California Gasket and Rubber Corporation
533 W. Collins Ave.
Orange, CA 92867
(714) 202-8500 Phone
(714) 639-0586 Fax
www.calgasket.com

GUIDE TO UNDERSTANDING ASTM D2000 SPECIFICATIONS

ASTM D2000 is a published specification that provides buyers and suppliers with a standard way to describe rubber. Designed for automotive applications, this classification system is also used by other industries because it's clear, concise, and highly descriptive.

Call Outs

ASTM D 2000 uses letters and numbers to describe or "call out" the properties of vulcanized rubber. Type and Class are the most important call outs to consider. In the language of rubber, think of Types and Classes as nouns and verbs – the building blocks of sentences. There are also other callouts that, like adjectives and verbs, help with descriptions.

Here's a complete "sentence" in ASTM D2000. We'll use it as an example throughout.

ASTM D 2000-3 M2BG714B14EA14EF11EF31 EO14 EO34 F17

Yes, this dialect in the language of rubber looks complicated. But let's crack the code one step at a time by examining its components:

- Standards
- Year Last Revised
- Units of Measure
- Grade
- Durometer Hardness and Tensile Strength
- Suffixes

Standard

The first few letters and numbers (ASTM D 2000) simply indicate the standard.

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Year Last Revised

The -3 after the 2000 indicates the year (2003) in which the standard was last revised.

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Units of Measure

The M after the -3 indicates that all units of measure are metric. So, when you're reading about temperatures, think Centigrade instead of Fahrenheit. If the M is missing, then English units are used.

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Grade

In our example, the 2 after the -3 is the grade of the rubber. Typically, grade numbers are only given when the basic requirement (Grade 1) doesn't sufficiently describe the material's properties.

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Type

Type describes a rubber's temperature resistance - and is so important in our sample ASTM D 2000 "sentence" that Type is like a noun! Look for the type (B) after the grade (2).

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With types, a rubber material must meet the following requirements after 70 hours of heat aging at a specified temperature.

- Change in tensile strength: ±30%
- Change in hardness: -50% max.
- Change in hardness ±15 points

So what are these specified temperatures? That's what the table below explains.

Table 1 - Types

ASTM D 2000 assigns a letter to each test temperature. Again, our example uses Type B.

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

Class

Class describes a rubber's resistance to swelling in oil after 70 hours at the temperatures listed in Table 1, but only up to 150° C. In case you're wondering, that's the maximum temperature stability of the test oil (IRM No. 903) used in ASTM D 2000.

In the language of rubber, class is so important that it's like a verb. By putting a noun (type) and verb (class) together, we form a basic sentence in ASTM D 2000. As with most English sentences, too, our verb (G) follows the noun (B).

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Table 2 - Classes

ASTM D 2000 then assigns lettered classes to each maximum allowable volume swell by percentage (%). Again, our example uses Class G.

Type	**Max. Swell (%)**
A	No requirement
B	140
C	120
D	100
E	80
F	60
G	40
H	30
J	20
K	10

Durometer Hardness and Tensile Strength

ASTM D 2000 defines durometer hardness and tensile strength with a three-digit number.

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In our example of 714, the 7 denotes a material with a durometer hardness of 70 ± 5 A. The 14 indicates that the tensile strength must be at least 14 MPa, or 2032 psi.

Suffixes

As we've learned, the language of rubber contains the equivalent of nouns, verbs, adjectives, adverbs, and other parts of speech. There are suffixes, too – literally. These combinations of letters and numbers can be quite long, depending on your requirements. As you can see, our example is half suffix!

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Table 3 – Suffix Letters

ASTM D 2000 assigns a letter to each suffix elements.

Suffix	Required Test
A	Heat Resistance
B	Compression Set
C	Ozone or Weather Resistance
D	Compression-Deflection Resistance
EA	Water Resistance
EF	Fuel Resistance
EO	Oil and Lubricant Resistance
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	Other (User-Defined)

Language can be colorful, of course, and the language of rubber is no exception. Remember, however, to always assume that the color of rubber is black ***except for*** FC, FE, FK, and GE. If you need a different color rubber material, then consider that a color change may also change the material's physical properties. When in doubt, check with your supplier!

Table 4 – Suffix Numbers

In addition to letters, suffixes contain numbers.

- The first number specifies the duration of the test and the test method.
- The second number indicates the testing temperature.

Understanding all of the suffix numbers in ASTM D 2000 is a tall order and means purchasing the specification. If you do buy the entire standard from ASTM International, then refer to Tables 4 and 5 for details. Remember, too, that there are restrictions on how much of ASTM D 2000 you can share.