



## Standard Test Method for Roll Stability of Lubricating Grease<sup>1</sup>

This standard is issued under the fixed designation D 1831; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

### 1. Scope

1.1 This test method covers determination of the changes in the consistency, as measured by cone penetration, of lubricating greases when worked in the roll stability test apparatus.

1.2 The values stated in inch-pound units for the apparatus dimensions are to be regarded as standard; the SI conversions are provided for information only. All other values stated in SI units are standard.

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.*

### 2. Referenced Documents

#### 2.1 ASTM Standards:

D 217 Test Methods for Cone Penetration of Lubricating Grease<sup>2</sup>

D 1403 Test Method for Cone Penetration of Lubricating Grease Using One-Quarter and One-Half Scale Cone Equipment<sup>2</sup>

D 4175 Terminology Relating to Petroleum, Petroleum Products, and Lubricants<sup>3</sup>

### 3. Terminology

#### 3.1 Definitions:

3.1.1 *lubricating grease, n*—a semi-fluid to solid product of a dispersion of a thickener in a liquid lubricant.

3.1.1.1 *Discussion*—The dispersion of the thickener forms a two-phase system and immobilizes the liquid lubricant by surface tension and other physical forces. Other ingredients imparting special properties are often included. D 217

3.1.2 *lubricant, n*—any material interposed between two surfaces that reduces the friction or wear between them. D 4175

3.1.3 *thickener, n*—in lubricating grease, a substance composed of finely divided particles dispersed in a liquid lubricant

to form the product's structure.

3.1.3.1 *Discussion*—The thickener can be fibers (such as various metallic soaps) or plates or spheres (such as certain non-soap thickeners) which are insoluble or, at the most, only very slightly soluble in the liquid lubricant. The general requirements are that the solid particles be extremely small, uniformly dispersed, and capable of forming a relatively stable, gel-like structure with the liquid lubricant. D 217

3.1.4 *consistency, n*—of lubricating grease, the degree of resistance to movement under stress.

3.1.4.1 *Discussion*—The term consistency is used somewhat synonymously with penetration. Generally, consistency refers to the worked penetration of a grease. D 217

3.1.5 *penetration, n*—of lubricating grease, the depth that the standard cone, when released to fall under its own weight for 5 s, enters the sample. D 217

3.1.6 *working, n*—of lubricating grease, the subjection of a sample to the shearing action of the standard grease worker. D 217

3.1.7 *worked penetration, n*—of lubricating grease, the penetration at 25°C (77°F), without delay, of a sample after 60 double strokes in a standard grease worker. D 217

#### 3.2 Definitions of Terms Specific to This Standard:

3.2.1 *roll stability, n*—of lubricating grease, the change in consistency of a sample after a specified amount of working in a test apparatus utilizing a weighted roller inside a rotating cylinder.

### 4. Summary of Test Method

4.1 The Test Method D 1403 cone penetration of an approximately 50-g aliquot of lubricating grease is determined. The grease is then subjected to low shear at 20 to 35°C (68 to 95°F) for 2 h  $\pm$  5 min in a standard roll stability apparatus, before the cone penetration is again measured. The difference between the cone penetration before working and the cone penetration after is used as a measure of the effect of low shear working on grease consistency.

### 5. Significance and Use

5.1 The roll stability test is widely used in specifications. Test results are significant insofar as they can show a directional change in consistency that could occur in service. No accurate correlation is established between the test results and shear stability in actual service.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D-2 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.G on Lubricating Grease.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 05.01.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 05.02.