

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J90

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Submitted for recognition as an American National Standard

STANDARD CLASSIFICATION SYSTEM FOR NONMETALLIC AUTOMOTIVE GASKET MATERIALS

Foreword—This reaffirmed document has not changed other than to put it into the new SAE Technical Standards Board Format.

1. Scope

- 1.1** The classification system provides a means for specifying or describing pertinent properties of commercial nonmetallic gasket materials. Materials composed of asbestos, cork, cellulose, and other organic or inorganic materials in combination with various binders or impregnants are included. Materials normally classified as rubber compounds are not included, since they are covered in SAE J200—ASTM D 2000. Gasket coatings are not covered, since details thereof are intended to be given on engineering drawings or in separate specifications.
- 1.2** Since all of the properties that contribute to gasket performance are not included, use of the classification system as a basis for selecting materials is limited.
- 1.3** The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.
- 1.4** This SAE Recommended Practice may involve hazardous materials, operations, and equipment. This document does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this document to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. References

- 2.1 Applicable Publications**—The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.

- 2.1.1 SAE PUBLICATIONS**—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J90—Standard Classification System for Nonmetallic Automotive Gasket Materials

SAE J200—Classification System for Rubber Products in Automotive Applications

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2.1.2 ASTM PUBLICATIONS—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM D 2000—Classification System for Rubber Products in Automotive Applications
ASTM E 11—Specification for Wire-Cloth Sieves for Testing Purposes
ASTM F 36—Test Method for Compressibility and Recovery of Gasket Materials
ASTM F 37—Test Methods for Sealability of Gasket Materials
ASTM F 38—Test Methods for Creep Relaxation of a Gasket Material
ASTM F 146—Test Methods for Fluid Resistance of Gasket Materials
ASTM F 147—Test Method for Flexibility of Non-Metallic Gasket Materials
ASTM F 148—Test Method for Binder Durability of Cork Composition Gasket Materials
ASTM F 152—Test Methods for Tension Testing of Nonmetallic Gasket Materials
ASTM F 433—Practice for Evaluating Thermal Conductivity of Gasket Materials
ASTM F 607—Test Method for Adhesion of Gasket Materials to Metal Surfaces

3. Significance and Use

- 3.1** This classification is intended to encourage uniformity in reporting properties; to provide a common language for communications between suppliers and consumers; to guide engineers and designers in the test methods commonly used for commercially available materials; and to be versatile enough to cover new materials and test methods as they are introduced.
- 3.2** It is based on the principle that nonmetallic gasket materials should be described, insofar as is possible, in terms of specific physical and mechanical characteristics, and that an infinite number of such descriptions can be formulated by use of one or more standard statements based on standard tests. Therefore, users of gasket materials can, by selecting different combinations of statements, specify different combinations of properties desired in various parts. Suppliers, likewise, can report properties available in their respective products.

4. Basis of Classification

- 4.1** To permit "line call-out" of the descriptions mentioned in 3.2, this classification system establishes letter or number symbols or both for various performance levels of each property or characteristic (see Table 1).
- 4.2** In specifying or describing gasket materials, each "line call-out" shall include the number of this system (minus date symbol) followed by the letter "F" and six numerals, for example: SAE J90 (F125400). Since each numeral of the call-out represents a characteristic (as shown in Table 1), six numerals are always required. The numeral "0" is used when the description of any characteristic is not desired. The numeral "9" is used when the description of any characteristic (or test related thereto) is specified by some supplement to this classification system, such as notes on engineering drawings.
- 4.3** To further specify or describe gasket materials, each "line call-out" may include one or more suffix letter-numeral symbols, as listed in Table 2, for example: SAE J90 (F125400-B2M4). Various levels of definition may be established by increasing or decreasing the number of letter-numeral symbols used in the "line call-out."

