



Standard Test Method for Coolant Compatibility of Way Lubricants¹

This standard is issued under the fixed designation D 6553; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method measures the ability of single-use way lubricants to separate from metalworking coolants (synthetic coolants, semisynthetic coolants, and soluble oils) or other alkaline aqueous fluids.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* For specific precautionary statements, see Section 7.

2. Referenced Documents

2.1 *ASTM Standards:*

D 1193 Specification for Reagent Water²

D 1401 Test Method for Water Separability of Petroleum Oils and Synthetic Fluid³

D 4057 Practice for Manual Sampling of Petroleum and Petroleum Products⁴

3. Terminology

3.1 *Definitions:*

3.1.1 *cuff*—a layer between the way oil layer and the coolant or buffer layer that contains significant amounts of both. In describing this intermediate layer, *cuff* is preferred to *emulsion* since many of the coolants are themselves emulsions.

4. Summary of Test Method

4.1 This test procedure is essentially identical to Test Method D 1401, with the actual coolant or an alkaline buffer replacing the distilled water of that test method. A 40-mL sample and 40 mL of either actual coolant or a pH 9.0 buffer

solution (see Note 1) are stirred for 5 min at 54°C (see Note 2) in a graduated cylinder. The time required for the separation of the emulsion thus formed is recorded. If complete separation or emulsion reduction to 3 mL or less does not occur after standing for 30 min, the volumes of oil (or fluid), water, and emulsion remaining at the time are reported.

NOTE 1—Distilled water is not a satisfactory aqueous phase for testing the ability of way lubricants to separate from coolants because distilled water gives different results from coolants. The best procedure is to use the actual coolant that the way lubricant will contaminate. A buffer solution of pH 9.0 may be used in place of a specific coolant to predict the separability from alkaline coolants in general.

NOTE 2—It is recommended, however, that the test temperature be raised to $82 \pm 1^\circ\text{C}$ when testing way lubricants more viscous than 90 cSt (mm²/s) at 40°C.

5. Significance and Use

In the normal use of a way lubricant in a machine tool, the way lubricant eventually becomes a contaminant that may emulsify into the coolant. It is generally desirable to remove this contaminant by skimming; otherwise, the coolant lifetime may be significantly shortened. This test method provides a guide for determining the separability characteristics of way lubricants that are expected to get into aqueous alkaline metalworking coolants. It is used for specification of new oils and might be useful in monitoring of in-service oils.

6. Apparatus

6.1 *Cylinder*, 100 mL, graduated from 5 to 100 mL in 1.0-mL divisions, made of glass, heat-resistant glass, or a chemical equivalent. The inside diameter shall be no less than 27 mm and no more than 30 mm throughout its length, measured from the top to a point 6 mm from the bottom of the cylinder. The overall length of the cylinder shall be 225 to 260 mm. The graduation shall not be in error by more than 1 mL at any point on the scale.

6.2 *Heating Bath*, sufficiently large and deep enough to permit the immersion of at least two test cylinders in the bath liquid up to their 85-mL graduations. The bath shall be capable of being maintained at a temperature of $54 \pm 1^\circ\text{C}$ (see Note 2), and shall be fitted with clamps, which hold the cylinder in a position so that the longitudinal axis of the paddle corresponds to the vertical center line of the cylinder during the stirring

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.L0 on Industrial Lubricants.

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² *Annual Book of ASTM Standards*, Vol 11.01.

³ *Annual Book of ASTM Standards*, Vol 05.01.

⁴ *Annual Book of ASTM Standards*, Vol 05.02.