Designation: D 3137 – 81 (Reapproved 2001)

# Standard Test Method for Rubber Property—Hydrolytic Stability[1]

This standard is issued under the fixed designation D 3137; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

## 1. Scope

1.1 This test method covers the determination of the ability of rubber to withstand the environmental effects of high humidity. This is accomplished by examination of the material after removal from the moisture-laden environment. It is designed for testing specimens of rubber materials cut from standard sheets prepared in accordance with Practice D 3182.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* (For specific precautionary statements, see Note 1.)

## 2. Referenced Documents

2.1 *ASTM Standards:*

D 412 Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers— Tension[2]

D 573 Test Method for Rubber—Deterioration in an Air Oven[2]

D 3040 Practice for Preparing Precision Statements for Standards Related to Rubber and Rubber Testing[3]

D 3182 Practice for Rubber—Materials, Equipment, and Procedures for Mixing Standard Compounds and Preparing Standard Vulcanized Sheets[2]

## 3. Summary of Test Method

3.1 Test specimens are exposed to the influence of humid environments under definite conditions of temperature, humidity, and time for the purpose of measuring the resulting hydrolytic degradation by noting the change in tensile strength after exposure over distilled water.

## 4. Significance and Use

4.1 Rubber and rubber products for certain applications must withstand the environmental effect of high humidity and resist the deterioration of physical properties under these conditions with time. This test method allows performance properties to be determined under the accelerated conditions of high humidity and elevated temperature.

4.2 In view of climatic variations in service conditions, this method may not give results correlating exactly with service performance. However, the test method yields comparative data on which to base judgment as to service quality and it is useful in research and development work.

4.3 This test method is not applicable to coated fabrics; its use for materials other than rubber has not been established.

## 5. Test Conditions

5.1 *Temperature*—The test temperature shall be 85 ± 1°C (185 ± 2°F).

5.2 *Exposure Period*—The exposure period shall be 96 ± 1 h.

5.3 *Conditioning Period*—After the specified exposure period, the specimens shall be conditioned on a flat surface for 16 to 96 h at 50 ± 5 % relative humidity and 23 ± 2°C (73.4 ± 3.6°F).

## 6. Procedure

6.1 *Original Tensile Strength*—Cut three ASTM dumbbell or ring specimens and condition for at least 3 h at 23 ± 2°C (73.4 ± 3.6°F) prior to testing. Determine the original tensile strength in accordance with Test Methods D 412.

6.2 *Deteriorated Tensile Strength*—Cut three specimens from the same rubber sheet from which specimens were cut for the original tensile strength. Measure the thickness of each specimen and suspend the specimens in a container approximately 1 $dm^3$(1 qt) in volume and at least 170 mm (6.7 in.) in height, containing 100 $cm^3$ of distilled water. Suspend the specimens on noncorrosive metal hooks, soldered to the bottom of the container cap or on a glass "tree" placed in the container, so that the specimens do not contact the container or each other. Cap the container loosely and place the container in a circulating air oven (see Test Method D 573) according to the required test conditions (see 5.1 and 5.2). After 15 min, open

[1] This test method is under the jurisdiction of ASTM Committee D11 on Rubber and is the direct responsibility of Subcommittee D11.15 on Degradation Tests.

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[2] *Annual Book of ASTM Standards*, Vol 09.01.

[3] Discontinued—see *1986 Annual Book of ASTM Standards*, Vols 09.01 and 09.02.

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