



Designation: ~~C928-05~~ Designation: C 928/C 928M – 08

Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs¹

This standard is issued under the fixed designation C 928/C 928M; 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 packaged, dry, cementitious mortar or concrete materials for rapid repairs to hardened hydraulic-cement concrete pavements and structures. Materials that contain organic compounds, such as bitumens, epoxy resins, and ~~polyesters, polymers,~~ as the principal binder are not included.

1.1.1 Packaged, dry, concrete material contains aggregate of which at least 5 % by mass of the total mixture is retained on a 9.5-mm (~~[$\frac{3}{8}$ -in.]~~-in.) sieve.

1.1.2 Packaged, dry, mortar material contains aggregate of which less than 5 % by mass of the total mixture is retained on a 9.5-mm (~~[$\frac{3}{8}$ -in.]~~-in.) sieve.

1.2 Aqueous solutions, aqueous emulsions or dispersions may be included as components of the packaged materials. The manufacturer may specify that these liquids are to replace some or all of the mixing water.

1.3 Aggregates must be included as a component of the packaged materials. The manufacturer may recommend job site addition of specific amounts and types of additional aggregates to his product for some uses. However, such reformulated products are not within the scope of this specification.

~~1.4 The values stated in SI units are to be regarded as standard. The inch-pound units given in parentheses are for information only. Values in SI units shall be obtained by measurement in SI units or by appropriate conversion of measurements made in other units, using the Rules for Conversion and Rounding given in IEEE/ASTM SI-10.~~

1.4 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.5 The following safety hazards caveat pertains to the test methods portion of this specification: *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

C39/C 39M Test Method for Compressive Strength of Cylindrical Concrete Specimens

C 78 Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)

C 109/C 109M Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)

~~C143 Test Method for Slump of Hydraulic-Cement Concrete~~ 143/C 143M Test Method for Slump of Hydraulic-Cement Concrete

C 157/C 157M Test Method for Length Change of Hardened Hydraulic-Cement, Mortar, and Concrete

C 192/C 192M Practice for Making and Curing Concrete Test Specimens in the Laboratory

C 403/C 403M Test Method for Time of Setting of Concrete Mixtures by Penetration ~~Resistance~~ Resistance

C494 494/C 494M Specification for Chemical Admixtures for Concrete

C666 666/C 666M Test Method for Resistance of Concrete to Rapid Freezing and Thawing

C 672/C 672M Test Method for Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals

C 702 Practice for Reducing Samples of Aggregate to Testing Size

C 882 Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear

¹ This specification is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.43 on Packaged, Dry, Packaged Dry Combined Concrete Materials.

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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.

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

C 1012 Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution

E96 Test Methods for Water Vapor Transmission of Materials

IEEE/ASTM SI-10 Standard for Use of the International System of Units (SI): The Modern Metric System 96/E 96M Test Methods for Water Vapor Transmission of Materials

3. Materials and Manufacture

3.1 Three types of packaged, dry, rapid-hardening concrete and three types of packaged, dry, rapid-hardening mortar are identified in Table 1.

TABLE 1 Performance Requirements^A

	3 hours	1 day	7 days	28 days
Compressive Strength, min, MPa (psi)				
Compressive Strength, min, MPa [psi]				
R1 concrete or mortar	3.5 (500)	14 (2000)	28 (4000)	^B
R1 concrete or mortar	3.5 [500]	14 [2000]	28 [4000]	^B
R2 concrete or mortar	7.0 (1000)	21 (3000)	28 (4000)	^B
R2 concrete or mortar	7.0 [1000]	21 [3000]	28 [4000]	^B
R3 concrete or mortar	21 (3000)	35 (5000)	35 (5000)	^B
R3 concrete or mortar	21 [3000]	35 [5000]	35 [5000]	^B
Bond strength, min, MPa (psi)				
Bond strength, min, MPa [psi]				
R1, R2 and R3 concrete or mortar	—	7 (1000)	10 (1500)	—
R1, R2 and R3 concrete or mortar	—	7 [1000]	10 [1500]	—
Length change, based on length at 3 h, max, %				
R1, R2, and R3 concrete or mortar			allowable increase after 28 days in water	+0.15
			allowable decrease after 28 days in air	-0.15
Consistency of concrete or mortar ^C			concrete slump, min, mm (in.)	Flow of mortar, min, %
Consistency of concrete or mortar ^C			concrete slump, min, mm [in.]	Flow of mortar, min, %
R1 consistency after 15 min after addition of mixing liquid			75 (3)	100
R1 consistency after 15 min after addition of mixing liquid			75 [3]	100
R2 and R3 consistency at 5 min after addition of mixing liquid			75 (3)	100
R2 and R3 consistency at 5 min after addition of mixing liquid			75 [3]	100
Scaling resistance to deicing chemicals after 25 cycles of freezing and thawing				
Concrete, max visual rating			2.5	
Mortar, max scaled material ^D			5 kg/m ² (1 lb/ft ²)	
Mortar, max scaled material ^D			5 kg/m ² [1 lb/ft ²]	

^A It is recognized that other characteristics of rapid-hardening concrete repair materials might need consideration. Such characteristics might be necessary in some environments and applications; however, to impose specification limits on all products is considered beyond the scope of this specification. Optional considerations with suggested methods of test may include tests for the following:

- Time of setting Test Method C 403/C 403M
- Flexural strength Test Method C 78
- Freeze thaw Test Method C 666/C 666M, Procedure A
- Sulfate expansion Test Method C 1012

^B The strength at 28 days shall be not less than the strength at 7 days.

^C Slump or flow requirements are waived for materials intended for vertical or overhead applications.

^D A 250-mm-([10-in.]) square spalled to an average depth of 3 mm-([1/8 in.]) for 100 % of its surface would have about 10 kg/m² ([2.0 lb/ft²]) of scaled material.