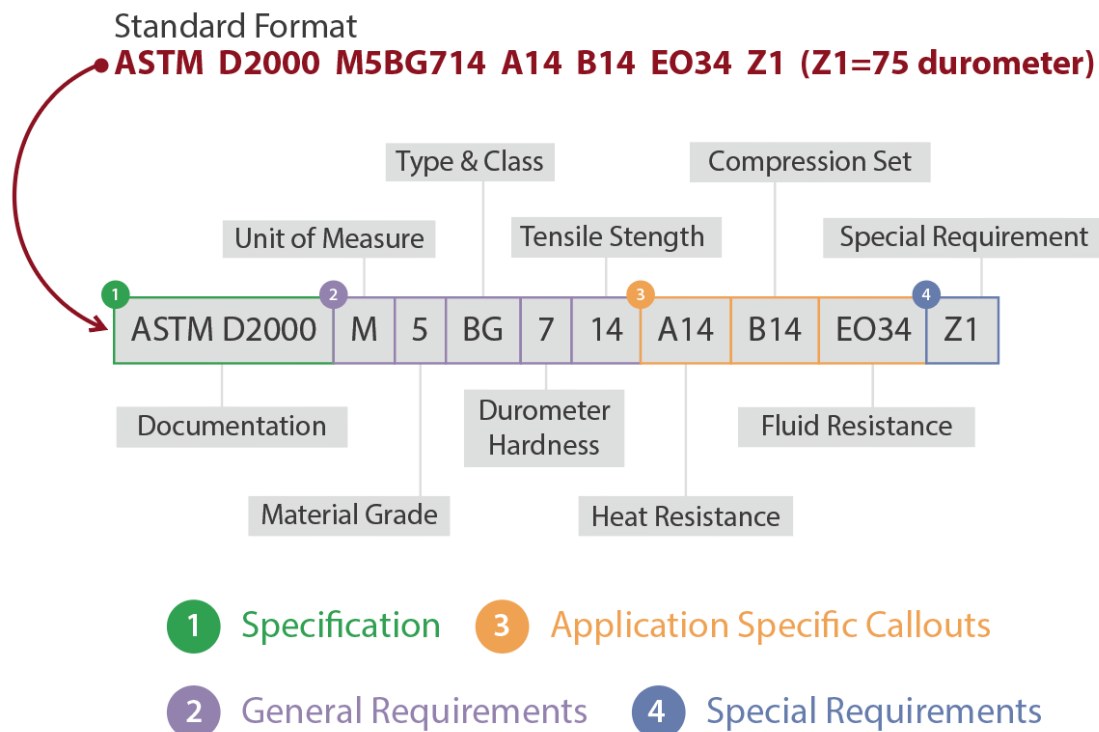


ASTM D2000 M5BG714 A14 B14 EO34 Z1

How to Read & Understand an ASTM D2000 Rubber Specification

This article breaks down the ASTM D2000 specification outlined by ASTM International (American Society for Testing and Materials), a globally recognized organization that sets voluntary technical standards for a wide array of materials, including rubber.

As a key specification in our industry, understanding ASTM rubber specifications is essential for manufacturers, engineers, and users to make informed decisions about the selection and design of rubber materials.



This article is divided into 3 sections

1. Breaking down an **example**
2. **Tables** used to decode ASTM callouts
3. A brief **overview** of ASTM D200 documentation



Breaking Down an Example (ASTM D2000)

An ASTM specification is made up of a series of callouts where each section of letter/number combinations relates to a specific aspect of the rubber material's physical properties that critically affect functionality. With proper understanding, a long and complex specification can be translated into an exact list of requirements.

Example: ASTM D2000 M5BG714 A14 B14 E034 Z1 (Z1 = 75 durometer)

We have separated this example specification into 4 sections:

1. **Specification (ASTM D2000)**

This outlines the documentation that you must refer to in order to get the full background, tables, test methods, and more from the complete ASTM specification, see section "Aspects of ASTM Specification Documentation" below for more information.

