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Designation: D 3551 – 02

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

This standard is issued under the fixed designation D 3551; 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 Note—Editorial changes were made in January 1997.~~

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 *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.*

1.3 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:*

D 653 Terminology Relating to Soil, Rock, and Contained Fluids²

D 2216 Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures²

3. Significance and Use

~~3.1 This practice standardizes the preparation~~ Terminology

~~3.1 Definitions:~~

~~3.1.1 For definitions of soil-lime mixtures for laboratory testing by engineers and researchers interested terms used 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 practice, refer to be used in testing depends upon each specific use. Terminology D 653.~~

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.

5. Apparatus

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

45.2 *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.

45.3 *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.

¹ This practice is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of Subcommittee D 18.15 on Stabilization with Admixtures.

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² *Annual Book of ASTM Standards*, Vol 04.08.

56. Mixture Preparation

56.1 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 1). In this case, the soil should be cured at or near its final 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 1—A 24-h period of air drying is typical.

56.2 Determine the hygroscopic water content of the air-dried soil in accordance with Method D 2216. 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.

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

56.4 Weigh or measure into a suitable container the amount of water required to provide the desired water content (Note 2), 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 2—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.

56.5 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.

56.6 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 3—A 1-h mellowing period is typical, although periods up to 24 h have been used.

67. Keywords

67.1 lime; Mechanical mixing; soil-lime; soil stabilization

SUMMARY OF CHANGES

In accordance with Committee D18 policy, this section identifies the location of changes to this standard since the last edition (90(1996)e1) that may impact the use of this standard.

- (1) Section 1.3 was added in accordance with D18 policy.
- (2) D 653 was added to Section 2 in accordance with D18 policy.
- (3) A new Section 3 on Terminology was added in accordance with D18 policy and subsequent sections were renumbered.
- (4) One keyword was added to Section 7.

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