



Standard Test Method for Rubber Property—Resilience by Vertical Rebound¹

This standard is issued under the fixed designation D 2632; 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 impact resilience of solid rubber from measurement of the vertical rebound of a dropped mass.

1.2 This test method is not applicable to the testing of cellular rubbers or coated fabrics.

NOTE 1—A standard test method for impact resilience and penetration of rubber by a rebound pendulum is described in Test Method D 1054.

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

1.4 *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.*

2. Referenced Documents

2.1 ASTM Standards:

D 832 Practice for Rubber Conditioning for Low-Temperature Testing²

D 1054 Test Method for Rubber Property—Resilience Using a Rebound Pendulum²

D 1349 Practice for Rubber—Standard Temperatures for Testing²

D 3182 Practice for Rubber—Materials, Equipment, and Procedures for Mixing Standard Compounds and Preparing Standard Vulcanized Sheets²

D 3183 Practice for Rubber—Preparation of Pieces for Test Purposes from Products²

D 4483 Practice for Determining Precision for Test Method Standards in the Rubber and Carbon Black Industries²

2.2 Military Standard:³

MIL-STD 45662A Calibration System Requirements

3. Summary of Test Method

3.1 Resilience is determined as the ratio of rebound height

¹ This test method is under the jurisdiction of ASTM Committee D-11 on Rubber and is the direct responsibility of Subcommittee D11.14 on Time and Temperature Dependent Physical Properties.

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² Annual Book of ASTM Standards, Vol 09.01.

³ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

to drop height of a metal plunger of prescribed weight and shape which is allowed to fall on the rubber specimen.

4. Significance and Use

4.1 Resilience is a function of both dynamic modulus and internal friction of a rubber. It is very sensitive to temperature changes and to depth of penetration of the plunger. Consequently, resilience values from one type of rebound instrument may not, in general, be predicted from results on another type of rebound instrument.

4.2 This test method is used for development and comparison of materials. It may not directly relate to end-use performance.

5. Apparatus

5.1 A diagram of the essential features and dimensions of the apparatus appears in Fig. 1. Basically it includes means for suspending a plunger at a given height above the specimen, for releasing the plunger, and for measuring its rebound height.

5.2 The plunger dimensions are also given in Fig. 1. Its mass shall be 28 ± 0.5 g.

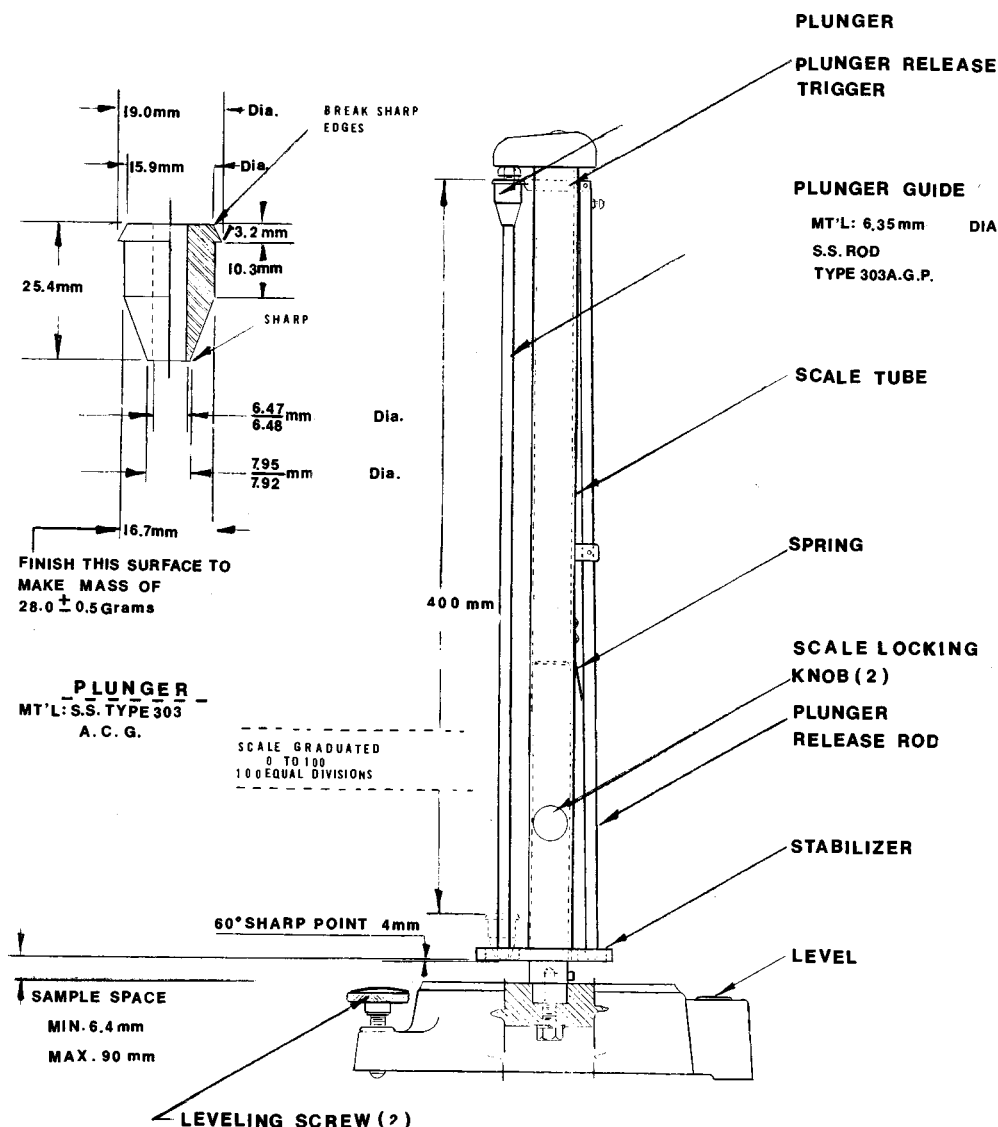
5.3 The height of the drop point and of the resilience scale above the base of the instrument should be adjustable so that the drop height is always 400 ± 1 mm (16 ± 0.04 in.) above the specimen surface. The resilience scale should be marked in 100 equally spaced divisions.

