



Standard Test Method for Determining the Ionic Resistivity (ER) of Alkaline Battery Separator Using a Carbon Electrode in an Electrolyte Bath Measuring System¹

This standard is issued under the fixed designation D7148; 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 pretreatment, test conditions, apparatus, and procedure to determine the ionic resistivity, commonly referred to in the battery industry as electrical resistance (ER) of an alkaline battery separator immersed in an electrolyte of 40 % potassium hydroxide (KOH).

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

1.3 *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.*

1.4 *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

D1711 Terminology Relating to Electrical Insulation

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

E2935 Practice for Conducting Equivalence Testing in Laboratory Applications

2.2 Battery Council International:

Standard Test Method for Determining the Electrical Resistance of a Battery Separator Using a Palico Measuring

System, Section 3.3b³

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *barrier resistance (RB)*, n —the resistance of the bath with a solid, nonporous sheet of alkaline resistant, electrical insulation that separates the electrodes.

3.1.2 *bath resistance (RC)*, n —the resistance of the bath without the specimen (separator).

3.1.3 *bath resistance (RT)*, n —the total electrical resistance of the bath and a separator specimen.

3.1.4 *battery separator*, n —an ion-permeable, nonconductive material that prevents electrical contact between electrodes of opposite polarity.

3.1.5 *electrolyte*, n —a 40 % potassium hydroxide solution.

3.1.6 *ionic resistivity (ER)*, n —the product of a change in electrical resistance times an area.

3.1.6.1 *Discussion*—The area is the aperture area divided by the number of separators between the electrodes. The change in resistance is the difference, in ohms, of the electrical resistance with and without the separator(s). The SI units for ER are ohms-metre² but the customary practice in the battery industry is to report the ER in units of ohms-cm². This terminology is not in conflict with Terminology D1711.

3.2 Symbols:

3.2.1 ER—a symbol, peculiar to the battery industry, denoting that characteristic of a sheet material that is related to the rate of transfer of ions through the interstices of a porous sheet immersed between two carbon electrodes in an aqueous electrolyte.

4. Summary of Test Method

4.1 This test method detects small changes in ohmic resistance between carbon electrodes immersed in an alkaline electrolyte with and without separator material between the carbon electrodes. This change is related to the rate of transfer

¹ This test method is under the jurisdiction of ASTM Committee D09 on Electrical and Electronic Insulating Materials and is the direct responsibility of Subcommittee D09.01 on Electrical Insulating Products.

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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.

³ Available from Battery Council International, 330 N. Wabash Ave., Ste. 2000, Chicago, IL 60611.