



Standard Test Methods for Wet Insulation Integrity Testing of Photovoltaic Modules¹

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1. Scope

1.1 These test methods provide procedures to determine the insulation resistance of a photovoltaic (PV) module, i.e. the electrical resistance between the module's internal electrical components and its exposed, electrically conductive, non-current carrying parts and surfaces.

1.2 The insulation integrity procedures are a combination of wet insulation resistance and wet dielectric voltage withstand test procedures.

1.3 These procedures are similar to and reference the insulation integrity test procedures described in Test Methods E1462, with the difference being that the photovoltaic module under test is immersed in a wetting solution during the procedures.

1.4 These test methods do not establish pass or fail levels. The determination of acceptable or unacceptable results is beyond the scope of these test methods.

1.5 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use. For specific precautionary statements, see Section 6.*

1.7 *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.*

¹ These test methods are under the jurisdiction of ASTM Committee E44 on Solar, Geothermal and Other Alternative Energy Sources and are the direct responsibility of Subcommittee E44.09 on Photovoltaic Electric Power Conversion. Current edition approved Aug. 1, 2023. Published August 2023. Originally approved in 1996. Last previous edition approved in 2018 as E1802 – 12 (2018). DOI: 10.1520/E1802-12R23.

2. Referenced Documents

2.1 ASTM Standards:²

E772 Terminology of Solar Energy Conversion

E1462 Test Methods for Insulation Integrity and Ground Path Continuity of Photovoltaic Modules

3. Terminology

3.1 *Definitions*—Definitions of terms used in this test method may be found in Terminology E772.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *insulation resistance*—the electrical resistance of a photovoltaic module's insulation, measured between the photovoltaic circuit and exposed, electrically conductive non-current-carrying parts and surfaces of the module.

4. Significance and Use

4.1 The design of a photovoltaic module or system intended to provide safe conversion of the sun's radiant energy into useful electricity must take into consideration the possibility of hazard should the user come into contact with the electrical potential of the module or system. In addition, the insulation system provides a barrier to electrochemical corrosion, and insulation flaws can result in increased corrosion and reliability problems. These test methods describe procedures for verifying that the design and construction of the module provides adequate electrical isolation through normal installation and use. At no location on the module should the PV-generated electrical potential be accessible, with the obvious exception of the output leads. This isolation is necessary to provide for safe and reliable installation, use, and service of the photovoltaic system.

4.2 This test method describes a procedure for determining the ability of the module to provide protection from electrical hazards. Its primary use is to find insulation flaws that could be dangerous to persons who may come into contact with the

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.