SAE International™

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J200

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Classification System for Rubber Materials

Foreword—The original version of this SAE Recommended Practice was prepared jointly by the Society of Automotive Engineers and the American Society for Testing and Materials and bore the designation SAE J200/ ANSI/ASTM D 2000. This document superseded and replaced SAE J14/ASTM D 735 and was intended to be used as a source of material quality "line call-out" specifications on procurement documents and drawings.

This Recommended Practice is now under the sole jurisdiction of the SAE Committee on Automotive Rubber Specifications and bears the designation SAE J200.

This document is based on basic physical properties of rubber materials obtained directly from standard compression molded test specimens. Test specimens may be fashioned from finished products or by alternate methods. However, test specimens so prepared may be affected by forming of the product or sample and/or by shaping them for testing. Therefore, test results prepared from finished products or by alternate methods may not duplicate values obtained from standard test specimens.

1. ***Scope***—This classification system tabulates the properties of vulcanized rubber materials (natural rubber, reclaimed rubber, synthetic rubbers, alone or in combination) that are intended for, but not limited to, use in rubber products for automotive applications.

   NOTE 1—The SAE Committe on Automotive Rubber Specifications (CARS) has the sole responsibility for SAE J200. CARS Works closely with and receives input from ASTM Subcommittee D11.30 on Classification of Rubber Compounds with the goal to keep SAE J200 and ASTM D 2000 technically equivalent. Candidate materials presented for development of new tables or for inclusion in Tables A1 or A2 of SAE J200 or Table X1.1 of ASTM D 2000 shall be initiated with the SAE CARS Committee. The procedure to be followed is detailed in Appendix C of SAE J200.

   NOTE 2—This document may serve many of the needs of other industries in much the same manner as SAE numbered steels. It must be remembered, however, that this system is subject to revision when required by automotive needs. It is recommended that the latest revision always be used. This document is based on the premise that all rubber materials intended for use in rubber products can be arranged into characteristic designations. These designations are determined by types, based on resistance to heat aging, and classes, based on resistance to swelling by oil. Basic levels are thus established which, together with values describing additional requirements, permit complete description of the quality of all rubber materials. In all cases where provisions of this document would conflict with those of the detailed specifications for a particular product, the latter shall take precedence.

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NOTE 3—When the rubber product is to be used for purposes where the requirements are too specific to be completely prescribed by this classification system, it is necessary for the purchaser to consult the supplier in advance to establish the appropriate properties, test methods, and specification test limits.

1.1 Purpose

1.1.1 The purpose of this document is to provide guidance to the engineer in the selection of practical, commercially available rubber materials, and further to provide a method for specifying these materials by the use of a simple line call-out designation.

1.1.2 This document was developed to permit the addition of descriptive values for future rubber materials without complete reorganization of the classification system and to facilitate the incorporation of future new methods of test to keep pace with changing industry requirements.

2. References

2.1 Applicable Publications—The following publications form a part of this specification to the extent specified herein.

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

ASTM D 395—Test Methods for Rubber Property-Compression Test
ASTM D 412—Test Methods for Rubber Properties in Tension
ASTM D 429—Test Methods for Rubber Property—Adhesion to Rigid Substrates
ASTM D 430—Test Methods for Rubber Deterioration-Dynamic Fatigue
ASTM D 471—Test Methods for Rubber Property-Effect of Liquids
ASTM D 573—Test Methods for Rubber Deterioration in an Air Oven
ASTM D 575—Test Methods for Rubber Properties in Compression
ASTM D 624—Test Methods for Rubber Property-Tear Resistance
ASTM D 865—Test Methods for Rubber Deterioration by Heating in Air (Test Tube Enclosure)
ASTM D 925—Test Methods for Rubber Property-Staining of Surfaces (Contact, Migration, and Diffusion)
ASTM D 945—Test Methods for Rubber Properties in Compression or Shear (Mechanical Oscillograph)
ASTM D 1053—Test Method for Rubber Property—Stiffening at Low Temperature; Flexible Polymers and Coated Fabrics
ASTM D 1171—Test Method for Rubber Deterioration—Surface Ozone Cracking Outdoors or Chamber (Triangular Specimens)
ASTM D 1329—Test Method for Evaluating Rubber Property—Retraction at Low Temperatures (TR Test)
ASTM D 1349—Practice for Rubber—Standard Temperatures for Testing
ASTM D 1418—Practice for Rubber and Rubber Lattices—Nomenclature
ASTM D 2137—Test Methods for Rubber Property—Brittleness Point of Flexible Polymers and Coated Fabrics
ASTM D 2240—Test Method for Rubber Property-Durometer Hardness
ASTM D 3183—Practice for Rubber—Preparation of Pieces for Test Purposes from Products

2.1.2 ISO PUBLICATIONS—Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

ISO 1629—Rubber and latices—Nomenclature
ISO Guide 25

3. Type and Class

3.1 The prefix letter M shall be used to indicate that this classification system is based on SI units.

NOTE 4—Call-outs not prefixed by the letter M refer to an earlier classification system based on U.S. customary units. This was published in editions prior to 1979.

3.2 Rubber materials shall be designated on the basis of type (heat aging resistance) and class (oil swelling resistance). Type and class are each indicated by letter designations as shown in Tables 1 and 2 and illustrated in 8.1. Type is the first letter after the grade number and class is the second letter. See Appendix A for the types of polymers most often used to meet the specification.

TABLE 1—BASIC REQUIREMENTS FOR ESTABLISHING TYPE BY TEMPERATURE

Type	Test Temperature, °C
A	70
B	100
C	125
D	150
E	175
F	200
G	225
H	250
J	275
K	300

TABLE 2—BASIC REQUIREMENTS FOR ESTABLISHING CLASS BY VOLUME SWELL

Class	Volume Swell, max, %
A	no requirement
B	140
C	120
D	100
E	80
F	60
G	40
H	30
J	20
K	10

3.3 Type is based on changes in tensile strength of not more than ±30%, elongation of not more than −50%, and hardness of not more than ±15 points after heat aging for 70 h at an appropriate temperature. The temperatures at which these materials shall be tested for determining type are listed in Table 1.

3.4 Class is based on the resistance of the material to swelling in ASTM Oil No. 3 after 70 h immersion at a temperature determined from Table 1, except that a maximum temperature of 150 °C (the upper limit of oil stability) shall be used. Limits of swelling for each class are shown in Table 2.

NOTE 5—The selection of type based on heat aging resistance is understood to be indicative of the inherent heat aging resistance that can be normally expected from commercial compositions. Differences in severity of two approved heat aging test methods (ASTM D 865 and D 573) may invalidate direct comparison between those classes of rubber material not tested by the same method. Likewise, choice of class is based on the range of volume swell normally expected from such commercial compositions as established by type. The fact that a type and class of material is listed under Basic Requirements, indicates that materials that meet these requirements for heat aging and oil swelling resistance are commercially available.

NOTE 6—ASTM Oil No. 3 is no longer available (as of December 1993). It has been replaced by IRM903[1], which does not necessarily produce the same degree of swelling as ASTM Oil No. 3. Comparison of the effect of IRM903 versus ASTM Oil No. 3, on most elastomers tested, produces a close correlation.

NOTE 7—Oil aged data in the SAE J200 tables are to be used as a guideline for material selection. Continued conformance will be based on testing in IRM903 oil. Requirements shall be agreed upon between the customer and the material supplier and be specified by use of a "Z" suffix.

3.5 The letter designations shall always be followed by a three-digit number to specify the hardness and the tensile strength—for example, 505. The first digit indicates durometer hardness, for example, 5 for 50 ± 5, 6 for 60 ± 5. The next two digits indicate the minimum tensile strength - for example, 05 for 5 MPa, 14 for 14 MPa. Correlation of available materials for desired hardness and tensile strength is obtained through the elongation values (see 6.2).

4. Grade Numbers, Suffix Letters, and Numbers

4.1 Grade Numbers—Since the basic requirements do not always sufficiently describe all the necessary qualities, provision is made for deviation or adding requirements through a system of prefix grade numbers, suffix letters, and suffix numbers. Grade No. 1 indicates that only the basic requirements are compulsory and no suffix requirements are permitted. Grades other than No. 1 are used for expressing deviations or additional requirements. A grade number is written as a material prefix number preceding the letters for type and class (see 8.1). Grade No. 1 is always an available suffix grade number, and thus is not referenced in the last column of each basic requirement table.

4.2 Suffix Letters—The suffix letters that may be used together with their meaning, appear in Table 3.

4.3 Suffix Numbers—Each suffix letter should preferably be followed by two suffix numbers (see Note 8 in 7.1). The first suffix number always indicates the method of test; time of test is part of the method and is taken from the listings in Table 4. The second suffix number, if used, always indicates the temperature of test and is taken from Table 5. Where three-digit numbers are required, a dash (–) is used for separation, for example: A1–10; B4–10; F1–11.

TABLE 3—MEANING OF SUFFIX LETTERS

Suffix Letter	Test Required
A	Heat Aging Resistance
B	Compression Set
C	Ozone or Weather Resistance
D	Compression-Deflection Resistance
EA	Fluid Resistance (Aqueous)
EF	Fluid Resistance (Fuels)
EO	Fluid Resistance (Oils and Lubricants)
F	Low-Temperature Resistance
G	Tear Resistance
H	Flex Resistance
J	Abrasion Resistance
K	Adhesion
M	Flammability Resistance
N	Impact Resistance
P	Staining Resistance
R	Resilience
Z	Any special requirement which shall be specified in detail

1. Available from R.E. Carroll, P.O. Box 139, Trenton, NJ 08801.

TABLE 4—ASTM METHODS OF TEST[1]

Requirement or Suffix Letter	Basic	1	2	3	4	5	6	7	8
Durometer Hardness (Type A)	D 2240	—	—	—	—	—	—	—	—
Tensile Strength, Elongation	D 412 die C	—	—	—	—	—	—	—	—
Suffix A, Heat Aging Resistance	—	D 573, 70 h	D 865, 70 h	D 865, 168 h	D 573, 168 h	D 573, 1000 h	D 865, 1000 h	—	—
Suffix B, Compression Set	—	D 395, 22 h, Method B, solid	D 395, 70 h, Method B, solid	D 395, 22 h, Method B, plied	D 395, 70 h, Method B, plied	D 395, 1000 h Method B, solid	D 395, 1000 h Method B, plied	—	—
Suffix C, Ozone or Weather Resistance	—	D 1171,[2] ozone exposure, Method A	D 1171,[3] weather exposure	D 1171,[4] ozone exposure, Method B	—	—	—	—	—
Suffix D, Compression-Deflection Resistance	—	D 575, Method A	D 575, Method B	—	—	—	—	—	—
Suffix EA, Fluid Resistance (Aqueous)	—	D 471, water 70 h[5]	D 471, water-ethylene glycol, 70 h[6]	—	—	—	—	—	—
Suffix EF, Fluid Resistance (Fuels)	—	D 471, Reference Fuel A, 70 h	D 471, Reference Fuel B, 70 h	D 471, Reference Fuel C, 70 h	D 471, Reference Fuel D, 70 h	D 471, 85 volume percent Reference Fuel D plus 15 volume percent denatured anhydrous ethanol,[7] 70 h	D 471, 85 volume percent Reference Fuel C plus 15 volume percent anhydrous ethanol,[7] 70 h	D 471, 85 volume percent Reference Fuel C plus 15 volume percent anhydrous methanol	—
Suffix EO, Fluid Resistance (Oils and Lubricants)	—	D 471, ASTM Oil No. 1,[8] 70 h	D 471, ASTM Oil No. 2,[8] 70 h	D 471, ASTM Oil No. 3,[8] 70 h	D 471, ASTM Oil No. 1,[8] 168 h	D 471, ASTM Oil No. 2,[8] 168 h	D 471, ASTM Oil No. 3, [8] 168 h	D 471, Service Fluid No. 101, [8] 70 h	D 471, Fluid as designated in Table 6, [8] 70 h
Suffix F, Low-Temperature Resistance	—	D 2137, Method A, paragraph 9.3.2 3 min	D 1053, 5 min T_2 or T_5 or T_{10} or T_{50} or T_{100}	D 2137, Method A, Paragraph 9.3.2, 22 h	D 1329, 38.1 mm die, 50% elongation, 10 min, paragraph 7.5, retraction 10% min	D 1329, 38.1 mm 50% elongation, 10 min, paragraph 7.5, retraction 50% min	—	—	—
Suffix G, Tear Resistance	—	D 624, die B	D 624, die C	—	—	—	—	—	—
Suffix H, Flex Resistance	—	D 430, Method A	D 430, Method B	D 430, Method C	—	—	—	—	—
Suffix J, Abrasion Resistance[9]	—	—	—	—	—	—	—	—	—
Suffix K, Adhesion	—	D 429, Method A	D 429, Method B	[10]	—	—	—	—	—
Suffix M, Flammability Resistance[9]	—	—	—	—	—	—	—	—	—
Suffix N, Impact Resistance[9]	—	—	—	—	—	—	—	—	—

TABLE 4—ASTM METHODS OF TEST[1] (CONTINUED)

Requirement or Suffix Letter	Basic	1	2	3	4	5	6	7	8
Suffix P, Staining Resistance	—	D 925, Method A	D 925, Method B, Control Panel	—	—	—	—	—	—
Suffix R, Resilience	—	D 945	—	—	—	—	—	—	—
Suffix Z, Special Requirement[9]	—	—	—	—	—	—	—	—	—

