



Designation: C 1529 – 02a

Standard Specification for Quicklime, Hydrated Lime, and Limestone for Environmental Uses¹

This standard is issued under the fixed designation C 1529; 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 lime and limestone products suitable for environmental uses as shown in Table 1.

1.2 The buyer shall designate the use, as listed in Table 1, and may specify one or more of the type designations listed below Table 1.

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 requirements 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

C 400 Test Methods for Quicklime and Hydrated Lime for Neutralization of Waste Acid²

D 6249 Guide for Alkaline Stabilization of Wastewater Treatment Plant Residuals³

3. Chemical Composition and Physical Properties

3.1 The requirements for quicklime, hydrated lime, and limestone for the designated end uses are as shown in Table 1, and are on the basis of the weight of sample taken at the place of manufacture.

4. General Requirements

4.1 Quicklime shall be reasonably free of unslakable residues and shall be capable of disintegrating in water to form a suspension of finely divided material. The amount of residue shall not exceed that agreed upon between the manufacturer and the purchaser (the residue is the amount of material retained on a specified screen). The method for measuring quicklime residue appears in Test Methods C 110.

4.2 The slaking rate for the specified quicklime should be matched to the requirements of the slaking equipment. The method for measuring the slaking rate of quicklime appears in Test Methods C 110.

5. Sampling and Inspection

5.1 Conduct the sampling, inspection, rejection, retesting, packaging, and marking in accordance with Practice C 50.

6. Test Methods

6.1 The chemical analyses shall be made in accordance with Test Methods C 25.

6.2 The physical tests shall be made in accordance with Test Methods C 110.

6.3 The basicity-factor tests shall be made in accordance with Test Methods C 400.

7. Keywords

7.1 biosolids; calcium oxide; dolomitic lime; dolomitic limestone; drinking water; high calcium lime; high calcium limestone; hydrated lime; environmental; industrial waste; lime; lime by-product; limestone; magnesian lime; magnesian limestone; neutralization; quicklime; residuals; sewage sludge; stabilization; treatment; waste; wastewater; water; water softening

¹ This specification is under the jurisdiction of ASTM Committee C07 on Lime and is the direct responsibility of Subcommittee C07.04 on Environmental Uses. Current edition approved Dec. 10, 2002. Published January 2003.

² Annual Book of ASTM Standards, Vol 04.01.

³ Annual Book of ASTM Standards, Vol 11.04.

TABLE 1 Lime and Limestone for Environmental Uses

Use	Notes Referenced	Approved Types of Lime	Chemical Requirements, %				Physical Requirements, % less than	
			CaO +MgO, min	CO ₂ , max	Available CaO, min	Basicity Factor, min	Dry Sieve, % in.	Wet Sieve, 100 mesh
Drinking water softening	^A	CQ	...	...	90	...	...	...
		CH	...	...	68	...	...	...
Waste and wastewater neutralization	^B	CH	95.0 ^C	5.0	...	0.72	...	...
		DH	95.0 ^C	5.0	...	0.81	...	...
		MH	95.0 ^C	5.0	...	0.74	...	...
		BH	90.0 ^C	...	...	...	...	...
		CQ	90.0	...	...	0.93	...	...
		DQ	90.0	...	...	1.06	...	...
		MQ	90.0	...	...	0.93	...	...
		CL ^D	90.0 ^C	...	...	0.45	...	...
		DL ^D	90.0 ^C	...	...	0.56	...	...
		ML ^D	90.0 ^C	...	...	0.48	...	...
Wastewater treatment plant residuals stabilization ^E	^{F,G,H}	CQ, DQ, MQ	90.0	...	...	...	100	...
		CH, DH, MH	90.0 ^C	...	...	...	...	95
		Byproduct alkaline materials	25.0 ^{I,J}	...	...	...	100	...

CQ = Quicklime, high-calcium
 DQ = Quicklime, dolomitic
 MQ = Quicklime, magnesian
 CH = Hydrated lime, high-calcium
 DH = Hydrated lime, dolomitic
 MH = Hydrated lime, magnesian
 BH = Hydrated lime, by-product
 CL = Limestone, high-calcium
 DL = Limestone, dolomitic
 ML = Limestone, magnesian

iTeh Standards

^A In the softening of drinking water, lime is used alone or with coagulant aids to produce a precipitate that assists in the clarification of water, removal of bacteria, and removal of hardness. Lime and soda ash may be used together for softening water. The lime serves as a chemical reagent in water softening. The only useful constituent of the lime is the calcium oxide content of the quicklime or hydrated lime capable of reacting with the other chemicals in the water or added to it. Inert material, besides reducing the value in proportion to its amount, also makes more sludge to be disposed of for a given amount of chemical action and thus reduces the capacity of the equipment in which it is used. In addition to water softening, lime is also used for color removal and clarification of water.

^B When determining the quantity of liming material for the neutralization of liquid acidic wastes, use is made of an acid value-basicity factor relationship. Acid value and basicity factor test methods are in Test Methods C 400.

^C On a nonvolatile basis.

^D Limestone analyses are typically reported as carbonate (CO₃). The requirement that limestone contains a minimum of 90 % CaO + MgO on a non-volatile basis corresponds to approximately 95 % CaCO₃+ MgCO₃.

^E Wastewater treatment plant residuals may be referred to as sewage sludge or biosolids. <https://www.astm.org/standards/c1529-02a>

^F Also see "Standard Guide for Alkaline Stabilization of Wastewater Treatment Plant Residuals" (D 6249).

^G Quicklime, hydrated lime, and alkaline by-product materials will raise the pH of biosolids.

^H If quicklime or by-product alkaline materials containing calcium or magnesium oxide are used, the reaction with water will generate heat. High calcium quicklime will slake more quickly and achieve a higher total temperature rise than other alkaline materials, which generally facilitates treatment. Although slaking rate and total temperature rise are not part of this specification, they are critical site-specific factors that should be matched to the user's treatment objective and technology. The methods for measuring the slaking rate of quicklime and total temperature rise appear in Test Methods C 110.

^I Tested on an as received basis.

^J The available lime index test in Test Methods C 25, which measures only calcium oxide and hydroxide, can be used.

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org).