

SSPC: The Society for Protective Coatings

COATING APPLICATION STANDARD NO. 19

Standard for Visual Evaluation of Pinholes in a Concrete or Masonry Coating

1. Scope

1.1 This standard contains a procedure for use when examining the final coat of a coating system applied to concrete or masonry surfaces to determine the number of visible pinholes. It also contains a pinhole frequency classification scheme that is used to determine the acceptability of the applied coating. Nonmandatory Note 9.1 describes additional assessment procedures that may be specified when it is necessary to determine whether pinholes extend to the substrate.

Aggregated-filled finishes, stippled finishes, finishes that are intentionally porous, craters and surface imperfections other than pinholes cannot be assessed by this method.

2. Units of Measure

This standard provides both IEEE/ASTM/SI 1⁽¹⁾, International Standards (SI) units and U.S. Customary units. The measurements are not exact equivalents; therefore, each system must be used independently of the other without combining in any way. This standard uses SI units with U.S. Customary substitution units shown in parentheses.

3. Definitions

Crater: A small, rounded depression in a coating film that does not expose the previous coat or the substrate.

Pinhole: (as used in this standard): A minute hole through a coat or coats that exposes an underlying coat or the substrate.⁽²⁾ *Discussion: Pinholes are often caused by latent solvent release during drying (and lack of flow-out of the coating), the trapping of air or gas in the coating film during drying, or the release of trapped air from voids in the concrete substrate.*

Evaluation Spot: An evaluation spot is ~1000 cm² (~1 ft²) in size. [For U.S. standard size concrete masonry unit (CMU) blocks, 1000 cm² is approximately equivalent to the face of one 8 x 18-in or 12 x 12-in masonry block.]

⁽¹⁾ ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, phone int+1-610-832-9500. For referenced ASTM standards, visit the ASTM website <<http://www.astm.org>>

⁽²⁾ NACE SP0188, Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates. NACE International, 15835 Park Ten Place Houston, Texas 77084, USA. Phone: +1-281-228-6200.

This standard, developed by the SSPC C.8.1, Commercial Cleaning and Coating Committee, was first issued in December 2019.

Evaluation Zone: An evaluation zone consists of an easily definable surface such as exterior north wall or the interior south wall on the first floor or other area description agreed to by the contracted parties.

Coating: A generic term for a paint, varnish, lacquer, or other material evenly applied to a surface in a uniform adherent layer to fulfill a protective, functional or decorative purpose.

4. Pinhole Frequency Classification

Pinholes shall be classified by their frequency of occurrence within the evaluation spot (see Section 3). Pinhole frequency shall be represented on a relative scale referred to as None, Low, Moderate, or High as follows:

None – 0 pinholes per evaluation spot

Low – 1 to 10 pinholes per evaluation spot

Moderate – 11 to 20 pinholes per evaluation spot

High – greater than 20 pinholes per evaluation spot

5. Procedure

5.1 Inspection shall be performed without magnification using normal or corrected normal vision, at approximately (~) 1 meter (~40 inches) from the coated surface. To reveal the presence of pinholes, shine a hand-held light across the surface at a low angle. The light shall provide at least 538 lux (~50 foot candles) of illumination at the surface and shall illuminate at least one-third of the evaluation spot at a time from a fixed position.

5.2 Unless otherwise specified in the procurement documents (project specification), coated surfaces shall be inspected as follows:

5.2.1 Select evaluation zones (defined in Section 3) for assessment. Ensure that the evaluation spots selected within each zone in 5.2.1.1 through 5.2.1.3 include all substrate types (e.g., smooth face block, split face block, poured concrete) and environmental conditions present within that zone during application (shade, sunlight exposure, etc.).

5.2.1.1 For evaluation zones not exceeding 30 m² (~300 ft²) select and inspect one (1) evaluation spot for each substrate type in each 10 m² (~100 ft²) area. For example, if both smooth face and split face block are present, select one (1) evaluation spot for each block type.