TABLE 1—BASIC PHYSICAL AND MECHANICAL CHARACTERISTICS

Basic Six-Digit Number	Basic Characteristic
First Numeral	"Type" of material (the principal fibrous or particulate reinforcement material from which the gasket is made) shall conform to the first numeral of the basic six-digit number, as follows: 0 = not specified 1 = asbestos 2 = cork 3 = cellulose 4 = fluorocarbon polymer 5 = flexible graphite 7 = nonasbestos, tested as Type 1 9 = as specified⁽¹⁾
Second Numeral	Class of material (method of manufacture or common trade designation) shall conform to the second numeral of the basic six-digit number, as follows: When first numeral is "0" or "9," second numeral: 0 = not specified 9 = as specified⁽¹⁾ When first numeral is "1" or "7," second numeral: 0 = not specified 1 = compressed sheet process 2 = beater process 3 = paper and millboard 9 = as specified⁽¹⁾ When first numeral is "2," second numeral: 0 = not specified 1 = cork composition (Class 1) 2 = cork and elastomeric (Class 2) 3 = cork and cellular rubber (Class 3) 9 = as specified⁽¹⁾ When first numeral is "3," second numeral: 0 = not specified 1 = untreated fiber—tag, chipboard, vulcanized fiber, etc. (Class 1) 2 = protein treated (Class 2) 3 = elastomeric treated (Class 3) 4 = thermosetting resin treated (Class 4) 9 = as specified⁽¹⁾ When first numeral is "4," second numeral: 0 = not specified 1 = sheet PTFE 2 = PTFE of expanded structure 3 = PTFE filaments, braided, or woven 4 = PTFE felts 5 = filled PTFE 9 = as specified When first numeral is "5," second numeral: 0 = not specified 1 = homogeneous sheet 2 = laminated sheet 9 = as specified⁽¹⁾

TABLE 1—BASIC PHYSICAL AND MECHANICAL CHARACTERISTICS

Basic Six-Digit Number	Basic Characteristic										
Third Numeral	Compressibility characteristics, determined in accordance with 9.2, shall conform to the percent indicated by the third numeral of the basic six-digit number. (Example: 4 = 15 to 25%) <table> <tr> <td>0 = not specified</td><td>5 = 20 to 30%</td></tr> <tr> <td>1 = 0 to 10%</td><td>6 = 25 to 40%</td></tr> <tr> <td>2 = 5 to 15%*</td><td>7 = 30 to 50%</td></tr> <tr> <td>3 = 10 to 20%</td><td>8 = 40 to 60%</td></tr> <tr> <td>4 = 15 to 25%</td><td>9 = as specified⁽¹⁾</td></tr> </table> *7 to 17% for compressed sheeter process	0 = not specified	5 = 20 to 30%	1 = 0 to 10%	6 = 25 to 40%	2 = 5 to 15%*	7 = 30 to 50%	3 = 10 to 20%	8 = 40 to 60%	4 = 15 to 25%	9 = as specified ⁽¹⁾
0 = not specified	5 = 20 to 30%										
1 = 0 to 10%	6 = 25 to 40%										
2 = 5 to 15%*	7 = 30 to 50%										
3 = 10 to 20%	8 = 40 to 60%										