1. The designations refer to the following methods of the American Society for Testing and Materials.
   ASTM D 395—Test Methods for Rubber Property-Compression Test
   ASTM D 412—Test Methods for Rubber Properties in Tension
   ASTM D 429—Test Methods for Rubber Property-Adhesion to Rigid Substrates
   ASTM D 430—Test Methods for Rubber Deterioration-Dynamic Fatigue
   ASTM D 471—Test Methods for Rubber Property-Effect of Liquids
   ASTM D 573—Test Methods for Rubber Deterioration in an Air Oven
   ASTM D 575—Test Methods for Rubber Properties in Compression
   ASTM D 624—Test Methods for Rubber Property-Tear Resistance
   ASTM D 865—Test Methods for Rubber Deterioration by Heating in Air (Test Tube Enclosure)
   ASTM D 925—Test Methods for Rubber Property-Staining of Surfaces (Contact, Migration, and Diffusion)
   ASTM D 945—Test Methods for Rubber Properties in Compression or Shear (Mechanical Oscillograph)
   ASTM D 1053—Test Method for Rubber Property-Stiffening at Low Temperature; Flexible Polymers and Coated Fabrics
   ASTM D 1171—Test Method for Rubber Deterioration-Surface Ozone Cracking Outdoors or Chamber (Triangular Specimens)
   ASTM D 1329—Test Method for Evaluating Rubber Property-Retraction at Low Temperatures (TR Test)
   ASTM D 1349—Practice for Rubber-Standard Temperatures for Testing
   ASTM D 1418—Practice for Rubber and Rubber Lattices — Nomenclature
   ASTM D 2137—Test Methods for Rubber Property-Brittleness Point of Flexible Polymers and Coated Fabrics
   ASTM D 2240—Test Method for Rubber Property-Durometer Hardness
   ASTM D 3183—Practice for Rubber-Preparation of Pieces for Test Purposes from Products
2. Use ozone chamber exposure method of ASTM Method D 1171, Method A.
3. ASTM Method D 1171, Weather Test, is 6 weeks duration. Test area and time of year to be agreed upon by the purchaser and the manufacturer.
4. Use ozone chamber exposure method of ASTM Method D 1171, Method B.
5. Distilled water shall be used. Volume increase by water displacement method, except alcohol dip omitted. When determining changes in tensile strength, elongation, and hardness, test tube to be 3/4 full after specimens are immersed. Determination to be made after 30 min. Cool in distilled water; acetone dip to be omitted.
6. Equal parts by volume of distilled water and reagent grade ethylene glycol. Volume increase by displacement method, except alcohol dip omitted. When determining changes in tensile strength, elongation, and hardness, test tube to be 3/4 full after specimens are immersed. Determination to be made after 30 min. Cool in distilled water; acetone dip to be omitted.
7. Anhydrous ethanol denatured with unleaded gasoline according to CDA formula #20. Sources are Archer-Daniels-Midland, P.O. Box 1445, Cedar Rapids, Iowa 52406 and Ralph Shrader Inc., 2450 Lovette Avenue, Detroit, Michigan 48210.
8. ASTM Oil No. 1 is available from: MZF Assoc., 11200 Homedale Street, Los Angeles, CA 90049.
   ASTM Oils No. 2 and 3 are no longer commercially available.
   ASTM Service Fluid 101 is available as Anderol 774 from Hüls AG Division, P.O. Box 2, Turner Place, Piscataway, NJ 08854.
   ASTM Service Fluid 102 consists of 95 mass percent ASTM No. 1 Oil + 5 mass percent Anglamol 99. Anglamol 99 is available from Lubrizol Corp., P.O. Box 17100, Cleveland, OH 44117.
   The above fluids are intended for comparative testing purposes. Commercial fluids may produce different results.
9. Test Method to be specified.
10. Bond made after vulcanization. Method of evaluation and requirement shall be based on agreement between fabricator and end user.

TABLE 5—SUFFIX NUMBERS TO INDICATE TEMPERATURE OF TEST

Applicable Suffix Requirements	Second Suffix No.	Test Temperature °C[1]
	11	275
	10	250
	9	225
	8	200
	7	175
	6	150
A, B, C,	5	125
EA, EF, EO,	4	100
G, K,	3	70
	2	38
	1	23
	0	[2]
	1	23
	2	0
	3	–10
	4	–18
	5	–25
	6	–35
F	7	–40
	8	–50
	9	–55
	10	–65
	11	–75
	12	–80

1. These test temperatures are based on the ASTM Recommended Practice D 1349. Annual Book of ASTM Standards, Parts 37 and 38.
2. Ambient temperature in the case of outdoor testing.

5. Composition and Manufacture

5.1 This classification is predicated upon materials, furnished under a specification based thereon, being manufactured from natural rubber, reclaimed rubber, synthetic rubber, alone or in combination, together with added compounding materials of such nature and quantity as to produce vulcanizates that comply with the specified requirements. All materials and workmanship shall be in accordance with good commercial practice, and the resulting product shall be free of porous areas, weak sections, bubbles, foreign matter, or other defects affecting serviceability.

5.2 **Color—**With the exception of FC, FE, FK, and GE materials, the values in the material tables are based on black compounds and comparable values may not be available in color.

6. Basic Requirements

6.1 The basic requirements for physical properties of available rubber materials are listed in Tables 6.AA to 6.KK[2] are based on test results obtained on test specimens having the highest and lowest tensile strength specified for each grade and durometer range.

Test results from specimens prepared from finished products may not duplicate values obtained from standard test specimens.

NOTE 8—When standard test specimens can be cut from finished parts in accordance with ASTM D 3183[3] a deviation to the extent of 10% (on tensile strength and elongation values only) is permissible when agreed upon by the purchaser and the supplier. This deviation is permissible only because of the recognized effects of knitting, grain, and buffing on the material when test specimens are prepared from finished parts and tested for tensile strength and elongation. This deviation is intended to apply to goods purchased by the government. For all other uses, when differences due to the method of processing or to the difficulty in obtaining suitable test specimens from the finished part arise, the purchaser and the supplier may agree on acceptable deviations. This can be done by comparing results of standard test specimens with those obtained on actual parts.

6.2 The available materials are listed in the appropriate material section of the table, giving each hardness and tensile strength grade with its appropriate elongation value. Also, there is a repetition of the values for the basic heat and oil aging requirements for the material resulting from the assignment of type and class. Compression set values are basic requirements to ensure proper vulcanization.

6.3 Available suffix numbers for each available rubber material are shown in the last column under Basic Requirements.

7. Suffix Requirements

7.1 Supplementary (suffix) requirements for available grades are listed in Tables 6.AA to 6.HK.

Suffix requirements shall be specified only as needed to define qualities necessary to meet service requirements. These suffix requirements are set forth for the various grade numbers. Suffix letters and suffix numbers describing these suffix requirements may be used singly or in combination, but not all suffix values available for a given material need be specified.

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2. Tensile strength values (psi) shown in Tables 6.AA to 6.KK are for information purposes only.
3. Annual Book of ASTM Standards, Section 9, Volume 09.01.

TABLE 6.AA—BASIC AND SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR CLASSIFICATION OF RUBBER MATERIALS—AA MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 573, 70 h at 70 °C	Oil Immersion, ASTM D 471, No. 3 Oil[1] 70 h at 70 °C	Compression Set, ASTM D 395, Method B, Solid, max, %, 22 h at 70 °C	Available Suffix Grade Numbers
30	7	1015	400				2, 4
30	10	1450	400				2, 4
30	14	2031	400				2, 4
40	7	1015	400				2, 4
40	10	1450	400				2, 4
40	14	2031	400				2, 4
40	17	2466	500				2, 4
40	21	3046	600				2, 4
50	3	435	250				2
50	6	870	250				2
50	7	1015	400				2, 3
50	8	1160	400				2, 3
50	10	1450	400				2, 3, 4, 5
50	14	2031	400				2, 3, 4, 5
50	17	2466	400				2, 3, 4, 5
50	21	3046	500				2, 3, 4, 5
60	3	435	250				2
60	6	870	250	Change in durometer hardness,			2
60	7	1015	300	±15 points			2, 3
60	8	1160	300	Change in tensile strength, ±30%	No requirement	Compression set, 50% max	2, 3
60	10	1450	350	Change in ultimate elongation,			2, 3, 4, 5
60	14	2031	400	–50% max			2, 3, 4, 5
60	17	2466	400				2, 3, 4, 5
60	21	3046	400				2, 3, 4, 5
60	24	3481	500				2, 3, 4, 5
70	3	435	150				2
70	6	870	150				2
70	7	1015	200				2, 3
70	8	1160	200				2, 3
70	10	1450	250				2, 3, 4, 5
70	14	2031	300				2, 3, 4, 5
70	17	2466	300				2, 3, 4, 5
70	21	3046	350				2, 3, 4, 5
80	3	435	100				2
80	7	1015	100				2
80	10	1450	150				2
80	14	2031	200				2
80	17	2466	200				2
90	3	435	75				2
90	7	1015	100				2
90	10	1450	125				2

1. See Note 6 in 3.4.

TABLE 6.AA—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR CLASSIFICATION OF RUBBER MATERIALS—AA MATERIALS (CONTINUED)

Suffix	Requirements	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
A13	Heat aging resistance, ASTM D 573, 70 h at 70°C:								
	Change in hardness, max, points	Basic Requirements Only	±15		+10	+10			
	Change in tensile strength, max, %	Basic Requirements Only	±30		–25	–25			
	Change in ultimate elongation, max, %	Basic Requirements Only	–50		–25	–25			
B13	Compression set, ASTM D 395, Method B, 22 h at 70 °C, max, %	Basic Requirements Only		25	25	25			
B33	Compression set, ASTM D 395, Method B, 22 h at 70 °C, max, %	Basic Requirements Only		35	35	35			
C12	Resistance to ozone, ASTM D 1171, quality retention rating, min, %	Basic Requirements Only	85		85				
C20	Resistance to outdoor aging, ASTM D 1171, quality retention rating, min, %	Basic Requirements Only	85	85	85	85			
EA14	Fluid resistance, ASTM D 471, water, 70 h at 100 °C, volume change, max, %	Basic Requirements Only	10	10	10	10			
F17	Low-temperature resistance, ASTM D 2137, Method A, paragraph 9.3.2, nonbrittle after 3 min at –40 °C	Basic Requirements Only	pass	pass	pass	pass			
G21	Tear resistance, ASTM D 624, Die C:								
	Under 7.0 MPa tensile strength, min, kN/m	Basic Requirements Only		22	22	22			
	Over 7.0 MPa tensile strength, min, kN/m	Basic Requirements Only		26	26	26			
K11	Adhesion, ASTM D 429, Method A, min, MPa	Basic Requirements Only	1.4	2.8	1.4	2.8			
K21	Adhesion, ASTM D 429, Method B, min, kN/m	Basic Requirements Only	7	7	7	7			
P2	Staining resistance, ASTM D 925, Method B, Control Panel, Nonstaining	Basic Requirements Only	pass	pass	pass	pass			
Z	Special requirements, specified in detail (including test methods & aging parameters), or additional requirements per Tables 3, 4, and 5 specified as in Section 8.2								

TABLE 6.AK—BASIC REQUIREMENTS FOR CLASSIFICATION OF RUBBER MATERIALS—AK MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 573, 70 h at 70 °C	Oil Immersion, ASTM D 471, No. 3 Oil[1] 70 h at 70 °C	Compression Set, ASTM D 395, Method B, Solid, max, %, 22 h at 70 °C	Available Suffix Grade Numbers
40	3	435	400				2
50	3	435	400				2
60	5	725	300	Change in durometer hardness, ±15 points Change in tensile strength, ±30%	Volume change, +10% max	Compression set, 50% max	2
70	7	1015	250	Change in ultimate elongation, −50% max			2
80	7	1015	150				3
90	7	1015	100				3

1. See Note 6 in 3.4.

TABLE 6.AK—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR CLASSIFICATION OF RUBBER MATERIALS—AK MATERIALS (CONTINUED)

	Suffix Requirements	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
A14	Heat aging resistance, ASTM D 573, 70 h at 100 °C:								
	Change in durometer hardness, max, points	Basic Requirements Only	+15	+15					
	Change in tensile strength, max, %	Basic Requirements Only	−15	−15					
	Change in ultimate elongation, max, %	Basic Requirements Only	−40	−40					
B33	Compression set, ASTM D 395, Method B, 22 h at 70 °C max, %	Basic Requirements Only	50	50					
EO14	Fluid resistance, ASTM D 471, No. 1 Oil, 70 h at 100 °C:								
	Change in volume, %	Basic Requirements Only	−3 to +5	−3 to +5					
EO34	Fluid resistance, ASTM D 471, No. 3 Oil[1], 70 h at 100 °C:								
	Change in durometer hardness, points	Basic Requirements Only	−5 to +10	−5 to +10					
	Change in tensile strength, max, %	Basic Requirements Only	−30	−30					
	Change in ultimate elongation, max, %	Basic Requirements Only	−50	−50					
F17	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle, 3 min at −40 °C	Basic Requirements Only	pass						
Z	Special requirements, specified in detail (including test method & aging parameters), or additional requirements per Tables 3, 4, and 5 per Section 8.2.								

1. See Note 6 in 3.4.

TABLE 6.BA—BASIC REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—BA MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 573, 70 h at 100 °C	Oil Immersion, ASTM D 471, No. 3 Oil[1] 70 h at 100 °C	Compression Set, ASTM D 395, Method B, Solid, max, %, 22 h at 70 °C	Available Suffix Grade Numbers
20[2]	6	870	400				3
30	7	1015	400				2
30	10	1450	400				2,3,4,5
30	14	2031	400				2,3,4,5
40	3	435	300				2,8
40	7	1015	300				2,8
40	10	1450	400				2,3,4,5,6
40	14	2031	400				2,3,4,5
50	7	1015	300				2,8
50	10	1450	400				2,3,4,5,6
50	14	2031	400				2,3,4,5
50	17	2466	400				2,3,4,5
60	3	435	250				8
60	6	870	250	Change in durometer hardness,			8
60	7	1015	300	±15 points			2,8
60	10	1450	350	Change in tensile strength, ±30%	No requirement	Compression set, 50% max	2,3,4,5,6
60	14	2031	400	Change in ultimate elongation,			2,3,4,5,6
60	17	2466	400	−50% max			2,3,4,5,6
70	3	435	150				8
70	6	870	150				8
70	7	1015	200				2,8
70	8	1160	200				8
70	10	1450	250				2,3,4,5,6
70	14	2031	300				2,3,4,5
70	17	2466	300				2,3,4,5
80	7	1015	100				2,7
80	10	1450	150				2,4
80	14	2031	200				2,4
90	3	435	75				7
90	7	1015	100				2,7
90	10	1450	125				2,4

1. See Note 6 in 3.4.
2. Materials would typically be 20 to 25 durometer based upon current capability.

TABLE 6.BA—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—BA MATERIALS (CONTINUED)

	Suffix Requirements	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
A14	Heat aging resistance ASTM D 573, 70 h at 100 °C:								
	Change in hardness, max, points	Basic Requirements Only		+10	+10				
	Change in tensile strength, max, %	Basic Requirements Only		–25	–25				
	Change in ultimate elongation, max, %	Basic Requirements Only		–25	–25				
B13	Compression set, ASTM D 395, Method B, 22 h at 70 °C, max, %	Basic Requirements Only		25			25		25
C12	Resistance to ozone, ASTM D 1171, quality retention rating, min, %	Basic Requirements Only	100	100	100	100	100	100	100
F17	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at –40 °C	Basic Requirements Only	pass	pass	pass	pass			
F19	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at –55 °C	Basic Requirements Only		pass		pass			
K11	Adhesion, ASTM D 429, Method A, min, MPa	Basic Requirements Only		1.4	1.4	1.4	1.4		
K21	Adhesion, ASTM D 429, Method B, min, kN/m	Basic Requirements Only		7.0	7.0	7.0			
K31	Adhesion, bond made after vulcanization	Basic Requirements Only		(1)	(1)	(1)			
Z	Special requirements, specified in detail (including test method & aging parameters), or additional requirements per Tables 3, 4, and 5 per Section 8.2								

