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Standard Classification and Specification for Automotive Service Greases^{1,2}

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INTRODUCTION

This specification describes current categories of lubricating greases for automotive service-fill applications. A specific designation is assigned to each category. The system is open ended, that is, new designations are assigned for use with new categories as each new set of grease performance characteristics is defined. Grease categories are referenced by automotive manufacturers in making lubrication recommendations and used by grease suppliers and users in identifying products for specific applications.

1. Scope*

1.1 This specification covers lubricating greases suitable for the periodic relubrication of chassis systems and wheel bearings of passenger cars, trucks, and other vehicles.

1.2 This specification defines the requirements used to describe the properties and performance characteristics of chassis greases and wheel bearing greases for service-fill applications.

1.3 The test requirements (acceptance limits) given in this specification are, as the case may be, minimum or maximum acceptable values for valid duplicate test results. Apply no additional corrections for test precision, such as described in Practice D3244, inasmuch as the precision of the test methods was taken into account in the determination of the requirements.

1.4 The values stated in SI units are to be regarded as standard.

1.4.1 *Exceptions*—Test Method D2596 reports test results in kgf units, and Test Method D4289 reports rubber hardness in Durometer Shore A units.

1.5 *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.*

mentations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 *ASTM Standards:*³

D217 Test Methods for Cone Penetration of Lubricating Grease

D1264 Test Method for Determining the Water Washout Characteristics of Lubricating Greases

D1742 Test Method for Oil Separation from Lubricating Grease During Storage

D1743 Test Method for Determining Corrosion Preventive Properties of Lubricating Greases

D2265 Test Method for Dropping Point of Lubricating Grease Over Wide Temperature Range

D2266 Test Method for Wear Preventive Characteristics of Lubricating Grease (Four-Ball Method)

D2596 Test Method for Measurement of Extreme-Pressure Properties of Lubricating Grease (Four-Ball Method)

D3244 Practice for Utilization of Test Data to Determine Conformance with Specifications

D3527 Test Method for Life Performance of Automotive Wheel Bearing Grease

D4170 Test Method for Fretting Wear Protection by Lubricating Greases

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

D4289 Test Method for Elastomer Compatibility of Lubricating Greases and Fluids

¹ This classification and specification is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.B0.04 on Automotive Greases.

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² This classification and specification was developed as a cooperative effort among the American Society for Testing and Materials, the National Lubricating Grease Institute (NLGI), and the Society of Automotive Engineers (SAE).

³ 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.

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

D4290 Test Method for Determining the Leakage Tendencies of Automotive Wheel Bearing Grease Under Accelerated Conditions

D4693 Test Method for Low-Temperature Torque of Grease-Lubricated Wheel Bearings

2.2 SAE Standards:⁴

AMS 3217A Standard Elastomer Stock-Test Slabs

AMS 3217/2C Test Slabs, Acrylonitrile Butadiene (NBR-L)-Low Acrylonitrile, 65-75⁵

AMS 3217/3C Test Slabs Chloroprene (CR)-70-80

SAE J310 Automotive Lubricating Greases

3. Terminology

3.1 Definitions:

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

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

3.1.2.1 *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**

3.1.3 *thickener, n*—in lubricating grease, a substance composed of finely-divided particles dispersed in a liquid 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. **D217**

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *automotive service grease, n*—a lubricating grease suitable for the periodic relubrication of serviceable-type, chassis components or wheel bearings of passenger cars, trucks, and other vehicles and distinct from factory-fill greases (also known as initial-fill and OEM greases) initially installed by the original equipment manufacturer.

3.2.2 *category, n*—with respect to automotive service grease, a designation, such as LB, GC, etc., for a given level of performance in standardized tests.

3.2.3 *chassis grease, n*—an automotive service grease used to lubricate ball joints, steering pivots, universal joints, and other lubrication points designated in the vehicle owner’s service guide.

