This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

Designation: C309 – 19

Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete[1]

This standard is issued under the fixed designation C309; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This specification covers liquid membrane-forming compounds suitable for application to concrete surfaces to reduce the loss of water during the early-hardening period. White-pigmented membrane-forming compounds serve the additional purpose of reducing the temperature rise in concrete exposed to radiation from the sun. The membrane-forming compounds covered by this specification are suitable for use as curing media for fresh concrete, and may also be used for further curing of concrete after removal of forms or after initial moist curing.

NOTE 1—This specification addresses only those properties listed in Sections 6 through 9. Membrane-forming compounds with special properties including better water retention, minimum solids content, resistance to ultraviolet radiation, acid and alkali resistance and non-interference with adhesives are described in Specification C1315.

NOTE 2—Solutions of silicate salts are chemically reactive in concrete rather than membrane-forming; therefore, they do not meet the intent of this specification.

1.2 This is a performance specification. The allowable composition of products covered by this specification is limited by various local, regional, and national regulations. Issues related to air quality (solvent emission), worker exposure, and other hazards are not addressed here. It is the responsibility of the producers and users of these materials to comply with pertinent regulations.

1.3 **Warning—**Some VOC exempt solvents used to meet the regulations are extremely flammable with low auto ignition temperatures and rapid evaporation rates. Consult the manufacturer's product information sheet for important application and safety information.

1.4 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes shall not be considered as requirements of the standard.

1.5 The values stated in SI units are to be regarded as the standard. The values given in parentheses are provided for informational purposes only.

1.6 The following precautionary caveat pertains only to the test methods portion, Section 11, 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C125 Terminology Relating to Concrete and Concrete Aggregates

C156 Test Method for Water Loss [from a Mortar Specimen] Through Liquid Membrane-Forming Curing Compounds for Concrete

C1315 Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete

D869 Test Method for Evaluating Degree of Settling of Paint

D883 Terminology Relating to Plastics

D1309 Test Method for Settling Properties of Traffic Paints During Storage

D2369 Test Method for Volatile Content of Coatings

E1347 Test Method for Color and Color-Difference Measurement by Tristimulus Colorimetry

3. Terminology

3.1 For definitions of terms used in this specification, refer to Terminology C125.

[1] This specification is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregatesand is the direct responsibility of Subcommittee C09.22 on Materials Applied to New Concrete Surfaces.

Current edition approved June 15, 2019. Published August 2019. Originally approved in 1953. Last previous edition approved in 2011 as C309–11. DOI: 10.1520/C0309-19.

[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**

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4. Classification

4.1 The following types of liquid membrane-forming compounds are included:

4.1.1 *Type 1*—Clear or translucent without dye,

4.1.2 *Type 1-D*—Clear or translucent with fugitive dye, and

4.1.3 *Type 2*—White pigmented.

4.2 The solids dissolved in the vehicle shall be one of the following classes:

4.2.1 *Class A*—No restrictions,

4.2.2 *Class B*—Must be a resin as defined in Terminology D883.

NOTE 3—Permanent colors other than white, or other special attributes, are beyond the scope of this specification and are subject to negotiation between the purchaser and the supplier.

5. Ordering Information

5.1 The purchaser shall include the following information in the purchase order when applicable:

5.1.1 Type of liquid membrane-forming compound and class of solids to be furnished, and

5.1.2 Rate of application to be used to determine conformance to this specification. If not specified, the liquid membrane-forming material shall be applied at a rate of 5.0 m^2/L (200 ft^2/gal) for testing purposes.

NOTE 4—The application rate used for testing may, or may not, be the same as the rate to be used for field application. Many agencies use the same rate for field application on relatively smooth surfaces as the rate used for testing, while requiring a substantially greater field application rate on deeply textured surfaces.

5.1.3 The intended method of application (for example, spraying, brushing, or by roller). If not specified, the material shall be of a sprayable consistency.

5.1.4 Maximum permissible volatile organic compound (VOC) content if required by applicable regulations.

6. General Requirements

6.1 Liquid membrane-forming compound Types 1 and 1-D shall be clear or translucent. Membrane-forming compounds with a fugitive dye (Type 1-D) shall be readily distinguishable upon the concrete surface for at least 4 h after application but shall become inconspicuous within 7 days after application if exposed to direct sunlight.

NOTE 5—No laboratory test for the fugitive characteristic of the color in dyed (Type 1-D) compounds is provided in this specification. The disappearance of these colors is strongly dependent on the nature of the exposure and the rate of application of the compounds.

6.2 Type 2 liquid membrane-forming compounds shall consist of finely-divided white pigment and vehicle, ready-mixed for immediate use as is. The membrane-forming compound shall present a uniform white appearance when applied uniformly to a new concrete surface at the specified rate of application.

6.3 Liquid membrane-forming compounds shall be of such a consistency that they can be readily applied by spraying, or by brushing or rolling, when specified, to a uniform coating at temperatures above 4 °C (40 °F).

NOTE 6—For uniform application in the field on vertical concrete surfaces, the specified rate of application may be achieved by two coats applied at an interval of approximately 1 h.

6.4 Liquid membrane-forming compounds shall adhere to freshly placed concrete that has stiffened or set sufficiently to resist marring during application, and to damp, hardened concrete, and shall form a continuous film when applied at the specified rate of application.

6.5 Liquid membrane-forming compounds shall not react deleteriously with concrete. Deleterious reactions are detected by scratching the surface of a mortar specimen (used for the water-retention test) with a knife or screwdriver, not less than 72 h after application, and comparing with the surface hardness similarly determined of a similar specimen that has been moist-cured for approximately half as long. Any softening of the liquid membrane-forming compound-treated surface indicated by such a comparison shall be considered sufficient cause for rejection of the compound.

NOTE 7—Testing for deleterious reactions need only be done for curing compounds of a new or unknown composition.

6.6 Liquid membrane-forming compounds shall be storable for at least 6 months without deterioration, except compounds of the water-emulsion type will not be expected to resist freezing. Type 2 liquid membrane-forming compounds shall not settle out excessively or cake in the container, and shall be capable of being mixed to a uniform consistency by moderate stirring or agitation. When tested for long-term settling, as stated in 11.4, the compound shall have a rating of not less than four.

iTeh Standards
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ASTM C309-19
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7. Water Loss Properties

7.1 Liquid membrane-forming compounds, when tested in accordance with 11.1, shall restrict the loss of water to not more than 0.55 kg/m^2 in 72 h.

8. Reflectance Properties

8.1 Type 2 liquid membrane-forming compounds, when tested in accordance with 11.2, shall exhibit a daylight reflectance of not less than 60 %.

9. Drying Time Requirement

9.1 Liquid membrane-forming compounds, when tested in accordance with 11.3, shall dry to touch in not more than 4 h.

10. Sampling

10.1 Samples shall be taken either at the plant or warehouse prior to delivery, or at the point of delivery, at the option of the purchaser. If sampling is done prior to shipment, the inspector representing the purchaser shall have free access to the materials being sampled and shall be afforded all reasonable facilities for inspection and sampling.

10.2 Shake or thoroughly stir liquid membrane-forming compounds before taking a sample. Take one sample for each lot, batch, or other unit of production in a shipment. If the liquid membrane-forming compound is in mixing tanks or vats, one third of the sample shall represent the material coming from the tank at the beginning of the filling operation, one third shall represent the material coming at the middle of the filling