2. **General Requirements (M5BG714)**

This string details the general performance characteristics and essential requirements for the rubber material including unit of measure, grade, type, class, durometer and minimum tensile strength required.

- a. Type & class are often used together for polymer determination
 1. Type: temperature required during test
 2. Class: level of oil swell resistance
- b. In the example, the type & class **BG** requirements are can be reached with nitrile

3. **Application-Specific Callouts (A14 B14 E034)**

These sets of callouts (1-4 characters per callout) dictate the application-specific testing and performance requirements of the rubber material. Each callout is comprised of 2 sections of letters and numbers such as **A14**.

- a. Letter(s) (A) - physical characteristic test
 - 1. compression set, tear resistance, adhesion, etc. See Table C below
- b. 1st Number (1) - various requirements and methodology of testing
- c. 2nd Number (4) - temperature requirement for the test

4. Special Requirement Callouts (Z1)

An engineer or end user may use any number of 'Z' callouts to alter the specification for their specific requirement and they can be utilized to convey physical characteristics such as color, compatibilities, polymer/filler type, resistances and more. In this example, the Z1 callout is used to override the set durometer from 70 to 75.

Section	Specification Callout	Category	Requirement
1. Specification	ASTM D2000	Document	N/A
2. General Requirements	M	Unit of Measure	Metric Units. <i>Please note: Imperial Units are used when no letter "M" is present</i>
	5	Material Grade	Meeting requirements of Grade 5
	BG	Type & Class	Requirements typically met by NBR Polymers
	7	Durometer Hardness	70 ± 5
	14	Tensile Strength	2031 psi minimum
3. Application Specific Callouts	A14	Heat Resistance	During the test, materials may exhibit changes within these ranges: ± 15 Hardness, -20% Tensile, -40% Elongation
	B14	Compression Set	During the test, materials may exhibit changes within these ranges: 25% Max
	EO34	Fluid Resistance	During the test, materials may exhibit changes within these ranges: 0 to -15 Hardness, -45% Tensile, -45% Elongation, -35% to +35% Volume
4. Special Requirements	Z1	Special Requirement 1	75 Durometer Hardness



Tables for Decoding ASTM Callouts

To effectively translate your ASTM specification, you must use the tables for each specification section. We have provided a few of the tables that will help you get started, though we advise that you contact the manufacturer of your rubber products directly to decipher your application's requirements or aid in decoding your specification.

Please also contact WARCO at [714-532-3355](tel:714-532-3355) or sales@warco.com for assistance.

Table A: Material Type

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 B: Material Class

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

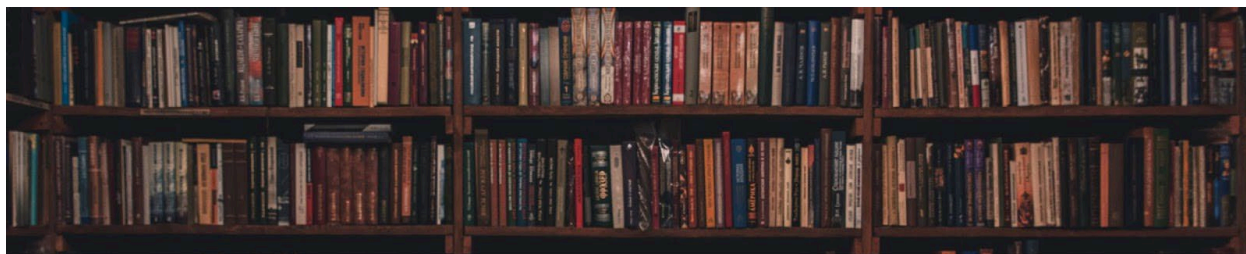
Table AB: **Material Recommendation for Common Type & Class Combinations**

