



Standard Practice for Laboratory Preparation of Soil-Lime Mixtures Using Mechanical Mixer¹

This standard is issued under the fixed designation D3551; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope*

1.1 This practice covers the laboratory preparation of soil-lime mixtures for use in determining the effects of lime on soil properties (plasticity, strength, moisture-density relations, etc.) and the design of mixtures for construction.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 *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.*

1.4 *This practice offers a set of instructions for performing one or more specific operations. This document cannot replace education or experience and should be used in conjunction with professional judgement. Not all aspects of this practice 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 the ASTM consensus process.*

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](#)

¹ This practice is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.15 on Stabilization With Admixtures.

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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.

[D3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction](#)

3. Terminology

3.1 *Definitions:*

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

4. Significance and Use

4.1 This practice standardizes the preparation of soil-lime mixtures for laboratory testing by engineers and researchers interested in determining properties of soil when stabilized with lime. In this method, mention is made of the mellowing period, but no specific recommendations are made because the mellowing period to be used in testing depends upon each specific use.

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, and the like. 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.

5. Apparatus

5.1 *Mechanical Mixer*, capable of producing uniform and homogeneous mixtures of soil, lime, and water.

5.2 *Spatulas, Trowels, Scoops*, etc., as appropriate for use in transferring soil and lime to the mixer and for scraping and cleaning the bowl and all other parts of the mixer.

5.3 *Balance*—A balance or scale capable of weighing at least 1000 g to the nearest 1 g, for use in weighing soil, lime, and water.

6. Mixture Preparation

6.1 Soil for mixture preparation should be in an air-dried or oven-dried condition unless there is reason to believe that air-drying or oven-drying may detrimentally affect the results ([Note 2](#)). In this case, the soil should be cured at or near its final

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

moisture content for a predetermined time period. The size of the sample and the sample preparation shall be dictated by the test requirements for which the sample is prepared.

NOTE 2—A 24-h period of air drying is typical.

6.2 Determine the hygroscopic water content of the air-dried soil in accordance with Method **D2216**. Weigh out an amount of the soil sufficient to provide the weight of oven-dry soil required for the desired number of test specimens, and place in the bowl of the mechanical mixer. Also weigh out the amount of lime, based on the oven-dry weight of the soil required for the percentage desired in the final mixture, and place in the bowl.

6.3 Start the mixer and dry-mix the soil and lime for 1 min, or until the mixture appears uniform in color.

6.4 Weigh or measure into a suitable container the amount of water required to provide the desired water content (**Note 3**), and add to the mixture in a thin stream or a fine spray while the mixer is running. After the water is added, continue the mixing for an additional 5 min. After about half of this 5-min period is completed, stop the mixer for a few seconds and scrape all parts to return any caked mixture to the mixing bowl. Continue the mixing for the remainder of the 5-min period.

NOTE 3—The water added should include about 1 % more than the desired final moisture content to provide for the evaporation that occurs during the mixing operation. The amount of extra water required will depend on laboratory conditions and should be determined experimentally.

6.5 Turn the mixer off and scrape all parts to return any caked portions of the mixture to the mixing bowl. Remove the bowl from the mixer, blend the mixture briefly with a trowel or spatula, and form into a lightly compacted mound in the bottom of the bowl. Cover the bowl immediately to minimize evaporation of moisture.

6.6 If mellowing of the mixture is permitted, the mixture should be placed in a smaller, suitable, closed container to reduce the amount of evaporation. Operations should be planned so that the mixture is used immediately after the mixing operation or after a mellowing period, if such is desired.

NOTE 4—A 1-h mellowing period is a typical minimum, although periods up to 48 h have been used.

7. Keywords

7.1 lime; Mechanical mixing; soil-lime; soil stabilization

SUMMARY OF CHANGES

Committee D18 has identified the location of selected changes to this standard since the last issue (D3551 – 02) that may impact the use of this standard. (Approved July 1, 2008.)

(1) **Note 4** was modified to reflect mellowing of highly plastic soils.

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