



Designation: D8576 – 24

Standard Test Method for Measuring the Thread Length and Pull-off Force of a Lubricating Grease by using the Falex TAA Instrument¹

This standard is issued under the fixed designation D8576; 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 covers a procedure for measuring the thread length and pull of force of lubricating greases, using the Falex Tackiness Analyzing Apparatus (TAA). Data from this test can be used to characterize cohesive, adhesive, and tackiness properties of lubricating greases, with respect to changes in retraction speed and temperature.

1.2 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

D217 Test Methods for Cone Penetration of Lubricating Grease

D1403 Test Methods for Cone Penetration of Lubricating Grease Using One-Quarter and One-Half Scale Cone Equipment

D4057 Practice for Manual Sampling of Petroleum and Petroleum Products

D4175 Terminology Relating to Petroleum Products, Liquid Fuels, and Lubricants

D6300 Practice for Determination of Precision and Bias Data for Use in Test Methods for Petroleum Products, Liquid Fuels, and Lubricants

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this test method, refer to Terminology D4175.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *cycle, n*—one indentation-retraction experiment.

3.2.1.1 *Discussion*—The experiment can be repeated on the same position, in the same grease volume, so several cycles can be programmed repetitively.

3.2.2 *force-displacement curve, n*—the curve of force versus distance when a probe is moved into a sample of grease, covering a metal substrate, and being retracted again with a given retraction speed.

3.2.2.1 *Discussion*—See Fig. 1 for an example of the force-displacement curve.

3.2.3 *grease adhesion, n*—the force (mN) needed to separate two surfaces that are connected by a grease layer.

3.2.4 *grease cavity, n*—an individually defined cavity of fixed volume and geometry that holds a pocket of test grease, formed by the mounting of a mask on top of the substrate plate of the tester.

3.2.4.1 *Discussion*—The TAA has a standard of 15 cavities.

3.2.5 *indentation-retraction experiment, n*—a probe connected to a high precision force sensor is pressed into the grease sample, held with a pre-set load for a given time, then retracted under a pre-set speed, and at a preset substrate temperature.

3.2.5.1 *Discussion*—The forces with respect to the motion of the probe are recorded to determine pull-off force and thread length. The curve is referred as the force displacement curve.

3.2.6 *probe, n*—a spherical probe with a 3 mm diameter copper tip (ball) connected to a 1000 mN sensor with a 0.01 mN resolution.

3.2.7 *pull-off force, n*—the maximum force that must be overcome to start separating the two grease-covered surfaces.

3.2.7.1 *Discussion*—Pull-off force is an indication for the adhesion of the ball to the substrate, caused by the grease film

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.G0.02 on Consistency and Related Rheological Tests.

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