4 = 15 to 25%	9 = as specified ⁽¹⁾										
Fourth Numeral	Thickness increase when immersed in ASTM No. 3 Oil: determined in accordance with 9.3, shall conform to the percent indicated by the fourth numeral of the basic six-digit number. (Example: 4 = 15 to 30%) <table> <tr> <td>0 = not specified</td><td>5 = 20 to 40%</td></tr> <tr> <td>1 = 0 to 15%</td><td>6 = 30 to 50%</td></tr> <tr> <td>2 = 5 to 20%</td><td>7 = 40 to 60%</td></tr> <tr> <td>3 = 10 to 25%</td><td>8 = 50 to 70%</td></tr> <tr> <td>4 = 15 to 30%</td><td>9 = as specified⁽¹⁾</td></tr> </table>	0 = not specified	5 = 20 to 40%	1 = 0 to 15%	6 = 30 to 50%	2 = 5 to 20%	7 = 40 to 60%	3 = 10 to 25%	8 = 50 to 70%	4 = 15 to 30%	9 = as specified ⁽¹⁾
0 = not specified	5 = 20 to 40%										
1 = 0 to 15%	6 = 30 to 50%										
2 = 5 to 20%	7 = 40 to 60%										
3 = 10 to 25%	8 = 50 to 70%										
4 = 15 to 30%	9 = as specified ⁽¹⁾										
Fifth Numeral	Weight increase when immersed in ASTM No. 3 Oil: determined in accordance with 9.3, shall conform to the percent indicated by the fifth numeral of the basic six-digit number. (Example: 4 = 30% max) <table> <tr> <td>0 = not specified</td><td>5 = 40%, max</td></tr> <tr> <td>1 = 10%, max</td><td>6 = 60%, max</td></tr> <tr> <td>2 = 15%, max</td><td>7 = 80%, max</td></tr> <tr> <td>3 = 20%, max</td><td>8 = 100%, max</td></tr> <tr> <td>4 = 30%, max</td><td>9 = as specified⁽¹⁾</td></tr> </table>	0 = not specified	5 = 40%, max	1 = 10%, max	6 = 60%, max	2 = 15%, max	7 = 80%, max	3 = 20%, max	8 = 100%, max	4 = 30%, max	9 = as specified ⁽¹⁾
0 = not specified	5 = 40%, max										
1 = 10%, max	6 = 60%, max										
2 = 15%, max	7 = 80%, max										
3 = 20%, max	8 = 100%, max										
4 = 30%, max	9 = as specified ⁽¹⁾										
Sixth Numeral	Weight increase when immersed in water: determined in accordance with 9.3, shall conform to the percent indicated by the sixth numeral of the basic six-digit number. (Example: 4 = 30%, max) <table> <tr> <td>0 = not specified</td><td>5 = 40%, max</td></tr> <tr> <td>1 = 10%, max</td><td>6 = 60%, max</td></tr> <tr> <td>2 = 15%, max</td><td>7 = 80%, max</td></tr> <tr> <td>3 = 20%, max</td><td>8 = 100%, max</td></tr> <tr> <td>4 = 30%, max</td><td>9 = as specified⁽¹⁾</td></tr> </table>	0 = not specified	5 = 40%, max	1 = 10%, max	6 = 60%, max	2 = 15%, max	7 = 80%, max	3 = 20%, max	8 = 100%, max	4 = 30%, max	9 = as specified ⁽¹⁾
0 = not specified	5 = 40%, max										
1 = 10%, max	6 = 60%, max										
2 = 15%, max	7 = 80%, max										
3 = 20%, max	8 = 100%, max										
4 = 30%, max	9 = as specified ⁽¹⁾										

