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Standard Test Methods for Cone Penetration of Lubricating Grease Using One-Quarter and One-Half Scale Cone Equipment[1]

This standard is issued under the fixed designation D1403; 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.

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

1. Scope*

1.1 These test methods cover two procedures for measuring the consistency of small samples of lubricating greases by penetration of a ¼-scale cone or a ½-scale cone. These test methods include procedures for the measurement of unworked and worked penetrations.

1.2 Unworked penetrations do not generally represent the consistency of greases in use as effectively as do worked penetrations. The latter are usually preferred for inspecting lubricating greases.

1.3 The values in SI units are to be regarded as the standard. The values given in parentheses are for information only. In the United States, the equipment dimensions stated in inches are to be regarded as the standard.

1.4 *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:*[2]

D217 Test Methods for Cone Penetration of Lubricating Grease

D4175 Terminology Relating to Petroleum, Petroleum Products, and Lubricants

2.2 *Energy Institute Standard:*[3]

IP 50 Method of Testing for Cone Penetration of Lubricating Grease

3. Terminology

3.1 *Definitions:*

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

3.1.1.1 *Discussion*—The term consistency is used somewhat synonymously with penetration. Generally, consistency refers to the worked penetration of a grease. **D217**

3.1.2 *lubricant, n*—any material interposed between two surfaces that reduces the friction or wear between them. **D4175**

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

3.1.3.1 *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. **D217**

3.1.4 *penetrometer, n*—an instrument that measures the consistency or hardness of semiliquid to semisolid materials by measuring the depth to which a specified cone or needle under a given force falls into the material.

3.1.4.1 *Discussion*—In these test methods, either a one-quarter scale cone (A1.1) or a one-half scale cone (A1.3) can be used to determine the consistency of lubricating greases. The penetration forces are determined by the respective masses of the cones and shafts.

3.1.5 *thickener, n—in lubricating grease*, a substance composed of finely divided particles dispersed in a liquid lubricant to form the product's structure.

3.1.5.1 *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

[1] These test methods are under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.G0.02 on Consistency and Related Rheological Tests.

In the IP, this test method is under the jurisdiction of the Standardization Committee. This test method has been approved by the sponsoring committee and accepted by the cooperating societies in accordance with established procedures.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from Energy Institute, 61 New Cavendish St., London, WIG 7AR, U.K., http://www.energyinst.org.uk.

***A Summary of Changes section appears at the end of this standard**

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