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Standard Test Method for Electrical Resistivity of Membrane-Pavement Systems¹

This standard is issued under the fixed designation D3633; 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 test method covers the measurement of the electrical resistivity of water-barrier membrane-pavement systems when applied to concrete bridge decks.

1.2 Measurements shall be performed on the bituminous pavement surface covering the water-barrier membrane.

1.3 This test method utilizes a measure of electrical resistance between the saturated top surface of the water-barrier membrane and the reinforcing steel embedded in the concrete bridge deck.

1.4 The values measured represent the electrical resistance obtained with the equipment and procedures stated herein and do not necessarily agree or correlate with those using other equipment or procedures.

~~1.5 The values stated in SI units are to be regarded as the standard.~~

1.5 Units—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 nonconformance with the standard.

1.6 *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

C670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials

D3743 Terminology Relating to Bridge Deck and Substructure Protection

D4071 Practice for Use of Portland Cement Concrete Bridge Deck Water Barrier Membrane Systems

E105 Practice for Probability Sampling of Materials

3. Terminology

3.1 For definitions of terms used in this specification, refer to Terminology D3743.

4. Significance and Use

4.1 This test method for measuring the electrical resistivity of water-barrier membrane-pavement systems may be interpreted to indicate the effectiveness of such systems.

4.2 This test method is predicated on the fact that an electrical connection between the surface of the pavement and the reinforcing steel in the concrete pavement cannot be made through an impermeable water-barrier membrane.

4.3 This test method may be used for acceptance when the accepting agency specifies the minimum resistance value desired.

5. Apparatus

5.1 *Ohmmeter*, dc, 20 000 Ω/V rating connected to a double-pole, double-throw switch box or ac ohmmeter (switch box not required).

NOTE 1—When this test method is used for acceptance, the accepting agency should specify the type of ohmmeter to be used.

5.2 *Insulated Wire*, No. 18, Belden test probewire or equivalent. Two spools, minimum 38 m (125 ft). 125 ft.

¹ This test method is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.32 on Bridges and Structures.

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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.

5.3 *Copper Plate*, 305 by 305 by 3.0 mm (12 by 12 by 1/8 in.), with the means for connecting the ohmmeter lead and a wooden handle approximately 1 m (39 in.) in length.

5.4 *Polyurethane Sponge*, 305 by 305 by 13 mm (12 by 12 by 1/2 in.), to be attached to the copper plate with rubber bands or other suitable means. When assembled this apparatus is called the probe.

5.5 *Pressure Spray Can*, 12-L (3-gal) capacity, with a hose and spray nozzle.

6. Reagent

6.1 A wetting agent which, when added to the water, will break the surface tension and promote the penetration of the water through the bituminous pavement.

NOTE 2—An example of a wetting agent is a super-saturated solution of cupric sulfate crystals in warm water to which is added 19 mL/gal of D -diocetyl S -sodium- S -sulfo-succinate (Tradename “Aerosol” OT Clear, 10 %). When ambient test site temperature is below 50°F (10°C), add 15 % by volume of either isopropyl or denatured alcohol to prevent clouding of the wetting agent. Clouding of the wetting agent may inhibit penetration.

7. Sampling

7.1 Determine locations on the bridge deck to be tested by using either a grid pattern similar to that illustrated in Fig. 1 or by a random location system, based upon Practice E105 or a similar method, that will ensure that the bridge deck area to be tested will be adequately represented.

8. Procedure

8.1 Prepare the surface to be tested by removing all foreign material by sweeping or scraping, or both. Do not use water to clean. The surface must be dry and clean before testing.

8.1.1 Locate the reinforcing steel with a pachometer. Drill with a rotary impact hammer at selected locations to expose the reinforcing steel to allow attachment of ohmmeter leads. Alternately, drill until the drill bit contacts the steel firmly to allow ohmmeter lead attachment.

8.2 Uncoil an ample length of wire to reach all areas to be tested, attach the minus (-) jack of the ohmmeter to the reinforcing steel and the plus (+) jack to the 305 by 305 by 3.0-mm (12 by 12 by 1/8-in.) copper plate of the probe. Then saturate the sponge with water containing the wetting agent.

NOTE 3—A direct connection from the ohmmeter to the top layer of reinforcing steel in the deck is desirable. However, if it is not practical to do this, the bridge railing, expansion joints, light standards, drainage scuppers, or other exposed steel, which is known to have contact with the top mat of reinforcing steel, may be used to provide this connection.

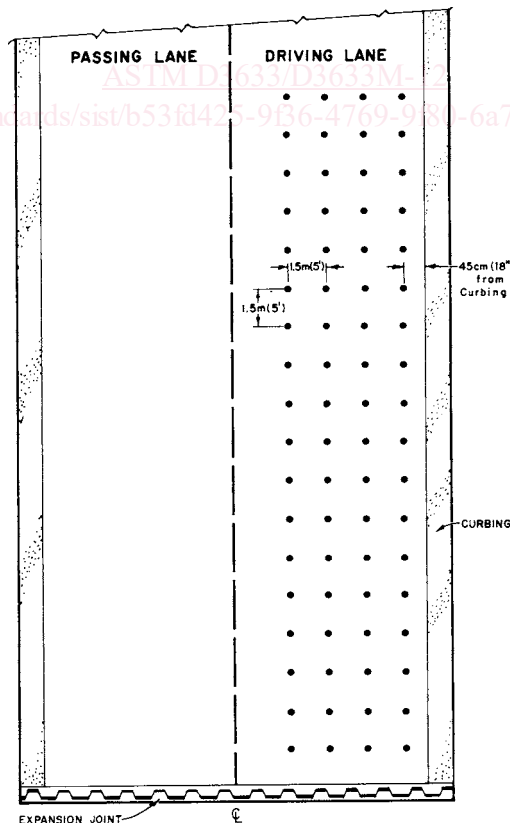


FIG. 1 Layout for Test Grid