1. On engineering drawings or other supplement to this classification system.

TABLE 2—SUPPLEMENTARY PHYSICAL AND MECHANICAL CHARACTERISTICS

Suffix Symbol	Supplementary Characteristics																						
A9	Sealability characteristics shall be determined in accordance with 9.4. External load, internal pressure, other details of test, and results shall be as specified on engineering drawing or other supplement to this classification.																						
B1 through B9	Creep relaxation characteristics shall be determined in accordance with 9.5. Loss of stress at end of 24 h shall not exceed the amount indicated by the numeral of the B-symbol. <table> <tr> <td>B1 = 10%</td><td>B5 = 30%</td></tr> <tr> <td>B2 = 15%</td><td>B6 = 40%</td></tr> <tr> <td>B3 = 20%</td><td>B7 = 50%</td></tr> <tr> <td>B4 = 25%</td><td>B8 = 60%</td></tr> <tr> <td></td><td>B9 = as specified⁽¹⁾</td></tr> </table>	B1 = 10%	B5 = 30%	B2 = 15%	B6 = 40%	B3 = 20%	B7 = 50%	B4 = 25%	B8 = 60%		B9 = as specified ⁽¹⁾												
B1 = 10%	B5 = 30%																						
B2 = 15%	B6 = 40%																						
B3 = 20%	B7 = 50%																						
B4 = 25%	B8 = 60%																						
	B9 = as specified ⁽¹⁾																						
D00 through D99	The former ASTM standard F 64, Test Method for Corrosive and Adhesive Effects of Gasket Materials on Metal Surfaces, was discontinued in 1980. The recently established test for adhesion has become Test Method ASTM F 607.																						
E00 through E99	Weight and thickness change after immersion in ASTM Fuel B shall be determined in accordance with 9.3. Weight increase shall not exceed the standard rating number indicated by the first numeral of the two-digit number of the E-symbol. Thickness increase shall not exceed the standard rating number indicated by the second numeral of the E-symbol. <table> <tr> <td>Weight Increase, % (first numeral)</td><td>Thickness Increase, % (second numeral)</td></tr> <tr> <td>E0_ = not specified</td><td>E_0 = not specified</td></tr> <tr> <td>E1_ = 10</td><td>E_1 = 0 to 5</td></tr> <tr> <td>E2_ = 15</td><td>E_2 = 0 to 10</td></tr> <tr> <td>E3_ = 20</td><td>E_3 = 0 to 15</td></tr> <tr> <td>E4_ = 30</td><td>E_4 = 5 to 20</td></tr> <tr> <td>E5_ = 40</td><td>E_5 = 10 to 25</td></tr> <tr> <td>E6_ = 60</td><td>E_6 = 15 to 35</td></tr> <tr> <td>E7_ = 80</td><td>E_7 = 25 to 45</td></tr> <tr> <td>E8_ = 100</td><td>E_8 = 30 to 60</td></tr> <tr> <td>E9_ = as specified⁽¹⁾</td><td>E_9 = as specified⁽¹⁾</td></tr> </table>	Weight Increase, % (first numeral)	Thickness Increase, % (second numeral)	E0_ = not specified	E_0 = not specified	E1_ = 10	E_1 = 0 to 5	E2_ = 15	E_2 = 0 to 10	E3_ = 20	E_3 = 0 to 15	E4_ = 30	E_4 = 5 to 20	E5_ = 40	E_5 = 10 to 25	E6_ = 60	E_6 = 15 to 35	E7_ = 80	E_7 = 25 to 45	E8_ = 100	E_8 = 30 to 60	E9_ = as specified ⁽¹⁾	E_9 = as specified ⁽¹⁾
Weight Increase, % (first numeral)	Thickness Increase, % (second numeral)																						
E0_ = not specified	E_0 = not specified																						
E1_ = 10	E_1 = 0 to 5																						
E2_ = 15	E_2 = 0 to 10																						
E3_ = 20	E_3 = 0 to 15																						
E4_ = 30	E_4 = 5 to 20																						
E5_ = 40	E_5 = 10 to 25																						
E6_ = 60	E_6 = 15 to 35																						
E7_ = 80	E_7 = 25 to 45																						
E8_ = 100	E_8 = 30 to 60																						
E9_ = as specified ⁽¹⁾	E_9 = as specified ⁽¹⁾																						
H	Adhesion characteristics shall be determined in accordance with 9.6. Results shall be as specified on engineering drawing or other supplement to this classification.																						
K1 through K9	Thermal conductivity characteristics shall be determined in accordance with 9.10. The K-factor obtained in $W/(m \cdot K)(Btu \cdot in/h \cdot ft^2 \cdot ^\circ F)$ shall fall within the ranges indicated by the numeral of a K symbol. <table> <tr> <td>K1 = 0.00 to 0.09 (0.00 to 0.65)</td><td>K5 = 0.29 to 0.38 (2.00 to 2.65)</td></tr> <tr> <td>K2 = 0.07 to 0.17 (0.50 to 1.15)</td><td>K6 = 0.36 to 0.45 (2.50 to 3.15)</td></tr> <tr> <td>K3 = 0.14 to 0.24 (1.00 to 1.65)</td><td>K7 = 0.43 to 0.53 (3.00 to 3.65)</td></tr> <tr> <td>K4 = 0.22 to 0.31 (1.50 to 2.15)</td><td>K8 = 0.50 to 0.60 (3.50 to 4.15)</td></tr> <tr> <td></td><td>K9 = as specified⁽¹⁾</td></tr> </table>	K1 = 0.00 to 0.09 (0.00 to 0.65)	K5 = 0.29 to 0.38 (2.00 to 2.65)	K2 = 0.07 to 0.17 (0.50 to 1.15)	K6 = 0.36 to 0.45 (2.50 to 3.15)	K3 = 0.14 to 0.24 (1.00 to 1.65)	K7 = 0.43 to 0.53 (3.00 to 3.65)	K4 = 0.22 to 0.31 (1.50 to 2.15)	K8 = 0.50 to 0.60 (3.50 to 4.15)		K9 = as specified ⁽¹⁾												
K1 = 0.00 to 0.09 (0.00 to 0.65)	K5 = 0.29 to 0.38 (2.00 to 2.65)																						
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K3 = 0.14 to 0.24 (1.00 to 1.65)	K7 = 0.43 to 0.53 (3.00 to 3.65)																						
K4 = 0.22 to 0.31 (1.50 to 2.15)	K8 = 0.50 to 0.60 (3.50 to 4.15)																						
	K9 = as specified ⁽¹⁾																						
M1 through M9	Tensile strength characteristics shall be determined in accordance with 9.7. Results in MPa (psi) shall be no less than the value indicated by the numeral of the M-symbol.																						