1. Method of evaluation and requirement shall be based on agreement between fabricator and end user.

TABLE 6.BC—BASIC REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—BC MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 573, 70 h at 100 °C	Oil immersion, ASTM D 471, No. 3 Oil[1] 70 h at 100 °C	Compression Set, ASTM D 395, Method B, Solid, max, %, 22 h at 100 °C	Available Suffix Grade Numbers
30	3	435	300				2, 5
30	7	1015	400				2, 5
30	10	1450	500				2, 5
30	14	2031	500				2
40	3	435	300				2
40	7	1015	400				2, 5
40	10	1450	500				2, 5
40	14	2031	500				2, 5
40	17	2466	500				2
50	3	435	300				2, 5
50	7	1015	300				2, 5
50	10	1450	350				2, 5, 6
50	14	2031	400				2, 5, 6
50	17	2466	450				2, 6
50	21	3046	500				2, 6
50	24	3481	500				2, 6
60	3	435	300				3, 5
60	7	1015	300	Change in durometer hardness,			3, 5
60	10	1450	350	±15 points	Volume change,	Compression set, 80% max	3, 5, 6
60	14	2031	350	Change in tensile strength, ±30%	+120% max		3, 6
60	17	2466	400	Change in ultimate elongation,			3, 6
60	21	3046	400	–50% max			3, 6
60	24	3481	400				3, 6
70	3	435	200				3, 5
70	7	1015	200				3, 5
70	10	1450	250				3, 5, 6
70	14	2031	300				3, 5, 6
70	17	2466	300				3, 6
70	21	3046	300				3, 6
80	3	435	100				4
80	7	1015	100				4
80	10	1450	100				4
80	14	2031	150				4
90	3	435	50				4
90	7	1015	100				4
90	10	1450	150				4
90	14	2031	150				4

1. See Note 6 in 3.4.

TABLE 6.BC—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—BC MATERIALS (CONTINUED)

	Suffix Requirements	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
A14	Heat aging resistance, ASTM D 573, 70 h at 100 °C:								
	Change in hardness, max, points	Basic Requirements Only	+15	+15	+15	+15	+15		
	Change in tensile strength, max, %	Basic Requirements Only	–15	–15	–15	–15	–15		
	Change in ultimate elongation, max, %	Basic Requirements Only	–40	–40	–40	–40	–40		
B14	Compression set, ASTM D 395, Method B, 22 h at 100 °C, max, %	Basic Requirements Only	35	35	35	35	35		
C12	Resistance to ozone, ASTM D 1171, quality retention rating, min, %	Basic Requirements Only	100	100	100	100	100		
EO14	Fluid resistance, ASTM D 471, No. 1 Oil, 70 h at 100 °C:								
	Change in hardness, points	Basic Requirements Only	±10	±10	±10	±10	±10		
	Change in tensile strength, max, %	Basic Requirements Only	–30	–30	–30	–30	–30		
	Change in ultimate elongation, max, %	Basic Requirements Only	–30	–30	–30	–30	–30		
	Change in volume, %	Basic Requirements Only	–10 to +15	–10 to +15	–10 to +15	–10 to +15	–10 to +15		
EO34	Fluid resistance, ASTM D 471, No. 3 Oil[1] 70 h at 100 °C:								
	Change in tensile strength, max, %	Basic Requirements Only	–70	–60	–45	–60	–60		
	Change in ultimate elongation, max, %	Basic Requirements Only	–55	–50	–30	–60	–50		
	Change in volume, max, %	Basic Requirements Only	+120	+100	+80	+100	+100		
F17	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at –40 °C	Basic Requirements Only	pass	pass	pass		pass		
F19	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at –55 °C					pass			
G21	Tear resistance, ASTM D 624, Die C:								
	Under 7.0 MPa tensile strength, min, kN/m	Basic Requirements Only	22	22	22				
	7.0 to 10 MPa tensile strength, min, kN/m	Basic Requirements Only	26	26	26				
	10 MPa tensile strength and over, min, kN/m	Basic Requirements Only	26	26	26	26	26		
K11	Adhesion, ASTM D 429, Method A, min, MPa	Basic Requirements Only	1.4	1.4	1.4	1.4	2.8		
P2	Staining resistance, ASTM D 925, Method B, Control Panel, Nonstaining	Basic Requirements Only	pass	pass	pass				
Z	Special requirements, specified in detail (including test method & aging parameters), or additional requirements per Tables 3, 4, and 5 per Section 8.2								

1. See Note 6 in 3.4.

TABLE 6.BE—BASIC REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—BE MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 573, 70 h at 100 °C	Oil Immersion, ASTM D 471, No. 3 Oil[1] 70 h at 100 °C	Compression Set, ASTM D 395, Method B, Solid, max, %, 22 h at 100 °C	Available Suffix Grade Numbers
40	3	435	500			40	2
40	7	1015	500			40	2
50	3	435	350			40	2
50	6	870	350			40	2
50	7	1015	400			40	2
50	10	1450	400			40	2,3
50	14	2031	400			40	2
60	3	435	300			40	2
60	6	870	300			40	2
60	7	1015	350	Change in durometer hardness,		40	2
60	10	1450	350	±15 points	Volume change,	40	2,3
60	14	2031	350	Change in tensile strength, ±30%	+80% max	40	2
70	3	435	200	Change in ultimate elongation, −50% max		50	2
70	6	870	200			50	2
70	7	1015	200			50	2
70	10	1450	250			50	2,3
70	14	2031	250			50	2
70	17	2466	250			50	2
80	7	1015	100			50	2
80	10	1450	100			50	2
80	14	2031	150			50	2
80	17	2466	150			50	2
90	7	1015	100			50	2
90	10	1450	100			50	2
90	14	2031	150			50	2

1. See Note 6 in 3.4.

TABLE 6.BE—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—BE MATERIALS (CONTINUED)

	Suffix Requirements	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
A14	Heat aging resistance, ASTM D 573, 70 h at 100°C:								
	Change in hardness, max, points	Basic Requirements Only	+15	+15					
	Change in tensile strength, max, %	Basic Requirements Only	−15	−15					
	Change in ultimate elongation, max, %	Basic Requirements Only	−40	−40					
B14	Compression set, ASTM D 395, Method B 22 h at 100 °C, max, %	Basic Requirements Only	25	25					
C12	Resistance to ozone, ASTM D 1171, quality retention rating, min, %	Basic Requirements Only	100	100					
EO14	Fluid resistance, ASTM D 471, No. 1 Oil, 70 h at 100 °C:								
	Change in hardness, points	Basic Requirements Only	±10	±10					
	Change in tensile strength, max, %	Basic Requirements Only	−30	−30					
	Change in ultimate elongation, max, %	Basic Requirements Only	−30	−30					
	Change in volume, %	Basic Requirements Only	−10 to +15	−10 to +15					
EO34	Fluid resistance, ASTM D 471, No. 3 Oil(1), 70 h at 100 °C:								
	Change in tensile strength, max, %	Basic Requirements Only	−50	−50					
	Change in ultimate elongation, max, %	Basic Requirements Only	−40	−40					
F17	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at −40 °C	Basic Requirements Only	pass						
F19	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at −55 °C	Basic Requirements Only		pass					
G21	Tear resistance, ASTM D 624, Die C:								
	10 MPa tensile strength and over, min, kN/m	Basic Requirements Only		26					
K11	Adhesion, ASTM D 429, Method A, min, MPa	Basic Requirements Only		1.4					
Z	Special requirements, specified in detail (including test method & aging parameters), or additional requirements per Tables 3, 4, and 5 per Section 8.2								

1. See Note 6 in 3.4.

TABLE 6.BF—BASIC REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—BF MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 573, 70 h at 100 °C	Oil Immersion, ASTM D 471, No. 3 Oil[1] 70 h at 100 °C	Compression Set, ASTM D 395, Method B, Solid, max, %, 22 h at 100 °C	Available Suffix Grade Numbers
60	3	435	200				2
60	6	870	200				2
60	7	1015	250				2
60	8	1160	250				2
60	10	1450	300				2
60	14	2031	350				2
60	17	2466	350				2
70	3	435	150				2
70	6	870	150	Change in durometer hardness,			2
70	7	1015	200	±15 points	Volume change,	Compression set, 50% max	2
70	8	1160	200	Change in tensile strength, ±30%	+60% max		2
70	10	1450	250	Change in ultimate elongation,			2
70	14	2031	250	–50% max			2
70	17	2466	300				2
80	3	435	100				2
80	7	1015	100				2
80	10	1450	125				2
80	14	2031	125				2

1. See Note 6 in 3.4.

TABLE 6.BF—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—BF MATERIALS (CONTINUED)

Suffix	Suffix Requirements	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
B14	Compression set, ASTM D 395, Method B, 22 h at 100 °C max, %	Basic Requirements Only	25						
B34	Compression set, ASTM D 395, Method B, 22 h at 100 °C max, %	Basic Requirements Only	25						
EO14	Fluid resistance, ASTM D 471, No. 1 Oil, 70 h at 100 °C:								
	Change in hardness, points	Basic Requirements Only	±10						
	Change in tensile strength, max, %	Basic Requirements Only	–25						
	Change in ultimate elongation, max, %	Basic Requirements Only	–45						
	Change in volume, %	Basic Requirements Only	–10 to +10						
EO34	Fluid resistance, ASTM D 471, No. 3 Oil[1], 70 h at 100 °C:								
	Change in hardness, max, points	Basic Requirements Only	–20						
	Change in tensile strength, max, %	Basic Requirements Only	–45						
	Change in ultimate elongation, max, %	Basic Requirements Only	–45						
	Change in volume, %	Basic Requirements Only	0 to +60						
F19	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at –55 °C	Basic Requirements Only	pass						
Z	Special requirements, specified in detail (including test method & aging parameters), or additional requirements per Tables 3, 4, and 5 per Section 8.2								

1. See Note 6 in 3.4.

TABLE 6.BG—BASIC REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—BG MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 573, 70 h at 100 °C	Oil Immersion, ASTM D 471, No. 3 Oil[1] 70 h at 100 °C	Compression Set, ASTM D 395, Method B, Solid, max, %, 22 h at 100 °C	Available Suffix Grade Numbers
40	7	1015	450				2, 5
40	10	1450	450				2, 5
50	3	435	300				2, 5
50	6	870	300				2
50	7	1015	350				2, 5
50	8	1160	350				2
50	10	1450	300				2, 3, 4, 5
50	14	2031	350				2, 3, 4, 5
50	21	3046	400				3, 4
60	3	435	200				2, 5
60	6	870	200				2
60	7	1015	250				2, 5
60	8	1160	250				2
60	10	1450	300				2, 5
60	14	2031	300				2, 3, 4, 5
60	17	2466	350	Change in durometer hardness,			2
60	21	3046	350	±15 points			3, 4
60	28	4061	400	Change in tensile strength, ±30%	Volume change,	Compression set, 50% max	3, 4
				Change in ultimate elongation,	+40% max		
70	3	435	150	−50% max			2, 5
70	6	870	150				2
70	7	1015	200				2, 5
70	8	1160	200				2
70	10	1450	250				2, 5
70	14	2031	250				2, 3, 4, 5
70	17	2466	300				2, 3
70	21	3046	350				3, 4
70	28	4061	400				3, 4
80	3	435	100				6, 7
80	7	1015	100				6, 7
80	10	1450	125				6, 7
80	14	2031	125				3, 4, 6, 7
80	21	3046	300				3, 4
80	28	4061	350				3, 4
90	3	435	50				6, 7
90	7	1015	100				6, 7
90	10	1450	100				6, 7

1. See Note 6 in 3.4.

TABLE 6.BG—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—BG MATERIALS (CONTINUED)

	Suffix Requirements	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
A14	Heat aging resistance, ASTM D 573, 70 h at 100 °C:								
	Change in hardness, max, points	Basic Requirements Only			±5	±15	±15		
	Change in tensile strength, max, %	Basic Requirements Only			±15	–20	–20		
	Change in ultimate elongation, max, %	Basic Requirements Only			–15	–40	–40		
B14	Compression set, ASTM D 395, Method B, 22 h at 100 °C max, %	Basic Requirements Only	25	50	50	25	25	25	
B34	Compression set, ASTM D 395, Method B 22 h at 100 °C max, %	Basic Requirements Only	25			25	25		
EA14	Fluid resistance, ASTM D 471, water, 70 h at 100 °C:								
	Change in hardness, points	Basic Requirements Only	±10					±10	
	Change in volume, %	Basic Requirements Only	±15					±15	
EF11	Fluid resistance, ASTM D 471, Reference Fuel A, 70 h at 23 °C:								
	Change in hardness, points	Basic Requirements Only	±10					±10	
	Change in tensile strength, max, %	Basic Requirements Only	–25					–25	
	Change in ultimate elongation, max, %	Basic Requirements Only	–25					–25	
	Change in volume, %	Basic Requirements Only	–5 to +10					–5 to +10	
EF21	Fluid resistance, ASTM D 471, Reference Fuel B, 70 h at 23 °C:								
	Change in hardness, points	Basic Requirements Only	0 to –30					0 to –30	
	Change in tensile strength, max, %	Basic Requirements Only	–60					–60	
	Change in ultimate elongation, max, %	Basic Requirements Only	–60					–60	
	Change in volume, %	Basic Requirements Only	0 to +40					0 to +40	
EO14	Fluid resistance, ASTM D 471, No. 1 Oil, 70 h at 100 °C:								
	Change in hardness, max, points	Basic Requirements Only	–5 to +10	–7 to +5	–7 to +5	–5 to +15	–5 to +15	–5 to +15	
	Change in tensile strength, max, %	Basic Requirements Only	–25	–20	–20	–25	–25	–25	
	Change in ultimate elongation, max, %	Basic Requirements Only	–45	–40	–40	–45	–45	–45	
	Change in volume, %	Basic Requirements Only	–10 to +5	–5 to +10	–5 to +5	–10 to +5	–10 to +5	–10 to +5	
EO34	Fluid resistance, ASTM D 471, No. 3 Oil,[1] 70 h at 100 °C:								
	Change in hardness, points	Basic Requirements Only	–10 to +5	–10 to +5	–10 to +5	0 to –15	0 to –20	–10 to +5	
	Change in tensile strength, max, %	Basic Requirements Only	–45	–35	–35	–45	–45	–45	
	Change in ultimate elongation, max, %	Basic Requirements Only	–45	–40	–40	–45	–45	–45	
	Change in volume, %	Basic Requirements Only	0 to +25	+16 to +35	0 to +6	0 to +35	0 to +35	0 to +25	
F16	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at –35 °C	Basic Requirements Only						pass	
F17	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at –40 °C	Basic Requirements Only	pass				pass		
F19	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at –55 °C	Basic Requirements Only		pass	pass	pass			
P2	Staining resistance, ASTM D 925, Method B, Control Panel, Nonstaining	Basic Requirements Only		pass	pass				
Z	Special requirements, specified in detail (including test method & aging parameters), or additional requirements per Tables 3, 4, and 5 per Section 8.2								

