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# SPEC DATA<sup>®</sup>

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Mason's Lime Committee  
August 1993  
(Supersedes February 1990)

4  
MORTAR AND MASONRY GROUT  
Hydrated Lime

## 1. PRODUCT NAME

Mason's Hydrated Lime: Type S (Special) and Type SA (Special Air-Entraining)

## 2. MANUFACTURER

Mason's hydrated lime is produced by companies represented on the Mason's Lime Committee, 200 North Glebe Road, Suite 800, Arlington, VA 22203-3728, as follows:

**APC Lime Corp.**  
Route 6, Box 662  
New Braunfels, TX 78132-5011  
Phone: (800) 292-5278 (in TX)  
(210) 625-2327  
FAX: (210) 625-0552

**Ash Grove Cement Company**  
8900 Indian Creek Pkwy.  
Suite 600  
PO Box 25900  
Overland Park, KS 66225

Phone: (913) 451-8900  
FAX: (913) 451-8324

**Chemstar Lime Co.**  
495 East Rincon Street  
Suite 202  
Corona, CA 91719-1334  
Phone: (800) 274-8977  
(909) 273-7590  
FAX: (909) 273-0968

**Corson Lime Co.**  
500 Stenton Avenue  
Plymouth Meeting, PA 19462  
Phone: (215) 828-4300  
(800) 545-5611  
FAX: (215) 828-5696

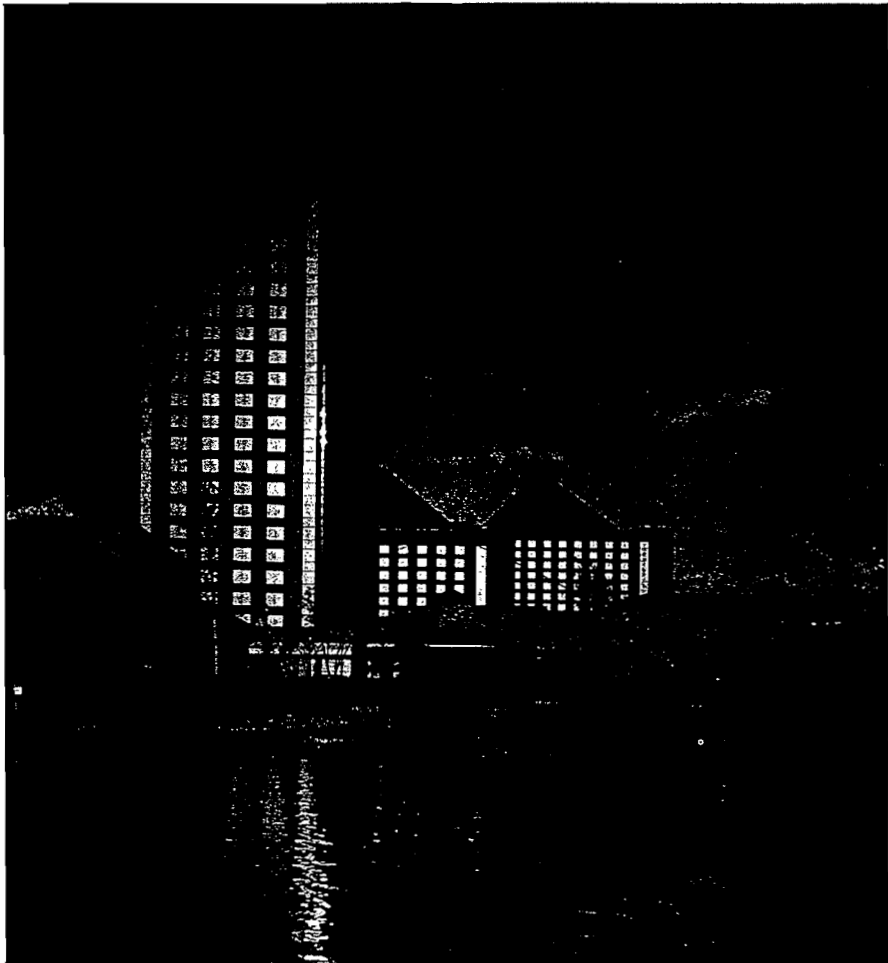
**GenLime Group, LP**  
PO Box 158  
Genoa, OH 43430  
Phone: (419) 855-8336  
(800) 537-4489  
FAX: (419) 855-4602