3.2.4 *classification, n*—with respect to automotive service grease, the systematic arrangement into categories according to differing levels of performance.

⁴ Available from Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.

⁵ With respect to elastomer AMS 3217/2B, the elastomer specification has been superseded by AMS 3217/2C. Per SAE, the 2A and 2B elastomers were identical, however the synthetic lubricant immersion fluid used to reference the elastomer has been exchanged from ARM-200 to AMS 3021. Reference fluid AMS 3021 better represents current market aviation fluids. Elastomers 2B and 2C were compared using NLGI GC-LB reference greases batch 1 and 2 and were found to give similar results.

3.2.5 “G” category group, *n*—automotive service greases of such composition, properties, and performance characteristics as to be suitable for the service lubrication of those types of wheel bearings that require periodic relubrication.

3.2.6 “L” category group, *n*—automotive service greases of such composition, properties, and performance characteristics as to be suitable for the service lubrication of those types of suspension, steering, and drive-line components that require periodic relubrication.

3.2.7 *multipurpose grease, n*—an automotive service grease suitable for both chassis and wheel bearing lubrication.

3.2.7.1 *Discussion*—Commercial lubricating greases other than *automotive service greases* are often designated as multipurpose greases.

3.3 Abbreviations:

3.3.1 ASTM—American Society for Testing and Materials

3.3.2 NLGI—National Lubricating Grease Institute

3.3.3 SAE—Society of Automotive Engineers

4. Performance Classification⁶

4.1 Automotive service greases are classified into two general groups. Those designated with an “L” prefix (chassis greases) are intended for the service lubrication of ball joints, steering pivots, universal joints, and other chassis components as designated by the equipment manufacturer. Those designated with a “G” prefix are intended primarily for the service lubrication of wheel bearings. These groups are further subdivided into categories with intended service applications as follows:

4.1.1 *LA*—Service typical of chassis components and universal joints in passenger cars, trucks, and other vehicles under mild duty only. Mild duty is encountered in vehicles operated with frequent relubrication in noncritical applications.

4.1.2 *LB*—Service typical of chassis components and universal joints in passenger cars, trucks, and other vehicles under mild to severe duty. Severe duty is encountered in vehicles operated under conditions which might include prolonged relubrication intervals, or high loads, severe vibration, exposure to water or other contaminants, etc.

4.1.3 *GA*—Service typical of wheel bearings operating in passenger cars, trucks, and other vehicles under mild duty. Mild duty is encountered in vehicles operated with frequent relubrication in noncritical applications.

4.1.4 *GB*—Service typical of wheel bearings operating in passenger cars, trucks, and other vehicles under mild to moderate duty. Moderate duty is encountered in most vehicles operated under normal urban, highway, and off-highway service.

⁶ The letter designations for the grease categories and the corresponding Performance Classification descriptions in Section 4 were developed by an *ad hoc* panel of the NLGI Literature Subcommittee in cooperation with ASTM D02.B0.04.02, (Subsection on) Automotive Grease Specifications. Although these designations and descriptions of the categories have been adopted *in toto* in this standard, the NLGI Literature Subcommittee retains jurisdiction over them as published in, “Chassis and Wheel Bearing Service Classification System,” available from NLGI, 249 SW Noel, Suite 249, Lee’s Summit, MO 64063. It is the intention of Subcommittee D02.B0 to include in this standard future revisions to these descriptions providing they are deemed acceptable by ASTM.