1. See Note 6 in 3.4.

TABLE 6.BK—BASIC REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—BK MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 573, 70 h at 100 °C	Oil Immersion, ASTM D 471, No. 3 Oil[1] 70 h at 100 °C	Compression Set, ASTM D 395, Method B, Solid, max, %, 22 h at 100 °C	Available Suffix Grade Numbers
60	3	435	200				4
60	6	870	200				4
60	7	1015	250				4
60	8	1160	250				4
60	10	1450	300				4
60	14	2031	350				4
60	17	2466	350				4
70	3	435	150				4
70	6	870	150	Change in durometer hardness,			4
70	7	1015	200	±15 points	Volume change,	Compression set, 50% max	4
70	8	1160	200	Change in tensile strength, ±30%	+10% max		4
70	10	1450	250	Change in ultimate elongation,			4
70	14	2031	250	−50% max			4
70	17	2466	300				4
80	3	435	100				4
80	7	1015	100				4
80	10	1450	125				4
80	14	2031	125				4
90	3	435	50				4
90	7	1015	100				4
90	10	1450	100				4

1. See Note 6 in 3.4.

TABLE 6.BK—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—BK MATERIALS (CONTINUED)

Suffix	Requirements	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
A24	Heat aging resistance, ASTM D 865, 70 h at 100 °C:								
	Change in hardness, points	Basic Requirements Only			±10				
	Change in tensile strength, max, %	Basic Requirements Only			−20				
	Change in ultimate elongation, max, %	Basic Requirements Only			−30				
B14	Compression set, ASTM D 395, Method B, 22 h at 100 °C, max, %	Basic Requirements Only			25				
B34	Compression set, ASTM D 395, Method B, 22 h at 100 °C, max, %	Basic Requirements Only			25				
EF11	Fluid resistance, ASTM D 471, Reference Fuel A, 70 h at 23 °C:								
	Change in hardness, points	Basic Requirements Only			±5				
	Change in tensile strength, max, %	Basic Requirements Only			−20				
	Change in ultimate elongation, max, %	Basic Requirements Only			−20				
	Change in volume, %	Basic Requirements Only			±5				
EF21	Fluid resistance, ASTM D 471, Reference Fuel B, 70 h at 23 °C:								
	Change in hardness, points	Basic Requirements Only			0 to −20				
	Change in tensile strength, max, %	Basic Requirements Only			−50				
	Change in ultimate elongation, max, %	Basic Requirements Only			−50				
	Change in volume, %	Basic Requirements Only			0 to +25				
EO14	Fluid resistance, ASTM D 471, No. 1 Oil, 70 h at 100 °C:								
	Change in hardness, points	Basic Requirements Only			±5				
	Change in tensile strength, max, %	Basic Requirements Only			−20				
	Change in ultimate elongation, max, %	Basic Requirements Only			−20				
	Change in volume, %	Basic Requirements Only			−10 to 0				
EO34	Fluid resistance, ASTM D 471, No. 3 Oil[1] 70 h at 100 °C:								
	Change in hardness, points	Basic Requirements Only			−10 to +5				
	Change in tensile strength, max, %	Basic Requirements Only			−20				
	Change in ultimate elongation, max, %	Basic Requirements Only			−30				
	Change in volume, %	Basic Requirements Only			0 to +5				
Z	Special requirements, specified in detail (including test method & aging parameters), or additional requirements per Tables 3, 4, and 5 per Section 8.2								

1. See Note 6 in 3.4.

TABLE 6.CA—BASIC REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—CA MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 573, 70 h at 125 °C	Oil Immersion, ASTM D 471, No. 3 Oil[1] 70 h at 125 °C	Compression Set, ASTM D 395, Method B, Solid, max, %, 22 h at 100 °C	Available Suffix Grade Numbers
30	7	1015	500				2
30	10	1450	500				2
40	7	1015	400				2
40	10	1450	400				2
40	14	2031	400				2
50	7	1015	300				3
50	10	1450	300				4
50	14	2031	350	Change in durometer hardness,			4
50	17	2466	350	±15 points			4
				Change in tensile strength, ±30%	No requirements	Compression set, 60% max	
60	7	1015	250	Change in ultimate elongation,			3
60	10	1450	250	−50% max			4
60	14	2031	250				4
70	7	1015	200				3
70	10	1450	200				4,5
70	14	2031	200				4,5
80	7	1015	150				6
80	10	1450	150				7,8
80	14	2031	150				7,8
90	7	1015	100				6
90	10	1450	100				7,8

1. See Note 6 in 3.4.

TABLE 6.CA—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—CA MATERIALS (CONTINUED)

	Suffix Requirements	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
A25	Heat aging resistance, ASTM D 865, 70 h at 125 °C:								
	Change in hardness, max, points	Basic Requirements Only	+10	+10	+10	+10	+10	+10	+10
	Change in tensile strength, max, %	Basic Requirements Only	–20	–20	–20	–20	–20	–20	–20
	Change in ultimate elongation, max, %	Basic Requirements Only	–40	–40	–40	–40	–40	–40	–40
B35	Compression set, ASTM D 395, Method B, 22 h at 125 °C, max, %	Basic Requirements Only	70	70	70	50	70	70	50
B44	Compression set, ASTM D 395, Method B, 70 h at 100 °C, max, %	Basic Requirements Only	35	50					
C32	Resistance to ozone, ASTM D 1171, Method B	Basic Requirements Only	pass	pass	pass	pass	pass	pass	pass
EA14	Fluid resistance, ASTM D 471, water, 70 h at 100 °C, volume change, %	Basic Requirements Only	±5	±5	±5	±5	±5	±5	±5
F17	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle, after 3 min at –40 °C	Basic Requirements Only	pass	pass	pass	pass	pass	pass	pass
F18	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at –50 °C	Basic Requirements Only	pass	pass	pass	pass		pass	
F19	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at –55 °C	Basic Requirements Only			pass				
G11	Tear resistance, ASTM D 624, Die B, min, kN/m	Basic Requirements Only	17	26	26	26	26	26	26
G21	Tear resistance, ASTM D 624, Die C, min, kN/m	Basic Requirements Only	17	26	26	26	26	26	26
K11	Adhesion, ASTM D 429, Method A, min, MPa	Basic Requirements Only		1.4	2.8	2.8	1.4	2.8	2.8
P2	Staining resistance, ASTM D 925, Method B, Control Panel, Nonstaining	Basic Requirements Only	pass	pass	pass	pass	pass	pass	pass
R11	Resilience in compression, ASTM D 945, min, %	Basic Requirements Only	70	50	60				
Z	Special requirements, specified in detail (including test method & aging parameters), or additional requirements per Tables 3, 4, and 5 per Section 8.2								

TABLE 6.CE—BASIC REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—CE MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 573, 70 h at 125 °C	Oil Immersion, ASTM D 471, No. 3 Oil[1] 70 h at 125 °C	Compression Set, ASTM D 395, Method B, Solid, max, %, 22 h at 70 °C	Available Suffix Grade Numbers
50	14	2031	400				2,3
60	10	1450	350				2,3
60	14	2031	400				2,3
60	17	2466	400	Change in durometer hardness, ±15 points			2,3
70	7	1015	200	Change in tensile strength, ±30%	Volume change,	Compression set, 80% max	2,3
70	10	1450	250	Change in ultimate elongation,	+80% max		2,3
70	14	2031	300	−50% max			2,3
70	27	2466	300				2,3
80	7	1015	200				2,3
80	10	1450	250				2,3
80	14	2031	250				2,3

1. See Note 6 in 3.4.

TABLE 6.CE—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—CE MATERIALS (CONTINUED)

	Suffix Requirements	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
A16	Heat aging resistance, ASTM D 573, 70 h at 150 °C:								
	Change in hardness, points	Basic Requirements Only	±20						
	Change in tensile strength, %	Basic Requirements Only	±30						
	Change in ultimate elongation, max, %	Basic Requirements Only	−60						
B15	Compression set, ASTM D 395, Method B, 22 h at 125 °C, max, %	Basic Requirements Only	60	80					
F19	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at −55 °C	Basic Requirements Only	pass	pass					
P2	Staining resistance, ASTM D 925, Method B, Control Panel, Nonstaining	Basic Requirements Only	pass	pass					
Z	Special requirements, specified in detail (including test method & aging parameters), or additional requirements per Tables 3, 4, and 5 per Section 8.2								

TABLE 6.CH—BASIC REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—CH MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength min (psi)	Ultimate Elongation min, %	Heat Aged, ASTM D 865, 70 h at 125 °C	Oil Immersion, ASTM D 471, No. 3 Oil (1) 70 h at 125 °C	Compression Set, ASTM D 395, Method B, Solid, max, % 22 h at 100 °C	Available Suffix Grade Numbers
60	3	435	200				2,3
60	6	870	200				2,3
60	7	1015	250				2,3
60	8	1160	250				2,3
60	10	1450	300				2,3,5,6
60	14	2031	350				2,3
60	17	2466	350				2,3
70	3	435	150				2,3
70	6	870	150	Change in durometer hardness,			2,3
70	7	1015	200	±15 points			2,3
70	8	1160	200	Change in tensile strength, ±30%	Volume change,	Compression set, 50% max	2,3
70	10	1450	250	Change in ultimate elongation,	+30% max		2,3
70	14	2031	250	−50% max			2,3,5,6
70	17	2466	300				2,3
80	3	435	100				3,4
80	7	1015	100				3,4
80	10	1450	125				3,4
80	14	2031	125				3,4,5,6
90	3	435	50				3,4
90	7	1015	100				3,4
90	10	1450	100				3,4,5,6

1. See Note 6 in 3.4.

TABLE 6.CH—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—CH MATERIALS (CONTINUED)

Suffix Requirements		Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
A25	Heat aging resistance, ASTM D 865, 70 h at 125 °C:								
	Change in hardness, points	Basic Requirements Only	0 to +15	0 to +15	0 to +15	0 to +10	0 to +10		
	Change in tensile strength, max, %	Basic Requirements Only	−25	−25	−25	−10	−20		
	Change in ultimate elongation, max, %	Basic Requirements Only	−50	−50	−50	−40	−30		
B14	Compression set, ASTM D 395, Method B, 22 h at 100 °C, max, %	Basic Requirements Only	25	25	25	30	25		
B34	Compression set, ASTM D 395, Method B, 22 h at 100 °C, max, %	Basic Requirements Only	25	25		30	25		
C12	Resistance to ozone, ASTM D 1171, quality retention rating, min, %	Basic Requirements Only				100	100		
EF31	Fluid resistance, ASTM D 471, Reference Fuel C, 70 h at 23 °C:								
	Change in hardness, points	Basic Requirements Only	0 to −30		0 to −30	0 to −20	0 to −20		
	Change in tensile strength, max, %	Basic Requirements Only	−60		−60	−50	−50		
	Change in ultimate elongation, max, %	Basic Requirements Only	−60		−60	−60	−50		
	Change in volume, %	Basic Requirements Only	0 to +50		0 to +50	0 to +40	0 to +40		
EO15	Fluid resistance, ASTM D 471, No. 1 Oil, 70 h at 125 °C:								
	Change in hardness, points	Basic Requirements Only	0 to +10		0 to +10				
	Change in tensile strength, max, %	Basic Requirements Only	−20		−20				
	Change in ultimate elongation, max, %	Basic Requirements Only	−35		−35				
	Change in volume, %	Basic Requirements Only	−15 to +5		−15 to +5				
EO16	Fluid resistance, ASTM D 471, No. 1 Oil, 70 h at 150 °C:								
	Change in hardness, points	Basic Requirements Only		0 to +10					
	Change in tensile strength, max, %	Basic Requirements Only		−20					
	Change in ultimate elongation, max, %	Basic Requirements Only		−40					
	Change in volume, %	Basic Requirements Only		−15 to +5					
EO35	Fluid resistance, ASTM D 471, No. 3 Oil(1), 70 h at 125 °C:								
	Change in hardness, points	Basic Requirements Only	±10		±10				
	Change in tensile strength, max, %	Basic Requirements Only	−15		−15				
	Change in ultimate elongation, max, %	Basic Requirements Only	−30		−30				
	Change in volume, %	Basic Requirements Only	0 to +25		0 to +25				
EO36	Fluid resistance, ASTM D 471, No. 3 Oil(1), 70 h at 150 °C:								
	Change in hardness, points	Basic Requirements Only		±10		−5 to +10	−5 to +10		
	Change in tensile strength, max, %	Basic Requirements Only		−35		−10	−15		
	Change in ultimate elongation, max, %	Basic Requirements Only		−35		−50	−40		
	Change in volume, %	Basic Requirements Only		0 to +25		0 to +10	0 to +15		
F14	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at −18 °C	Basic Requirements Only				pass			
F16	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at −35 °C	Basic Requirements Only			pass				
F17	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at −40 °C	Basic Requirements Only	pass				pass		
Z	Special requirements, specified in detail (including test method & aging parameters), or additional requirements per Tables 3, 4, and 5 per Section 8.2								

1. See Note 6 in 3.4.

TABLE 6.DA—BASIC REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—DA MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 573, 70 h at 150 °C	Oil Immersion, ASTM D 471, No. 3 Oil[1] 70 h at 150 °C	Compression Set, ASTM D 395, Method B, Plied, max, %, 22 h at 150 °C	Available Suffix Grade Numbers
50	7	1015	300				2
50	10	1450	300				2
50	14	2031	350				2
60	7	1015	250				2,3
60	10	1450	250	Change in durometer hardness,			2,3
60	14	2031	300	±15 points			2,3
				Change in tensile strength, ±30%	No requirement	Compression set, 50% max	
70	7	1015	200	Change in ultimate elongation,			2,3
70	10	1450	200	–50% max			2,3
70	14	2031	200				2,3
80	7	1015	150				2,3
80	10	1450	150				2,3
80	14	2031	150				2,3

