



SURFACE VEHICLE RECOMMENDED PRACTICE

J2983™

OCT2019

Issued 2012-12
Revised 2019-10

Superseding J2983 DEC2012

(R) Recommended Practice for Determining Material Properties
of Li-Battery Separator

RATIONALE

As the market for Li-battery continues to grow, due to the evolution of motive and stationary power applications, new separator concepts are being proposed for incorporation into the batteries, including solutions using a composite of different materials. Solutions include ceramic or high temperature polymer coatings for traditional separators, as well as other solutions incorporating high temperature fibers, high temperature polymers, or ceramic materials. The need for thermal stability is becoming important as the thickness of separators is reduced and the energy density of electrode materials increases. There are a variety of properties that should be measured and a variety of methodologies to perform testing. This Recommended Practice (RP) provides a set of test methods for the characterization of the Li-battery separator's properties, which, if used consistently across different materials, will facilitate the comparison of the properties of Li-battery separator.

INTRODUCTION

It is important for the Li-ion battery separator user to evaluate and define the specific design characteristics needed for the fabrication of a battery separator. The separator must be physically durable and electrically isolate the anode from the cathode, and porous enough to allow the transfer of ions between anode and cathode. This RP describes the test methods required for the separator user to evaluate the material characteristics to be used for a good separator design.

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1. SCOPE

This SAE RP provides a set of test methods and practices for the characterization of the properties of Li-battery separator.

The test methods in this RP have been grouped into one of three categories:

1. Separator material parameters: Minimum set of separator properties to be measured.
2. Chemistry/customer-specific parameters: Properties that are dependent on the application, customer needs and/or requirements, manufacturing process, etc. This RP will include the current best practice methodologies for these tests, with an understanding that the best practice methodologies are evolving as more information is learned.
3. R&D parameters: Properties that are dependent on the application, customer needs and/or requirements, manufacturing process, etc. The methodologies in this third section are under development and have not yet achieved broad application.

It is not within the scope of this document to establish criteria for the test results, as this is usually established between the materials supplier and separator manufacturer and the user. This is especially true where this document specifies a range of target values, or an open testing parameter. In these cases, the sample supplier and recipient must agree to specific numbers for the test parameters.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J1715 Hybrid Electric Vehicle (HEV) and Electric Vehicle (EV) Terminology

SAE J1715/2 Battery Terminology

2.1.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM D149-09 Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Material at Commercial Power Frequencies

ASTM D618-00 Standard Practice for Conditioning Plastics for Testing

ASTM D726-94 Standard Test Method for Resistance of Nonporous Paper to Passage of Air

ASTM D882-09 Standard Test Method for Tensile Properties of Thin Plastic Sheeting

ASTM D1204-08 Standard Test Method for Linear Dimensional Changes on Nonrigid Thermoplastic sheeting or Film at Elevated Temperature

ASTM D7334-08 Standard Test Method for Surface Wettability of Coatings, Substrates and Pigments by Advancing Contact Angle Measurement

ASTM D2103-15 Standard Specifications for Polyethylene Film and Sheeting