TABLE 2—SUPPLEMENTARY PHYSICAL AND MECHANICAL CHARACTERISTICS

Suffix Symbol	Supplementary Characteristics	
	M1 = 0.689 (100)	M5 = 10.342 (1500)
	M2 = 1.724 (250)	M6 = 13.790 (2000)
	M3 = 3.447 (500)	M7 = 20.684 (3000)
	M4 = 6.895 (1000)	M8 = 27.579 (4000)
		M9 = as specified ⁽¹⁾
R	Binder Durability characteristics shall be determined in accordance with 9.8. There shall be no evidence of disintegration at conclusion of test.	
S9	Volume change characteristics, when immersed in ASTM No. 1 Oil, ASTM No. 3 Oil, and ASTM Reference Fuel A, shall be determined in accordance with 9.3. Results shall be as specified on engineering drawing or other supplement to this classification.	
T	Flexibility characteristics shall be determined in accordance with 9.9. There shall be no evidence of cracks, breaks, or separation at conclusion of test.	
Z	Other characteristics shall be as specified on engineering drawing or other supplement to this classification.	

1. On engineering drawing or other supplement to this classification system.

- 4.4** For convenience, gasket materials are referred to by Type according to the principal fibrous or particulate reinforcement or other material from which the gasket is made and by Class according to the manufacturing method, or the common trade designation. Type numbers correspond with the first numeral, and class numbers correspond with the second numeral of the basic six-digit line call-out, as shown in Table 1.

NOTE—While this "cell-type" format provides the means for close characterization and specification of each property and combinations of properties for a broad range of materials, it is subject to possible misapplications, since impossible property combinations can be coded if the user is not familiar with available commercial materials. Table A1 of this classification indicates properties, characteristics, and test methods that are normally considered applicable to each type of material.

5. *Physical and Mechanical Requirements*

- 5.1** Gasket materials identified by this classification shall have the characteristics or properties indicated by the first six numerals of the line call-out, within the limits shown in Table 1, and by additional letter-numeral symbols shown in Table 2.

6. *Thickness Requirements*

- 6.1** Gasket materials identified by this classification system shall conform to the thickness tolerances specified in Table 3.

7. *Sampling*

- 7.1** Specimens shall be selected from finished gaskets or sheets of suitable size, whichever is the more practicable. If sheets are used, they shall, where applicable, be cut squarely with the grain of the stock, and the grain direction shall be noted by an arrow. If finished gaskets are used, the dimensions of sample and any variations from method must be reported.

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- 7.2** For qualification purposes, thickness shall be 0.8 mm (0.03 in), except for Type 2, where the qualification thickness is to be 1.5 to 6.4 mm (0.06 to 0.25 in), and Type 5 Class 1, where the qualification thickness is to be 0.4 mm (0.015 in). When thicknesses other than those shown previously are to be tested, the specification limits shall be agreed to in writing between the purchaser and the supplier.

TABLE 3—THICKNESS TOLERANCES

Type and Class of Material (First Two Numerals of Basic Six-Digit Number)	Thickness Specified, mm (in)	Applicable Tolerance, ⁽¹⁾ mm (in)
11 and 12	0.41 (0.016) and under	+0.13 (+0.005) −0.05 (−0.002)
	over 0.41 (0.016) and under 1.57 (0.062)	±0.13 (±0.005)
	1.57 (0.062) and over	±0.20 (±0.008)
13	up to 3.18 (0.125)	±0.13 (±0.005)
	3.18 (0.125) to 12.70 (0.500)	±0.25 (±0.010)
21	all thicknesses	±10%, or ±0.25 (±0.010) whichever is the greater
22	under 1.57 (0.062)	±0.25 (±0.010)
	1.57 (0.062) and over	±0.38 (±0.015)
23	1.57 (0.062) and over	±0.38 (±0.015)
31, 32, and 33 (also 00 and 99) ⁽²⁾	0.41 (0.016) and under	±0.089 (±0.0035)
	over 0.41 (0.016) to 1.57 (0.062)	±0.13 (±0.005)
	over 1.57 (0.062) to 2.39 (0.094)	±0.20 (±0.008)
	over 2.39 (0.094)	±0.41 (±0.016)
51	1.6 (0.062) and under	±0.051 (±0.002)
52	12.7 (0.5) and under	±10%

1. Tolerances listed are permissible variations applicable to a given lot of sheets or gaskets. Where other thickness tolerances are necessary due to the gasket application, tolerances applicable to individual sheet or gasket may be agreed to in writing between the purchaser and the supplier.
2. Unless otherwise specified on engineering drawing or other supplement to this classification system.

