



# Standard Specification for Agricultural Liming Materials<sup>1</sup>

This standard is issued under the fixed designation C 602; 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 ( $\epsilon$ ) 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 specification covers agricultural liming materials, such as quicklime (burnt lime), hydrated lime, limestone, (calcitic and dolomitic), marl, shells, and by-products including slag, and other materials.

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.*

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

**C 25** Test Methods for Chemical Analysis of Limestone, Quicklime, and Hydrated Lime

**C 50** Practice for Sampling, Sample Preparation, Packaging, and Marking of Lime and Limestone Products

**C 110** Test Methods for Physical Testing of Quicklime, Hydrated Lime, and Limestone

**C 125** Terminology Relating to Concrete and Concrete Aggregates

**D 3176** Practice for Ultimate Analysis of Coal and Coke

**E 11** Specification for Wire Cloth and Sieves for Testing Purposes

## 3. Terminology

3.1 *Definitions:*

3.1.1 *agricultural liming material*—a product whose calcium and magnesium compounds are capable of neutralizing soil acidity.

3.1.2 *air-cooled blast-furnace slag and granulated blast-furnace slag*—air-cooled blast-furnace slag and granulated blast furnace slag as defined in Terminology **C 125**.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee C07 on Lime and is the direct responsibility of Subcommittee C07.02 on Specifications and Guidelines.

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<sup>2</sup> 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.

3.1.3 *calcium carbonate equivalent (C.C.E.)*—the acid-neutralizing capacity (of an agricultural liming material) of the material expressed as weight percent of calcium carbonate.

## 4. Chemical Classifications

4.1 Agricultural liming materials shall be classified in terms of calcium carbonate equivalent (C.C.E.), as shown in **Table 1**.

**TABLE 1 Agricultural Liming Materials**

Material	Calcium Carbonate Equivalent (C.C.E.), percent
Quicklime	not less than 140
Hydrated lime	not less than 110
Limestone	not less than 80
Slag	not less than 80
Shells	not less than 80

NOTE 1—Marl and some by-product liming materials are used for neutralizing soil acidity, but due to their varying composition, their chemical limits are not included. In some economic circumstances limestone, slag, and shells of less than 80 % C.C.E. may be used.

## 5. Sieve Analysis Classifications for Agricultural Limestone

5.1 Agricultural limestone shall be classified according to the minimum percentages passing the No. 8 (2.36-mm) and No. 60 (250- $\mu$ m) sieves conforming to Specification **E 11**, as shown in **Table 2**.

**TABLE 2 Classification for Agricultural Limestone**

Class Designation	Passing No. 8 (2.36-mm) Sieve, min, percent	Passing No. 60 (250- $\mu$ m) Sieve, min, percent
S	100	100
T	99	75
O	95	55
N	90	40
E	80	25

NOTE 2—These classifications apply where the agricultural limestone is obtained by the normal crushing procedure and the product contains the fines of fracture. In some economic circumstances, coarser products are

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

used. The No. 60 (250- $\mu$ m) sieve was selected because research has shown that this sieve gives a more accurate representation of the particle size distribution of most agricultural limestones presently produced than a finer or coarser sieve. The No. 8 (2.36-mm) sieve is used to control the upper limit on the amount of coarse limestone particles that may be in the product.

## 6. Sieve Analysis Classifications for Agricultural Slag

6.1 *Air-Cooled Blast-Furnace Slag*—Air-cooled blast-furnace slag shall be classified the same as agricultural limestone as shown in Section 5.

6.2 *Granulated Blast-Furnace Slag*—Granulated blast-furnace slag shall be classified in accordance with the minimum percentages passing the No. 8 (2.36-mm) and the No. 60 (250- $\mu$ m) sieves.

## 7. Particle Size Requirements for Hydrated Lime and Quicklime

7.1 Hydrated lime and quicklime for agricultural use shall be classified in accordance with the minimum percentages passing the No. 8 (2.36-mm) and No. 60 (250- $\mu$ m) sieves, as follows:

Passing Sieve No.	Hydrated Lime	Min. %	Quicklime
8 (2.36 mm)	100		95
60 (250 $\mu$ m)	97		35

## 8. Sampling

8.1 Sampling shall be conducted using the procedures specified in Practice C 50.

## 9. Chemical Methods

9.1 Reagent grade chemicals or equivalent and water purity shall be used as specified in Test Methods C 25.

9.2 The analytical sample for chemical methods relative to this standard shall be pulverized to pass a 60 mesh sieve.

9.3 The following chemical parameters are to be determined using the methods as specified in Test Methods C 25.

9.3.1 Calcium carbonate equivalent, and

9.3.2 *Total calcium and magnesium*—determination can be made either gravimetrically or by EDTA titration.

## SIEVE ANALYSIS OF AGRICULTURAL LIMING MATERIALS

### 10. Preparation of Sample

10.1 Dry the sample to constant weight at  $110 \pm 5$  °C and store in an airtight container. Obtain the sample from a larger

sample of the material to be tested by the use of a riffle or a sample splitter in accordance with Practice D 3176, or by the method of quartering. The sample for sieve analysis shall have a weight of 100 to 150 g.

10.2 Where limestone contains clay, some agglomeration of fine particles may occur. The agglomerates must be broken by rolling the dry sample with a hard rubber roller on a hard rubber mat or by some equally effective means that does not result in crushing the limestone.

## 11. Procedure

11.1 Sieve analysis shall be conducted using the procedures in Test Methods C 110. Sieve the sample through No. 8 (2.36-mm) and No. 60 (250- $\mu$ m) sieves. Determine the weight of liming material passing each sieve on a scale or balance sensitive to at least 0.1 g. Calculate the amount of liming material passing the sieves to the nearest whole percentage of the total weight of the dry sample.

## 12. Report

12.1 Report the following results for agricultural liming materials:

12.1.1 *Percentage Calcium Carbonate Equivalent*—The percentage calcium carbonate equivalent (C.C.E.) shall be reported on the as-received basis. Calculate as follows:

$$\text{C.C.E. (as-received)} = [1 - (\% \text{ moisture} \div 100)] \times \text{C.C.E. (oven-dry)} \quad (1)$$

12.1.2 *Percentage Moisture*—Calculate as follows: (2)

$$\text{Moisture, \%} = \frac{\text{Weight of sample (as received)} - \text{oven-dry weight}}{\text{Weight of sample (as received)}} \times 100$$

12.1.3 *Percentage Calcium and Magnesium*—The percentages of elemental calcium and elemental magnesium on the basis of the as-received sample.

12.1.4 *Sieve Analysis*—The amount of dried sample passing the No. 8 (2.36-mm) and No. 60 (250- $\mu$ m) sieves as a percentage of the total weight of the dried sample with the figures rounded to the nearest whole percentage point.

## 13. Keywords

13.1 agricultural liming materials; agricultural limestone; calcium carbonate equivalent; hydrated lime; lime by-products; limestone; quicklime; slag

## SUMMARY OF CHANGES

Committee C07 has identified the location of selected changes to this specification since the last issue, C 602 – 06a, that may impact the use of this specification. (Approved June 15, 2007)

(1) Revised 11.1.

Committee C07 has identified the location of selected changes to this specification since the last issue, C 602 – 06, that may impact the use of this specification. (Approved December 15, 2006)

(1) Replaced outdated term “burnt lime” with “quicklime” throughout.

Committee C07 has identified the location of selected changes to this specification since the last issue, C 602 – 95a(2001), that may impact the use of this specification. (Approved July 1, 2006)

(1) Revised 1.2.

(2) Revised Section 8.

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