



Standard Test Method for Determination of the Spectral Mismatch Parameter Between a Photovoltaic Device and a Photovoltaic Reference Cell¹

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1. Scope

1.1 This test method provides a procedure for the determination of a spectral mismatch parameter used in performance testing of photovoltaic devices.

1.2 The spectral mismatch parameter is a measure of the error introduced in the testing of a photovoltaic device that is caused by the photovoltaic device under test and the photovoltaic reference cell having non-identical quantum efficiencies, as well as mismatch between the test light source and the reference spectral irradiance distribution to which the photovoltaic reference cell was calibrated.

1.2.1 Examples of reference spectral irradiance distributions are Tables E490 or G173.

1.3 The spectral mismatch parameter can be used to correct photovoltaic performance data for spectral mismatch error.

1.4 Temperature-dependent quantum efficiencies are used to quantify the effects of temperature differences between test conditions and reporting conditions.

1.5 This test method is intended for use with linear photovoltaic devices in which short-circuit is directly proportional to incident irradiance.

1.6 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.7 *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 This test method is under the jurisdiction of ASTM Committee E44 on Solar, Geothermal and Other Alternative Energy Sources and is the direct responsibility of Subcommittee E44.09 on Photovoltaic Electric Power Conversion.

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2. Referenced Documents

2.1 *ASTM Standards*:²

E490 Standard Solar Constant and Zero Air Mass Solar Spectral Irradiance Tables

E772 Terminology of Solar Energy Conversion

E948 Test Method for Electrical Performance of Photovoltaic Cells Using Reference Cells Under Simulated Sunlight

E1021 Test Method for Spectral Responsivity Measurements of Photovoltaic Devices

E1036 Test Methods for Electrical Performance of Nonconcentrator Terrestrial Photovoltaic Modules and Arrays Using Reference Cells

E1125 Test Method for Calibration of Primary Non-Concentrator Terrestrial Photovoltaic Reference Cells Using a Tabular Spectrum

E1362 Test Methods for Calibration of Non-Concentrator Photovoltaic Non-Primary Reference Cells

G138 Test Method for Calibration of a Spectroradiometer Using a Standard Source of Irradiance

G173 Tables for Reference Solar Spectral Irradiances: Direct Normal and Hemispherical on 37° Tilted Surface

SI10 Standard for Use of the International System of Units (SI): The Modern Metric System

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 *test light source, n*—a source of illumination whose spectral irradiance will be used for the spectral mismatch calculation. The light source may be natural sunlight or a solar simulator.

3.3 *Symbols*: The following symbols and units are used in this test method:

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.