



Standard Test Method for Rubber Property—Resilience Using Schob Type Rebound Pendulum¹

This standard is issued under the fixed designation D7121; 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.

1. Scope

1.1 This test method covers a means of determining the resilience of rubber, within a range of impact strain and strain rate, by means of the impacting and measuring apparatus conforming to the requirements described in this test method.

1.2 This test method is applicable to thermoset rubbers and thermoplastic elastomers, the hardness of which, at the specified test temperatures, lies between 30 and 85 IRHD (see Test Method [D1415](#)) or A/30 and A/85 (see Test Method [D2240](#)). It may also be applicable to some polyester, polyether foam, and plastic foam materials.

1.3 All materials, instruments, or equipment used for the determination of mass, force, or dimension shall have traceability to the National Institute for Standards and Technology, or other internationally recognized organization parallel in nature.

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

1.5 *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:²

[D832 Practice for Rubber Conditioning For Low Temperature Testing](#)

[D1349 Practice for Rubber—Standard Conditions for Testing](#)

[D1415 Test Method for Rubber Property—International Hardness](#)

[D2240 Test Method for Rubber Property—Durometer Hardness](#)

[D3182 Practice for Rubber—Materials, Equipment, and Procedures for Mixing Standard Compounds and Preparing Standard Vulcanized Sheets](#)

[D3183 Practice for Rubber—Preparation of Pieces for Test Purposes from Products](#)

[D4483 Practice for Evaluating Precision for Test Method Standards in the Rubber and Carbon Black Manufacturing Industries](#)

3. Summary of Test Method

3.1 This test method describes the determination of resilience, expressed as percentage resilience or rebound resilience, by a Schob Type pendulum rebound device as a ratio between the returned and applied energy when a spherically terminated mass impacts a test specimen under the conditions specified in this test method.

3.2 Resilience of the materials described is infinitely variable. It varies with temperature, strain rate (specifically related to the velocity of the indenter), and strain energy (specifically related to the mass of the indenter, coupled with velocity).

3.3 The variable factors, described and defined in this test method, will have effects on the outcomes of test results. Repetitive tests, under the defined conditions, on comparable materials, will provide meaningful, repeatable, and reproducible data.

4. Significance and Use

4.1 The Schob Type rebound pendulum is designed to measure the percentage resilience of a rubber compound as an indication of hysteretic energy loss that can also be defined by the relationship between storage modulus and loss modulus. The percent rebound measured is inversely proportional to the hysteretic loss.

4.1.1 Percentage resilience or rebound resilience are commonly used in quality control testing of polymers and compounding chemicals.

4.1.2 Rebound resilience is determined by a freely falling pendulum hammer that is dropped from a given height that impacts a test specimen and imparts to it a certain amount of energy. A portion of that energy is returned by the specimen to

¹ This test method is under the jurisdiction of ASTM Committee [D11](#) on Rubber and is the direct responsibility of Subcommittee [D11.10](#) on Physical Testing.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.