Australian/New Zealand Standard™

Photovoltaic (PV) array — On-site measurement of current-voltage characteristics

AS/NZS IEC 61829:2020

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First published as AS/NZS IEC 61829:2020.

Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-042, Renewable Energy Power Supply Systems and Equipment.

The objective of this Standard is to specify procedures for on-site measurement of flat-plate photovoltaic (PV) array characteristics, the accompanying meteorological conditions, and use of these for translating to standard test conditions (STC) or other selected conditions.

This Standard is identical with, and has been reproduced from, IEC 61829:2015, *Photovoltaic (PV) array — On-site measurement of current-voltage characteristics*.

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PHOTOVOLTAIC (PV) ARRAY – ON-SITE MEASUREMENT OF CURRENT-VOLTAGE CHARACTERISTICS

FOREWORD

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International Standard IEC 61829 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

This second edition cancels and replaces the first edition published in 1995. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) it addresses many outdated procedures;
b) it accommodates commonly used commercial I-V curve tracers;
c) it provides a more practical approach for addressing field uncertainties;
d) it removes and replaces procedures with references to other updated and pertinent standards, including the IEC 60904 series, and IEC 60891.

The result is a much more practical and useful standard.

The text of this standard is based on the following documents:

FDIS	Report on voting
82/1008/FDIS	82/1041/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

The performance of photovoltaic (PV) systems over their decades-long life time is determined by comparing measured power production with the expected production as estimated from recorded weather conditions. Continuous measurements of system- or subsystem-level operating output can detect underperforming arrays but are not well suited for tracking degradation with any accuracy, or for identifying the weaknesses or failure modes that may exist within the array. Field I-V curve measurements offer a practical method of *in situ* benchmarking or troubleshooting for modules, strings and arrays. This International Standard specifies methods and approaches for field I-V curve measurements and calculations, and includes guidance for addressing the uncertainties associated with measurement devices and array configurations. Consistent and proper application of I-V curve measurement procedures helps to ensure that a PV system's performance is adequately characterized over time.

PHOTOVOLTAIC (PV) ARRAY – ON-SITE MEASUREMENT OF CURRENT-VOLTAGE CHARACTERISTICS

1 Scope

This International Standard specifies procedures for on-site measurement of flat-plate photovoltaic (PV) array characteristics, the accompanying meteorological conditions, and use of these for translating to standard test conditions (STC) or other selected conditions.

Measurements of PV array current-voltage (I-V) characteristics under actual on-site conditions and their translation to reference test conditions (RTC) can provide:

- data for power rating or capacity testing;
- verification of installed array power performance relative to design specifications;
- detection of possible differences between on-site module characteristics and laboratory or factory measurements;
- detection of possible performance degradation of modules and arrays with respect to on-site initial data;
- detection of possible module or array failures or poor performance.

For a particular module, on-site measurements translated to STC can be directly compared with results previously obtained in a laboratory or factory for that module. Corrections for differences in the spectral or spatial response of the reference devices may need to be assessed as specified in IEC 60904.

On-site array measurements are affected by diode, cable, and mismatch losses, soiling and shading, degradation due to aging, and other uncontrolled effects. Therefore, they are not expected to be equal to the product of the number of modules and the respective module data.

If a PV array is formed with sub-arrays of different tilt, orientation, technology, or electrical configuration, the procedure specified in this International Standard is applied to each unique PV sub-array of interest.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60891, *Photovoltaic devices – Procedures for temperature and irradiance corrections to measured I-V characteristics*

IEC 60904-1, *Photovoltaic devices – Part 1: Measurement of photovoltaic current-voltage characteristics*

IEC 60904-2, *Photovoltaic devices – Part 2: Requirements for photovoltaic reference devices*

IEC 60904-3, *Photovoltaic devices – Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data*