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Standard Terminology Relating to Photovoltaic Solar Energy Conversion[1]

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1. Scope

1.1 This terminology pertains to photovoltaic (radiant-to-electrical energy conversion) device performance measurements and is not a comprehensive list of terminology for photovoltaics in general.

1.2 Additional terms used in this terminology and of interest to solar energy may be found in Terminology E 772.

2. Referenced Documents

2.1 *ASTM Standards:*

E 490 Solar Constant and Air Mass Zero Solar Spectral Irradiance Tables[2]

E 772 Terminology Relating to Solar Energy Conversion[3]

E 891 Tables for Terrestrial Direct Normal Solar Spectral Irradiance for Air Mass 1.5[3]

E 892 Tables for Terrestrial Solar Spectral Irradiance at Air Mass 1.5 for a 37° Tilted Surface[3]

3. Terminology

3.1 *Definitions:*

absolute spectral response, *n*—R_a (λ), AW^{-1}, *n*—*of a photovoltaic device*, the short-circuit current density per unit irradiance at a given wavelength.

DISCUSSION—Spectral response is normally reported over the wavelength range to which a device responds.

cell temperature, *n*—the temperature of the semiconductor junction of a photovoltaic cell.

efficiency, *n*—of a photovoltaic device, the ratio of the power produced by a photovoltaic device operated at its maximum power point to the incident radiant power.

fill factor, *n*—of a photovoltaic device, the ratio of maximum power to the product of open-circuit voltage and short-circuit current.

global horizontal solar irradiance, *n*—See **global solar irradiance** in Terminology E 772.

global normal solar irradiance, *n*— solar irradiance from a 2π steradian field-of-view incident upon a surface that is perpendicular to the axis of the solid angle defined by the disk of the sun.

irradiance, E, Wm^{-2}, *n*—See **solar irradiance at a point of surface** in Terminology E 772.

maximum power, *n*— *of a photovoltaic device*, the electrical output when operated at a point where the product of current and voltage is maximum.

open-circuit voltage, *n*— *of a photovoltaic device*, the voltage potential across the positive and the negative terminals under irradiation when zero current flows into or out of these terminals.

photovoltaic cell, *n*—the basic device that generates electricity by the photovoltaic effect when exposed to radiant energy such as sunlight.

photovoltaic cell area, *n*—the total frontal area of the cell including the area covered by the grids and contacts.

photovoltaic device, *n*—any photovoltaic cell or collection of cells (module, panel, or array) under consideration.

photovoltaic module, *n*—a single package containing two or more electrically interconnected photovoltaic cells.

photovoltaic module area, *n*—the rectangular area that touches the extreme outside edges of the module.

photovoltaic reference cell, *n*—a photovoltaic cell whose short-circuit current is calibrated against the total irradiance of a reference spectral irradiance distribution. See also **reference cell calibration constant.**

primary photovoltaic reference cell, *n*—a photovoltaic reference cell calibrated in sunlight.

rated power, *n*— See **reported power.**

reference cell calibration constant, *n*—a number that expresses the calibration of a photovoltaic reference cell in terms of short-circuit current per unit incident irradiance at a given temperature.

DISCUSSION—For a calibrated reference cell, the calibration constant equals the short-circuit current of the photovoltaic reference cell when irradiated by a reference spectral irradiance distribution (such as Standard E 490 or Tables E 891 or E 892) divided by the total irradiance of that reference spectral irradiance distribution.

reported power, *n*— *of a photovoltaic device*, the output power at a selected test voltage.

relative spectral response, R_r(λ), *n*— *of a photovoltaic device*, the absolute spectral response of a photovoltaic device where the irradiance is measured in relative units.

[1] This terminology is under the jurisdiction of ASTM Committee E-44 on Solar, Geothermal, and Other Alternative Energy Sourcesand is the direct responsibility of Subcommittee E44.09 on Photovoltaic Electric Power Conversion.

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[2] *Annual Book of ASTM Standards*, Vol 15.03.

[3] *Annual Book of ASTM Standards*, Vol 12.02.