NOTE 2—The top of the plunger should be in line with 100 on the scale when the plunger is locked in the elevated position. Some early commercial models of the apparatus do not meet this requirement but can be modified to do so.

5.4 The plunger fall and rebound is guided by a vertical rod. In order to minimize friction between the plunger and the guide, means must be provided for leveling the base of the instrument.

NOTE 3—The bottom of the guide rod has a 4-mm point to secure the location of the free end of the guide rod. This point should penetrate the test specimen and provide a firm location for the free end of the guide rod. The plunger may be allowed to rest at the lowest point of travel and will act as a guide to position the rod exactly in the center of the stabilizer as it is lowered onto the test specimen.

NOTE 4—For a pass-or-fail measurement, an opaque shield may be mounted between the operator's eye and the plunger scale. In use, the shield is set with its upper edge even with the specified scale reading. If the top of the rebounding plunger is visible above the shield, the specimen passes.



NOTE 1—1 in. = 25.4 mm.

FIG. 1 Rebound Apparatus

6. Test Specimen

6.1 Mixing, sheeting, and curing shall be performed in accordance with Practices D 3182 and D 3183, unless otherwise specified.

6.2 The standard test specimen shall have a thickness of 12.5 ± 0.5 mm (0.50 ± 0.02 in.). The specimen shall be cut so that the point of plunger impact is a minimum distance of 14 mm (0.55 in.) from the edge of the specimen. The test specimen may be molded or cut from a slab.

6.3 Alternative specimens may be prepared by plying up samples cut from a standard test slab. These samples shall be plied, without cementing, to the thickness required. Such plies shall be smooth, flat, and of uniform thickness. The results obtained with these specimens so prepared will not necessarily be identical with those obtained using a solid specimen of the same material and state of cure.

NOTE 5—A thin specimen reaches a higher state of cure at a given time and temperature of cure than does a thicker specimen. Therefore, if

plied-up specimens are used, their cure time should be appropriately lower than that for a single-piece specimen used for comparison.

6.4 Specimens may be prepared from finished products by cutting and buffing to the required dimensions, making sure that the opposing faces are parallel.

NOTE 6—If buffing is required, it is recommended that only one side be buffed and the unbuffed side tested or, if both sides must be buffed, comparisons should not be made between buffed and unbuffed specimens.

7. Calibration

7.1 Samples of the material being tested are not a valid calibration criteria.

7.2 A mechanical spring device with a known rebound value must be used to calibrate this instrument.

7.3 The instrument may be considered in calibration if the average of five readings taken from the instrument fall within the rebound values of the calibration device.

7.4 The calibration device values are assigned to the device.