



Standard Specification for Lime for Use with Pozzolans¹

This standard is issued under the fixed designation C821; 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. Scope*

1.1 This specification covers all types of commercial hydrated lime such as: high-calcium, magnesium, or dolomitic-hydrated lime. By-product limes and slaked quick limes in dry, wet, or slurried form are also included.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered 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.*

2. Referenced Documents

2.1 ASTM Standards:²

C25 Test Methods for Chemical Analysis of Limestone, Quicklime, and Hydrated Lime

C50 Practice for Sampling, Sample Preparation, Packaging, and Marking of Lime and Limestone Products

C51 Terminology Relating to Lime and Limestone (as used by the Industry)

C204 Test Methods for Fineness of Hydraulic Cement by Air-Permeability Apparatus

C593 Specification for Fly Ash and Other Pozzolans for Use With Lime for Soil Stabilization

C1271 Test Method for X-ray Spectrometric Analysis of Lime and Limestone

C1301 Test Method for Major and Trace Elements in Limestone and Lime by Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP) and Atomic Absorption (AA)

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

Current edition approved July 1, 2014. Published July 2014. Originally approved in 1975. Last previous edition approved in 2009 as C821 – 09. DOI: 10.1520/C0821-14.

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.

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this specification, refer to Terminology **C51**.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *chemical factor, n*—a numerical value of the active constituents in the hydrated lime that react chemically with a pozzolan. The value is based on the combined calcium oxide equivalents of free calcium oxide, calcium hydroxide, and magnesium oxide. Calcium carbonate and magnesium hydroxide are excluded, since these compounds have been found to be nonreactive.

3.2.2 *pozzolanic receptivity index, n*—a performance factor incorporating both chemical quality and fineness, determined by **Eq 3**.

4. Chemical and Physical Requirements

4.1 The lime shall conform to the requirements listed in **Table 1**, except as noted in Section 5.

5. Performance Requirements

5.1 If the chemical factor, Blaine fineness, or pozzolanic receptivity index is below the limits given in **Table 1**, the lime shall be required to meet the applicable performance requirements listed in **Table 2**. Where such lime complies with the limits listed in **Table 2**, it shall be considered acceptable for use with pozzolans. However, it may be necessary to increase the lime content in the lime-pozzolan mixtures in order to meet minimum design criteria.

6. Test Methods

6.1 Chemical Factor:

6.1.1 Determine calcium oxide (CaO) and magnesium oxide (MgO) contents in accordance with Methods **C25**, **C1271**, or **C1301**. Determine the carbon dioxide (CO₂) content in accordance with Method **C25**. When the magnesium oxide content is greater than 5 %, determine the peak height of magnesium oxide and magnesium hydroxide using standard X-ray diffraction procedures and calculate the ratio (*r*) of magnesium oxide to hydroxide using **Eq 1**. When the magnesium oxide is less than 5 %, the value of *r* shall be 0.30.

TABLE 1 Chemical and Physical Requirements

Chemical factor, min	50
Blaine fineness, min, cm ² /g	10 000
Pozzolanic receptivity index, min	100

TABLE 2 Performance Requirements

<i>Plastic Compositions:</i>		
Lime-pozzolan strength, min, psi (MPa)	600	(4.13)
<i>Nonplastic Compositions:</i>		
Lime-pozzolan-aggregate strength, min, psi (MPa)	400	(2.76)
Vacuum saturation strength, min, psi (MPa)	400	(2.8)

$$r = \frac{\text{cps MgO}}{\text{cps MgO} + 2.0 (\text{cps Mg (OH)}_2)} \quad (1)$$

where:

cps = counts per second of principal peaks corresponding to an interplanar spacing for MgO of 2.106 Å and for Mg(OH)₂ of 2.365 Å.

6.1.2 *Calculation of Chemical Factor*—Using the test results provided by 6.1.1 the chemical factor (C.F.) is determined by Eq 2:

$$\text{C.F.} = (\text{CaO}) - 1.27 (\text{CO}_2) + 1.4 r (\text{MgO}) \quad (2)$$

6.2 *Blaine Fineness*—Calculate in accordance with Method C204, except use the specific gravity of the lime in calculating the trial weight of the sample, and the weight finally chosen

must result in a firm bed as described in Test Method C204. Use the specific gravity of the lime and finally chosen weight to determine the porosity of the bed in accordance with Eq 2 of Test Method C204, and use this porosity (as well as specific gravity) in calculating the surface area.

6.3 Pozzolanic Receptivity Index (PRI):

$$\text{PRI} = \frac{\text{chemical factor} \times \text{Blaine fineness}}{10\,000} \quad (3)$$

6.4 *Lime-Pozzolan Strength*—See Specification C593, Section 7. The pozzolan used shall pass the requirements of Specification C593 when tested with a lime having a pozzolanic receptivity index of 80 or higher.

6.5 *Lime-Pozzolan-Aggregate Strength, Freeze-Thaw Resistance*—See Specification C593, Section 8. The pozzolan used shall pass the requirements of Specification C593 when tested with a lime having a pozzolanic receptivity index of 80 or higher.

7. Sampling, Inspection, Packing, and Marking

7.1 The sampling, inspection, rejection, retesting, packing, and marking shall be conducted in accordance with Methods C50.

8. Keywords

8.1 hydrated; lime; pozzolans

SUMMARY OF CHANGES

Committee C07 has identified the location of selected changes to this standard since the last issue (C219 – 09) that may impact the use of this standard. (Approved July 1, 2014.)

(1) Added Test Methods C1271 and C1301 to Referenced Documents section. (2) Revised 6.1.1.

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