

Two-Stroke-Cycle Engine Oil Fluidity/Miscibility Classification

1. **Scope**—This SAE Recommended Practice is intended for use by engine manufacturers in determining the Fluidity/Miscibility Grades to be recommended for use in their engines, and by oil marketers in formulating and labeling their products.

2. References

2.1 **Applicable Publications**—The following publications form a part of this specification to the extent specified herein.

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

ASTMD4682—Specification for Miscibility With Gasoline and Fluidity of Two-Stroke-Cycle Gasoline Engine Lubricants

ASTMD4857—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

ASTMD4858—Test Method for Determination of the Tendency of Lubricants to Promote Preignition in Two-Stroke-Cycle Gasoline Engines

ASTMD4859—Specification for Lubricants for Two-Stroke-Cycle Spark-Ignition Gasoline Engines—TC

ASTMD4863—Test Method for Determination of the Lubricity of Two-Stroke Gasoline Engine Lubricants

3. The SAE Fluidity/Miscibility Grades defined in Tables 1 and 2 constitute a classification for two-stroke-cycle engine lubricating oils in rheological terms only. Other oil characteristics are not considered or included.

Fluidity and Miscibility are measured according to test procedures described in ASTM D 4682-87. These test procedures relate to the two common methods for introducing lubricating oils into two-stroke-cycle engines as defined in Table 3.

Most oils will meet the requirements of one of the grades. In labeling an oil with its Fluidity/Miscibility Grade, only the highest grade may be referred to on the label.

Listed are all documents which have been published in support of the Two-Stroke Engine Oil Fluidity/Miscibility Classification and the Two-Stroke Engine Oil Performance and Service Classification. In brief, they are:

- a. Fluidity/Miscibility—SAE J1536 and ASTM D 4682
- b. Performance/Service TC (Formerly TSC-3)—ASTM D 4859, 4857, 4858, 4863

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TABLE 1—SAE MISCIBILITY GRADES FOR TWO-STROKE-CYCLE ENGINE OILS

Grade	Test Temperature °C ⁽¹⁾	Reference ⁽²⁾ Oil
1	0	VI-GG
2	-10	VI-FF
3	-25	VI-D
4	-40	VI-II

- Both Miscibility and Brookfield tests must be run on a candidate oil at the temperature intended for qualification.
- Miscibility revolutions on the candidate oil must not exceed those on the reference oil by more than 10% to qualify under a grade.

TABLE 2—SAE FLUIDITY GRADES FOR TWO-STROKE-CYCLE ENGINE OILS

Grade	Test Temperature °C ⁽¹⁾	Maximum Viscosity cP ⁽²⁾	Reference Oil ⁽³⁾	Reference Oil Limits cP ⁽²⁾
1	0	3 500	N74B	3 250 - 3 600
2	-10	3 500	N38B	2 900 - 3 300
3	-25	7 500	N25B	7 600 - 8 700
4	-40	17 000	N14B	16 000 - 18 000

- Both Miscibility and Brookfield tests must be run on a candidate oil at the temperature intended for qualification.
- Brookfield viscosity in centipoise on the candidate oil must not exceed the maximum limit as shown for each temperature. The test must be monitored by running a reference oil with each set of tests (same freezer, same time), and the reference oil result must be within the set limits.
- Available from Cannon Instrument Company,

TABLE 3—RHEOLOGICAL TEST PROCEDURES FOR TWO-STROKE-CYCLE ENGINE OILS

Test Procedure	Lubricating Oil Introduction By	Location
Miscibility	Mixture with fuel	In fuel tank or fuel line
Fluidity	Lube injection	Into air/fuel or fuel stream or at other points

4. Notes

- 4.1 Marginal Indicia**—The change bar (I) located in the left margin is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. An (R) symbol to the left of the document title indicates a complete revision of the report.

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