—The following publications form a part of the specification to the extent specified herein. Unless otherwise indicated the latest revision of SAE publications shall apply.

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

2.1.2 ASTM PUBLICATIONS—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

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

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ASTM D 4863-88—Test Method for Determination of Lubricity of Two-Stroke-Cycle Gasoline Engine Lubricants

2.1.3 NATIONAL MARINE MANUFACTURERS PUBLICATION—Available from NMMA, 401 North Michigan, Chicago, IL 60611.

TC-W (312-84)

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, primary performance criteria, and status for each category.

TABLE 1—PERFORMANCE AND SERVICE CLASSIFICATION TWO-STROKE-CYCLE GASOLINE ENGINE LUBRICANTS CRITICAL LUBRICATION REQUIREMENTS AND NORMAL SERVICE

API Letter Designation	Critical Lubrication Requirements	Normal Engine Service Applications
TA	• Piston Scuffing • Exhaust System Blocking	Mopeds and other Extremely Small Engines (Typically <50 cc)
TB	• Piston Scuffing • Deposit-Induced Preignition • Power Loss due to Combustion Chamber Deposits	Motorscooters and other Highly Loaded Small Engines (Typically 50 cc to 200 cc)
TC	• Ring Sticking • Deposit-Induced Preignition • Piston Scuffing	Various High-Performance Engines (Not Outboards) (Typically 20 cc to 500 cc)
TD	• 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 CANDIDATE OIL PERFORMANCE CRITERIA

Letter Designation	Status	ASTM[1] Designation	Test Engine	Primary Performance Criteria	
TA	Obsolete[2] as of MAR93	Not yet assigned	Yamaha CE50S	Tightening—Method in preparation Exhaust Blocking—Method in preparation	
TB	Obsolete[3] as of MAR93	Not applicable	Vespa 125TS	Tightening—Method never developed Preignition—Method never developed Power Loss—Method never developed	
TC		D 4859-88	Covers Category TC comprehensively, including Primary Performance Criteria		
		D 4857-88	Yamaha RD 350B	Ring Sticking/Deposits In Two (crossover) test runs	
				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
				Preignition (major)	1 Max per run
				Exhaust Blocking	10% Max above Reference Oil
				Scuff/Seizure	None
				In one (without crossover) test run	
				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	Preignition	

**TABLE 2—PERFORMANCE AND SERVICE CLASSIFICATION
TWO-STROKE-CYCLE GASOLINE ENGINE LUBRICANTS
TEST METHODS AND PRIMARY CANDIDATE OIL PERFORMANCE CRITERIA (CONTINUED)**

Letter Designation	Status	ASTM[1] Designation	Test Engine	Primary Performance Criteria	
				Preignitions (major)	1 Max
				Other	See D 4859, Paras 6.4.2 and 6.4.3
		D 4863-88	Yamaha CE50S	Lubricity	
				Torque Drop	No more than reference oil within 90% confidence limit
TD	Obsolete[4] as of MAR83	D 4681-87[5]	OMC 90 HP	Outboard Lubrication	
				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 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. CEC withdrew support for this category.
3. Test sponsor no longer desired this oil category.
4. This category has been superseded and is no longer recommended by the National Marine Manufacturers Association.
5. The engine test in this Standard Specification is identical to that in National Marine Manufacturers (NMMA) TC-W (312-84).