1. See Note 6 in 3.4.

TABLE 6.DA—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—DA MATERIALS (CONTINUED)

	Suffix Requirements	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
A26	Heat aging resistance, ASTM D 865, 70 h at 150 °C:								
	Change in hardness, max, points	Basic Requirements Only	+10	+10					
	Change in tensile strength, max, %	Basic Requirements Only	–20	–20					
	Change in ultimate elongation, max, %	Basic Requirements Only	–20	–20					
B36	Compression set, ASTM D 395, Method B, 22h at 150 °C, max,%	Basic Requirements Only	40	25					
C32	Resistance to ozone, ASTM D 1171, exposure Method B	Basic Requirements Only	pass	pass					
EA14	Fluid resistance, ASTM D 471, water, 70 h at 100 °C, volume change, max, %	Basic Requirements Only	±5	±5					
F19	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at –55 °C	Basic Requirements Only	pass	pass					
G11	Tear resistance, ASTM D 624, Die B, min, kN/m	Basic Requirements Only	17	17					
G21	Tear resistance, ASTM D 624, Die C, min, kN/m	Basic Requirements Only	17	17					
K11	Adhesion, ASTM D 429, Method A, min, MPa	Basic Requirements Only		1.4					
P2	Staining resistance, ASTM D 925, Method B, Control Panel, Nonstaining	Basic Requirements Only	pass	pass					
R11	Resilience in compression, D 945, min, %	Basic Requirements Only	60	60					
Z	Special requirements, specified in detail (including test method & aging parameters), or additional requirements per Tables 3, 4, and 5 per Section 8.2								

TABLE 6.DE—BASIC REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—DE MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 573, 70 h at 150 °C	Oil Immersion, ASTM D 471, No. 3 Oil [1] 70 h at 150 °C	Compression Set, ASTM D 395, Method B, Solid, max, %, 22 h at 125 °C	Available Suffix Grade Numbers
60	10	1450	350				2
60	14	2031	400				2, 3
60	17	2466	400				2, 3, 4
70	7	1015	200				2
70	10	1450	250	Change in durometer hardness,			5
70	14	2031	300	±15 points	Volume change,	Compression set, 80% max	
70	17	2466	300	Change in tensile strength, ±30%	+80% max		6
				Change in ultimate elongation,			
80	7	1015	200	−50% max			
80	10	1450	200				
80	14	2031	250				2
90	10	1450	150				
90	14	2031	150				5

1. See Note 6 in 3.4.

TABLE 6.DE—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—DE MATERIALS (CONTINUED)

	Suffix Requirements	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
A16	Heat aging resistance, ASTM D 573, 70 h at 150 °C:	Basic Requirements Only							
	Change in hardness, points		15	15	15		15		
	Change in tensile strength, %		30	30	30		30		
	Change in ultimate elongation, max, %		−30	−30	−30		−30		
B15	Compression set, ASTM D 395, Method B, 22 h at 125 °C, max, %	Basic Requirements Only	55	35	25	35	30		
EO36	Fluid resistance, ASTM D 471, No. 3 Oil[1], 70 h at 150 °C:	Basic Requirements Only							
	Volume change, max, %		+70	+70		+60			
F16	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at −35 °C	Basic Requirements Only	pass			pass			
F17	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at −40 °C	Basic Requirements Only		pass	pass		pass		
Z	Special requirements, specified in detail (including test method & aging parameters), or additional requirements per Tables 3, 4, and 5 per Section 8.2								

1. See Note 6 in 3.4.

TABLE 6.DF—BASIC REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—DF MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 865, 70 h at 150 °C	Oil Immersion, ASTM D 471, No. 3 Oil[1] 70 h at 150 °C	Compression Set, ASTM D 395, Method B, Solid, max, %, 22 h at 150 °C	Available Suffix Grade Numbers
40	6	870	225			80	2
50	7	1015	225			80	2
60	8	1160	175	Change in durometer hardness ±15 points	Volume change,	80	2
70	6	870	100	Change in tensile strength, ±30%	+60% max	90	5
70	8	1160	150	Change in ultimate elongation, −50% max		80	2
80	6	870	100			90	5
80	8	1160	150			80	3
90	7	1015	125			85	4

1. See Note 6 in 3.4.

TABLE 6.DF—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—DF MATERIALS (CONTINUED)

	Suffix Requirements	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
A26	Heat aging resistance, ASTM D 865, 70 h at 150 °C:								
	Change in hardness, max, points	Basic Requirements Only	+10	+10	+10	+10			
	Change in tensile strength, max, %	Basic Requirements Only	−25	−25	−25	−25			
	Change in ultimate elongation, max, %	Basic Requirements Only	−30	−30	−30	−30			
B16	Compression set, ASTM D 395, Method B, 22 h at 150 °C, max, %	Basic Requirements Only	50	60	75	80			
B36	Compression set, ASTM D 395, Method B, 22 h at 150 °C, max, %	Basic Requirements Only	75	80	85				
EO16	Fluid resistance, ASTM D 471, No. 1 Oil, 70 h at 150 °C:								
	Change in hardness points	Basic Requirements Only	−8 to +15	−8 to +10	−8 to +10	−8 to +10			
	Change in tensile strength, max, %	Basic Requirements Only	−20	−20	−20	−30			
	Change in ultimate elongation, max, %	Basic Requirements Only	−30	−30	−30	−50			
	Change in volume, %	Basic Requirements Only	−5 to +10	−5 to +10	−5 to +10	−5 to +10			
EO36	Fluid resistance, ASTM D 471, No. 3 Oil[1], 70 h at 150 °C:								
	Change in hardness, max, points	Basic Requirements Only	−30	−30	−30	−30			
	Change in tensile strength, max, %	Basic Requirements Only	−60	−60	−60	−60			
	Change in ultimate elongation, max, %	Basic Requirements Only	−40	−30	−30	−50			
	Change in volume, max, %	Basic Requirements Only	+50	+50	+50	+50			
F14	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at −18 °C	Basic Requirements Only		pass	pass	pass			
F15	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at −25 °C	Basic Requirements Only	pass						
K11	Adhesion, ASTM D 429, Method A, min, MPa	Basic Requirements Only	1.4	1.4	1.4	1.4			
Z	Special requirements, specified in detail (including test method & aging parameters), or additional requirements per Tables 3, 4, and 5 per Section 8.2								

1. See Note 6 in 3.4.

TABLE 6.DH—BASIC REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—DH MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 865, 70 h at 150 °C	Oil Immersion, ASTM D 471, No. 3 Oil [1] 70 h at 150 °C	Compression Set, ASTM D 395, Method B, Solid, max, %, 22 h at 150 °C	Available Suffix Grade Numbers
40	7	1015	300			60	2
50	8	1160	250			60	2
60	8	1160	200			60	2
60	10	1450	200			60	2
60	14	2030	250			40	4
70	6	870	100	Change in durometer hardness, ±15 points	Volume change,	75	5
70	8	1160	200	Change in tensile strength, ±30%	+30% max	60	3
70	10	1450	200	Change in ultimate elongation,		60	3
70	16	2320	250	−50%		40	4
80	6	870	100			75	5
80	8	1160	175			60	3
80	10	1450	175			60	3
80	20	2900	150			40	4
90	10	1450	100			60	4
90	20	2900	100			45	

1. See Note 6 in 3.4.

TABLE 6.DH—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—DH MATERIALS (CONTINUED)

	Suffix Requirements	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
A26	Heat aging resistance ASTM D 865, 70 h at 150 °C:								
	Change in hardness, max, points	Basic Requirements Only	+10	+10	+10	+10			
	Change in tensile strength, max, %	Basic Requirements Only	−25	−25	−15	−25			
	Change in ultimate elongation, max, %	Basic Requirements Only	−30	−30	−25	−30			
B16	Compression set, ASTM D 395, Method B, 22 h at 150 °C, max, %	Basic Requirements Only	30	30		60			
B36	Compression set, ASTM D 395, Method B, 22 h at 150 °C, max, %	Basic Requirements Only	50	50	35				
EO16	Fluid resistance, ASTM D 471, No. 1 Oil, 70 h at 150 °C:								
	Change in hardness, points	Basic Requirements Only	−5 to +10	−5 to +10	−5 to +10	−5 to +10			
	Change in tensile strength, max, %	Basic Requirements Only	−20	−20	−20	−20			
	Change in ultimate elongation, max, %	Basic Requirements Only	−30	−40	−30	−40			
	Change in volume, %	Basic Requirements Only	±5	±5	−10 +5	±5			
EO36	Fluid resistance, ASTM D 471, No. 3 Oil[1], 70 h at 150 °C:								
	Change in hardness, max, points	Basic Requirements Only	−15	−15	−15	−15			
	Change in tensile strength, max, %	Basic Requirements Only	−40	−30	−40	−40			
	Change in ultimate elongation, max, %	Basic Requirements Only	−40	−30	−30	−40			
	Change in volume, max, %	Basic Requirements Only	+25	+25	+25	+25			
F13	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at −10 °C	Basic Requirements Only		pass		pass			
F14	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at −18 °C	Basic Requirements Only	pass						
F17	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at −40 °C				pass				
K11	Adhesion, ASTM D 429, Method A, min, MPa	Basic Requirements Only	1.4	1.4		1.4			
Z	Special requirements, specified in detail (including test method & aging parameters), or additional requirements per Tables 3, 4, and 5 per Section 8.2								

1. See Note 6 in 3.4.

TABLE 6.EE—BASIC REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—EE MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 865, 70 h at 175 °C	Oil Immersion, ASTM D 471, No. 3 Oil[1] 70 h at 150 °C	Compression Set, ASTM D 395, Method B, Solid, max, %, 22 h at 150 °C	Available Suffix Grade Numbers
50	8	1160	400				
50	10	1450	500				3
50	12	1740	500				3
50	14	2031	500				
60	6	870	200				4
60	8	1160	300				3,4,5
60	12	1740	300				3
60	14	2031	400				3
70	8	1160	200	Change in durometer hardness, ±15 points	Volume change,	Compression set, 75% max	3,4,5
70	10	1450	200	Change in tensile strength, ±30%	+80% max		4
70	12	1740	300	Change in ultimate elongation, –50% max			3
80	10	1450	200				4
80	12	1740	200				3,4
80	14	2031	200				3,4,5
80	16	2320	200				3
90	6	870	100				
90	10	1450	100				4
90	14	2031	100				3

1. See Note 6 in 3.4.

TABLE 6.EE—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—EE MATERIALS (CONTINUED)

	Suffix Requirements	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
A47	Heat resistance, ASTM D 573, 168 h at 175 °C:								
	Change in hardness, max, points	Basic Requirements Only		+10	+20	+10			
	Change in tensile strength, max, %	Basic Requirements Only		–30	–30	–30			
	Change in ultimate elongation, max, %	Basic Requirements Only		–50	–65	–50			
B46	Compression set, ASTM D 395, Method B, 70 h at 150 °C, max, %	Basic Requirements Only		50	75	50			
B37	Compression set, ASTM D 395, Method B, 22 h at 175 °C, max, %	Basic Requirements Only		50	75	50			
EO16	Fluid resistance, ASTM D 471, No. 1 Oil, 70 h at 150 °C:								
	Change in hardness, max, points	Basic Requirements Only		–10 to +5	–10 to +5	–10 to +5			
	Change in tensile strength, max, %	Basic Requirements Only		–25	–25	–25			
	Change in ultimate elongation, max, %	Basic Requirements Only		–35	–35	–35			
	Change in volume, %	Basic Requirements Only		±15	±10	±10			
EO36(1)	Fluid resistance, ASTM D 471, No. 3 Oil(2) 70 h at 150 °C:								
	Change in tensile strength, max, %	Basic Requirements Only		–60	–50	–50			
	Change in ultimate elongation, max, %	Basic Requirements Only		–55	–50	–50			
	Change in volume, max, %	Basic Requirements Only		+70	+60	+50			
EA14	Water resistance, ASTM D 471, 70 h at 100 °C:								
	Change in volume, max, %	Basic Requirements Only		+15	+15	+15			
F17	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at –40 °C	Basic Requirements Only		pass	pass	pass			
G21	Tear resistance, ASTM D 624, Die C, min, kN/M	Basic Requirements Only		20	20	20			

1. EO36 change in hardness was not included as data contained too much scatter.
2. See Note 6 in 3.4.

TABLE 6.EH—BASIC REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—EH MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 865, 70 h at 175 °C	Oil Immersion, ASTM D 471, No. 3 Oil[1] 70 h at 150 °C	Compression Set, ASTM D 395, Method B, Solid, max, %, 22 h at 175 °C	Available Suffix Grade Numbers
40	7	1015	250			75	3
50	8	1160	175			75	3
60	6	870	100	Change in durometer hardness,		75	3
60	9	1306	150	±15 points	Volume change,	75	3
				Change in tensile strength, ±30%	+30% max		
70	6	870	100	Change in ultimate elongation,		75	3
70	9	1306	125	−50% max		75	3
80	7	1015	100			75	3

1. See Note 6 in 3.4.

TABLE 6.EH—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—EH MATERIALS (CONTINUED)

	Suffix Requirements	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
A27	Heat resistance, ASTM D 865, 70 h at 175 °C:								
	Change in hardness, max, points	Basic Requirements Only		+10					
	Change in tensile strength, max, %	Basic Requirements Only		−30					
	Change in ultimate elongation, max, %	Basic Requirements Only		−40					
B17	Compression Set, ASTM D 395, Method B, 22 h at 175 °C, max, %	Basic Requirements Only		60					
B37	Compression Set, ASTM D 395, Method B 22 h at 175 °C, max, %	Basic Requirements Only		60					
EO16	Fluid resistance ASTM D 471, No. 1 Oil, 70 h at 150 °C:								
	Change in hardness, points	Basic Requirements Only		±5					
	Change in tensile strength, max, %	Basic Requirements Only		−20					
	Change in ultimate elongation, max, %	Basic Requirements Only		−30					
	Change in volume, %	Basic Requirements Only		±5					
EO36	Fluid resistance ASTM D 471, No. 3 Oil[1], 70 h at 150 °C:								
	Change in hardness, points	Basic Requirements Only		−20					
	Change in tensile strength, max, %	Basic Requirements Only		−40					
	Change in ultimate elongation, max, %	Basic Requirements Only		−30					
	Change in volume, %	Basic Requirements Only		+25					
F14	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 minutes at -18 °C	Basic Requirements Only		pass					
F25	Low-temperature resistance, ASTM D 1053, T100, -25 °C	Basic Requirements Only		pass					
K11	Adhesion, ASTM D 429, Method A, min, MPa	Basic Requirements Only		1.4[2]					
Z	Special requirements, specified in detail (including test method & aging parameters), or additional requirements per Tables 3, 4, and 5 per Section 8.2								

