

ASTM G213-17

Pyranometer and pyr heliometer measurement uncertainty standard

The *G213 Guide for evaluating uncertainty in calibration and field measurements with pyranometers and pyr heliometers* was released by ASTM in June 2017. The standard gives directions on how to estimate uncertainties using GUM. In conformity declarations, providers can now refer to this standard. The standard has been prepared by a team of international experts, led by Aron HABTE of NREL. Hukseflux' Jørgen KONINGS has contributed to the Guide's text and underlying mathematics.

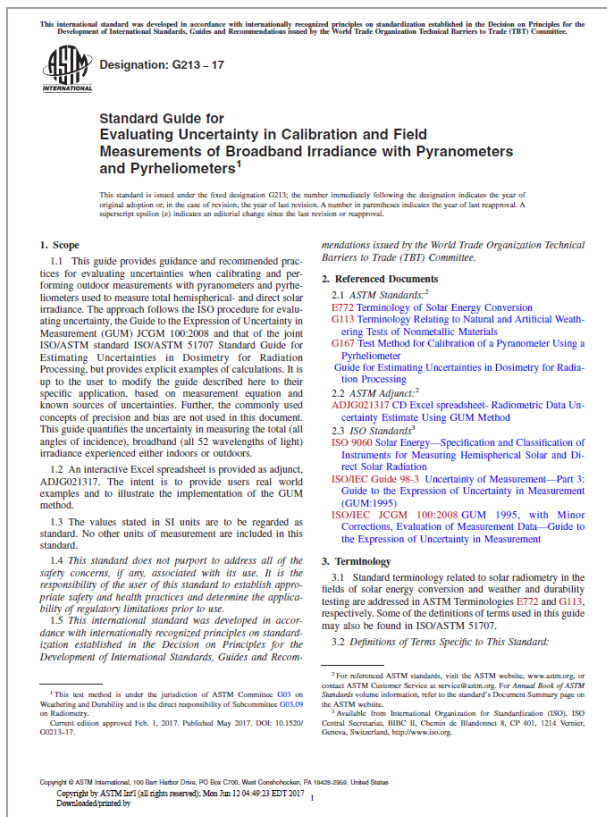


Figure 1 Cover of the ASTM G213-17 standard, published in June 2017.



Figure 2 Two SR30 Class A pyranometers measuring GHI (Global Horizontal Irradiance) and POA (Plane of Array) in a PV performance monitoring system.

Introduction

ASTM International has released the G213-17 "Standard Guide for Evaluating Uncertainty in Calibration and Field Measurements of Broadband Irradiance with Pyranometers and Pyr heliometers". It provides guidance and recommended practices for evaluating uncertainties when calibrating and performing outdoor measurements with pyranometers and pyr heliometers. In conformity declarations, providers can now refer to this standard. The ASTM standard follows the ISO procedure for evaluating uncertainty; the **Guide to the Expression of Uncertainty in Measurement (GUM) JCGM 100:2008**.

The ASTM guide provides explicit examples of calculations. The uncertainties may be estimated in daily totals, but also as a function of the time of day. It is up to the user to modify the guide described here to his specific application, based on measurement equations and known sources of uncertainties. Figure 3, on the next page, shows a selection of different error sources affecting measurement uncertainty evaluation of Global Horizontal Irradiance (GHI) as an example.

Free of charge spreadsheet

An interactive Excel spreadsheet is provided as adjunct ADJG021317. The intent is to provide users real world examples and to illustrate the implementation of the GUM method.

Interested in uncertainty analysis of your measurement? An Excel spreadsheet can be obtained free of charge at Hukseflux: **request a copy of the Excel sheet**.

The G213-17 standard itself can be purchased from **ASTM International**.

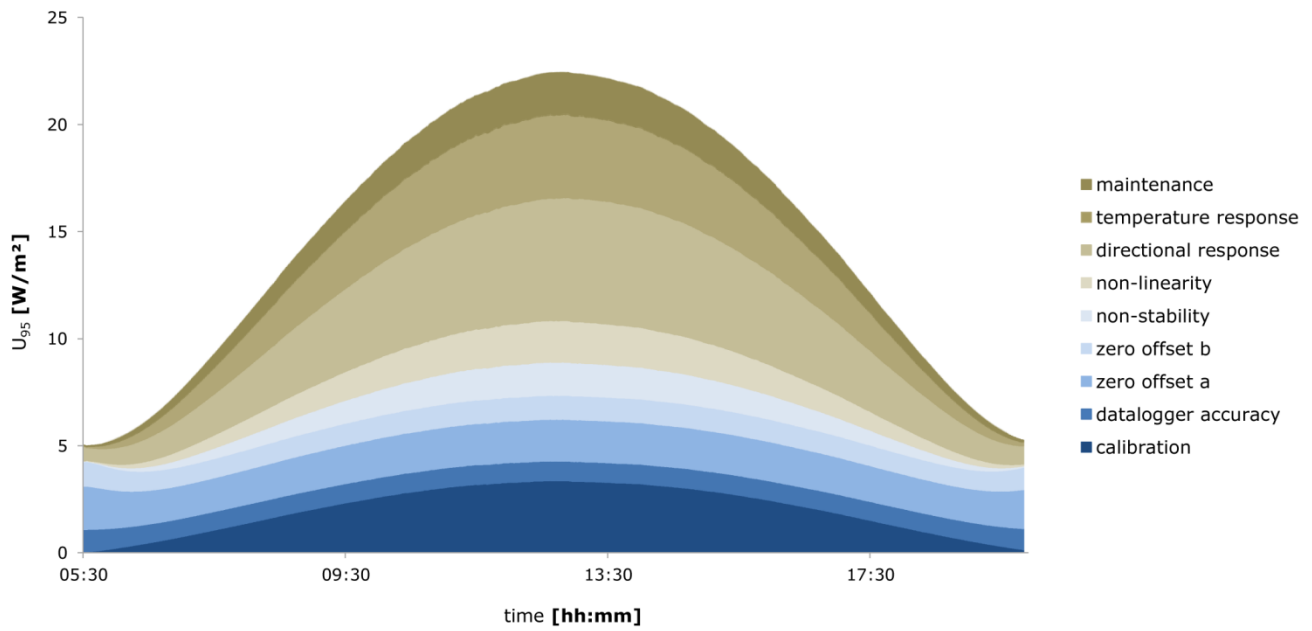


Figure 3 Uncertainty evaluation according to the ASTM Guide G213 of a measurement of Global Horizontal Irradiance (GHI) on a sunny day, expressed in W/m^2 . The maximum value around solar noon is $1000 W/m^2$. The different colours represent different error sources.

About Hukseflux

Hukseflux is the leading expert in measurement of energy transfer. We design and manufacture sensors and measuring systems that support the energy transition. We are market leaders in solar radiation and heat flux measurement. Customers are served through our headquarters in the Netherlands, and locally owned representative sales offices in the USA, Brazil, India, China, Southeast Asia and Japan.

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