



Standard Test Method for Indoor Transfer of Calibration from Reference to Field Pyranometers¹

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INTRODUCTION

Accurate and precise measurements of total solar and solar ultraviolet irradiance are required in: (1) the determination of the energy incident on surfaces and specimens during exposure outdoors to various climatic factors that characterize a test site, (2) the determination of solar irradiance and radiant exposure to ascertain the energy available to solar collection devices such as flat-plate collectors, and (3) the assessment of the irradiance and radiant exposure in various wavelength bands for meteorological, climatic and earth energy-budget purposes. The solar components of principal interest include total solar radiant exposure (all wavelengths) and various ultraviolet components of natural sunlight that may be of interest, including both total and narrow-band ultraviolet radiant exposure.

This test method for indoor transfer of calibration from reference to field instruments is only applicable to pyranometers and radiometers whose field angles closely approach 180° ... instruments which therefore may be said to measure hemispherical radiation, or all radiation incident on a flat surface. Hemispherical radiation includes both the direct and sky (diffuse) geometrical components of sunlight, while global solar irradiance refers only to hemispherical irradiance on a horizontal surface such that the field of view includes the entire hemispherical sky dome.

For the purposes of this test method, the terms pyranometer and radiometer are used interchangeably.

1. Scope

1.1 The method described in this standard applies to the indoor transfer of calibration from reference to field radiometers to be used for measuring and monitoring outdoor radiant exposure levels.

1.2 This test method is applicable to field radiometers regardless of the radiation receptor employed, but is limited to radiometers having approximately 180° (2π Steradian), field angles.

1.3 The calibration covered by this test method employs the use of artificial light sources (lamps).

1.4 Calibrations of field radiometers are performed with sensors horizontal (at 0° tilt from the horizontal to the earth). The essential requirement is that the reference radiometer shall have been calibrated at horizontal tilt as employed in the transfer of calibration.

1.5 The primary reference instrument shall not be used as a field instrument and its exposure to sunlight shall be limited to outdoor calibration or intercomparisons.

NOTE 1—At a laboratory where calibrations are performed regularly it is advisable to maintain a group of two or three reference radiometers that are included in every calibration. These serve as controls to detect any instability or irregularity in the standard reference instrument.

1.6 Reference standard instruments shall be stored in a manner as to not degrade their calibration.

1.7 The method of calibration specified for total solar pyranometers shall be traceable to the World Radiometric Reference (WRR) through the calibration methods of the reference standard instruments (Method **G167** and Test Method **E816**), and the method of calibration specified for narrow- and broad-band ultraviolet radiometers shall be traceable to the National Institute of Standards and Technology (NIST), or other internationally recognized national standards laboratories (Standard **G138**).

1.8 *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 **G03** on Weathering and Durability and is the direct responsibility of Subcommittee **G03.09** on Radiometry.

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