TABLE 1 “L” Chassis Grease Categories

Category	Test	Property	Acceptance Limit
LA	D217	Consistency, worked penetration, mm/10	220–340 ^A
	D2265	Dropping point, °C, min	80
	D2266	Wear protection, scar diameter, mm, max	0.9
	D4289	Elastomer SAE AMS 3217/3C ^C Compatibility (incubated for 70 hours -0 +2 hours at 100.0 °C ± 2.5 °C): Volume change, percent	0 to 40
LB	D217	Hardness change, Durometer-A points	-15 to 0
		Consistency, worked penetration, mm/10	220–340 ^A
	D2265	Dropping point, °C, min	150
	D2266	Wear protection, scar diameter, mm, max	0.6
	D4289	Elastomer SAE AMS 3217/3C ^C Compatibility (incubated for 70 hours -0 +2 hours at 100.0 °C ± 2.5 °C): Volume change, percent	0 to 40
	D1742	Hardness change, Durometer-A points	-15 to 0
		Oil separation, mass percent, max	10
	D1743	Rust protection, rating, max	Pass
	D2596	EP performance: Load wear index, N (kgf), min	295 (30)
	D4170	Weld point, N (kgf), min	1960 (200)
		Fretting protection, mass loss, mg, max	10 ^B
	D4693	Low-temperature performance, torque at -40 °C from 60 s to the end of the test, N·m, max	15.5

^A Vehicle manufacturer’s requirement might be more restrictive; grease containers should display NLGI Consistency Number as well as category designation.

^B The fretting wear requirement is significant in passenger car and light-duty truck service, but it has not been shown to be significant in heavy-duty truck applications.

^C With respect to elastomer AMS 3217/3B, the elastomer specification has been superseded by AMS 3217/3C.

4.1.5 *GC*—Service typical of wheel bearings operating in passenger cars, trucks, and other vehicles under mild to severe duty. Severe duty is encountered in certain vehicles operated under conditions resulting in high bearing temperatures. This includes vehicles operated under frequent stop-and-go service (buses, taxis, urban police cars, etc), or under severe braking service (trailer towing, heavy loading, mountain driving, etc.).

5. Performance Description⁷

5.1 The performance characteristics of the several categories of automotive service greases are described as follows:

5.1.1 *LA*—The grease shall satisfactorily lubricate chassis components and universal joints where frequent relubrication is practiced (at intervals of 3200 km or 2000 miles or less for passenger cars). During its service life, the grease should resist oxidation and consistency degradation and protect the chassis components and universal joints from corrosion and wear under lightly loaded conditions. NLGI 2 consistency greases are commonly recommended, but other grades may also be recommended. (NLGI Consistency Numbers are shown in [Table X1.1](#) of the appendix.)

5.1.2 *LB*—The grease shall satisfactorily lubricate chassis components and universal joints at temperatures as low as -40 °C and at temperatures as high as 120 °C over prolonged relubrication intervals (more than 3200 km or 2000 miles for passenger cars). During its service life, the grease should resist oxidation and consistency degradation while protecting the chassis components and universal joints from corrosion and wear even when aqueous contamination and heavily loaded

conditions occur. NLGI 2 consistency greases are commonly recommended, but other grades may also be recommended.

5.1.3 *GA*—The grease shall satisfactorily lubricate wheel bearings over a limited temperature range. Many products of this type are limited to bearing temperatures of (-20 to 70) °C. No additional performance requirements are specified for these greases.

5.1.4 *GB*—The grease shall satisfactorily lubricate wheel bearings over a wide temperature range. The bearing temperatures may range down to -40 °C, with frequent excursions to 120 °C and occasional excursions to 160 °C. During its service life, the grease shall resist oxidation, evaporation, and consistency degradation while protecting the bearings from corrosion and wear. NLGI 2 consistency greases are commonly recommended, but NLGI 1 or 3 grades may also be recommended.

5.1.5 *GC*—The grease shall satisfactorily lubricate wheel bearings over a wide temperature range. The bearing temperatures may range down to -40 °C, with frequent excursions to 160 °C and occasional excursions to 200 °C. During its service life, the grease shall resist oxidation, evaporation, and consistency degradation while protecting the bearings from corrosion and wear. NLGI No. 2 consistency greases are commonly recommended, but NLGI No. 1 or No. 3 grades may also be recommended.