Type & Class Combinations	Rubber Material Polymer Recommendation
AA	Natural Rubber , Reclaimed Rubber, SBR , Butyl , EP Polybutadiene, Polyisoprene
AK	Polysulfides
BA	Ethylene Propylene (EPDM), High-Temperature SBR , and Butyl Compounds
BC	Chloroprene Polymers (Neoprene), cm
BE	Chloroprene Polymers (Neoprene), cm
BF	Nitrile (NBR polymers, Buna-N)
BG	Nitrile (NBR polymers, Buna-N), Urethanes
BK	Nitrile (NBR, Buna-N)
CA	Ethylene Propylene (EPDM)
CE	Chlorosulfonated Polyethylene (Hypalon), cm
CH	Nitrile (NBR Polymers, Buna-N), Epichlorohydrin Polymers
DA	Ethylene Propylene (EPDM) Polymers
DE	CM, CSM
DF	Polyacrylic (Butyl-Acrylate Type)
DH	Polyacrylic Polymers, HNBR
EE	AEM
EH	ACM
EK	FZ
FC	Silicones (high strength) (INFINISIL™)
FE	Silicones (INFINISIL™)
FK	Fluorinated Silicones
GE	Silicones (INFINISIL™)

HK	Fluorinated Elastomers FKM (Fluorozone™ , Viton™ , Fluorocarbon, Fluorel, etc.)
KK	Perfluoroelastomers

Table C: Application-Specific Letters (Suffix Letters)

Suffix Letter	Application Specific Test Required
A	Heat 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, test method to be specified



Aspects of ASTM Specification Documentation

ASTM specification documentation will provide a complete explanation of the scope of requirement and test methods. As ASTM requirements are not limited to rubber products, their documentation is divided into these nine components which will allow you to better understand the correct applications for each specification.

1. Scope

The Scope section of an ASTM rubber specification defines the extent and application of the standard. It outlines the specific products, materials, or processes covered by the specification and may include limitations or exclusions.

2. Referenced Documents

This section lists relevant standards, test methods, and other documents referenced within the ASTM specification. It provides guidance on testing procedures, materials, and terminology used in conjunction with the specification.

3. Terminology

Terminology sections within ASTM specifications define key terms and definitions relevant to the subject matter. Clear and consistent terminology ensures mutual understanding among stakeholders and facilitates accurate interpretation and implementation of the specification.

4. Significance and Use

The Significance and Use section of an ASTM specification explains the purpose and importance of the standard. It provides guidance on the intended application, interpretation, and implementation of the specification to ensure effective utilization by industry professionals.

5. Materials and Manufacture

This section describes the materials and manufacturing processes of producing the specified rubber product. It may include requirements for raw materials, compound formulations, processing techniques, and quality control measures.

6. **Classification**

The Classification section categorizes rubber products based on specific criteria such as material composition, physical properties, intended use, or performance characteristics. Classification helps users identify suitable products for their applications and facilitates product comparison and selection.

7. **Requirements**

Requirements sections specify the mandatory characteristics, properties, or performance criteria that rubber products must meet to comply with the ASTM specification. It establishes minimum values, tolerance limits, or acceptance criteria for various attributes such as mechanical properties, chemical resistance, and durability.

8. **Test Methods**

Test Methods sections outline standardized procedures for evaluating the properties and performance of rubber products according to the ASTM specification. These methods provide consistent and reliable means of assessing product quality, verifying compliance with requirements, and ensuring consistency in testing across different laboratories and manufacturers.

9. **Keywords**

The Keywords section lists key terms and phrases used within the ASTM specification for easy reference and cross-referencing. It helps users quickly locate relevant information and facilitates communication and understanding among stakeholders.

Takeaways

A working understanding of the ASTM D2000 rubber specification is necessary for manufacturers, engineers, and users of rubber products to communicate requirements needed to achieve optimal product quality and performance across diverse applications. By delving into the intricate details of these specifications, one can decode complex callouts, understand material grades, and ascertain crucial performance metrics. The breakdown provided here offers a systematic approach to deciphering ASTM D2000 specifications, enabling you to make well-informed decisions in material selection, design, and application appropriateness.

WARCO has had over 114 years of experience developing quality rubber products for thousands of applications. Our vast catalogue of proven rubber compounds includes a wide variety of formulations, which meet countless ASTM D2000 specifications, that can jumpstart your next project. Contact us at sales@warco.com or 714-532-3355 to get started.