



Standard Test Method for Determining Automotive Gear Oil Compatability with Typical Oil Seal Elastomers¹

This standard is issued under the fixed designation D 5662; 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 laboratory test method² covers the determination of the compatibility of automotive gear oils with specific nitrile, polyacrylate, and fluoroelastomer oil seal materials.

1.2 Users of this test method should obtain Test Methods D 412, D 471, and D 2240 and become familiar with their use before proceeding with this test method.

1.3 The values stated in either SI units or inch pound units are to be regarded separately as standard. The values stated in each system are not exact equivalents; therefore, each system shall be used independently of the other.

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:

D 412 Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers—Tension³

D 471 Test Method for Rubber Property—Effect of Liquids³

D 2240 Test Method for Rubber Property—Durometer Hardness³

D 5704 Test Method for Evaluation of the Thermal and Oxidative Stability of Lubricating Oils Used for Manual Transmissions and Final Drive Axles⁴

D 5760 Specification for Performance of Manual Transmission Gear Lubricants⁴

¹ 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.B0.03 on Gear Lubricants.

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² Until the next revision of this test method, the ASTM Test Monitoring Center will update changes in this test method by means of Information Letters; these can be obtained from the ASTM Test Monitoring Center, 6555 Penn Ave., Pittsburgh, Pa 15206-4489. Attention: Administrator. This edition incorporates revisions in all Information Letters through No. 98-1.

³ *Annual Book of ASTM Standards*, Vol 09.01.

⁴ *Annual Book of ASTM Standards*, Vol 05.03.

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *dumbbell, n*—the specific cut shape (Die C) of an elastomer as explained in Section 13 of Test Methods D 412.

3.1.2 *formulation, n*—the specific chemical composition used in manufacturing a seal elastomer or a reference oil.

3.1.3 *percent ultimate elongation, n*—the stretch length at rupture of an elastomer dumbbell oil-aged by running this procedure minus the rupture stretch length of an untested dumbbell, all divided by rupture stretch length of the untested dumbbell and then multiplied by 100.

3.1.4 *percent volume change, n*—the change in volume of a test specimen as explained in Section 10 of Test Method D 471.

4. Summary of Test Method

4.1 Non-reference oils are tested using a modified version of Test Method D 471 on specific elastomer compounds. Measured quantities are percent ultimate elongation changes (further referred to as just percent elongation changes), durometer Type A hardness changes, and percent volume changes. Reference oils are run concurrently in the same oil bath to measure consistency from one test to another.

4.2 The duration of these tests is 240 h. Table 1 shows the types of seal materials and their associated test reference oils and temperatures. The reference oils are available from the ASTM Test Monitoring Center (TMC).⁵ The seal materials are available through a Central Parts Distributor (CPD).⁶

5. Significance and Use

5.1 There are several major causes of automotive lubricant-related seal failures. This test method addresses only those failures caused by excessive elastomer hardening, elongation loss, and volume swell and attempts to determine the likelihood that an oil might cause premature sealing system failures in field use. This test method may be used as a requirement of a performance specification, such as Specification D 5760.

⁵ Reference oils are available from the ASTM Test Monitoring Center, 6555 Penn Ave., Pittsburgh, Pa 15206-4489.

⁶ The Central Parts Distributor for this procedure is Test Engineering Inc., 12758 Cimarron Path, Suite 102, San Antonio, TX 78249.