- 7.3** Sufficient specimens shall be selected to provide a minimum of three determinations for each test specified. The average of the determinations shall be considered as the result.

8. Conditioning

- 8.1** Prior to all applicable tests, specimens shall be conditioned as follows:

- 8.1.1** When the first numeral of line call-out is "1" (Type 1 materials), specimens shall be conditioned in an oven at 100 °C ± 2 °C (212 °F ± 3.6 °F) for 1 h and allowed to cool to 21 to 30 °C (70 to 85 °F) in a desiccator containing anhydrous calcium chloride; except when second numeral of line call-out is "3" (Class 3 materials), the specimens shall be conditioned in an oven for 4 h at 100 °C ± 2 °C (212 °F ± 3.6 °F).

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- 8.1.2 When the first numeral of line call-out is "2" (Type 2 materials), specimens shall be conditioned at least 46 h in a controlled-humidity room or in a closed chamber with gentle mechanical circulation of the air at 21 to 30 °C (70 to 85 °F) and 50 to 55% relative humidity.

NOTE—If a mechanical means of maintaining 50 to 55% relative humidity is not available, a tray containing a saturated solution of reagent grade magnesium nitrate, $\text{Mg}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$, shall be placed in the chamber to provide the required relative humidity.

- 8.1.3 When the first numeral of line call-out is "3" (Type 3 materials), specimens shall be preconditioned for 4 h at 21 to 30 °C (70 to 85 °F) in a closed chamber containing anhydrous calcium chloride as a desiccant. The air in the chamber shall be circulated by gentle mechanical agitation. Specimens shall then be transferred immediately to a controlled-humidity room or closed chamber with gentle mechanical circulation of the air and conditioned for at least 20 h at 21 to 30 °C (70 to 85 °F) and 50 to 55% relative humidity.
- 8.1.4 When the first numeral of a line call-out is "4", no conditioning of specimens is necessary.
- 8.1.5 When the first numeral of a line call-out is "5", test specimens shall be conditioned in accordance with 8.1.1 (Type 1 materials).
- 8.1.6 When the first numeral of a line call-out is "0" or "9", specimens shall be conditioned as in 8.1.3, unless otherwise specified in supplements to this classification.
- 8.2 In all cases where testing is conducted outside the area of specified humidity, specimens shall be removed from the chamber one at a time just prior to testing.

9. Test Methods

9.1 Thickness

- 9.1.1 The specimens shall be measured with a device actuated by a dead-weight load. The device shall be capable of reading in 0.02 mm (0.001 in) or smaller units, and readings shall be estimated to the nearest 0.002 mm (0.0001 in). The presser foot shall be 6.40 mm $\pm$ 0.13 mm (0.252 in $\pm$ 0.005 in) in diameter. The anvil shall have a diameter not less than that of the presser foot. The pressure on the sample shall be as specified in Table 4.

TABLE 4—THICKNESS MEASUREMENT STRESSES AND FORCES

Type of Material of First Numeral of Six-Digit Number	Pressure on Sample, kPa (psi)	Total Force on Presser Foot, N (oz) (reference)
1	80.3 $\pm$ 6.9 (11.5 $\pm$ 1.0)	2.50 (9.0)
2	35 $\pm$ 6.9 (5.1 $\pm$ 1.0)	1.11 (4.0)
3	55 $\pm$ 6.9 (8.0 $\pm$ 1.0)	1.75 (6.3)
0 and 9 ⁽¹⁾	55 $\pm$ 6.9 (8.0 $\pm$ 1.0)	1.75 (6.3)
5	80.3 $\pm$ 6.9 (11.5 $\pm$ 1.0)	2.50 (9.0)

1. Unless otherwise specified on engineering drawing or other supplement to this classification system.

- 9.1.2 The reading shall be taken by lowering the presser foot gently until it is in contact with the specimen. A sufficient number of readings shall be taken, depending on the size of the specimen, to provide a reliable average value.

- 9.2 Compressibility and Recovery**—Specimens shall be tested in accordance with Test Method ASTM F 36 using the procedure which is applicable to the material described by the first two numerals of the basic six-digit number, as given in Table 5.

