

CRD-C 401-75

METHOD OF TEST FOR THE STAINING
PROPERTIES OF WATER

Scope

1. This method of test outlines three procedures for evaluating the staining properties of water proposed for use in curing concrete. The Preliminary Method is intended for use in selecting sources that are worthy of more complete investigation. The Complete Method should be used to evaluate those sources that the Preliminary Method indicates to be promising. The Field Method should be used as a means of evaluating the source or sources finally selected for use.

Preliminary Method

Preparation of Test Specimen

2. At least 24 h before starting the actual procedure, a neat cement or plaster-of-Paris specimen, approximately 4 in. (50 mm) square and 1/2 to 3/4 in. (12-18 mm) thick, shall be prepared. A white cement or plaster-of-Paris paste mixed to approximately normal consistency shall be compacted in a suitable mold and a deep concave surface formed in the top face by pressing a watch glass 4 in. (50 mm) in diameter into the specimen immediately after molding. The watch glass shall be removed and the specimen cured in the moist room for at least 24 h. Upon removal from the mold the specimen shall be stored in the moist room until needed.

Procedure

3. The sample of water shall be vigorously shaken, and 3000 ml shall be measured out before settling occurs (Note).

Note.- It is important that the 3000-ml portion should include a representative amount of any sediment or precipitate in the original sample.

With continuous stirring to insure transfer of all sediment, the depression in the specimen shall be filled with a portion of the 3000-ml sample of water. The specimen shall be placed in an atmosphere favorable to

evaporation (on a hot plate at low heat, or in a stream of warm air). As the water is evaporated from the specimen (Note), more of the sample shall be added until the total 3000 ml has been transferred to the specimen and evaporated to dryness. Any iron or organic impurities possessing staining properties will be left on the specimen, producing a greater or lesser degree of stain. The specimen shall be visually examined and classified as showing: no stain, slight stain, moderate stain, or severe stain.

Note.- When staining due to iron compounds is going to occur to such an extent that moderate or severe stain is developed, the specimen will begin to show slight stain when only about 300 ml of water have been evaporated. A tentative evaluation may therefore be made at this point in the testing procedure if circumstances make such action desirable.

Complete Method

Apparatus

4. The apparatus shall consist of the following:

(a) Rack.- The rack shall support a water dispenser for each of the mortar test specimens. Provisions shall be made for supporting four 250-watt reflector-type industrial heat lamps approximately 15 in. (480 mm) from the surface of each mortar test specimen in a position such that the heat will be evenly distributed over the surface.

(b) Water Dispenser.- The water dispenser shall consist of a glass or plastic carboy of at least 3-gal (11 dm³) capacity fitted with a two-hole rubber stopper and glass tubing. One length of tubing shall serve as an air vent and shall be of a length sufficient to nearly reach the top of the inverted container. A short length of rubber tubing may be placed on the end of the glass tubing to extend the air vent above the surface of the water. A short length of glass tubing shall be inserted through the remaining hole in the stopper and shall be fitted with a length of rubber tubing to which a screw clamp is attached. The rubber tubing shall be positioned

(Issued 1 Jun. 1975)

2 TEST FOR THE STAINING PROPERTIES OF WATER (C 401-75)

so that water drips on the mortar test specimen.

(c) Fan.- A small electric fan may be placed at the base of the rack to provide circulation of air over the surface of the test specimen.

Sample

5. The sample shall consist of 3 gal (11 dm³) of water representative of the source under investigation.

Fabrication of Mortar Test Specimen

6. The mortar shall be proportioned and mixed¹ and the specimens cast as described in CRD-C 302, except that the edge of the specimens shall not be sealed, and the molds shall be underfilled so that the top surface of the finished specimen will be approximately 3/8 in. (10 mm) below the sides of the mold. The specimens shall be cured in laboratory air for 3 days prior to test. At least one specimen more than the number required for the staining tests to be performed shall be made and used as a comparative standard.

Procedure

7. A 3-gal (11 dm³) sample of the water that is representative of the source under investigation shall be placed in the carboy. The mortar test specimens shall be covered to a depth of approximately 1/8 in. (3 mm) with the water under test. The specimen shall be positioned under the heat lamps and the rate of flow adjusted to equal the rate of evaporation. The flow of water shall be interrupted and the specimen evapo-

rated to dryness once each day. This procedure shall be repeated until the entire 3-gal (11 dm³) sample has been evaporated.

Interpretation of Test Results

8. This method of test is designed to develop the staining potential of curing waters. The conditions of test are more severe than will generally be encountered in the field. Samples of water that do not produce a stain when tested by this method will not produce a stain under normal field use. Samples that produce a significant stain when tested by this method may or may not be suitable for use. If economic or other considerations indicate the need for more complete investigation, field tests should be conducted.

Field Method

Test Panel

9. A concrete test panel containing approximately 20 sq ft (1.9 m²) of area in its top surface, and of any convenient thickness, shall be cast in a location that receives maximum exposure to the sun. The panel shall be placed on a slight angle to facilitate runoff of the curing water.

Procedure

10. The test panel shall be cured for a period of not less than 28 days using the curing water proposed for use on the project. The flow of water over the test panel shall be sufficient to keep it in a wet condition, but runoff shall be kept to the minimum. The panel shall be inspected frequently during the test for evidence of staining.

¹Hand-mixing or a suitable mechanical mixer may be substituted for the mixer specified in CRD-C 302.