**Lee Lime Corporation**  
Marble Street  
PO Box 710  
Lee, MA 01238  
Phone: (413) 243-0053  
FAX: (413) 243-4323

**Rockwell Lime Co.**  
4110 Rockwood Road  
Manitowoc, WI 54220  
Phone: (414) 682-7771 (in WI)  
(800) 558-7711  
FAX: (414) 682-7972

**Warner Co.**  
PO Box 457  
Yellow Springs Road  
Devault, PA 19432  
Phone: (215) 644-7100  
FAX: (215) 651-0950

**Western Lime & Cement Co.**  
PO Box 57  
141 North Main Street  
West Bend, WI 53095  
Phone: (414) 334-3005 (in WI)  
(800) 433-0036  
FAX: (414) 334-2874



Loews Anatole Hotel, Dallas, TX, a beautiful masonry structure made with mortar containing Type S lime.

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Since products will vary from manufacturer to manufacturer, the following information generally applies for all products. For more specific information, contact the individual manufacturer concerned.

### 3. PRODUCT DESCRIPTION

**Basic Mortar Use:** Type S mason's lime is a fine, white, high-purity hydrated lime that has been specially hydrated for convenient, trouble-free use. Type SA hydrated lime is similar, except that it includes an air-entraining agent which produces minute air voids in mortar. Either type, properly combined with portland cement and sand, will provide a superior quality mortar.

Type S hydrated lime is a key ingredient in constructing durable, watertight masonry. In particular, Type S lime improves mortar bond to masonry units (brick, concrete block, and stone). Bond strength is important in design considerations in the prevention of cracking, water leakage, and efflorescence. Type S lime improves mortar plasticity and workability, essential for consistent workmanship and aesthetically pleasing masonry. Type SA lime extends workability and boardlife in hot weather.

Although mortar compressive strength should not exceed the strength of the masonry units, mortars containing Type S lime always exceed 28 day compressive strengths, as specified in ASTM C 270. Strength will continue to increase over time. Type S lime will improve water retention of mortar. High water-retentive mortars are especially desirable for use with high absorption units such as concrete block.

**Basic Stucco Use:** Type S and SA limes are highly recommended for use in scratch, brown, and finish coats. There are benefits in both interior and exterior applications. In interior work, tight, smooth finishes are consistently and readily achieved. In exterior work, fine reactive lime particles reduce cracking in scratch and brown coats. Whether the wall base is block or wood stud construction, adding Type S hydrated lime improves resistance to water intrusion. It enhances bonding of stucco finishes to undercoats and reduces surface peeling. Because of its

CHEMICAL PROPERTIES	TYPE S AND SA
Calcium and Magnesium Oxides (non-volatile basis, min. %)	95
Carbon Dioxide (as received basis), max. % if sample taken at manufacturer	5
if sample taken elsewhere	7
Unhydrated Oxides (as received basis), max. %	8
PHYSICAL PROPERTIES*	
Plasticity (Emley), min.	200**
Water Retention, min. %	85
Retained on No. 30 Sieve, max. %	0.5
Approximate Bulk Density, lb./cu. ft.	40

\*The air content of mortar does not exceed 7% for Type S and 14% for Type SA lime.  
\*\*Type S and SA limes generally exceed 300 Emley plasticity.

greater plasticity and workability, stucco can be applied in a wide range of decorative shapes—curved and angular surfaces, solar screens, and ornate columns. Stuccos containing Type S lime exhibit remarkable color consistency and can be pumped as high as 185'. See table on last page for recommended stucco proportions.

**Other Building Uses:** Lime is effective in drying up wet soil at construction sites to expedite construction.

**Limitations:** Do not use air-entraining portland cement with air-entraining Type SA lime in mortar. Type SA lime is not recommended for use with gypsum gaging plaster in gaged lime-putty finishes or with Keene's cement interior finishes.

Waterproofing, plasticizing, or cold weather additives are not recommended or required for use with cement-lime mortars. But, if an additive is specified, lab or field tests should be performed for compatibility of materials prior to approval. Such additives are non-cementitious and oftentimes can cause discoloring, efflorescence, poor workability, and reduced strength.

