



Designation: D8262 – 22

Standard Test Method for Determining the pH of Granular Material for Use in Embankments, Subgrades, and Retaining Wall Backfill¹

This standard is issued under the fixed designation D8262; 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 uses a pH meter to measure the pH of as-received granular material that represents what will be used in the field for embankments, subgrades, and retaining wall backfill applications. The principal use of the test method is to supplement soil resistivity measurements to identify conditions under which the corrosion of metal embedded in granular material, or in contact with the granular material may be sharply accentuated.

1.2 The pH of granular material is often specified by agencies to meet criteria that are necessary to prevent or reduce corrosion of metal objects embedded in the granular material used in embankments, subgrade, and retaining wall backfill.

1.3 The types of granular material that can be tested for pH using this standard are natural or manufactured coarse sand, natural or crushed stone, natural or crushed gravel, air-cooled blast furnace slag, and aggregates: lightweight, heavyweight, or normal weight. According to AASHTO M 145, these granular materials generally fall into AASHTO classification groups A-1, A-2-4, A-2-5, or A-3. The ideal material is a well-graded, free draining material that has less than 10-15 % passing the 75 μ m (No. 200) sieve.

1.4 This test is based on the volumetric method because the unit weight of the fill material will vary depending on source and project specifications.

1.5 *Units*—The values stated in SI units are to be regarded as standard. Except the sieve designations, they are identified using the “alternative” system in accordance with Specification E11, such as 3 in. and No. 200, instead of the “standard” of 75 mm and 75 μ m, respectively. No other units of measurement are included in this standard. Reporting of test results in units other than SI shall not be regarded as nonconformance with this standard.

1.6 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice D6026, unless superseded by this test method.

¹ This test method is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.06 on Physical-Chemical Interactions of Soil and Rock.

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1.6.1 The procedures used to specify how data are collected/recorded and calculated in the standard are regarded as the industry standard. In addition, they are representative of the significant digits that generally should be retained. The procedures used do not consider material variation, purpose for obtaining the data, special purpose studies, or any considerations for the user’s objectives; and it is common practice to increase or reduce significant digits of reported data to be commensurate with these considerations. It is beyond the scope of these test methods to consider significant digits used in analysis methods for engineering data.

1.7 *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.*

1.8 *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

- C125 Terminology Relating to Concrete and Concrete Aggregates
- C702/C702M Practice for Reducing Samples of Aggregate to Testing Size
- D75/D75M Practice for Sampling Aggregates
- D653 Terminology Relating to Soil, Rock, and Contained Fluids
- D1193 Specification for Reagent Water
- D3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
- D4972 Test Methods for pH of Soils

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.

D6026 Practice for Using Significant Digits and Data Records in Geotechnical Data

D6913/D6913M Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

2.2 *AASHTO Standards*:³

M 145 Standard Specification for the Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes

3. Terminology

3.1 Definitions:

3.1.1 For definitions of common technical terms used in this standard, refer to Terminology **D653** and Terminology **C125**.

4. Summary of Test Method

4.1 A bulk sample that is representative of the material for the intended application is obtained from the field. The bulk sample is reduced to obtain a representative sample. The representative sample is then reduced to obtain one or more test specimens. The test water and specimen(s) are mixed together in a specimen container at a ratio of five parts water to one part specimen. After 24 h, the pH of the test specimen in test water is measured.

5. Significance and Use

5.1 Granular material being used in embankments, subgrades, and retaining wall backfill must often meet certain specifications relating to corrosion potential, such as pH and electrical resistivity. This standard is used by manufacturers, suppliers, and recipients of the materials to measure the pH of the material for acceptance for its intended use.

5.2 Retaining wall manufactures often use a granular material specification similar to: 100 % passing the 100 mm (4 in.) sieve, 75-100 % passing the 75 mm (3 in.) sieve, and 0-15 % passing the 75 μ m (No. 200) sieve. The specification may vary depending on availability of local materials.

5.3 Since the total surface area of the material being tested affects the test results, the sample and specimen must have the same grading as the material specified or proposed for use. Reducing the particle size by crushing is not permitted since this process may alter the pH of the material and will likely not be representative of the material actually being placed in the field.

NOTE 1—The quality of the result produced by this standard is dependent on the competence of the personnel performing it, and the suitability of the equipment and facilities used. Agencies that meet the criteria of 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 assure reliable results. Reliable results depend on many factors; Practice **D3740** provides a means of evaluating some of those factors.

6. Apparatus

6.1 *pH Meter*—Potentiometer equipped with an electrode system having a readability to the nearest 0.1 pH unit and an accuracy of ± 0.1 pH units or better.

6.2 *Timing Device*—A clock, stopwatch, digital timer, or comparable device readable to 1 s or better.

6.3 *Thermometric Device*—A thermometric device capable of measuring the temperature range within which the test is being performed readable to 0.5°C or better and having an accuracy of at least $\pm 0.5^\circ\text{C}$.

6.4 *Specimen Container*—A clean, chemically inert container or bucket having enough capacity to hold the specimen and test water. The container shall have solid walls that do not have any defects or holes that will allow water or the material to be lost after filling.

6.5 *Miscellaneous Items*—Items such as a chemically inert spatula or spoon, aluminum foil, lid, straightedge, graduated cylinders/beakers, and tissues are useful.

7. Reagents and Materials

7.1 *Purity of Reagents*—Reagent-grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society where such specifications are available.⁴ Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

7.2 *Buffer Solutions*—Commercially available, providing they meet the purity of reagents as described above, or made in-house buffer solutions of 4.0, 7.0, and 10.0 shall be used (see **Note 2**). See Test Methods **D4972** for making buffer solutions.

7.3 *Test Water*—Distilled water as defined by Types I, II, or III of Specification **D1193** is the only permissible test fluid. The use of tap water is not permitted. The pH of the distilled water must be between 5.5 and 7.5. The test water must be at a temperature of $21 \pm 2^\circ\text{C}$.

NOTE 2—In some cases it may be appropriate to also include a pH buffer of 12 if the suspected pH of the material could be higher than 10 or a buffer of 2 if the pH could be lower than 4. These solutions may cause eye and skin irritation. Care should be taken to avoid contact. The use of latex gloves and possibly safety glasses when using the solutions is recommended.

8. Sampling and Test Specimens

8.1 Obtain the bulk sample in accordance with Practice **D75/D75M** making sure the gradation of the sample is representative of the material intended for use.

8.2 Reduce the bulk sample using either Practice **C702/C702M** or Test Method **D6913/D6913M**, Annex A2 in order to obtain a representative sample. The representative sample must have a minimum volume of 1.5 L.

³ Available from American Association of State Highway and Transportation Officials (AASHTO), 444 N. Capitol St., NW, Suite 249, Washington, DC 20001, <http://www.transportation.org>.

⁴ *Reagent Chemicals, American Chemical Society Specifications*, American Chemical Society, Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see the *United States Pharmacopeia and National Formulary*, U.S. Pharmacopeial Convention, Inc. (USPC), Rockville, MD.