



Standard Specification for Chemically Setting Silicate and Silica Chemical-Resistant Mortars¹

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1. Scope

1.1 This specification covers requirements for chemically setting silicate and silica chemical-resistant mortars for bonding chemical-resistant masonry units.

NOTE 1—For information on the use of these materials, see Practice C 397.

2. Referenced Documents

2.1 ASTM Standards:

- C 279 Specification for Chemical-Resistant Masonry Units²
- C 321 Test Method for Bond Strength of Chemical-Resistant Mortars²
- C 397 Practice for Use of Chemically Setting Chemical-Resistant Silicate and Silica Mortars²
- C 413 Test Method for Absorption of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacing²
- C 414 Test Method for Working, Setting and Curing Times of Chemically Setting Chemical-Resistant Silicate and Silica Mortars²
- C 531 Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes²
- C 579 Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes²
- C 580 Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes²

3. Terminology

3.1 Definition:

3.1.1 *chemically setting silicate and silica chemical-resistant mortar*—an intimate mixture of a silicate or silica binder, a chemically inert solid filler(s), and a setting agent. The binder may be silicate or silica, liquid, or a powder, which requires the use of potable water. These components are subsequently hardened by the chemical reaction between the

setting agent and the binder.

4. Types of Mortars

4.1 Single and Multicomponent:

4.1.1 A single component mortar consists of a binder powder, a setting agent, and a chemically inert solid filler(s) to which potable water is added to make a trowelable mortar.

4.1.2 A multicomponent mortar consists of a binder liquid, a powder containing a setting agent, and a chemically inert solid filler(s) which are combined to form a trowelable mortar.

4.1.3 Some single and multicomponent mortars may permit the addition of a properly graded, high-purity silica sand in accordance with the manufacturer's recommendation.

5. Chemical Composition

5.1 The setting agent generally used is an acid compound that reacts with the silicate binders, or an alkaline compound that reacts with the silica sol binder, to form an insoluble silica gel. The filler materials shall be selected to have resistance to the particular chemicals to which they will be exposed. The service limitations of the filler shall be defined by the manufacturer.

6. Physical Requirements

6.1 Chemically setting silicate or silica chemical-resistant mortars prepared from these materials shall conform to the respective physical requirements prescribed in Table 1.

7. Performance Requirements

7.1 The liquid binder shall be of a viscosity that will permit it to be readily mixed manually with the filler. The filler shall have properly graded particles that will permit the preparation of a joint thickness of $\frac{1}{16}$ in. (1.6 mm).

8. Test Methods

8.1 The properties enumerated in this specification shall be determined in accordance with the following methods:

8.1.1 *Bond Strength*—Test Method C 321. Brick described in Specification C 279 shall be used in this test.

8.1.2 *Absorption*—Test Method C 413.

8.1.3 *Working Life and Setting Times*—Test Method C 414.

8.1.4 *Shrinkage*—Test Method C 531.

8.1.5 *Compressive Strength*—Test Methods C 579.

8.1.6 *Flexural Strength*—Test Method C 580.

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² *Annual Book of ASTM Standards*, Vol 04.05.



TABLE 1 Physical Requirements

Property	Type of Mortar		
	Sodium Silicate	Potassium Silicate	Silica
Bond strength, min, 7 days, psi (MPa)	80 (0.5)	150 (1.0)	80 (0.5)
Absorption, max, weight %	18.0	19.0	15.0
Working life, minimum, at 73°F (23°C), minutes	15	20	15
Shrinkage, max, 7 days at 73 ± 4°F (23 ± 2°C), %	1.0	3.0	—
Compressive strength, min, 7 days, psi (MPa)	1400 (9.6)	3000 (20.7)	3500 (24.1)
Flexural strength, min, 7 days, psi (MPa)	500 (3.4)	600 (4.1)	900 (6.2)

9. Rejection

9.1 The binder or filler, or both, may be rejected if they or the mortars made, therefrom, fail to meet any of the requirements of this specification.

10. Packaging and Package Marking

10.1 Single component mortars shall be packaged properly to prevent deterioration in storage.

10.2 For multicomponent mortars, the binder liquid shall be packaged in suitable containers and marked to denote the type

of silicate or silica solution. The powder shall be packaged properly to prevent deterioration in storage.

11. Keywords

11.1 masonry units; chemical-resistant; mortars; chemical resistant; mortars; potassium silicate; mortars; silica; mortars; sodium silicate

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