1. See Note 6 in 3.4.
2. From current DH specification.

TABLE 6.EK—BASIC REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—EK MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 573, 70 h at 175 °C	Oil Immersion, ASTM D 471, No. 3 Oil[1] 70 h at 150 °C	Compression Set, ASTM D 395, Method B, Solid, max, %, 22 h at 175 °C	Available Suffix Grade Numbers
50	9	1305	125	Change in durometer hardness, ±15 points	Volume change,	60	2
70	10	1450	125	Change in tensile strength, ±30%	+10% max	60	2
80	10	1450	100	Change in ultimate elongation, −50% max		60	2

1. See Note 6 in 3.4.

TABLE 6.EK—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—EK MATERIALS (CONTINUED)

	Suffix Requirements	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
A17	Heat aging resistance, ASTM D 573, 70 h at 175 °C:								
	Change in hardness, points	Basic Requirements Only	±10						
	Change in tensile strength, %	Basic Requirements Only	−25						
	Change in ultimate elongation, max, %	Basic Requirements Only	−20 to +30						
A18	Heat aging resistance, ASTM D 573, 70 h at 200 °C:								
	Change in hardness, points	Basic Requirements Only	−15 to +10						
	Change in tensile strength, max, %	Basic Requirements Only	−60						
	Change in ultimate elongation, %	Basic Requirements Only	−10 to +40						
B17	Compression set, ASTM D 395, Method B,	Basic Requirements Only							
	solid, 22 h at 175 °C, max, %		60						
B26	Compression set, ASTM D 395, Method B,	Basic Requirements Only							
	solid, 70 h at 150 °C, max, %		50						
C32	Resistance to ozone, ASTM D 1171, Method B	Basic Requirements Only	pass						
EA14	Fluid resistance, ASTM D 471, water, 70 h at 100 °C:								
	Change in hardness, points	Basic Requirements Only	−5 to +10						
	Change in volume	Basic Requirements Only	0 to +20						
EF31	Fluid resistance, ASTM D 471, Reference Fuel C, 70 h at 23 °C								
	Change in hardness, points	Basic Requirements Only	−20 to +5						
	Change in tensile strength, max, %	Basic Requirements Only	−50						
	Change in ultimate elongation, max, %	Basic Requirements Only	−50						
	Change in volume, max, %	Basic Requirements Only	+40						
EO16	Fluid resistance, ASTM D 471, No. 1 Oil, 70 h at 150 °C:								
	Change in hardness, points	Basic Requirements Only	−10 to +5						
	Change in tensile strength, max, %	Basic Requirements Only	−10						
	Change in ultimate elongation, max, %	Basic Requirements Only	−20						
	Change in volume, max, %	Basic Requirements Only	+10						
EO36	Fluid resistance, ASTM D 471, No. 3 Oil[1] 70 h at 150 °C:								
	Change in hardness, points	Basic Requirements Only	−15 to 0						
	Change in tensile strength, max, %	Basic Requirements Only	−20						
	Change in ultimate elongation, max, %	Basic Requirements Only	−20						
	Change in volume, max, %	Basic Requirements Only	+10						
F19	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at −55 °C	Basic Requirements Only	pass						
F49	Low-temperature resistance, ASTM D 1329, after 10 min at −55 °C, 10% retraction, min	Basic Requirements Only	pass						

1. See Note 6 in 3.4.

TABLE 6.FC—BASIC REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—FC MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 573, 70 h at 200 °C	Oil Immersion, ASTM D 471, No. 3 Oil[1] 70 h at 150 °C	Compression Set, ASTM D 395, Method B, Plied, max, %, 22 h at 175 °C	Available Suffix Grade Numbers
30	3	435	350			60	2
30	5	725	400			60	2
40	7	1015	400			60	3
				Change in durometer hardness,			
50	7	1015	400	±15 points	Volume change,	60	3
50	8	1160	500	Change in tensile strength, ±30%	+120% max	80	4
				Change in ultimate elongation,			
60	7	1015	300	–50% max		60	3
60	8	1160	400			80	4
70	7	1015	200			60	3

1. See Note 6 in 3.4.

TABLE 6.FC—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—FC MATERIALS (CONTINUED)

	Suffix Requirements	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
A19	Heat aging resistance, ASTM D 573, 70 h at 225 °C:								
	Change in hardness, max, points	Basic Requirements Only	+10	+10	+15				
	Change in tensile strength, max, %	Basic Requirements Only	–40	–40	–50				
	Change in ultimate elongation, max, %	Basic Requirements Only	–40	–40	–50				
B37	Compression set, ASTM D 395, Method B, 22 h at 175 °C, max, %	Basic Requirements Only	40	45	60				
EA14	Fluid resistance, ASTM D 471, water, 70 h at 100 °C:								
	Change in hardness, points	Basic Requirements Only	±5	±5	±5				
	Change in volume, %	Basic Requirements Only	±5	±5	±5				
EO16	Fluid resistance, ASTM D 471, No. 1 Oil, 70 h at 150 °C:								
	Change in hardness, points	Basic Requirements Only	0 to –10	0 to –15	0 to –15				
	Change in tensile strength, max, %	Basic Requirements Only	–50	–50	–50				
	Change in ultimate elongation, max, %	Basic Requirements Only	–30	–50	–50				
	Change in volume, %	Basic Requirements Only	0 to +20	0 to +20	0 to +20				
F1-11	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at –75 °C	Basic Requirements Only	pass	pass	pass				
G11	Tear resistance, ASTM D 624, Die B:								
	Under 7.0 MPa tensile strength, min, kN/m	Basic Requirements Only	5						
	7.0–10 MPa tensile strength, min, kN/m	Basic Requirements Only		17	26				
Z	Special requirements, specified in detail (including test method & aging parameters), or additional requirements per Tables 3, 4, and 5 per Section 8.2								

TABLE 6.FE—BASIC REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—FE MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 573, 70 h at 200 °C	Oil Immersion, ASTM D 471, No. 3 Oil[1] 70 h at 150 °C	Compression Set, ASTM D 395, Method B, Solid, max, %, 22 h at 175 °C	Available Suffix Grade Numbers
30	3	435	400	Change in durometer hardness,		60	2
30	7	1015	500	±15 points		60	5
				Change in tensile strength, ±30%	Volume change,		
40	8	1160	500	Change in ultimate elongation,	+80% max	60	3
				–50% max			
50	8	1160	500			80	4

1. See Note 6 in 3.4.

TABLE 6.FE—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—FE MATERIALS (CONTINUED)

	Suffix Requirements	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
A19	Heat aging resistance, ASTM D 573, 70 h at 225 °C:								
	Change in hardness, max, points	Basic Requirements Only	+10	+10	+15	+10			
	Change in tensile strength, max, %	Basic Requirements Only	–60	–40	–40	–50			
	Change in ultimate elongation, max, %	Basic Requirements Only	–60	–60	–60	–50			
B37	Compression set, ASTM D 395, Method B, 22 h at 175 °C, max, %	Basic Requirements Only	45	50	65	35			
EA14	Fluid resistance, ASTM D 471, water, 70 h at 100 °C:								
	Change in hardness, points	Basic Requirements Only	±5	±5	±5	±5			
	Change in volume, %	Basic Requirements Only	±5	±5	±5	±5			
EO16	Fluid resistance, ASTM D 471, No. 1 Oil, 70 h at 150 °C:								
	Change in hardness, points	Basic Requirements Only	0 to –10	0 to –10	0 to –10	0 to –10			
	Change in tensile strength, max, %	Basic Requirements Only	–50	–50	–50	–40			
	Change in ultimate elongation, max, %	Basic Requirements Only	–50	–50	–50	–40			
	Change in volume, %	Basic Requirements Only	0 to +20	0 to +20	0 to +20	0 to +20			
EO36	Fluid resistance, ASTM D 471, No. 3 Oil , [1] 70 h at 150 °C:								
	Change in hardness, points	Basic Requirements Only			–40				
	Change in volume, max, %	Basic Requirements Only		+80	+80	+65			
F19	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at –55 °C	Basic Requirements Only	pass	pass	pass				
G11	Tear resistance, ASTM D 624, Die B:								
	Under 7.0 MPa tensile strength, min, kN/m	Basic Requirements Only	9						
	7.0–10 MPa, tensile strength, min, kN/m	Basic Requirements Only		22	26	25			
K31	Adhesion, bond made after vulcanization	Basic Requirements Only	(2)	(2)	(2)	(2)			
P2	Staining resistance, ASTM D 925, Method B, Control Panel, Nonstaining	Basic Requirements Only	pass	pass	pass				
Z	Special requirements, specified in detail (including test method & aging parameters), or additional requirements per Tables 3, 4, and 5 per Section 8.2								

1. See Note 6 in 3.4.
2. Materials must be free from surface conditions and compound constituents that are or may become deleterious to adhesion.

TABLE 6.FK—BASIC REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—FK MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 573, 70 h at 200 °C	Oil Immersion, ASTM D 471, No. 3 Oil (1) 70 h at 150 °C	Compression Set, ASTM D 395, Method B, Plied, max, %, 22 h at 175 °C	Available Suffix Grade Numbers
60	6	870	150	Change in durometer hardness, ±15 points Change in tensile strength, ±30% Change in ultimate elongation, –50% max	Volume change, +10% max	50	2

1. See Note 6 in 3.4

TABLE 6.FK—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—FK MATERIALS (CONTINUED)

	Suffix Requirements	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
A19	Heat aging resistance, ASTM D 573, 70 h at 225 °C:								
	Change in hardness, max, points	Basic Requirements Only	+15						
	Change in tensile strength, max, %	Basic Requirements Only	–45						
	Change in ultimate elongation, max, %	Basic Requirements Only	–45						
EF31	Fluid resistance, ASTM D 471, Reference Fuel C, 70 h at 23 ° C								
	Change in hardness, points	Basic Requirements Only	0 to –15						
	Change in tensile strength, max, %	Basic Requirements Only	–60						
	Change in ultimate elongation, max, %	Basic Requirements Only	–50						
	Change in volume, %	Basic Requirements Only	0 to +25						
EO36	Fluid resistance, ASTM D 471, No. 3 Oil (1), 70 h at 150 °C:								
	Change in hardness, points	Basic Requirements Only	0 to –10						
	Change in tensile strength, max, %	Basic Requirements Only	–35						
	Change in ultimate elongation, max, %	Basic Requirements Only	–30						
	Change in volume, %	Basic Requirements Only	0 to +10						
F19	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at –55 °C	Basic Requirements Only	pass						
Z	Special requirements, specified in detail (including test method & aging parameters), or additional requirements per Tables 3, 4, and 5 per Section 8.2								

1. See Note 6 in 3.4.

TABLE 6.GE—BASIC REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—GE MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 573, 70 h at 225 °C	Oil Immersion, ASTM D 471, No. 3 Oil[1] 70 h at 150 °C	Compression Set, ASTM D 395, Method B, Plied, max, %, 22 h at 175 °C	Available Suffix Grade Numbers
30	3	435	300			50	2
30	5	725	400			50	2
30	6	870	400			50	8
40	3	435	200			50	2
40	5	725	300			50	2
40	6	870	300			50	8
50	3	435	200			50	3
50	5	725	250	Change in durometer hardness,		70	4, 5
50	6	870	250	±15 points	Volume change,	50	5
50	8	1160	400	Change in tensile strength, ±30%	+80% max	60	9
60	3	435	100	Change in ultimate elongation, −50% max		50	3
60	5	725	200			70	4, 5
60	6	870	200			50	5
70	3	435	60			50	6
70	5	725	150			50	7
70	6	870	150			50	5
80	3	435	50			50	6
80	5	725	100			50	7
80	6	870	100			50	5

1. See Note 6 in 3.4.

TABLE 6.GE—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—GE MATERIALS (CONTINUED)

	Suffix Requirements	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
A19	Heat aging resistance, ASTM D 573, 70 h at 225 °C:									
	Change in hardness, max, points	Basic Requirements Only	+10	+10	+10	+10	+10	+10	+10	+10
	Change in tensile strength, max, %	Basic Requirements Only	–25	–25	–30	–25	–25	–25	–25	–30
	Change in ultimate elongation, max, %	Basic Requirements Only	–30	–30	–30	–30	–30	–30	–25	–30
B37	Compression set, ASTM D 395, Method B, 22 h at 175 °C, max, %	Basic Requirements Only	25	30	50	25	30	30	25	40
EA14	Fluid resistance, ASTM D 471, water, 70 h at 100 °C:									
	Change in hardness, max, points	Basic Requirements Only	±5	±5	±5	±5	±5	±5	±5	±5
	Change in volume, %	Basic Requirements Only	±5	±5	±5	±5	±5	±5	±5	±5
EO16	Fluid resistance, ASTM D 471, No. 1 Oil, 70 h at 150 °C:									
	Change in hardness, points	Basic Requirements Only	0 to –10	0 to –15	0 to –15	0 to –15	0 to –15	0 to –15	0 to –10	0 to –10
	Change in tensile strength, max, %	Basic Requirements Only	–30	–20	–20	–20	–20	–20	–30	–30
	Change in ultimate elongation, max, %	Basic Requirements Only	–30	–20	–20	–20	–20	–20	–20	–30
	Change in volume, %	Basic Requirements Only	0 to +15	0 to +10	0 to +15	0 to +10	0 to +10	0 to +15	0 to +15	0 to +10
EO36	Fluid resistance, ASTM D 471, No. 3 Oil(1), 70 h at 150 °C:									
	Change in hardness, max, points	Basic Requirements Only		–30	–35	–30	–40	–40	(1)	–30
	Change in volume, max, %	Basic Requirements Only	+60	+60	+60	+60	+60	+60	+60	+60
F19	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at –55 °C	Basic Requirements Only	pass	pass	pass	pass	pass	pass	pass	pass
G11	Tear resistance, ASTM D 624, Die B:									
	Under 7.0 MPa tensile strength, min, kN/m	Basic Requirements Only	5	6	9	9	5	9	9	
	7.0–10 MPa, tensile strength, min, kN/m	Basic Requirements Only								25
K31	Adhesion, bond made after vulcanization	Basic Requirements Only	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
P2	Staining resistance, ASTM D 925, Method B, Control Panel, Nonstaining	Basic Requirements Only	pass	pass	pass	pass	pass	pass	pass	pass
Z	Special requirements, specified in detail (including test method & aging parameters), or additional requirements per Tables 3, 4, and 5 per Section 8.2									

1. See Note 6 in 3.4.
2. Method of evaluation and requirement shall be based on agreement between fabricator and end user.

