



Designation: F2468 – 05 (Reapproved 2011)

## Standard Classification for Specifying Silicone Adhesives and Sealants for Transportation Applications<sup>1</sup>

This standard is issued under the fixed designation F2468; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This classification covers silicone adhesives and sealants intended for but not limited to sealing and retaining metallic and nonmetallic component assemblies in transportation applications. The materials cure to an elastomeric state by their specified cure system and mechanism.

NOTE 1—The classification system may serve many of the needs of industries using silicone materials. This classification is subject to revision, as the need requires; therefore, the latest revision should always be used.

1.2 This classification is intended to be a means of classifying silicone materials. It is not intended for engineering design purposes.

1.3 It is not the intent of this classification to include pressure-sensitive or hot-melt adhesives.

1.4 In all cases in which the provisions of this classification system would conflict with the referenced ASTM standard for a particular method, the latter shall take precedence.

1.5 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.6 The following safety hazards caveat pertains only to the test methods portion, Section 7, of this classification. *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:<sup>2</sup>

**C679** Test Method for Tack-Free Time of Elastomeric Sealants

<sup>1</sup> This classification is under the jurisdiction of ASTM Committee F03 on Gaskets and is the direct responsibility of Subcommittee F03.30 on Classification. Current edition approved May 1, 2011. Published July 2011. Originally approved in 2005. Last previous edition approved in 2005 as F2468 – 05. DOI: 10.1520/F2468-05R11.

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

**D149** Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies

**D150** Test Methods for AC Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulation

**D257** Test Methods for DC Resistance or Conductance of Insulating Materials

**D412** Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension

**D471** Test Method for Rubber Property—Effect of Liquids

**D573** Test Method for Rubber—Deterioration in an Air Oven

**D618** Practice for Conditioning Plastics for Testing

**D624** Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers

**D792** Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement

**D907** Terminology of Adhesives

**D1002** Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal)

**D1053** Test Methods for Rubber Property—Stiffening at Low Temperatures: Flexible Polymers and Coated Fabrics

**D1084** Test Methods for Viscosity of Adhesives

**D1349** Practice for Rubber—Standard Temperatures for Testing

**D1415** Test Method for Rubber Property—International Hardness

**D1566** Terminology Relating to Rubber

**D1898** Practice for Sampling of Plastics (Withdrawn 1998)<sup>3</sup>

**D2240** Test Method for Rubber Property—Durometer Hardness

**D3182** Practice for Rubber—Materials, Equipment, and Procedures for Mixing Standard Compounds and Preparing Standard Vulcanized Sheets

**D4800** Guide for Classifying and Specifying Adhesives

#### 2.2 SAE Standard:<sup>4</sup>

<sup>3</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

<sup>4</sup> Available from SAE International (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001, <http://www.sae.org>.

