



Designation: D8356 – 20

Standard Test Method for Sonic Velocity in Manufactured Carbons and Graphite Materials for use in Obtaining Approximate Elastic Constants: Young's Modulus, Shear Modulus, and Poisson's Ratio¹

This standard is issued under the fixed designation D8356; 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 procedure for measuring the longitudinal and transverse (shear) sonic velocities in manufactured carbon and graphite which can be used to obtain approximate values for the elastic constants: Young's modulus (E), the shear modulus (G), and Poisson's ratio (ν).

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

C559 Test Method for Bulk Density by Physical Measurements of Manufactured Carbon and Graphite Articles

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.F0 on Manufactured Carbon and Graphite Products.

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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.

C747 Test Method for Moduli of Elasticity and Fundamental Frequencies of Carbon and Graphite Materials by Sonic Resonance

D4175 Terminology Relating to Petroleum Products, Liquid Fuels, and Lubricants

D6300 Practice for Determination of Precision and Bias Data for Use in Test Methods for Petroleum Products, Liquid Fuels, and Lubricants

D7775 Guide for Measurements on Small Graphite Specimens

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

IEEE/ASTM SI 10 Standard for Use of the International System of Units (SI) (the Modern Metric System)

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *end correction time* (T_e), n —a fixed correction time associated with the potential interaction of the couplant medium and the test material.

3.1.2 *longitudinal sonic pulse*, n —a sonic pulse in which the displacements are in the direction of propagation of the pulse.

3.1.3 *pulse travel time*, (T_t), n —the total time, measured in seconds, required for the sonic pulse to traverse the specimen being tested, and for the associated electronic signals to traverse the transducer coupling medium and electronic circuits of the pulse-propagation system.

3.1.4 *shear or transverse sonic pulse*, n —a sonic pulse in which the displacements are perpendicular to the direction of propagation of the pulse.

3.1.5 *time of flight* (ToF), n —the total time, measured in seconds, required for the sonic pulse to traverse the specimen being tested ($T_t - T_e$).