



**Designation: D 4609 – 94<sup>ε1</sup>**

## **Standard Guide for Evaluating Effectiveness of Chemicals for Soil Stabilization<sup>1</sup>**

This standard is issued under the fixed designation D 4609; 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 (<sup>ε</sup>) indicates an editorial change since the last revision or reapproval.

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<sup>ε1</sup> NOTE—Paragraph 1.5 was added editorially in October 1998.

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### **1. Scope \***

1.1 This guide describes laboratory techniques for evaluating the effectiveness of chemicals for improving the engineering properties of fine-grained soils.

1.2 Effectiveness is assessed by comparing the unconfined compressive strength (UCS), moisture susceptibility, and moisture-density relationships (MD) of treated and untreated soils.

1.3 The values stated in SI units are to be regarded as the standard. The inch-pound units given in parentheses are for information only.

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.*

1.5 *This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this guide may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.*

### **2. Referenced Documents**

#### **2.1 ASTM Standards:**

D 421 Practice for Dry Preparation of Soil Samples for Particle Size Analysis and Determination of Soil Constants<sup>2</sup>

D 422 Method for Particle-Size Analysis of Soils<sup>2</sup>

D 698 Test Methods for Moisture-Density Relations of

Soils and Soil-Aggregate Mixtures Using 5.5-lb (2.49-kg) Rammer and 12-in. (305-mm) Drop<sup>2</sup>

D 2166 Test Method for Unconfined Compressive Strength of Cohesive Soil<sup>2</sup>

D 2216 Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures<sup>2</sup>

D 2217 Practice for Wet Preparation of Soil Samples for Particle Size Analysis and Determination of Soil Constants<sup>2</sup>

D 3877 Test Methods for One-Dimensional Expansion, Shrinkage, and Uplift Pressure of Soil-Lime Mixtures<sup>2</sup>

D 4318 Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils<sup>2</sup>

#### **2.2 AASHTO Documents:**

SPEL Special Products Evaluation List<sup>3</sup>

T 88 Particle Size Analysis of Soils<sup>3</sup>

T 89 Determining the Liquid Limit of Soils<sup>3</sup>

T 90 Determining the Plastic Limit and Plasticity Index of Soils<sup>3</sup>

T 99 Moisture-Density Relations of Soils, Using a 5.5-lb (2.5-kg) Rammer and a 12-in. (305-mm) Drop<sup>3</sup>

T 208 Unconfined Compressive Strength of Cohesive Soil<sup>3</sup>

T 265 Laboratory Determination of Moisture Content of Soils<sup>3</sup>

### **3. Summary of Guide**

3.1 Chemical soil stabilizers are screened by comparing the results of a suite of engineering soil tests conducted on untreated soil and the same soil treated at appropriate amounts of the material being evaluated. Effectiveness is assessed by comparing the Atterberg limits, MD, USC, and resistance to moisture of treated and untreated soil samples.

### **4. Significance and Use**

4.1 This guide is intended to assist users and producers of chemicals, soil modifiers, and stabilizers in the evaluation of a product's potential for improving a soil's engineering properties (such as, deformation under load, shear strength, and volume stability).

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<sup>1</sup> This guide is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of Subcommittee D18.15 on Stabilization with Admixtures.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.08.

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<sup>3</sup> Available from American Association of State Highway and Transportation Officials, 444 N. Capitol St., NW, Suite 225, Washington, DC 20001.