**Applicable Standards:** Standard Specification for Hydrated Lime for Masonry Purposes, ASTM C 207-91

(specify either Type S (special) or Type SA (special air-entrained)). Also, refer to Brick Institute of America Technical Notes on Brick Construction 8 (Revised Nov., 1989), 8A (Revised Sept., 1988), and 8B (Reissued Sept., 1988). Also, refer to Building Code Requirements for Masonry Structures (ACI 530/ASCE 5/TMS 402) and Specifications for Masonry Structures (ACI 530.1/ASCE 6/TMS 602), all dated 1992.

**Sizes:** Mason's hydrated lime is packaged in 50 lb. multiwall paper bags.

### 4. TECHNICAL DATA

Typical physical and chemical properties of mason's hydrated lime are given above.

Mortar ingredient proportions and minimum performance requirements are given in ASTM C 270. The table below shows typical compressive strength and water retention values for specified proportions, using ASTM laboratory tests with standard Ottawa sands.

Of greater interest to the specifier is the performance of masonry assemblages when Type S lime is an ingredient in mortar. ASTM C 270 provides for two classes of mortar; one containing lime (portland cement-lime) and one containing masonry cement. Portland cement-lime mortars must

ASTM C 270 MORTAR SPECIFICATION		TYPICAL LABORATORY TEST DATA**	
Mortar Type	Proportions*	Compressive Strength 28 Days, psi	Water Retention
O	1:2:9	750	90
N	1:1:6	1500	85
S	1:½:4½	2200	80
M	1:¼:3¾	2800	75

\*Portland cement, Type S lime, and sand, by volume  
\*\*Not applicable to field materials and conditions

Fig. 1—TENSILE BOND OF BRICK MASONRY PRISMS

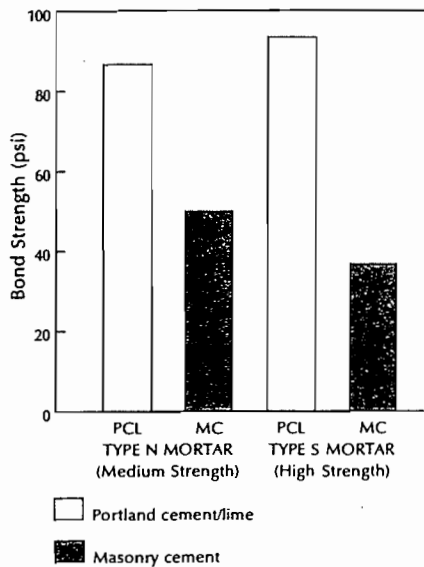


Fig. 2—SHEAR STRENGTH OF BRICK MASONRY PANELS

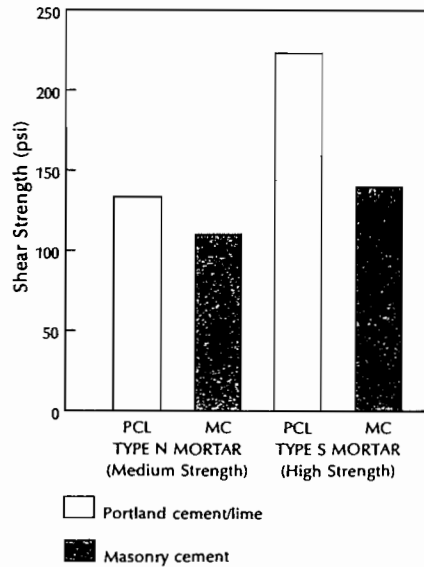
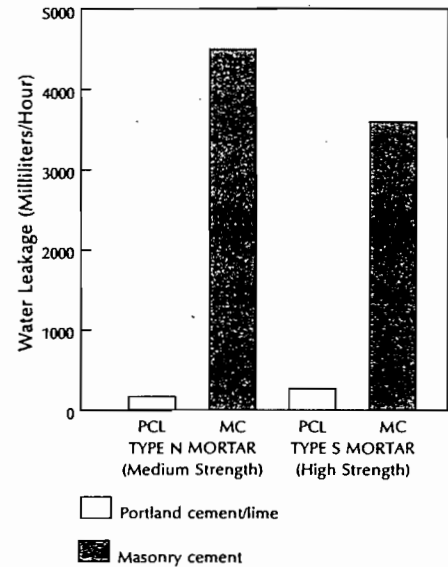


Fig. 3—BRICK WALL LEAKAGE RATES



be a blend of portland cement, Type S lime, and sand. By contrast, masonry cement mortars are a blend of a variety of materials and additives, including high levels of entrained air (up to 22%). Masonry cements may contain hydrated lime, but almost always contain ground limestone in place of hydrated lime. Limestone is a relatively inert mineral that imparts some workability to mortar, but has very little cementitious value. On the other hand, hydrated lime (Type S) is a reactive building material which is highly plastic and cementitious by definition. Relatively low addition levels of Type S lime have a significant positive impact on masonry assemblage properties. This cannot be said for limestone, even at high addition levels.

