



Designation: C 977 – 02

Standard Specification for Quicklime and Hydrated Lime for Soil Stabilization¹

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

1. Scope

1.1 This specification pertains to quicklime and hydrated lime, either high calcium, dolomitic, or magnesian lime, for use in stabilization of soils (See Note 2).

NOTE 1—Quicklime and hydrated lime act upon clay soils and may render such soils suitable for highway construction and for other load-bearing applications. In most cases, lime causes finely divided clay particles to agglomerate into coarser particles which improves load-bearing properties and subsequently the lime-treated soil hardens by chemical reaction.

NOTE 2—No attempt is made to present requirements for by-product lime, commercial lime slurry, etc. Specification requirements for these materials could be better determined on a local basis.

1.2 The following safety hazards caveat pertains only to the test method portion, Appendix X1, of this specification: *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.*

2. Referenced Documents

2.1 ASTM Standards:

- C 25 Test Methods for Chemical Analysis of Limestone, Quicklime, and Hydrated Lime²
- C 50 Practice for Sampling, Sample Preparation, Packaging, and Marking of Lime and Limestone Products²
- C 51 Terminology Relating to Lime and Limestone (as Used by the Industry)²
- C 110 Test Methods for Physical Testing of Quicklime, Hydrated Lime, and Limestone²
- D 6276 Test Method for Using pH to Estimate the Soil-Lime Proportion Requirement for Soil Stabilization³

3. Chemical Composition

3.1 Unless otherwise specified, for definitions of terms used in this specification, refer to Terminology C 51.

3.2 Quicklime and hydrated lime for soil stabilization shall conform to the following chemical composition:

Calcium and Magnesium Oxides (on a non-volatile basis, minimum %)	90.0
Carbon Dioxide (taken at point of manufacture, maximum %)	5.0
Free Moisture (taken at point of manufacture, maximum %)	2.0

4. Physical Properties

4.1 *Hydrated Lime*, shall have not more than 3 % retained on a No. 30 (590- μ m) sieve and not more than 25 % retained on a No. 200 (74- μ m) sieve.

4.2 Quicklime:

4.2.1 *Fineness of Quicklime*—Quicklime shall all pass a 1.0-in. (24.4-mm) sieve.

4.2.2 Quicklime for soil stabilization shall have a temperature rise of a minimum of 30°C in 20 min as measured by Test Methods C 110.

4.2.3 *Residue of Quicklime*—Quicklime for soil stabilization shall have not more than 10 % residue as measured by Test Methods C 110.

5. Field Applications

5.1 When quicklimes are used, ensure that thorough mixing of the lime and soil is accomplished and all lime pebbles have been hydrated with additional water and distributed uniformly throughout the soil. There shall be no lime pebbles present before the compaction operation starts. Check by turning soil with a spade at representative intervals and inspect for visible lime pebbles. Care should be exercised on initial dry applications to minimize environmental dusting.

5.2 For hydrated limes, additional water shall be added to the lime-soil mixture to facilitate mixing and uniform distribution of the hydrated lime in the soil layer. There shall be no lime clumps present before the compaction operation starts. Check by turning soil with a spade at representative intervals and inspect for visible lime clumps. Care should be exercised on initial dry applications to minimize environmental dusting.⁴

6. Test Method

6.1 The chemical analysis of quicklime and hydrated lime shall be determined in accordance with Test Methods C 25.

¹ This specification is under the jurisdiction of ASTM Committee C07 on Lime and is the direct responsibility of Subcommittee C07.03 on Industrial Uses.

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² *Annual Book of ASTM Standards*, Vol 04.01.

³ *Annual Book of ASTM Standards*, Vol 04.09.

⁴ Further information on soil stabilization construction technique is available from National Lime Association Bulletin No. 326, 3601 N. Fairfax Dr., Arlington, VA, 22201.