**TABLE 1 Minimum Classification Requirements**

Selection Order Sequence	Property	Designation								
		1	2	3	4	5	6	7	8	9
1 <sup>st</sup> Digit	Cure system (Cure by-product)	Addition (no by-product)	Acetoxy (acetic acid)	Alkoxy (methanol, ethanol)	Amine (cyclohexylamine)	Enoxy (acetone)	Oxime (methyl ethyl ketoxime)	Free radical	...	As specified
2 <sup>nd</sup> Digit	Cure mechanism	One-part moisture cure	Two-part moisture cure	One-part radiation cure <sup>A</sup>	One-part radiation-moisture cure	One-part thermal cure	Two-part thermal cure	Radiation	...	As specified
3 <sup>rd</sup> Digit	Application rate, g/min	<50	50-99	100-199	200-299	300-499	500-749	750-999	>999	As specified
4 <sup>th</sup> Digit	Test Method <b>C679</b> , Tack free time, min	<5	5-9.9	10-19.9	20-29.9	30-39.9	40-49.9	50-60	>60	As specified
5 <sup>th</sup> Digit	Test Methods <b>D412</b> (Die C) Ultimate elongation, %	<100	100-199	200-299	300-499	500-699	700-999	>999	...	As specified
6 <sup>th</sup> Digit	Test Methods <b>D412</b> , Tensile strength, MPa	<0.345	0.345-0.690	0.691-1.035	1.036-1.380	1.381-3.450	3.451-6.899	6.90-14.0	>14	As specified
7 <sup>th</sup> Digit	Blowout resistance, <sup>B</sup> s	<10	10-20	21-30	31-40	41-50	51-60	>60	...	As specified
8 <sup>th</sup> Digit	Test Methods <b>D792</b> , Specific gravity, g/cc	<0.85	0.86-0.95	0.96-1.05	1.06-1.15	1.16-1.25	1.26-1.35	1.36-1.50	>1.5	As specified
9 <sup>th</sup> Digit	Test Method <b>D1002</b> , <sup>C</sup> Lap shear bond strength, MPa	<0.345	0.345-0.690	0.691-1.035	1.036-1.380	1.381-3.450	3.451-6.899	6.90-14.0	>14	As specified
10 <sup>th</sup> Digit	Silicone volatile Content, %	<0.6	0.6-1.0	1.1-1.9	2.0-2.9	3.0-4.9	5.0-6.9	7-10	>10	As specified

<sup>A</sup> Ultraviolet light (UV), microwave, or visible light cure.

<sup>B</sup> Resistance to blowout refers to the time to failure at a standardized internal pressure using a fixture as agreed upon between producer and user.

<sup>C</sup> Standard test conditions: 5 cm (1.97 in.)/min cross head speed, 1 mm (0.039 in.) gap, 1.27 cm (0.50 in.) overlap, Q panel 20204T3 Aluminum (as received).

## SAE J369 Flammability of Polymeric Interior Materials—Horizontal Test Method

### 2.3 UL Standard:<sup>5</sup>

### UL 94 Flammability

## 3. Terminology

3.1 *Definitions*—Some terms in this classification are defined in Terminologies **D907** and **D1566**.

### 3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *cure mechanism*—the method of initiating the cure for a silicone material.

3.2.2 *cure system*—the cross-linking mechanism the silicone material uses to transition to the elastomeric state.

3.2.3 *draw-down*—a method of sample preparation of viscous and sag-resistant sealants, in which the sealant is leveled using a knife or tool to a specified thickness.

3.2.4 *formed in place gasket, fig*—a one- or two-component adhesive or sealant applied wet, uncured, to a joint surface where the mating parts are assembled before the curing process is complete. When fully cured it forms a barrier to media migration across the joint.

3.2.5 *sag resistance*—a property of some adhesives and sealants that enables the applied or extruded material to retain its shape before curing or cross-linking.

3.2.6 *thixotropic*—a rheological property of uncured sealants in which the sealant resists sagging or slumping unless disturbed by an external force or pressure.

3.2.7 *transportation*—any transportation venue involving land, sea, or air, civilian or military, stationary and small engines.

3.2.8 *volatiles*—low molecular weight components of an adhesive or sealant that can be extracted by the environment of the application.

## 4. Significance and Use

4.1 The purpose of this classification system is to provide a method of adequately identifying silicone adhesives and sealants through the use of a line call-out designation.

4.2 This classification system was designed to permit the addition of property values for future silicone adhesives and sealants.

## 5. Classification

5.1 A ten-digit numbering system is used to classify a silicone adhesive and sealant cure system, cure mechanism, application rate, tack free time; ultimate elongation, tensile strength; blowout resistance, lap shear bond strength, specific gravity, and silicone volatile content as defined in **Table 1**. The first column (left side of the table) indicates the digit number or order sequence required while the designation numbers for each property are indicated on the top of the table. The ten-digit classification number must also be separated with hyphens

<sup>5</sup> Available from Underwriters Laboratories (UL), 333 Pfingsten Rd., Northbrook, IL 60062-2096, <http://www.ul.com>.