

 SURFACE VEHICLE STANDARD	SAE	J2236 SEP2010
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		Superseding J2236 MAY1999
Standard Method for Determining Continuous Upper Temperature Resistance of Elastomers		

RATIONALE

Revisions are editorial to clarify the use of Die C per ASTM D 412, and to replace references to SAE J3000 with SAE J2558. Testing requirements are increased from five batches to six batches to obtain a statistically valid sample size of 30 specimens in total.

1. SCOPE

This method is intended to define the continuous upper temperature resistance (CUTR) of thermoplastic elastomers and thermoset rubber with durometer hardness ≤ 90 Shore A, to oxidation or other degradation when exposed solely to hot air for an extended period of time.

- 1.1 This method established the upper thermal aging limits of commercially available compounds as measured at 23 °C by retention of at least 50% original elongation and tensile at break after 1008 h of heat aging. This method does not take into account nor measure the effects of stress, environment, or temperature variations on the thermal aging characteristics of the materials tested.
- 1.2 This method may involve hazardous materials, operations, and equipment. This SAE Standard does not address the safety problems associated with its use. It is the responsibility of the user of this document to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.
- 1.3 This test method is based on SI units.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

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2.1.1 SAE Publications

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

- SAE J200 Classification System for Rubber Materials
- SAE J1344 Marking of Plastic Parts
- SAE J2332 Marking of Rubber Parts
- SAE J2558 Classification System for Thermoplastic Elastomers

2.1.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

- ASTM D 412 Standard Test Methods for Rubber Properties in Tension, Method A
- ASTM D 573 Standard Test Method for Rubber—Deterioration in an Air Oven
- ASTM D 1418 Standard Practice for Rubber and Rubber Lattices—Nomenclature
- ASTM D 1972 Practice for Generic Marking of Plastic Products
- ASTM D 2240 Standard Test Method for Rubber Property—Durometer Hardness

3. TERMS SPECIFIC TO THIS STANDARD

3.1 CONTINUOUS UPPER TEMPERATURE LIMIT (CUTL)

The temperature at which the material retains a 50% minimum of both the original elongation and tensile at break after 1008 h in an air circulating oven per ASTM D 573, Type IIA or IIB. Note per ASTM D 573: Type IIB ovens are not suitable for test temperatures above 70 °C.

3.2 TEST METHOD

A definitive procedure for identification, measurement, and evaluation of one or more qualities, characteristics, or properties of a material, product system, or service that produces a test result.

3.3 PRODUCTION COMPOUND

An identifiable, homogeneous quantity of material from a standard production period with a consistency and properties demonstrated through testing and use.

3.4 COMMERCIAL MATERIAL

A finished compound developed primarily, but not exclusively, for heat resistance from readily available ingredients and processed on conventional industry equipment.

4. SIGNIFICANCE AND USE

- 4.1 Data obtained by this method are applicable to the material under conditions of this test and are not necessarily the same as those obtained in end use applications. The information may be used for comparison, selection, or qualification of commercially available compounds where a level of proficiency is desired beyond short time quality control tests.
- 4.2 Ultimate elongation was selected over other physical property measurements because of its greater sensitivity to the various effects of air oven aging on elastomers. Tensile strength is also used since some compounds maintain more than 50% of their original elongation while losing considerable tensile strength after heat aging.
- 4.3 A material classification CUTL represents the highest temperature value the compound(s) can achieve per Table A1 guidelines (see Appendix A). The materials are classified according to ASTM D 1418, ASTM D 1972, or SAE J1344. Not all compounds within a material category can reach the listed maximum temperature.
- 4.4 This document requires aging at elevated temperatures in a hot air circulating oven per ASTM D 573, regardless of what is used in SAE J200. Care must be taken to test only similar generic compounds (i.e., silicone to silicone) in order to avoid cross contamination from volatile products and subsequent variation in test data.

5. GENERAL TEST CONDITIONS

- 5.1 Unless otherwise specified, the material shall be tested to ASTM D 412 Die C, Method A requirements at 23 °C.

5.2 Aging Temperatures

Variation around a specified temperature shall be within ± 2 °C.

5.3 Aging Temperature Increments

Unless otherwise specified, test new materials (per SAE J200 Table 1, plus 135 °C and 165 °C) to establish the upper continuous temperature limit to the definition in 3.1. Material tables shall be established using this criterion to minimize testing burden.

5.4 Aging Time

1008 h \pm 2 h

5.5 Uniform Aging Conditions

Tests of samples shall ensure that all surfaces be exposed and the temperature uniform.

6. SAMPLE REQUIREMENTS

- 6.1 Thermoplastic elastomer and thermoset rubber elongation and tensile at break data used to establish tables or qualify new materials shall be the median of a minimum of five samples per batch from six different batches.

6.2 Sample Dimensions for Thermoset Rubber

Follow ASTM D 412 requirements using Die C.

6.3 Thermoplastic Elastomers (from SAE J2558)

Unless otherwise noted, samples are to be die cut from injection molded rectangular plaques 2.0 mm \pm 0.4 mm thick. Specimens of other thickness will not necessarily give comparable results. Plaque dimensions must be sufficient to permit this. Five samples are to be tested in the direction of highest tensile strength and the median value is reported for both elongation and tensile at break.

6.4 Certain elastomers may require post curing or other conditions to achieve optimum heat resistance properties.

7. TABLE REQUIREMENTS

7.1 The material heat resistance table (Table A1) in the appendix shall be developed using temperatures from SAE J200 Table 1, and additional temperatures (135 °C and 165 °C) appropriate to industry needs. If a material meets a temperature requirements, it is presumed that it will meet all lower temperatures.

7.2 Test commercially available compounds to Section 5 conditions for 1008 h. Determine the percent elongation and tensile at break prior to and immediately after the test period per ASTM D 412 Die C for thermoset and thermoplastic materials with durometer hardness of ≤ 90 Shore A hardness or less.

7.3 Test at 23 °C and report results for the number of samples stated in 6.1 and 6.3 per ASTM D 412 Die C.

7.4 A material will qualify for inclusion in the temperature classification table (Table A1) when test data satisfies the requirements of 3.1.

8. PRECISION AND BIAS

8.1 No precision statement exists for 1008 h oven aging per ASTM D 573. See ASTM D 573 for the precision of oven aging after 48 and 96 h and ASTM D 412 for precision of tensile testing.

9. NOTES

9.1 Marginal Indicia

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