University research studies\* comparing portland cement-lime and masonry cement mortars were conducted in 1987 and 1988. The research focused on masonry assemblage performance, including bond strength, shear strength, and water leakage. Cement-lime mortars contained Type S lime. Masonry cement mortars contained ground limestone but no lime. Medium and high compressive strength mortars were used to construct both clay brick and concrete block assemblages. Tensile bond, shear strength, and water

leakage results for clay brick are given in Figures 1, 2, and 3. The benefits of using Type S lime on assemblage performance are apparent. Bond and shear strengths are much higher; water leakage is much lower. Only one assemblage property, prism compressive strength, is the same for either mortar class.

Tests made with 8" x 8" x 16" medium weight concrete block showed similar results. With PCL mortar (containing portland cement and Type S lime), prism flexural bond strength was 70% higher than when MC (masonry cement) mortar was used. Air bag wall tests also showed higher flexural bond strength (of nearly 80%) when PCL mortar was used over MC mortar.

Complete reports of these studies are available from the Mason's Lime Committee headquarters.

## 5. INSTALLATION

Lime bags should be stored in a dry place providing protection from damage, deterioration, and contamination.

In preparing mortar, use portland cement conforming to ASTM C 150; clean, well-graded natural or manufactured sand conforming to ASTM C 144; and water that is clean and free of deleterious amounts of acids, alkalis, and organic materials.

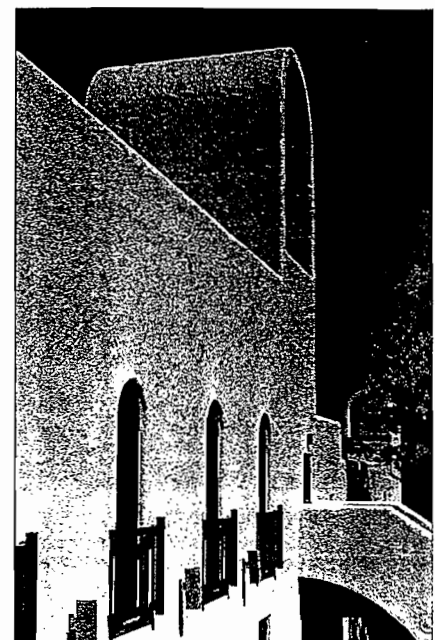
Proportion ingredients accurately and mix for at least 5 minutes in mechanical batch mixer with the maximum amount of water to pro-

duce a workable consistency. A recommended procedure is

- Add approximately 80% of total volume of water
- Add total sand
- Add total hydrated lime
- Mix for 1 minute
- Add total portland cement
- Add remaining volume of water
- Mix for at least 4 minutes

Lay mortar in a uniform bed and completely fill bed and head joints. Mortar which has started to set should not be retempered or used.

In cold weather construction, temperature of masonry materials should be above freezing when



Attractive winery in Napa Valley, CA, built with stucco containing Type S lime and portland cement.

\*"Conventional Masonry Mortar Investigation," by John H. Matthys, University of Texas at Arlington, August, 1988.

