



Standard Test Method for Determining the Volume of Bulk Materials Using Contours or Cross Sections Created by Direct Operator Compilation Using Photogrammetric Procedures¹

This standard is issued under the fixed designation D6172; 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 procedures concerning site preparation, technical procedures, quality control, and equipment to direct the efforts for determining volumes of bulk material. These procedures include practical and accepted methods of volumetric determination.

1.2 This test method allows for only two volume computation methods.

1.2.1 *Contour Test Method*—See 8.1.1 and 9.1.

1.2.2 *Cross-Section Test Method*—See 8.1.2 and 9.2

1.2.3 This test method requires direct operator compilation for both contours and cross-section development.

1.2.4 The use of Digital Terrain Model software and procedures to create contours or cross sections for volume calculation is NOT encompassed in this test method.

NOTE 1—A task group has been established to develop a test method for Digital Terrain Modeling (DTM) procedures. It will address all known data collection procedures such as conventional ground survey, photogrammetry, geodetic positioning satellite (GPS), and so forth.

1.3 The values stated in either inch-pound units or SI units are to be regarded separately as standard. Within the text, the SI units are shown in parentheses. The values stated in each system are not exact equivalents; therefore, each system is used independently of the other. Combining values from the two systems can result in nonconformance with the specification.

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. Terminology

2.1 Definitions of Terms Specific to This Standard:

¹ This test method is under the jurisdiction of ASTM Committee D05 on Coal and Coke and is the direct responsibility of Subcommittee D05.07 on Physical Characteristics of Coal.

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2.1.1 *base map*—a map showing the soil surface of a site used for material storage including control monument locations and values and surface elevations.

2.1.2 *calibration forms/reports*—equipment calibrations performed by federal agencies or equipment manufacturers.

2.1.3 *check panel*—a target used for the sole purpose of marking a point on the surface of the stockpile whose value is used to verify the setup of the stereo model.

2.1.4 *check point*—targeted points within the stockpile area for the purpose of checking the accuracy of the photogrammetry. Elevations are established by ground surveying at these points. Points should be evenly spaced at various different elevations in the stockpile.

2.1.5 *ground control*—surveyor provided xyz values of targets or specific points near the project area necessary to scale and level the stereo model.

2.1.6 *monument*—a ground control point used to be a reference position of survey values.

2.1.7 *peripheral material*—material existing within the site that is above the recognized base and outside of the obvious stockpile perimeter.

2.1.8 *stereo model*—the overlapping area covered by two adjacent aerial photographs used to create measurement observation.

2.1.9 *stereo operator*—a person who is trained and competent to make quality measurement observations from aerial photographs, using a stereo instrument, for the purpose of creating volume computations.

2.1.10 *stereo report form*—a formal document that displays pertinent information required to evaluate and reestablish the stereo model setup parameters.

2.1.11 *sweeps*—repetitive traverse of a pile, by equipment, to create a cleaner geometric shape.

2.1.12 *target*—a geometric shape of contrasting color used to mark a ground feature such as a monument, or check point that otherwise would not be visible on the aerial photograph.

2.1.13 *topographic map*—a drawing that uses contours to define graphically the shape of a surface.