5.2.1.2 For evaluation zones greater than 30 m² (~300 ft²) and not exceeding 100 m² (~1,000 ft²) arbitrarily select and inspect one (1) evaluation spot for each substrate type in each of three 10 m² (~100 ft²) areas. For example, if both smooth face and split face block are present in the above quantity, the number of evaluation spots applies to each block type.

5.2.1.3 For evaluation zones greater than 100 m² (~1,000 ft²), inspect the first 100 m² (~1000 ft²) area as described in Section 5.2.1.2, then arbitrarily select and inspect three (3) evaluation spots for each substrate type in each 100 m² (~1,000 ft²) area thereafter. For example, if both smooth face and split face block are present in the above quantity, the number of evaluation spots applies to each block type.

5.3 PINHOLE FREQUENCY: Pinhole frequency shall be represented on a relative scale referred to as None, Low, Moderate or High as defined in Section 4.

Report overall pinhole frequency on a structure, based on the average results from each evaluation zone as specified. (Note 9.2 provides optional reporting formats).

6. Acceptability of Results

6.1 The pinhole frequency shall be classified as defined in Section 4. The acceptable level of pinhole frequency shall be as defined in the procurement documents. If the acceptable level of pinhole frequency is not specified, the default level shall be Moderate.

6.2 If the coating manufacturer's restrictions on the number of pinholes are more stringent than the above acceptance criteria category being specified, comply with the manufacturer's requirements, unless otherwise stated in the procurement documents (project specification).

7. Nonconforming Areas

7.1 If the number of pinholes exceeds the acceptance criteria in a single evaluation spot, the procedure described in Sections 7.1.1 and 7.1.2 shall be followed to assess the magnitude of the nonconforming area.

7.1.1 Inspect four additional evaluation spots at each of the following directions, 1 m (~3 ft) from the original nonconformance (0, 90, 180, and 270 degrees). If all additional evaluation spots are compliant, use chalk to circle a 1 m (~3 ft) radius area around the original nonconformance.

7.1.2 If more noncompliant areas are found using the procedure in Section 7.1.1, then continue evaluating spots as described in Section 7.1.1 until an area has been surrounded by all compliant evaluation spots or you have reached the end of an evaluation zone. Circle the area in chalk around all noncompliant evaluation spots to demarcate

the noncompliance as described in Section 7.1.1. See Figure 1 for an illustration of this procedure.

7.2 If repairs are made, reevaluate only the repaired areas as described in Sections 7.1.1 and 7.1.2 to confirm overall acceptance.

8. Disclaimer

8.1 This standard is a consensus document developed by SSPC: The Society for Protective Coatings. While every precaution is taken to ensure that all information furnished in SSPC standards is as accurate, complete, and useful as possible, SSPC cannot assume responsibility nor incur any obligation resulting from the use of any materials, coatings, or methods described herein, or of the standard itself.

8.2 This standard does not attempt to address problems concerning safety associated with its use. The user of this standard, as well as the user of all products or practices described herein, is responsible for instituting appropriate health and safety practices and for ensuring compliance with all governmental regulations.

9. Notes:

Notes are not requirements of this standard.

9.1 This standard is used to classify the frequency of pinholes on the surface of a coating when viewed without magnification. Depending on the service environment, pinholes that do not extend through the coating system to the substrate may not be detrimental to coating performance, but an assessment of their potential effect on long-term performance is beyond the scope of this standard. If a judgement regarding the long-term performance of coating systems containing pinholes is required, microscopic examination of selected pinholes may be undertaken to determine if the substrate is exposed.

9.1.1 The specifier should consider the conditions of the surfaces to be coated and the service environment prior to specifying acceptable results. While fewer visible pinholes may increase the service life of the coated substrate, the increased cost associated with achieving a low frequency of visible pinholes should be considered. The increase in cost to achieve a visually pinhole-free surface may be excessive. A protective coatings specialist, the coating contractor and the coating manufacturer may be consulted to make the appropriate choice for the project.

9.1.2 Additional information is available in the following ASTM standards:

- ASTM B926, Standard Method for Pinhole Determination in Aluminum and Aluminum Alloy Plain Foil