



Designation: D4381 – 22

Standard Test Method for Sand Content by Volume of Construction Slurries¹

This standard is issued under the fixed designation D4381; 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 the determination of the sand content of bentonitic slurries used in slurry construction techniques. This test method has been modified from API Recommended Practice 13B.

1.2 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice [D6026](#).

1.3 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard. Except, the sieve designation is identified using the “alternative” system in accordance with Practice [E11](#) instead of the “standard system,” such that the sieve used is referred to as a No. 200 sieve, instead of a 75 μm sieve.

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

1.5 *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

- [D653 Terminology Relating to Soil, Rock, and Contained Fluids](#)
- [D1796 Test Method for Water and Sediment in Fuel Oils by the Centrifuge Method \(Laboratory Procedure\)](#)
- [D3740 Practice for Minimum Requirements for Agencies](#)

¹ This test method is under the jurisdiction of ASTM Committee [D18](#) on Soil and Rock and is the direct responsibility of Subcommittee [D18.16](#) on Grouting.

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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.

[Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction](#)
[D6026 Practice for Using Significant Digits and Data Records in Geotechnical Data](#)
[E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves](#)
[E542 Practice for Gravimetric Calibration of Laboratory Volumetric Instruments](#)
2.2 *American Petroleum Institute (API) Standard:*
[API RP 13B Recommended Practice Standard Procedure for Testing Drilling Fluids](#)³

3. Terminology

3.1 Definitions:

3.1.1 For definitions of common terms used in this standard, refer to Terminology [D653](#).

4. Summary of Test Method

4.1 The measuring tube of the sand-content set ([Fig. 1](#)) is filled with construction slurry and water to the appropriate marks and is shaken. The mixture is poured through the sieve. The funnel is fitted over the top of the screen and the assembly inverted, inserting the tip of the funnel into the measuring tube. All material is washed from the screen and the amount of sand read in the measuring tube, as percent by volume.

5. Significance and Use

5.1 This test method is used to determine the percentage of sand by volume in construction slurry. The significance of this test method mainly relates to construction slurries used for concrete wall and drilled piers construction. The range of measurement is too limited for use in applications where the sand content is intended to be greater than 20 %, such as in the cases of cement bentonite or soil bentonite walls.

5.2 A high sand content in the construction slurry is abrasive for construction plant such as pumps, and is furthermore adverse to the formation of a filter cake in applications where bentonite fluid is used to stabilize an excavation.

NOTE 1—The quality of the result produced by this standard depends on the competence of the personnel performing it and the suitability of the equipment and facilities being used. Agencies that meet the criteria of

³ Available from American Petroleum Institute (API), 200 Massachusetts Ave. NW, Suite 1100, Washington, DC 20001, <http://www.api.org>.

*A Summary of Changes section appears at the end of this standard



Documents

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NOTE 1—Photo courtesy of N. L. Baroid—N. L. Industries, Inc., Houston, TX.

FIG. 1 Sand-Content Set

Practice D3740 are generally considered capable of competent and objective testing, sampling, inspection, etc. Users of this standard are cautioned that compliance with Practice D3740 does not in itself ensure reliable results. Reliable results depend on many factors; Practice D3740 provides a means of evaluating some of those factors.

6. Apparatus

6.1 *Sand-Content Set* (see Fig. 1), consisting of the following:

6.1.1 *Sieve*, No. 200 mesh, shall be 50 mm in diameter.

6.1.2 *Funnel*, to fit screen and measuring tube.

6.1.3 *Measuring Tube*, each:

6.1.3.1 The measuring tube shall be a 200 mm long cone shaped centrifuge tube, conforming to the dimensions and tolerances given in Fig. 2 and made of thoroughly annealed glass. The taper shall be uniform, and the bottom shall be rounded. All graduations shall be clear and distinct. Scale error tolerances of the graduations apply to calibrations made with

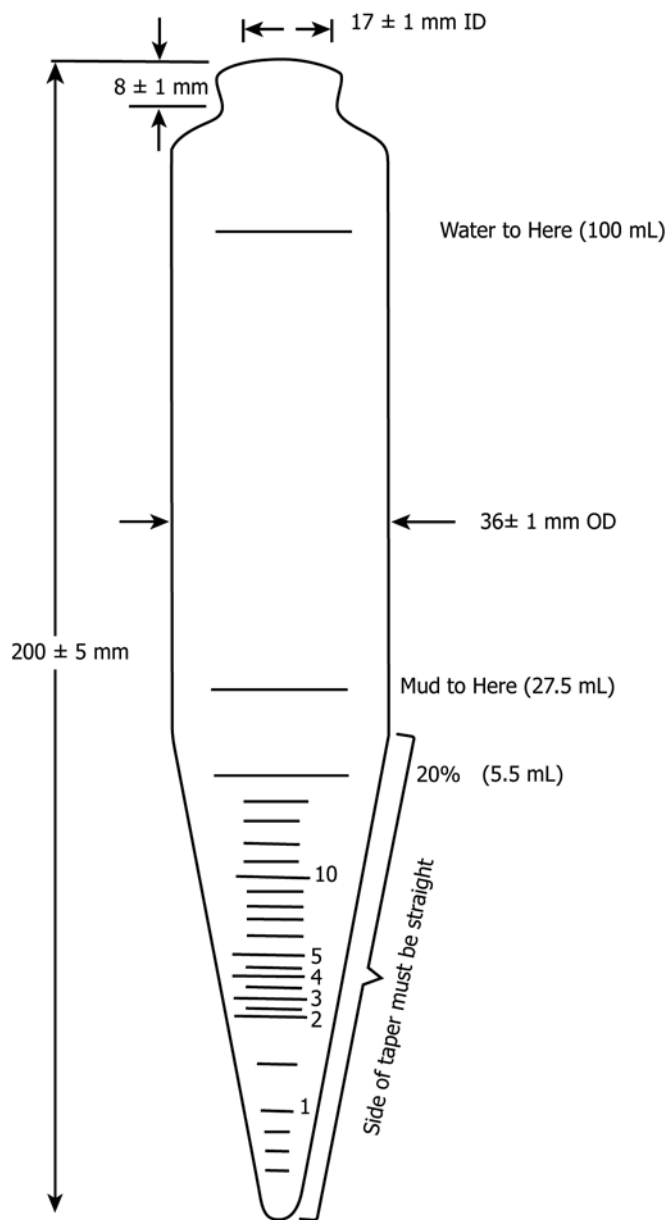


FIG. 2 Measuring Tube Dimensions

air-free water at 20°C, when reading the bottom of the shaded meniscus. Practice E542 references standards that address graduation marks and other glassware specifications in detail.

6.1.3.2 The mud line graduation shall correspond to a volume of 27.5 mL, and the water line graduation shall correspond to a volume of 100.0 mL, as shown in Fig. 2. The limit of error in determining these graduations shall not exceed 1.0%.

6.1.3.3 Sand content graduations shall be marked volumes as percentages from 0 to 20 % and as shown in Fig. 2. The limit of error in determining these graduations are given in Table 1.

NOTE 2—Volume of sand, including void spaces between grains, is measured and expressed as percent by volume of construction slurry.

6.1.3.4 The accuracy of the graduation marks shall be gravimetrically certified, in accordance with Practice E542 using equipment traceable through the National Institute of Standards and Technology (NIST) to the International System of Units (SI).