

## SPECIFICATIONS FOR ELASTOMER COMPOUNDS FOR AUTOMOTIVE APPLICATIONS—SAE J14

SAE Standard

Report of Passenger Car Division approved January 1943 and last revised by Nonmetallic Materials Committee June 1961. Editorial change August 1962. Conforms with ASTM D 735, Tentative Specifications for Elastomer Compounds for Automotive Applications.

The Technical Committee on Automotive Rubber intends that the new classification system ASTM D 2000—SAE J200 be used as a source of material quality "line call-out" specifications on all new and revised procurement documents and blueprints. Conversion from the nomenclature of ASTM D 735—SAE J14 (formerly SAE 10R) is provided in ASTM D 2000—SAE J200. The Technical Committee on Automotive Rubber plans no further additions or revisions of ASTM D 735—SAE J14. After a two year transition period the committee will determine whether or not the present version of ASTM D 735—SAE J14 will continue to be published. Therefore, rapid adoption of ASTM D 2000—SAE J200 is indicated.

**Scope**—These specifications cover vulcanized elastomer compounds of natural rubber, reclaimed rubber, synthetic rubber, or rubberlike materials, alone or in combination, which are intended for use in manufacturing products for automotive applications. Compounds for tires, inner tubes, sponge rubber, hard rubber, belts, hose, mats, and insulated wire and cable are not included.

The compounds listed in Tables 1 to 6 are of three types grouped in six classifications, based primarily on physical properties, which are prescribed in the tables. These values together with any additional requirements indicated by suffix letters in the grade designations as described in section, Types, Classes, and Grades of Compounds, define the properties of the compounds after vulcanization. These values apply to test specimens obtained from standard laboratory test slabs or blocks prepared in accordance with procedures described in the applicable ASTM methods. TEST RESULTS FROM FINISHED PRODUCTS MAY NOT DUPLICATE THE VALUES OBTAINED FROM STANDARD TEST SPECIMENS. 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.

Since it is recognized that basic requirements used mainly to classify compounds do not sufficiently describe some compositions, provision is made for added requirements which are indicated by suitable suffixes to the grade numbers. When the compounds may be used for purposes where the requirements are too specific to be prescribed in general specifications, it is advisable for the purchaser to consult the supplier to secure adjustment of the properties to suit the actual operations to which the material is to be subjected.

In case of conflict between the provisions of these general specifications and those of detailed specifications for a particular product, the latter shall take precedence.

These automotive classified compounds will serve many of the needs of other industries, even as SAE numbered steels are used. It must be remembered, however, that these specifications are subject to revision when required by automotive needs, and there is no assurance that the change will be acceptable to all other users.

A key chart for reference use contains pertinent information and an example illustrating the use of these specifications.

### GLOSSARY OF TERMS

This glossary of terms is included as part of the key chart in this SAE Standard, for information only, and is not to be considered a part of the specifications.

**ASTM Oil No. 1**—This is generally considered to be representative of high aniline point aircraft lubricating oils. It is defined by ASTM D 471. Such oils exert minimum swelling effects on most elastomer vulcanizates, and are therefore considered representative of the least severe oils encountered in service applications.

**ASTM Oil No. 3**—This is generally considered to be representative of low aniline point automotive lubricating oils. It is defined by ASTM

D 471. Such oils produce severe swelling effects on most elastomer vulcanizates, and are therefore considered representative of the most severe oils encountered in service applications.

**Hydrocarbon Test Fluid**—This test fluid contains 8% by weight of a hydrocarbon composition containing sulfur and chlorine constituents of controlled activity toward metal surfaces. This material is representative of the additives used in many compounded oils.

**Cellular Rubbers**—This is a "classifying" name applied to all types of sponge rubber. In practice this includes both "open cell" and "closed cell" sponge made from any of the Class 1 or Class 3 elastomers. In

addition, latex foam types of sponge are available from Type R compounds as described by the Tentative Specifications for Latex Foam Rubbers, ASTM D 1055. Oil-resistant types of foam, however, may be made from Type S latexes, but are not at present covered by the specifications.

**Type R**—Type R includes compounds made from natural, reclaimed, or synthetic rubber, or mixtures thereof. This means that Type R compounds will normally be made from natural rubber, reclaimed rubbers, or SBR. In many cases low-temperature SBR will be used. It is further intended that Type R compounds include those made from butyl rubber. Generally, butyl rubber will be required to meet the most severe oven-aging requirements. Type R compounds are not considered oil resistant, and should not be specified where resistance to oils and greases is required.

**Type S**—Type S includes compounds made from synthetic rubber, or rubberlike materials, or mixtures thereof which have specific degrees of oil resistance. Type S compounds should be specified for use wherever elastomeric parts are to be used in contact with oils, greases, motor fuels, or the like. Type S compounds are subdivided into three classes, depending upon the degree of resistance to the action of petroleum-base oils, as follows:

**Class SA**—Compounds having very low volume swell. In practice such compounds are normally made from polysulfide organic dihalide polymers (Thiokol).

**Class SB**—Compounds having low volume swell in petroleum hydro-

carbons. These compositions are normally made from copolymers containing acrylonitrile.