6. Performance Requirements⁷

6.1 The greases identified by these categories shall conform to the requirements listed in [Table 1](#) and [Table 2](#). A guide to the requirements of all the grease categories is given in [Table X1.2](#) of the appendix.

6.2 The consistency requirements in [Table 1](#) and [Table 2](#) cover NLGI Consistency Numbers 1 through 3 (see [Table](#)

⁷ The Performance Descriptions and Performance Requirements for the grease categories, as described in Sections 5 and 6, were developed by ASTM D02.B0.04.02 in cooperation with the NLGI Literature Subcommittee. ASTM Subcommittee D02.B0 retains jurisdiction over these descriptions (see Footnote 7).

TABLE 2 “G” Wheel Bearing Grease Categories

Category	Test	Property	Acceptance Limit
GA	D217	Consistency, worked penetration, mm/10	220–340 ^A
	D2265	Dropping point, °C, min	80
	D4693	Low temperature, performance, Torque at –20 °C, N-m, max	15.5
GB	D217	Consistency, worked penetration, mm/10	220–340 ^A
	D2265	Dropping point, °C, min	175
	D4693	Low temperature performance, Torque at –40 °C from 60 s to the end of the test, N-m, max	15.5
	D1264	Water resistance at 80 °C, %, max	15
	D1742	Oil separation, mass %, max	10
	D1743	Rust protection, rating, max	Pass
	D2266	Wear protection, scar diameter, mm, max	0.9
	D3527	High temperature life, hours, min	40
	D4289	Elastomer SAE AMS 3217/2C Compatibility ^B (incubated for 70 hours -0 +2 hours at 150.0 °C ± 2.5 °C): Volume change, percent	–5 to + 30
		Hardness change, durometer-A points	–15 to + 2
	D4290	Leakage tendencies, g, max	24
	D217	Consistency, worked penetration, mm/10	220–340 ^A
	GC	D2265	Dropping point, °C, min
D4693		Low temperature performance, Torque at –40 °C from 60 s to the end of the test, N-m, max	15.5
D1264		Water resistance at 80 °C, percent, max	15
D1742		Oil separation, mass percent, max	6
D1743		Rust protection, rating, max	Pass
D2266		Wear protection, scar diameter, mm, max	0.9
D3527		High temperature life, hours, min	80
D4289		Elastomer SAE AMS 3217/2C Compatibility (incubated for 70 hours -0 +2 hours at 150.0 °C ± 2.5 °C): Volume change, percent	–5 to + 30
		Hardness change, durometer-A points	–15 to + 2
D4290		Leakage tendencies, g, max	10
D2596		EP Performance: Load wear index, N (kgf), min	295 (30)
		Weld point, N (kgf), min	1960 (200)

^A Vehicle manufacturer’s requirement might be more restrictive; grease containers should display NLGI Consistency Number as well as category designation.

^B With respect to elastomer AMS 3217/2B, the elastomer specification has been superseded by AMS 3217/2C. Per SAE, the 2A and 2B elastomers were identical, however the synthetic lubricant immersion fluid used to reference the elastomer has been exchanged from ARM-200 to AMS 3021. Reference fluid AMS 3021 better represents current market aviation fluids. Elastomers 2B and 2C were compared using NLGI GC-LB reference greases batch 1 and 2 and were found to give similar results.

X1.1). However, because the equipment manufacturers recommendations might be more restrictive, it is recommended that grease containers display the consistency number as well as the grease category designation.

6.3 Some grease makers market products under the term *multipurpose grease*, implying or stating that such products are suitable for both chassis and wheel bearing lubrication. To comply with this specification, greases intended and suitable for both chassis and wheel bearing lubrication might carry such

designation but, in addition, shall carry both an “L” and “G” designation (LB-GC, for example) and conform to the appropriate requirements listed in Table 1 and Table 2.

7. Keywords

7.1 automotive grease categories; automotive service grease; chassis grease; multipurpose automotive grease; NLGI chassis and wheel bearing service classification; NLGI grease classification; wheel bearing grease