



Designation: D2509 – 14^{ε1}

Standard Test Method for Measurement of Load-Carrying Capacity of Lubricating Grease (Timken Method)¹

This standard is issued under the fixed designation D2509; 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.

^{ε1} NOTE—The IP designation was removed and footnote 1 was revised editorially in March 2017.

1. Scope*

1.1 This test method covers the determination of the load-carrying capacity of lubricating greases by means of the Timken Extreme Pressure Tester.

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 warning statements, see 7.1, 7.2, and 9.4.

2. Referenced Documents

2.1 ASTM Adjuncts:

Glossy Prints of Test Blocks Showing Various Types of Scar²

3. Terminology

3.1 Definitions:

3.1.1 *load-carrying capacity, of a lubricating grease, n*—the maximum load or pressure that can be sustained by a lubricating grease without failure of the sliding contact surfaces as evidenced by seizure or welding.

3.1.1.1 *Discussion*—The values of load carrying capacity of a lubricating grease vary according to test method.

3.1.2 *scoring, in tribology, n*—a severe form of wear characterized by the formation of extensive grooves and scratches in the direction of sliding.

3.1.2.1 *Discussion*—When the lubricant film is substantially maintained, a smooth scar is obtained on the test block, but when there is a breakdown of the lubricant film, scoring or surface failure of the test block takes place as shown in Fig. 1.² In its simplest and recognized form, scoring is characterized by a wide scar on the test block and by the transfer of metal from the test block to the contacting surface of the test cup. The form of surface failure more usually encountered, however, consists of a comparatively smooth scar, which shows local damage that usually extends beyond the width of the scar. Scratches or striations that occur in an otherwise smooth scar and that do not extend beyond the width of the scar are not considered scoring in this test method. The term scuffing is sometimes used as a synonym for scoring.

3.1.3 *seizure or welding, n*—localized fusion of rubbing metal, usually indicated by streaks of transferred metal, increased friction and wear, or unusual noise and vibration.

3.1.4 *wear, n*—the removal of metal from a rubbing surface by mechanical action, or by a combination of mechanical and chemical actions.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *OK value, n*—the maximum mass (weight) added to the load lever mass (weight) pan, at which no scoring or seizure occurs.

3.2.2 *score value, n*—the minimum mass (weight) added to the load lever mass (weight) pan, at which scoring or seizure occurs.

4. Summary of Test Method

4.1 The tester is operated with a steel test cup rotating against a steel test block. The rotational speed is 800 ± 5 r/min, which is equivalent to a linear speed of 123.71 ± 0.77 m/min (405.88 ± 2.54 ft/min). Grease samples are brought to and applied at $24 \pm 6^\circ\text{C}$ ($75 \pm 10^\circ\text{F}$).

4.2 Two determinations are made: the minimum load (score value) that will rupture the lubricant film being tested between the rotating cup and the stationary block and cause adhesion; and the maximum load (OK value) at which the rotating cup will not rupture the lubricant film and cause adhesion between the rotating cup and the stationary block.

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.G0.04 on Functional Tests - Tribology.

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² Available from ASTM International Headquarters. Order Adjunct No. ADJD2509. Original adjunct produced in 1972.

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