TABLE 6.HK—BASIC REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—HK MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 573, 70 h at 250 °C	Oil Immersion, ASTM D 471, No. 3 Oil[1] 70 h at 150 °C	Compression Set, ASTM D 395, Method B, Plied, max, %, 22 h at 175 °C	Available Suffix Grade Numbers
60	7	1015	200				2, 4, 6
60	10	1450	200				2, 4, 6
60	14	2031	200				2, 4, 6
70	7	1015	175				2, 4, 6
70	10	1450	175	Change in durometer hardness,			2, 4, 6
70	14	2031	175	±15 points	Volume change,	Compression set, 35% max	2, 4, 6
				Change in tensile strength, ±30%	+10% max		
80	7	1015	150	Change in ultimate elongation,			2, 4, 6
80	10	1450	150	–50% max			2, 4, 6
80	14	2031	150				2, 4, 6
90	7	1015	100				3, 5, 7
90	10	1450	100				3, 5, 7
90	14	2031	100				3, 5, 7

1. See Note 6 in 3.4.

TABLE 6.HK—SUPPLEMENTARY (SUFFIX) REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—HK MATERIALS (CONTINUED)

	Suffix Requirements	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
A1–10	Heat aging resistance, ASTM D 573, 70 h at 250 °C:								
	Change in hardness, max, points	Basic Requirements Only	+10	+10			+10	+10	
	Change in tensile strength, max, %	Basic Requirements Only	–25	–25			–25	–25	
	Change in ultimate elongation, max, %	Basic Requirements Only	–25	–25			–25	–25	
A1–11	Heat aging resistance ASTM D 573, 70 h at 275 °C:								
	Change in hardness, max, points	Basic Requirements Only			+10	+10	–5 to +10	–5 to +10	
	Change in tensile strength, max, %	Basic Requirements Only			–40	–40	–40	–40	
	Change in ultimate elongation, max, %	Basic Requirements Only			–20	–20	–20	–20	
B31	Compression set, ASTM D 395, Method B, 22 h at 23 °C, max, %	Basic Requirements Only					15	20	
B37	Compression set, ASTM D 395, Method B, 22 h at 175 °C, max, %	Basic Requirements Only	50	30					
B38	Compression set, ASTM D 395, Method B, 22 h at 200 °C, max, %	Basic Requirements Only	50	50	50	50	15	20	
C12	Resistance to ozone, ASTM D 1171	Basic Requirements Only	pass	pass	pass	pass	pass	pass	
C20	Resistance to outdoor aging, ASTM D 1171	Basic Requirements Only	pass	pass	pass	pass	pass	pass	
EF31	Fluid resistance, ASTM D 471, Reference Fuel C, 70 h at 23 ° C								
	Change in hardness, points	Basic Requirements Only	±5	±5	±5	±5	±5	±5	
	Change in tensile strength, max, %	Basic Requirements Only	–25	–25	–25	–25	–25	–25	
	Change in ultimate elongation, max, %	Basic Requirements Only	–20	–20	–20	–20	–20	–20	
	Change in volume, %	Basic Requirements Only	0 to +10	0 to +10	0 to +10	0 to +10	0 to +10	0 to +10	
EO78	Fluid Resistance, ASTM D 471, Service Liquid No. 101[1], 70 h at 200 °C:								
	Change in hardness, points	Basic Requirements Only	–15 to +5	–15 to +5	–15 to +5	–15 to +5			
	Change in tensile strength, max, %	Basic Requirements Only	–40	–40	–40	–40			
	Change in ultimate elongation, max, %	Basic Requirements Only	–20	–20	–20	–20			
	Change in volume, %	Basic Requirements Only	0 to +15	0 to +15	0 to +15	0 to +15			
EO88	Fluid resistance, ASTM D 471, SAE Fluid 2, Stauffer 7700[2], 70 h at 200 °C:								
	Change in hardness, points	Basic Requirements Only					–15 to +5	–15 to +5	
	Change in tensile strength, max, %	Basic Requirements Only					–40	–40	
	Change in ultimate elongation, max, %	Basic Requirements Only					–20	–20	
	Change in volume, max, %	Basic Requirements Only					+25	+25	
F15	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at –25 °C	Basic Requirements Only	pass			pass	pass		
F17	Low-temperature resistance, ASTM D 2137, Method A, 9.3.2, nonbrittle after 3 min at –40 °C	Basic Requirements Only			pass				
Z	Special requirements, specified in detail (including test method & aging parameters), or additional requirements per Tables 3, 4, and 5 per Section 8.2								

1. Service Liquid 101- di 2 ethyl hexyl sebacate, 99.5 mass %; phenothiazine, 0.5 mass %.
2. Available from Akzo Nobel Chemicals, Inc., 5 Livingstone Avenue, Debbs Ferry, NY 10522, 1-800-666-1200.

TABLE 6.KK—BASIC REQUIREMENTS FOR THE CLASSIFICATION OF RUBBER MATERIALS—KK MATERIALS

Durometer Hardness, ±5 points	Tensile Strength, min (MPa)	Tensile Strength, min (psi)	Ultimate Elongation, min, %	Heat Aged, ASTM D 573, 70 h at 300 °C	Oil Immersion, ASTM D 471, IRM 903 Oil 70 h at 150 °C	Compression Set, ASTM D 395, Method B, Plied max, % 22 h at 200 °C
80	11	1595	125	Change in durometer hardness ±15 points Change in tensile strength, ±30% Change in ultimate elongation, –50% max	Volume Change, (+10% max)	Compression set, 25% max

NOTE— Examples of the use of suffix letters and numbers would be A14 and EO34. Suffix A (Table 11) stands for heat resistance. Suffix 1 (Table 12) specifies that the test be run according to ASTM Method D 573[4] for 70 h, and Suffix 4 (Table 13) indicates the temperature of test as 100 °C. Similarly, Suffix EO34 indicates resistance in ASTM Oil No. 3 measured in accordance with ASTM Method D 471[4] for 70 h at 100 °C.

7.2 Basic requirements are always in effect, unless superseded by specific suffix requirements in the line call-out.

8. Line Call-outs

8.1 A line call-out, which is a specification, shall contain: The document designations, the prefix letter M, the grade number, the material designation (type and class), and the hardness and tensile strength, followed by the appropriate suffix requirements. Figure 1 is an example of a line call-out.

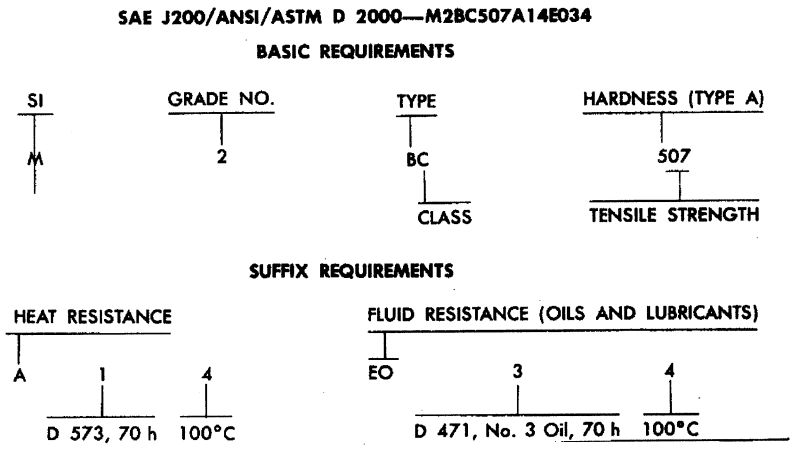

FIGURE 1—LINE CALL-OUT

In this example, the basic requirements for heat aging resistance and oil swelling resistance are superseded for suffix requirements. However, the basic requirements of 80% for compression set, which is not included as a suffix requirement, is not superseded and, therefore, shall be met as specified in Table 6.BC.

NOTE—Following is an example of a valid "line call-out," or specification.

SAEJ200M2BC507A14EO34

4. Annual Book of ASTM Standards, Section 9, Volume 09.01.

The line call-out is valid since Grade No. 2 is available for BC 507 in the list of Available Suffix Grade Numbers Table 6.BC and both A14 and EO34 are available Suffix Requirements for Grade No. 2 materials. The Grade No. 5 would be the only other grade available to a BC 507 material.

8.2 A step-by-step guide to establishing line call-outs is given in Appendix B.

NOTE 9—An invalid "line call-out" is unacceptable. An example of an invalid "line call-out" would be as follows:

SAEJ200M4BG617A14B14EO14F17

The suffix requirements included are all available for a Grade 4; however, 4 is not an Available Suffix Grade Number for a BG 617. The only Available Suffix Grade Number for a BG 617 is 2 and available Suffix Requirements would include B14, B34, EA14, EF11, EF21, EO14, EO34, F17, and Zs. Since no A14 suffix requirement is available, heat resistance would be either (1) that specified under basic BG requirements, or (2) that provided for by a special Z suffix requirement. When Z(s) are used, complete test conditions as well as requirements shall be specified.

Test conditions may be specified by referencing the suffix letter from Table 3 corresponding to the appropriate test, along with the suffix numbers from Tables 4 and 5 corresponding to the desired test method, exposure media, and exposure time. Deviations to durometer hardness, tensile strength, and elongation shall default to the industry method outlined in Table 4, unless otherwise specified. Methods other than those listed in Table 4 must be specified in detail. The requirement shall always follow the test method/condition when using a "Z" suffix. The final form of a callout using this method is:

SAEJ200M2BG617B14EO14F17Z1

Suffix Z1 – A14, hardness change, ±5 points max; tensile strength change, ±15% max; ultimate elongation change, –15% max.

9. Methods of Test

9.1 The applicable methods of test are listed in Table 4.

10. Sampling and Inspection

10.1 A lot, unless otherwise specified, shall consist of all products of the same material submitted for inspection at the same time.

10.2 When proof of conformance with a specification based on this classification system is required, the supplier shall, upon request of the purchaser at the time of ordering, furnish a sufficient number of samples to perform the required tests. Test specimens shall be prepared as prescribed in 6.1. The samples shall be warranted to have equivalent cure and to be from the same run or batch of compound used in the lot.

11. Limitations of Document in Establishing Material Specifications

11.1 The data in Table 6 are based on physical properties of rubber materials obtained directly from standard compression moulded test specimens made from compounds mixed under ideal conditions (for example, in a laboratory). They indicate the combinations of properties that are believed to be obtainable. Table 6 was not necessarily developed on the basis of statistical data. See Appendix C for the development of and additions to this table.

Setting of material specifications, the determination of Cpk values and a quality control plan are the responsibility of the producer and consumer.

11.2 It must be borne in mind that all physical tests are subject to test errors as indicated by precision statements included in many ASTM test procedures.

12. Notes

12.1 **Marginal Indicia—**The change bar (l) located in the left margin is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. An (R) symbol to the left of the document title indicates a complete revision of the report.

PREPARED BY THE SAE COMMITTEE ON AUTOMOTIVE RUBBER SPECIFICATIONS

APPENDIX A

DESIGNATION (TYPE AND CLASS) AND POLYMER

A.1 Appendix A is intended to assist the users of SAE J200 and is not to be considered as part of the system. Tables A1 and A2 list the SAE J200 designation (Type and Class) and the type of polymer most often used in meeting the material requirements. Table A1 is not intended to be limiting; other polymers may be used to meet the same specification.

TABLE A1—SAE J200 DESIGNATION

SAE J200 Material Designation (Type & Class)	Type of Polymer[1] Most Often Used
AA	NR, SBR, IR, IIR, BIIR, CIIR, EPM, EPDM, BR, Reclaim RBR
AK	T
BA	SBR, IIR, BIIR, CIIR, EPM, EPDM
BC	CR, CM
BE	CR, CM
BF	NBR
BG	NBR, AU, EU
BK	NBR
CA	EPM, EPDM
CE	CSM, CM
CH	NBR, CO, ECO
DA	EPM, EPDM
DE	CM, CSM
DF	ACM
DH	ACM
EE	AEM
EH	ACM
EK	FZ
FC	PVMQ
FE	MQ
FK	FVMQ
GE	VMQ
HK	FKM
KK	FFKM

1. Symbols and names are based on ASTM D 1418. Trade Names for the majority of rubber compounds utilizing above polymers may be located in the following and other publications of the rubber industry:
"The Synthetic Rubber Manual," International Institute of Synthetic Rubber Producers, Inc.
"Rubber World Magazine Blue Book," Lippincott & Peto.

TABLE A2—POLYMER MOST OFTEN USED FOR MATERIAL REQUIREMENTS

Polymer Symbol	Common Name (Chemical Name)	Polymer Symbol	Common Name (Chemical Name)[1]
NR	Natural Rubber	NBR	Nitrile Rubber
Reclaim RBR	Reclaimed Rubbers		(Acrylonitrile Butadiene
IR	Isoprene (Synthetic Rubber		Copolymer)
SBR	Styrene Butadiene Rubber	HNBR	Hydrogenated Nitrile Rubber
BR	Butadiene Rubber		(Hydrogentated Acrylonitrile
IIR	Butyl Rubber (Isobutene-Isoprene)		Butadiene Copolymer)
CIIR	Chlorobutyl Rubber (Chloro	CM	Chlorinated Poly-
	Isobutene-Isoprene)		ethylene
BIIR	Bromobutyl Rubber (Bromo	CSM	Chlorosulfonated
	Isobutene-Isoprene)		Polyethylene
T	Polysulfide Rubbers	ACM	Polyacrylate Rubber
EPM	Ethylene Propylene Copolymer		(Acrylic Esters
EPDM	Ethylene Propylene Diene		Copolymer)
	Terpolymer	AU	Polyurethane - Ester
CR	Polychloroprene		Type
CO	Epichlorohydrin Homopolymer	EU	Polyurethane - Ether
	(Polychloromethyl Oxirane)		Type
AEM	Acrylic Ester/Ethylene	MQ (MQ,	Silicone Rubbers
	Copolymer	VMQ,	
		PVMQ)	
		FVMQ	Fluorosilicone Rubber
FZ	Fluoroalkoxyphosphazene Rubber	FKM	Fluorocarbon Rubber
ECO	Epichlorohydrin/ Ethylene Oxide (Oxirane) Copolymer	FFKM	Perfluoroelastomer

1. Symbols and names are based on ASTM D 1418. Trade names for the majority of rubber compounds utilizing above polymers may be located in the following and other publications of the rubber industry:
"The Synthetic Rubber Manual," International Institute of Synthetic Rubber Producers, Inc.
"Rubber World Magazine Blue Book," Lippincott & Peto.

