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Standard Specification for Topsoil Used for Landscaping and Construction Purposes¹

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1. Scope*

1.1 This specification covers a physical evaluation of a soil containing organic material, relative to its use as a topsoil for vegetative growth purposes in landscaping and construction. For classification, a full agricultural textural classification may be used. Soils being evaluated for use as a topsoil must meet the requirements in **Table 1**.

1.2 When physically evaluating a soil, relative to its suitability to support plant growth (primarily grasses), tests must be made to determine the presence and the amount of organic matter, moisture content, inorganic matter (sand, silt and clay), pH, salt content, cation exchange capacity percentages and deleterious materials.

1.3 The presence in the soil of the correct nutrients, salts, and pH is necessary for healthy plant growth. This specification does not cover a determination of the nutrients, nor their availability.

1.4 Typical ranges of topsoil composition are presented in **Table 1**. Soils falling within these ranges will generally form a suitable topsoil. Soils being used as a topsoil with organic matter contents between 10 and 90 %, may need to be amended prior to use. It must, however, be recognized that in some geographic regions, achieving the values in **Table 1** could be difficult. In such cases, alternative specifications may need to be considered, or an engineered soil amendment meeting the requirements in **Table 1** excluding the sand, silt, and clay content as those materials will come from the subsurface soil being amended. When using an engineered soil amendment, the organic matter values need to be >75 % to help rebuild the subsoil layers.

1.5 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in 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values shall conform to the guidelines for significant digits and rounding established in Practice **D6026**, unless superseded by this test method.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 specification is under the jurisdiction of ASTM Committee **D18** on Soil and Rock and is the direct responsibility of Subcommittee **D18.22** on Media for Plant Growth.

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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

- D653 Terminology Relating to Soil, Rock, and Contained Fluids**
- D2216 Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass**
- D2974 Test Methods for Determining the Water (Moisture) Content, Ash Content, and Organic Material of Peat and Other Organic Soils**
- 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**
- D6026 Practice for Using Significant Digits and Data Records in Geotechnical Data**

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.

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

TABLE 1 Specification for Topsoil and Engineered Soil Amendment

Property	Test Method or Technique	Requirement	
		Topsoil	Engineered Soil Amendment
pH	D4972	5.5-7.5	5.5-7.5
Organic Matter	D2974 (Method C)	3-10 %	≥75 %
Moisture Content	D2216 (Method A)	≤20 %	≤40 %
Material retained on 2.00 mm (No.10) sieve	D6913/D6913M (Method A)	<5 %	<5 %
Sand Content (Material passing 2.00 mm (No. 10) and retained on 0.075 mm (No. 200) sieve)	D6913/D6913M (Method A)	20-60 %	...
Fines (silt and clay) Content (Material passing 0.075 mm (No. 200) sieve)	D6913/D6913M (Method A)	35-70 %	...
Total Dissolved Solids (TDS)	Saturated Paste Extract	<960 ppm	<960 ppm
Soluble Salt Concentration	Saturated Paste Extract	<2.5 mmhos/cm	<2.5 mmhos/cm
Potassium (K)	Ammonium Acetate Extraction	3-10 % CEC	...
Magnesium (Mg)	Ammonium Acetate Extraction	12-25 % CEC	...
Calcium (Ca)	Ammonium Acetate Extraction	55-75 % CEC	...
Sodium (Na)	Ammonium Acetate Extraction	<5 % CEC	...

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

3. Terminology

3.1 Definitions:

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

3.1.2 *topsoil, n—in soil horizons*, the naturally formed top horizon often designated as “A” horizon consisting of soils and materials which support the growth of plants and normally has a greater degree of weathering and greater accumulations of organic matter than underlying soil horizons or soil parent material.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *engineered soil amendment, n—in erosion control*, an alternative to topsoil to accelerate development of depleted soils/substrates with low organic matter, low nutrient levels and limited biological activity.

3.2.2 *saturated paste extract, n—in soil testing*, a mixture of soil or plant media created from a mixture of distilled water and soil or plant media used for obtaining soil testing values, the mixture usually creates a “paste” like material.

3.3 Acronyms:

3.3.1 *CEC, n*—cation exchange capacity

4. Physical Properties

4.1 **Table 1** presents the requirements the topsoil or engineered soil amendment must meet.

5. Sampling and Test Specimens

5.1 Take a representative sample of the topsoil following the guidance given Test Methods **D6913/D6913M** for sampling and specimen preparation. The total amount of representative sample needed will vary based on the maximum particle size of the topsoil or engineered soil amendment under evaluation. Each test method typically specifies a minimum dry mass required to perform the test; therefore, the representative sample shall be of such quantity that the needed amount of material for each of the test specimens is obtained.

NOTE 1—In general for a topsoil with a maximum particle size of 4.75 mm, the representative sample is usually between 500 and 1000 g.

5.2 Thoroughly mix the representative sample to make sure each of the test specimens are representative of the sample.

5.3 Select the test specimens to be tested following the specimen mass requirements given in the individual test methods listed in Section 6.

6. Test Methods

6.1 Use a test specimen for each to determine the:

6.1.1 pH using Test Methods **D4972**. Record to the nearest 0.1 pH unit.

6.1.2 organic matter using Test Method **D2974**, Method C. Record to the nearest 1 %.

6.1.3 water content using Test Method **D2216**, Method A. Record to the nearest 1 %.

6.1.4 particle-size gradation using Test Methods **D6913/D6913M**, Method A. Record to the nearest 1 % the amount retained on the 2.00 mm (No. 10 sieve), the amount of material passing the 2.00 mm (No. 10 sieve) and retained on the 0.075 mm (No. 200) sieve (sand content), and the amount of material passing the 0.075 mm (No. 200) sieve (fines content).

6.1.4.1 During soaking and washing, take care to agitate the specimen so that as much as practicable, the organic matter is decanted away.

6.1.5 total dissolved solids using the Saturated Paste Extract method. Record to the nearest 1 ppm.

6.1.6 soluble salt concentration using the Saturated Paste Extract method. Record to the nearest 0.01 mmhos/cm.

6.1.7 potassium using the ammonium acetate extraction method. Record to the nearest 1 % CEC.

6.1.8 magnesium using the ammonium acetate extraction method. Record to the nearest 1 % CEC.

6.1.9 calcium using the ammonium acetate extraction method. Record to the nearest 1 % CEC.

6.1.10 sodium using the ammonium acetate extraction method. Record to the nearest 1 % CEC.

NOTE 2—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.