



Standard Test Method for Determining the Resilient Modulus of Bituminous Mixtures by Indirect Tension Test¹

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1. Scope

1.1 This test method covers procedures for preparing and testing laboratory-fabricated or field-recovered cores of bituminous mixtures to determine resilient modulus values using a repeated-load indirect tension test.

1.2 The values stated in SI units are regarded as the standard. Values in parentheses are for informational use.

1.3 A precision and bias statement for this standard has not been developed at this time. Therefore, this standard should not be used for acceptance or rejection of a material for purchasing purposes.

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:²

D3387 Test Method for Compaction and Shear Properties of Bituminous Mixtures by Means of the U.S. Corps of Engineers Gyrotory Testing Machine (GTM)

D3666 Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

D4013 Practice for Preparation of Test Specimens of Bituminous Mixtures by Means of Gyrotory Shear Compactor (Withdrawn 2013)³

D6925 Test Method for Preparation and Determination of the Relative Density of Asphalt Mix Specimens by Means of the Superpave Gyrotory Compactor

D6926 Practice for Preparation of Bituminous Specimens

¹ This test method is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.26 on Fundamental/Mechanistic Tests.

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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.

³ The last approved version of this historical standard is referenced on www.astm.org.

Using Marshall Apparatus

D6931 Test Method for Indirect Tensile (IDT) Strength of Bituminous Mixtures

2.2 Other Document:

NCHRP Project 1-28A, Research Results Digest Number 285—Laboratory Determination of Resilient Modulus for Flexible Pavement Design, January 2004

3. Terminology

3.1 Definitions:

3.1.1 *contact load* (P_{contact}), n —the vertical load placed on the specimen to maintain a positive contact between the loading strip and the specimen. The contact load is 4 % of the maximum load ($0.04 P_{\text{max}}$) and is not less than 22.2 N (5 lb), but not more than 89.0 N (20 lb).

3.1.2 *core*, n —an intact cylindrical specimen of pavement material, which is removed from the pavement by drilling and sampling at the designated location. A core may consist of, or include, one, two, or more than two different layers.

3.1.3 *cyclic load (resilient vertical load, P_{cyclic})*, n —load applied to a specimen, which is directly used to calculate resilient modulus.

$$P_{\text{cyclic}} = P_{\text{max}} - P_{\text{contact}} \quad (1)$$

3.1.4 *haversine-shaped load form*, n —the required load pulse for the resilient modulus test. The load pulse is in the form $(1 - \cos \theta)/2$ with the cyclic load varying from the contact load (P_{contact}) to the maximum load (P_{max}).

3.1.5 *instantaneous resilient modulus*, n —determined from the deformation-time plots (both horizontal and vertical) as described in Section 10.

3.1.6 *lift*, n —that part of the pavement produced with similar material and placed with similar equipment and techniques. The lift thickness is the thickness of the compacted bituminous mixture that is achieved with one pass of the laydown machine and the subsequent compaction process and can be equal to or less than the core thickness or length.

3.1.7 *maximum applied load (P_{max})*, n —the maximum total load applied to the sample, including the contact and cyclic (resilient) loads.

$$P_{\text{max}} = P_{\text{contact}} + P_{\text{cyclic}} \quad (2)$$