TABLE 5—COMPRESSIBILITY TEST METHODS

First Two Numerals of Six-Digit Number	Procedure, Test Method ASTM F 36	Pressure, MPa (psi)
11 and 12	A	34.474 (5000)
13	H	6.895 (1000)
21 and 23	F	0.689 (100)
22	B	2.758 (400)
31, 32, 33, and 34	G	6.895 (1000)
00 and 99	G ⁽¹⁾	6.895 (1000)
51 and 52	A	34.474 (5000)
71 and 72	J	34.474 (5000)
73	K	6.895 (1000)

1. Unless otherwise specified on engineering drawing or other supplement to this classification system.

- 9.3 Fluid Resistance**—Specimens shall be tested in accordance with Test Method ASTM F 146.

- 9.3.1 OTHER TYPES OF MATERIALS (AS INDICATED BY 0 OR 9 FIRST NUMERAL OF BASIC SIX-DIGIT NUMBER)—Use the same apparatus and general procedure outlined for Type 3 materials, unless otherwise specified in the engineering drawing or other supplement to this classification.

- 9.4 Sealability**—Specimens shall be tested in accordance with Test Method ASTM F 37.

- 9.5 Creep Relaxation**—Specimens shall be tested in accordance with Test Method ASTM F 38.

- 9.6 Adhesion**—Specimens shall be tested in accordance with Test Method ASTM F 607.

- 9.7 Tensile Strength**—Specimens shall be tested in accordance with Test Method ASTM F 152.

- 9.7.1 OTHER TYPES OF MATERIAL (AS INDICATED BY 0 OR 9 FIRST NUMERAL OF BASIC SIX-DIGIT NUMBER)—Use the same apparatus and general procedure outlined for Type 3 materials, unless otherwise specified on engineering drawing or other supplement to this classification.

- 9.8 Binder Durability**—Specimens shall be tested in accordance with appropriate procedures in Test Method ASTM F 148.

- 9.9 Flexibility**—Specimens shall be tested in accordance with appropriate procedures in Test Method ASTM F 147.

- 9.10 Thermal Conductivity**—Specimens shall be tested in accordance with Practice ASTM F 433, using a temperature of 100 °C ± 2 °C (212 °F ± 3.6 °F).

PREPARED BY THE SAE GASKETING STANDARDS COMMITTEE

APPENDIX A

(NONMANDATORY INFORMATION)

A.1 Applicable Test Methods

A.1.1 Table A1 indicates properties, characteristics, and test methods that are normally considered applicable to each type of material. It is not intended to limit the use of numeral-symbols as provided in Classification System SAE J90 where experience indicates that the related properties, characteristics, or test methods, or both, are applicable.

A.1.2 Table A2 is being provided to offer an explanation of the system of identification of gasket materials previously used in SAE J90a which has been superseded by Classification System SAE J90.

A.1.3 Tables A3, A4, and A5 are also retained in this appendix to provide a reference for transforming formerly used P-number identification into the present SAE J90.

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TABLE A1—TYPICAL TYPES OF MATERIALS

NOTE: "X" indicates that the test conditions shown in first column have been used to characterize the type of material named in column heading.

"Dash" (-) indicates that the test method is either "not applicable" to the material named or has not been commonly used in characterizing the material.