**Class SC**—Compounds having medium volume swell in petroleum hydrocarbons. Such compounds are normally made from neoprene as the base material.

**Type T**—Type T includes compounds made from synthetic rubber or rubberlike materials which have specific resistance to the effects of prolonged exposure to abnormal temperatures and to compounded petroleum oils. Type T compounds are subdivided into two classes as follows:

**Class TA**—Compounds specified for services where outstanding resistance to change by extreme heat and cold are required. The oil-resistance test requirements as shown in Table 5 do not necessarily indicate corresponding resistance to gasoline and aromatic fuels. These compositions are normally made from silicone.

**Class TB**—Compounds specified for services where outstanding resistance to change by severe heat and in hot petroleum hydrocarbons, including those modified with sulfur compounds, is required. Class TB compounds should not be specified where resistance to steam is required. These compounds will not meet F1 and F2 suffix requirements. They may, however, be functional at low temperatures in suitably designed products. These compositions are normally made from polyacrylic rubbers as the base material.

### KEY TO: ELASTOMER COMPOUNDS FOR AUTOMOTIVE APPLICATIONS

For detailed requirements see ASTM Designation: D 735.

Compounds for tires, inner tubes, sponge rubber, hard rubber, belts, hose, mats, and insulated wire and cable are not included.

Prepared by SAE-ASTM Technical Committee on Automotive Rubber.

#### EXAMPLES

R 615 B, C, F1, D, and so forth

SC 615 B, C, F1, D, and so forth

**Types**  
Type R, TABLE 1  
For applications where specific resistance to the action of petroleum-base fluids is not required.

R—Compounds of natural rubber, synthetic rubber, and reclaimed, alone or combinations thereof.

Type S, TABLES 2, 3, 4  
For applications where specific resistance to the action of petroleum-base fluids is required.

S—Compounds of synthetic rubber, or combinations thereof, which have the following resistance to swelling in low aniline point hydrocarbon fluids:

SA—Very low volume swell.

SB—Low volume swell.

SC—Medium volume swell.

Type T, TABLES 5, 6  
For applications where specific resistance to the effects of prolonged exposure to abnormal temperatures or compounded petroleum oils, or both, is required.

T—Compounds of synthetic rubber or rubber-like materials which have the following resistance:

TA—Maximum resistance to heat and cold.

TB—Outstanding resistance to heat and oil.

#### Solid Grades Rubber

(615)

| Durometer Hardness<br>(ASTM D 676) | Min Tensile Strength, psi<br>(ASTM D 412) |
|------------------------------------|-------------------------------------------|
| 3-30 ± 5                           | 05-500                                    |
| 4-40 ± 5                           | 10-1000                                   |
| 5-50 ± 5                           | 15-1500                                   |
| 6-60 ± 5                           | 20-2000                                   |
| 7-70 ± 5                           | 25-2500                                   |
| 8-80 ± 5                           | 30-3000                                   |
| 9-90 ± 5                           | 35-3500                                   |

#### Suffix Letters

(May be used singly or in combination)

These suffix letters, when appended to the grade number, signify that the requirements for which they stand are to be met. If no method of test is provided, or if no value for the suffix letter requirement is specified in the tables, agreement as to method of test and required value shall be arranged between the purchaser and the supplier.

| Letter | Tests Required                                           | Applicable<br>ASTM Test<br>Method |
|--------|----------------------------------------------------------|-----------------------------------|
| A1     | Heat aging (70 hr at 212 F).....                         | D 573,<br>D 865                   |
| B      | Compression set (Method B).....                          | D 395                             |
| C      | Weather resistance .....                                 | D 1171                            |
| D      | Load deflection .....                                    | D 575                             |
| E1     | Oil resistance (ASTM Oil No. 1).....                     | D 471                             |
| E3     | Oil resistance (ASTM Oil No. 3).....                     | D 471                             |
| E4     | Oil resistance (Hydrocarbon Test Fluid).....             | D 471                             |
| F1     | Low temperature brittleness (at -40 F).....              | D 746                             |
| F2     | Low temperature brittleness (at -67 F).....              | D 746                             |
| G      | Tear resistance .....                                    | D 624                             |
| H      | Flex. resistance .....                                   | D 430                             |
| J      | Abrasion resistance .....                                | D 394                             |
| K1     | Adhesion to metal (Bond made during vulcanization) ..... | D 429                             |
| K2     | Adhesion (Cemented bonds made after vulcanization) ..... | —                                 |
| L      | Water resistance .....                                   | D 471                             |
| M      | Flammability resistance .....                            | —                                 |
| N      | Impact resistance .....                                  | —                                 |
| P      | Nonstaining .....                                        | D 925                             |
| R      | Resilience .....                                         | D 945                             |
| S1     | Low temperature stiffness (at -40 F).....                | D 1053                            |
| S2     | Low temperature stiffness (at -67 F).....                | D 1053                            |
| Z      | Special requirements .....                               | —                                 |

This key is to be used only for reference and to illustrate the use of the detailed specifications.

These specifications are subject to annual revision.

Additional information will be added to this Key Chart as it becomes available.