APPENDIX B

GUIDELINES FOR ESTABLISHING A LINE CALL-OUT

B.1 ***Step 1—***Using Tables 1 and 2, find the type and class which correspond to the temperature resistance and ASTM No. 3 oil volume swell requirements of the material; for example, AA, BA, BC, etc. Before proceeding, consult Tables 6.AA to 6.KK to make sure you have selected a type-class which corresponds to a material which is listed in the table. For example, it would be improper to select an AB material since Tables 6.AA to 6.KK include no such material.

B.2 ***Step 2—***Under the basic requirements heading in the appropriate type-class section of Tables 3 to 10, select the desired durometer-tensile-elongation combination. For example, in Table 6.BC, a 50 ± 5 Type A durometer material having a minimum tensile strength of 7 MPa would be described as a BC 507 material. This material will have a minimum elongation of 300%.

NOTE—Use only those durometer-tensile-elongation combinations specified in the table.

B.3 ***Step 3—***Determine whether the remaining basic requirements (under the headings "Heat Aged," "Oil Immersion," and "Compression Set") are satisfactory for the line call-out which is being established. If the basic requirements accurately and thoroughly describe the desired properties of the material, the line call-out is completed at this step. Steps 4 through 7 do not apply in this case. Prefix the line call-out with SAEJ200, the SI code "M" and the grade number of 1. Write the final form of the line call-out as:

SAEJ200M1BC507

The call-out is written as one continuous string having no spaces between characters.

B.4 ***Step 4—***If the basic requirements are not as stringent or complete as you would like, examine the available suffix grade numbers in the far right column of the table. In this example, for a BC 507 material, suffix grades 2 and 5 are available.

B.5 ***Step 5—***Go to the portion of Tables 6.AA to 6.HK headed "Suffix Requirements." Decide which of the suffix requirements are applicable to the material (such as heat aging resistance, fluid resistance, and so forth). Then choose the grade number which encompasses all or most of the applicable suffix requirements.

NOTE—Only suffix requirements appearing in the chosen grade number column may be specified. Of those suffix requirements which appear, only those which are necessary shall be added to the line call-out. In the example of 8.1, grade 2 was chosen and suffix requirements A14 and EO34 were selected for heat aging and fluid resistance, respectively. Thus, the suffix requirements are added to the line call-out in the following manner:

2BC507A14EO34

B.6 ***Step 6—***Special requirements that are demanded of the material but not shown in Table 6.AA to 6.HK shall be designated by a "Z" suffix. When indicating special requirements, keep in mind that they must be consistent with the type and class of the material. Do not specify, for example, a special requirement of 20% maximum volume swell in ASTM No. 3 oil for a BC material. The basic requirement for a BC material is 120% maximum volume swell.

If several special requirements exist, they are denoted by Z1, Z2, Z3, etc. "Z" requirements shall be specified in detail whenever used, including test method and test conditions. The format for specifying Z requirements is given in the following call-out:

2BC507A14E034Z1Z2Z3

suffix Z1 (for example)—polymer content of rubber compound shall be 100% polychloroprene
suffix Z2 (for example)—55 ± 5 Type A durometer, ASTM D 2240
suffix Z3 (for example)—20% maximum tension set, ASTM D 412 (elongate to 200% for 10 min, measure set after 10 min recovery)

B.7 ***Step 7—***Complete the line call-out by prefixing the line with SAE J200 and the SI code "M." The call-out is written as one continuous string having no spaces between characters. The final form of the example call-out is shown as follows:

SAEJ200M2BC507A14EO34Z1Z2Z3

suffix Z1—polymer content of rubber compound shall be 100% polychloroprene
suffix Z2—55 ± 5 Type A durometer, ASTM D 2240
suffix Z3—20% maximum tension set, ASTM D 412 (elongate to 200% for 10 min, measure set after 10 min recovery)

The line call-out is valid since Grade No. 2 is available for BC 507 in the list of Available Suffix Grade Numbers (Table 6.BC) and both A14 and EO34 are available Suffix Requirements for Grade No. 2 materials. Grade Number 5 would be the only other grade available to a BC 507 material.

APPENDIX C

DEVELOPMENT OF AND ADDITIONS TO THE SAE J200 AND J3000 TABLES

C.1 Purpose—The purpose of this section is to set forth the procedure for establishing new tables or additions to existing tables for the SAE J200 document.

C.2 Proposed SAE J200 Table Development Pre-Requisites

C.2.1 Present to the Committee on Automotive Rubber Specifications a proposal for an additional table or a revision to an existing table based upon preliminary laboratory data.

C.2.1.1 The proposed compound(s) must be a vulcanized commercial thermoset rubber prior to program initiation.

C.2.1.2 The proposed compound or family of materials currently under consideration and development is intended for, but not limited to, an automotive application.

C.2.1.3 Subsequent table data must represent commercial compounds convertible to useable goods.

C.2.1.4 The chemical family of materials, from which the compound is produced, must have an ASTM D 1418 or ISO 1629 chemical classification. This aids in table assignment and potential recycling identification. The ASTM D11.8 committee gives chemical classification designations. This may be done concurrent with table development.

C.2.2 Proposed SAE J200 Table Development

C.2.2.1 Identify the number of compositions intended to be tested and the basic requirements for each composition.

C.2.2.2 Identify the proposed suffix requirements, if any, for each of the compositions intended to be tested.

C.3 Approved SAE J200 Development Program

C.3.1 For an approved program, the proposer shall either co-ordinate the program, or shall designate a coordinator. The coordinator shall be responsible for the full implementation of the program and shall report back to Committee on Automotive Rubber Specifications at each subsequent committee meeting.

C.3.2 In conjunction with the committee, secure a minimum of six laboratories which may include the proposer's or coordinator's laboratory. Assign an alphanumeric code to each laboratory to insure anonymity.

C.3.3 The sponsor will obtain from the committee chair, a file copy of the reporting format. The sponsor shall remove any test sections from the file which are not pertinent to their round robin. If the round robin is to include additional test(s) not currently included in SAE J200, the sponsor shall add those tests to the file in the same format. The sponsor shall make sufficient disk copies and supply them to the participating laboratories (alternately the sponsor may Email these files). In the event a participating laboratory does not have the appropriate spreadsheet program, the sponsor shall supply a hard copy of the format.

C.3.4 The sponsor shall request the labs to respond as to which tests they are able to run internally. If any of the original six laboratories are unable to perform specific required tests, secure additional laboratories to perform those specific tests. The additional laboratories need not complete the entire test program.

C.3.5 Sample Preparation

C.3.5.1 Prepare a sufficient quantity of each of the compositions to provide samples for all of the required testing (five test specimens, per test per laboratory). It is preferable to use production compositions but laboratory prepared compositions are acceptable. Compositions shall be molded as designated by ASTM, or other approved procedures. It is imperative that all steps be taken to reduce variation. Prior to molding, and periodically throughout the molding, the mold temperature shall be checked using a pyrometer or similar instrument. All plaques for dumbbell samples shall be produced from a single mold. All samples for testing volume change, hardness, etc., shall be produced from a single mold.

C.3.5.2 Using the appropriate die, cut all test specimens required for a given composition. One operator shall cut all samples, and the die shall be inspected before cutting samples from a different composition. If a die is damaged during the course of cutting a composition it shall be repaired, and a new set of samples from that composition shall be prepared.

C.3.5.3 Test for tensile, elongation, hardness, and compression set to verify the composition meets the anticipated requirements.

C.3.5.4 When all the required test specimens have been prepared from a given composition, all of the test specimens of the same type shall be mixed, and the appropriate number randomly selected for each laboratory.

C.3.5.5 Each testing laboratory shall be provided five test specimens for each test that they are to conduct.

C.3.5.6 Sets of specimens should be placed in a small plastic bag with a label indicating the composition designation, ASTM test identification, the time, temperature, and environment for testing. All sample bags for a given composition should be placed in a large bag with a report form for that composition.

C.3.5.7 The report form should include the composition designation, the tests to be performed and space for recording the test result for each individual specimen.

C.4 Sample Testing

C.4.1 Inform the laboratories by letter of any special procedures to be used or precautions to be taken. A due date for returning data should be included.

C.4.2 Each testing laboratory is to carry out the tests that they have agreed to perform, taking care to ensure that the proper test procedures are followed and that all test temperatures are correct.

C.4.3 The participating laboratories shall include 5 data points (per test) on the spreadsheet. Averages are not allowed. All Data entries, where applicable, shall be in metric. The completed speadsheet file shall be forwarded to the program sponsor. The participating laboratories are to keep a copy of the spreadsheet, until 1 year after publication.

C.4.4 If 50% or more the test labs providing table data are ISO Guide 25 Accredited, that portion of the table shall be identified using the “A” symbol.

C.5 Data Processing

C.5.1 Submit the test data on the report form to SAE “CARS” including the proposed basic and suffix requirements and line call-outs.

C.5.2 A subcommittee of the Committee on Automotive Rubber Specifications will analyze the data and make the final recommendation to Committee on Automotive Rubber Specifications for inclusion into SAE J200 as appropriate.

C.6 Non-SAE CARS J200 Development

C.6.1 Partial or complete table development programs conducted with the approval of Committee on Automotive Rubber Specifications, but not by members of CARS shall be credited with the accomplishment by way of a footnote at the bottom of that table. In the case of partial development for additions to a table, the footnote shall designate the applicable section.

APPENDIX D

SAE J200 AND ASTM D 2000 SPECIFICATION SYSTEMS

D.1 ***Purpose.*** The SAE Committee on Automotive Rubber Specifications, (CARS), and the ASTM D11.30 Committee affirm that we will work together to maintain the SAE J200 and ASTM D 2000 specification systems. It is our goal to keep the tables in these two documents equivalent. As such, the SAE Committee on Automotive Rubber Specifications will be the gatekeeper of any changes and additions to the tables in these specification systems. They will consider, as necessary, the expansion of current tables or the addition of new tables based on new rubber materials that will better serve both the rubber industry and their customer. SAE Committee on Automotive Rubber Specifications may ask for assistance from ASTM D 11.30 Committee to provide the necessary laboratories for performing the required inter-laboratory testing. In the unlikely event that the SAE Committee on Automotive Rubber Specifications declines to make any additions or changes to the tables, then the ASTM D11.30 Committee may choose to proceed with making those changes or additions if they deem them as additive for the rubber industry.

SAE J200 Revised NOV2003

Rationale—J200 was issued in 1962. Several technical changes are recommended to remove the requirements which have no limits, but reference a footnote stating that materials are available, but limits have not yet been set. Since a "Z" shorthand callout can now be used to specify test type, method, and limits, the actual requirements in the suffix tables should be removed. No progress by C.A.R.S. to add the limits to these tests has been seen since its original publication. Technical corrections have been made based on historical review of the document. Many corrections were typo's that occured through the various re-publications over the years. Editorial corrections and changes have been made to the document to increase consistency between tables.

Relationship of SAE Standard to ISO Standard—Not applicable.

Application—This classification system tabulates the properties of vulcanized rubber materials (natural rubber, reclaimed rubber, synthetic rubbers, alone or in combination) that are intended for, but not limited to, use in rubber products for automotive applications.

NOTE 1—The SAE Committe on Automotive Rubber Specifications (CARS) has the sole responsibility for SAE J200. CARS Works closely with and receives input from ASTM Subcommittee D11.30 on Classification of Rubber Compounds with the goal to keep SAE J200 and ASTM D 2000 technically equivalent. Candidate materials presented for development of new tables or for inclusion in Tables A1 or A2 of SAE J200 or Table X1.1 of ASTM D 2000 shall be initiated with the SAE CARS Committee. The procedure to be followed is detailed in Appendix C of SAE J200.

NOTE 2—This document may serve many of the needs of other industries in much the same manner as SAE numbered steels. It must be remembered, however, that this system is subject to revision when required by automotive needs. It is recommended that the latest revision always be used. This document is based on the premise that all rubber materials intended for use in rubber products can be arranged into characteristic designations. These designations are determined by types, based on resistance to heat aging, and classes, based on resistance to swelling by oil. Basic levels are thus established which, together with values describing additional requirements, permit complete description of the quality of all rubber materials. In all cases where provisions of this document would conflict with those of the detailed specifications for a particular product, the latter shall take precedence.

NOTE 3—When the rubber product is to be used for purposes where the requirements are too specific to be completely prescribed by this classification system, it is necessary for the purchaser to consult the supplier in advance to establish the appropriate properties, test methods, and specification test limits.

Reference Section

ASTM D 395—Test Methods for Rubber Property-Compression Test

ASTM D 412—Test Methods for Rubber Properties in Tension

ASTM D 429—Test Methods for Rubber Property—Adhesion to Rigid Substrates

ASTM D 430—Test Methods for Rubber Deterioration-Dynamic Fatigue

ASTM D 471—Test Methods for Rubber Property-Effect of Liquids

ASTM D 573—Test Methods for Rubber Deterioration in an Air Oven

ASTM D 575—Test Methods for Rubber Properties in Compression

ASTM D 624—Test Methods for Rubber Property-Tear Resistance

ASTM D 865—Test Methods for Rubber Deterioration by Heating in Air (Test Tube Enclosure)

ASTM D 925—Test Methods for Rubber Property-Staining of Surfaces (Contact, Migration, and Diffusion)

ASTM D 945—Test Methods for Rubber Properties in Compression or Shear (Mechanical Oscillograph)

ASTM D 1053—Test Method for Rubber Property—Stiffening at Low Temperature; Flexible Polymers and Coated Fabrics

ASTM D 1171—Test Method for Rubber Deterioration—Surface Ozone Cracking Outdoors or Chamber (Triangular Specimens)

ASTM D 1329—Test Method for Evaluating Rubber Property—Retraction at Low Temperatures (TR Test)

ASTM D 1349—Practice for Rubber—Standard Temperatures for Testing

ASTM D 1418—Practice for Rubber and Rubber Lattices—Nomenclature

ASTM D 2137—Test Methods for Rubber Property—Brittleness Point of Flexible Polymers and Coated Fabrics

ASTM D 2240—Test Method for Rubber Property-Durometer Hardness

ASTM D 3183—Practice for Rubber—Preparation of Pieces for Test Purposes from Products

ISO 1629—Rubber and latices—Nomenclature

ISO Guide 25

Developed by the SAE Committee on Automotive Rubber Specifications