Recommended Proportions for Stucco\*

Use	Nominal Proportions	Stucco Mix Proportions			Volume (cu.yd.)
		Portland Cement	Type S or SA Hydrated Lime	Sand <sup>2</sup>	
Scratch Coat <sup>1</sup>	1:1:6	1 bag (94 lbs.)	¼-1 bag <sup>2</sup> (40-50 lbs.)	Approx. 30-36 #2 shovels <sup>2</sup> (5-6 cu. ft.)	⅓ (average)
Brown Coat <sup>1</sup>	1:1:6	1 bag (94 lbs.)	1 bag (50 lbs.)	Approx. 38-42 #2 shovels <sup>2</sup> (6-7 cu. ft.)	⅓ (approximate average)
Finish Coat <sup>2</sup>	1:2:9	1 bag (94 lbs.)	2 bags (100 lbs.)	Approx. 50-60 #2 shovels <sup>2</sup> (8-10 cu. ft.)	⅓

\*Generally complies with ASTM C 926-90

- (1) Curing with water after set required in accordance with local codes.
- (2) Upper end of range for use over concrete block where greater water retention and plasticity are required; lower end of range for use over metal reinforcing mesh with exterior sheathing or building paper.
- (3) Quantity used varies, depending on shape and size of local sand particles.

placed, and masonry should be protected from freezing for 48 hours after placing. Masonry should not be laid on walls or footings that are frozen or contain frost.

RECOMMENDED GUIDE FOR SELECTION OF MORTAR TYPE	
Exterior, above grade, load-bearing	N
Exterior, above grade, non-load-bearing	O
Exterior, above grade, parapet walls	N
Exterior, at or below grade	S
Interior, load-bearing	N
Interior, non-load-bearing	O

The above is a general guide for mortar selection; other factors to be considered include type and absorption of masonry unit, ap-

plicable building code, engineering requirements, such as allowable design stresses, etc.

6. AVAILABILITY AND COST

**Availability:** Mason's hydrated lime is marketed throughout the United States and Canada and is available through building supply dealers.

Contact individual manufacturers listed herein for literature, technical data and cost information.

7. WARRANTY

Mason's hydrated lime discussed herein meets ASTM C 207

(Type S or SA) specifications. Contractor is responsible for using sound materials and good construction practices for insuring durable masonry or stucco.

8. MAINTENANCE

Not applicable.

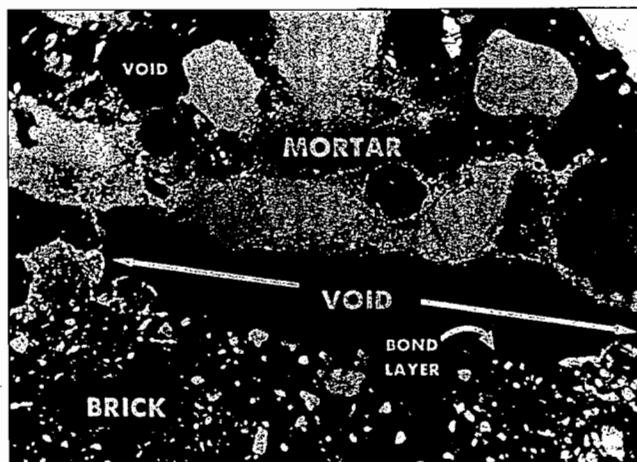
9. TECHNICAL SERVICES

Available from listed manufacturers (refer to Part 2—Manufacturer).

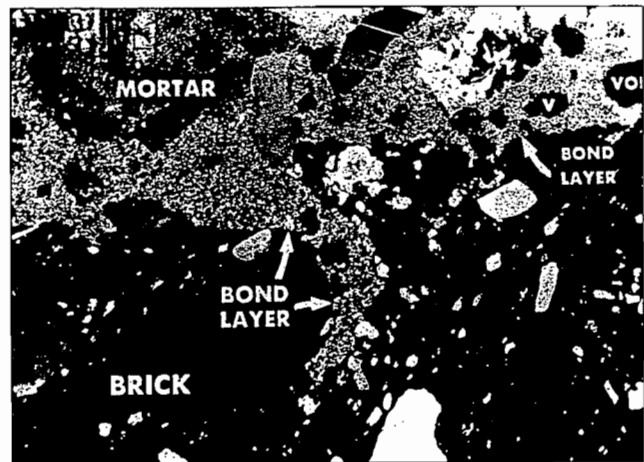
10. FILING SYSTEMS

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Additional literature is available upon request.



Photomicrograph of joint interface of dense brick and high cement (Type M) mortar, 21 years old (magnification 60 times). Note that the bond is not continuous, as evidenced by the large void present.



Photomicrograph of joint interface of moderately dense brick and high lime (Type O) mortar, 4 years old. Note that the plastic mortar has created a continuous bond. The filling of the irregular cavity is an example of the autogenous healing of a high lime mortar.