



Designation: D 1829 – 90 (Reapproved 1999)

Standard Test Method for Electrical Resistance of Ceramic Materials at Elevated Temperatures¹

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1. Scope

1.1 This test method covers two procedures for the determination of insulation resistance and volume resistivity of ceramic insulating materials at elevated temperatures between 100 and 500°C.

1.1.1 Procedure A is suitable for obtaining a curve of the resistance versus temperature characteristics of a single specimen over a wide temperature range.

1.1.2 Procedure B is more suitable for rapid testing of large numbers of specimens at a fixed temperature.

1.2 These properties shall be determined in accordance with Test Methods D 257, except that the special procedures described in this method shall be used.

1.3 The values stated in inch-pound units are to be regarded as standard.

1.4 *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. Specific hazard statements are found in Section 7.*

2. Referenced Documents

2.1 ASTM Standards:

D 257 Test Methods for D-C Resistance or Conductance of Insulating Materials²

D 1711 Terminology Relating to Electrical Insulation²

3. Terminology

3.1 *Definitions*—The definitions used in this test method are in accordance with Terminology D 1711.

4. Significance and Use

4.1 The significance and use of insulation resistance and volume resistivity measurements in general are discussed in Test Methods D 257. The influence of temperature is discussed in Appendix X1 of Test Methods D 257.

4.2 Insulation resistance and volume resistivity data can

indicate contamination of a part or material, as well as provide design data for high-temperature insulating devices.

5. Apparatus

5.1 *Resistance-Measurement Device*—The resistance between electrodes shall be measured with a suitable device having the required sensitivity and accuracy (see Test Methods D 257).

5.2 *Heating Chamber*—For heating the specimen, a suitable electric furnace shall be used. The construction of the furnace shall be such that the specimen is subjected to a uniform heat application with a minimum of temperature fluctuation. An adequate muffle should be provided to shield the specimen from direct radiation by the heating elements. This may be made of a ceramic such as aluminum oxide or equivalent. A grounded metallic shield shall also be provided within the furnace, preferably of silver, stainless steel, or equivalent, to isolate electrically the specimen test circuit from the heating elements.

5.3 Specimen Holder:

5.3.1 The specimen shall be mounted under sufficient pressure to make good contact between two electrode backing plates within the heating chamber. These backing plates and their respective leads should be made of silver or an equivalent metal of high thermal conductivity and thermal stability. Sufficient thickness, such as 3/4 in. (20 mm), shall be used to prevent warping and to provide heat equalization between the specimen and the electrode backing plates. The contact faces should be smaller than the test specimen electrodes, and one electrode backing plate shall be movable to allow insertion and removal of the specimen.

5.3.2 Bring the high voltage lead through a hole in the oven wall using a bushing or an insulated wire. The electrical insulation of the wire or bushing must have a high insulation resistance at the test temperature. Up to about 250°C, polytetrafluoroethylene or high alumina content ceramics are found suitable. At higher temperatures, it may be necessary to use a rigid lead passed through a hole in the oven wall and mounted on insulated supports outside the oven so that the lead does not contact the oven wall or any support within the oven. Even at very high temperatures air provides adequate insulation resistance.

5.3.3 Bring the low voltage electrode out of the oven using the techniques described in 5.3.2. Guard the low voltage lead

¹ This test method is under the jurisdiction of ASTM Committee C-21 on Ceramic Whitewares and Related Products and is the direct responsibility of Subcommittee C21.03 on Test Methods for Whiteware Properties.

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² *Annual Book of ASTM Standards*, Vol 10.01.