Properties, Characteristics, and Test methods	Type 1, Asbestos or Other Inorganic Fibers	Type 1, Asbestos or Other Inorganic Fibers	Type 1, Asbestos or Other Inorganic Fibers	Type 2, Cork	Type 2, Cork	Type 2, Cork	Type 3, Cellulose or Other Organic Fibers	Type 3, Cellulose or Other Organic Fibers	Type 3, Cellulose or Other Organic Fibers	Type 5, Flexible Graphite	Type 5, Flexible Graphite
	Compressed Asbestos	Beater Addition Asbestos	Asbestos Paper and Asbestos	Cork Composition	Cork and Elastomeric	Cork and Cellular Rubber	Untreated Fiber	Treated Protein	Treated Elastomeric	Homogeneous Sheet	Laminated Sheet
Compressibility:											
5000-psi load (Test Method F 36, Procedure A)	X	X	—	—	—	—	—	—	—	X	X
5000-psi load (Test Method F 36, Procedure J) ⁽¹⁾	X	X	—	—	—	—	—	—	—	X	X
1000-psi load (Test Method F 36, Procedure H)	—	—	X	—	—	—	—	—	—	—	—
1000-psi load (Test Method F 36, Procedure K) ¹	—	—	X	—	—	—	—	—	—	—	—
1000-psi load (Test Method F 36, Procedure G)	—	—	—	—	—	—	X	X	X	—	—
100-psi load (Test Method F 36, Procedure F)	—	—	—	X	—	X	—	—	—	—	—
400-psi load (Test Method F 36, Procedure B)	—	—	—	—	X	—	—	—	—	—	—
Tensile strength	X	X	X	X	X	X	X	X	X	X	X
Resistance to exposure in ASTM No. 3 Oil:											
Volume change, 70 h at 212°F	—	—	—	—	—	X	—	—	—	—	—
Weight increase, 22 h at 70 85°F	—	—	—	—	—	—	X	X	X	—	—
Thickness increase: 22 h at 70 to 85°F	—	—	—	—	—	—	X	X	X	—	—
5 h at 300°F	X	X	—	—	—	—	—	—	—	—	—
Resistance to exposure in ASTM Fuel B:											
Weight increase: 22 h at 70 to 85°F	—	—	—	—	—	—	X	X	X	—	—
5 h at 70 to 85°F	X	X	—	—	—	—	—	—	—	—	—
Thickness change: 22 h at 70 to 85 °F	—	—	—	—	—	—	X	X	X	—	—
5 h at 70 to 85 °F	X	X	—	—	—	—	—	—	—	—	—
Resistance to exposure in ASTM No. 1 Oil:											
Volume change, 70 h at 212 °F	—	—	—	—	X	X	X	—	—	—	—
Resistance to exposure in ASTM Fuel A:											
Volume change, 22 h at 70 to 85 °F	—	—	—	—	X	X	X	—	—	—	—
Resistance to exposure in distilled water:											
Weight increase, 22 h at 70 to 85 °F	—	—	—	—	—	—	X	X	X	—	—
Thickness change, 22 h at 70 to 85 °F	—	—	—	—	—	—	X	X	X	—	—
Sealability	X	X	X	X	X	X	X	X	X	X	X
Creep relaxation	X	X	—	—	—	—	—	—	—	X	X
Binder durability	—	—	—	X	—	—	—	—	—	—	—
Flexibility	—	—	—	X	X	X	—	—	—	X	X
Thermal conductivity	X	X	X	X	X	X	X	X	X	X	X

1. Type 7, Nonasbestos

TABLE A2—SYSTEM OF IDENTIFICATION

Digit	Type 1	Type 2	Type 3
First Digit (principal fibrous or particulate material)	1. Asbestos or other inorganic fibers	2. Cork	3. Cellulose or other organic fibers
Second Digit (trade designation)	1. Compressed asbestos sheet 2. Asbestos beater sheet 3. Asbestos paper and millboard	1. Cork composition 2. Cork and rubber 3. Cork and cellular rubber	0. Tag 1. Chipboard 2. Vulcanized fiber 3. Cellulose fiber 4. Fiber and filler compositions
Third Digit (binder or treatment other than sizing)	(Same for all three types)		
	0. None 1. Protein (glue-glycerin or equivalent) 2. Resin 3. Rubber, Type S, Class A (polysulfide or equivalent) 4. Rubber, Type S, Class SB (acrylonitrile or equivalent) 5. Rubber, Type S, Class SC (chloroprene or equivalent) 6. Rubber, Type R (natural, reclaim, styrene, or equivalent)		
Fourth Digit (compressibility index, Test Method ASTM F 36, Procedure G, total load—1000 psi). For identification purposes only. May not agree with compressibility in tables where other loads are employed.	(Same for all three types)		
	0. 0 to 5% 1. 6 to 15% 2. 16 to 25% 3. 26 to 35% 4. 36 to 45% 5. 46 to 55% 6. 56 to 65% 7. 66 to 75% 8. 76 to 85% 9. 86 to 95%		
Suffix Letter	Used to distinguish grades of material within one 4-digit category which differ sufficiently to justify separate tabular values. If only one grade of material is listed in the table, the letter "A" is used.		
Example:	Letter indicating a gasket material included in ASTM D 1170		
	Cellulose or other organic fibers		
	Rope or chemical wood, or both		
	Binder or treatment, rubber, Type S, Class SC		
	Compressibility index is 26 to 35%		
	Grade		
P	3	3	5
	3	A	