

SS 601 : Part 1 : 2020
IEC 62446-1:2016+A1:2018, MOD
(ICS 27.160)

SINGAPORE STANDARD

Photovoltaic (PV) systems – Requirements for testing, documentation and maintenance

– Part 1: Grid connected systems – Documentation, commissioning tests and inspection

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CONTENTS

National Foreword	8
FOREWORD	9
INTRODUCTION	11
1 Scope	12
2 Normative references	12
3 Terms and definitions	13
4 System documentation requirements	15
4.1 General	15
4.2 System data	15
4.2.1 Basic system information	15
4.2.2 System designer information	15
4.2.3 System installer information	16
4.3 Wiring diagram	16
4.3.1 General	16
4.3.2 Array – General specifications	16
4.3.3 PV string information	16
4.3.4 Array electrical details	16
4.3.5 AC system	17
4.3.6 Earthing and overvoltage protection	17
4.4 String layout	17
4.5 Datasheets	17
4.6 Mechanical design information	17
4.7 Emergency systems	17
4.8 Operation and maintenance information	17
4.9 Test results and commissioning data	18
5 Verification	18
5.1 General	18
5.2 Inspection	18
5.2.1 General	18
5.2.2 DC system – General	19
5.2.3 DC system – Protection against electric shock	19
5.2.4 DC system – Protection against the effects of insulation faults	19
5.2.5 DC system – Protection against overcurrent	19
5.2.6 DC system – Earthing and bonding arrangements	20
5.2.7 DC system – Protection against the effects of lightning and overvoltage	20
5.2.8 DC system – Selection and erection of electrical equipment	20
5.2.9 AC system	21
5.2.10 Labelling and identification	21
5.3 Testing	21
5.3.1 General	21
5.3.2 Test regimes and additional tests	22
5.3.3 Test regimes for systems with module level electronics	22

5.3.4	Category 1 test regime – All systems	23
5.3.5	Category 2 test regime	23
5.3.6	Additional tests	24
6	Test procedures – Category 1	24
6.1	Continuity of protective earthing and equipotential bonding conductors	24
6.2	Polarity test	25
6.3	PV string combiner box test	25
6.4	PV string – Open circuit voltage measurement	25
6.5	PV string – Current measurement	26
6.5.1	General	26
6.5.2	PV string – Short circuit test	26
6.5.3	PV string – Operational test	28
6.6	Functional tests	28
6.7	PV array insulation resistance test	28
6.7.1	General	28
6.7.2	PV array insulation resistance test – Test method	29
6.7.3	PV array insulation resistance – Test procedure	29
7	Test procedures – Category 2	31
7.1	General	31
7.2	String I-V curve measurement	31
7.2.1	General	31
7.2.2	I-V curve measurement of V_{OC} and I_{SC}	31
7.2.3	I-V curve measurement – Array performance	31
7.2.4	I-V curve measurement – Identification of module / array defects or shading issues	32
7.3	PV array infrared camera inspection procedure	33
7.3.1	General	33
7.3.2	IR test procedure	33
7.3.3	Interpreting IR test results	33
8	Test procedures – Additional tests	35
8.1	Voltage to ground – Resistive ground systems	35
8.2	Blocking diode test	35
8.3	PV array – Wet insulation resistance test	35
8.3.1	General	35
8.3.2	Wet insulation test procedure	36
8.4	Shade evaluation	36
9	Verification reports	37
9.1	General	37
9.2	Initial verification	37
9.3	Periodic verification	37
Annex A (informative)	Model verification certificate	38
Annex B (informative)	Model inspection report	40
Annex C (informative)	Model PV array test report	44
Annex D (informative)	Interpreting I-V curve shapes	46
D.1	General	46

D.2	Variation 1 – Steps or notches in curve	47
D.3	Variation 2 – Low current.....	47
D.4	Variation 3 – Low voltage	48
D.5	Variation 4 – Rounder knee	48
D.6	Variation 5 – Shallower slope in vertical leg.....	48
D.7	Variation 6 – Steeper slope in horizontal leg.....	49
Annex ZA (informative) National Deviations		50
Figure 1 – Example sun-path diagram		36
Figure D.1 – I-V curve shapes		46
Table 1 – Modifications to the test regime for systems with module level electronics ..		22
Table 2 – Minimum values of insulation resistance – PV arrays up to 10 kWp.....		30

National Foreword

This Singapore Standard was prepared by the Working Group on Solar PV Energy Systems set up by the Technical Committee on Power System and Utilisation under the purview of EESC.

It is a revision of SS 601 : 2014 “Code of practice for maintenance of grid-tied solar photovoltaic (PV) power supply system”.

This standard is a modified adoption of IEC 62446-1:2016+A1:2018, “Photovoltaic (PV) systems – Requirements for testing, documentation and maintenance – Part 1: Grid connected systems – Documentation, commissioning tests and inspection”, including its Amendment, published by International Electrotechnical Commission.

In this standard, certain modifications due to national requirements and the particular needs of the local industry have been made. These technical deviations and additional information have been added directly to the clauses to which they refer, and are marked by a margin bar on the left of the standard. It is to be noted that Annex A to Annex C in this standard are for references only; refer to SS 638 (Code of practice for electrical installations). A complete list of modifications, together with their justifications, is given in Annex ZA.

NOTE 1 – Reference to International Standards are replaced by applicable Singapore Standards.

NOTE 2 – Where numerical values are expressed as decimals, the comma is read as a full point.

Attention is drawn to the possibility that some of the elements of this Singapore Standard may be the subject of patent rights. Enterprise Singapore shall not be held responsible for identifying any or all of such patent rights.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**PHOTOVOLTAIC (PV) SYSTEMS – REQUIREMENTS FOR TESTING,
DOCUMENTATION AND MAINTENANCE –**

**Part 1: Grid connected systems – Documentation,
commissioning tests and inspection**

FOREWORD

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This Consolidated version of IEC 62446-1 bears the edition number 1.1. It consists of the first edition (2016-01) [documents 82/1036/FDIS and 82/1056A/RVD] and its amendment 1 (2018-08) [documents 82/1415/FDIS and 82/1426/RVD]. The technical content is identical to the base edition and its amendment.

This Final version does not show where the technical content is modified by amendment 1. A separate Redline version with all changes highlighted is available in this publication.

International Standard IEC 62446-1 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

This first edition constitutes a technical revision.

This edition includes the following significant technical change with respect to IEC 62446:2009:

- the scope has been expanded to include a wider range of system test and inspection regimes to encompass larger and more complex PV systems.

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

A list of all parts in the IEC 62446 series, published under the general title *Photovoltaic (PV) systems – Requirements for testing, documentation and maintenance*, can be found on the IEC website.

The committee has decided that the contents of the base publication and its amendment will remain unchanged until the stability date indicated on the IEC web site 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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

Grid connected PV systems are expected to have a lifetime of decades, with maintenance or modifications likely at some point over this period. Building or electrical works in the vicinity of the PV array are very likely, for example roof works adjacent to the array or modifications (structural or electrical) to a home that has a PV system. The ownership of a system may also change over time, particularly for systems mounted on buildings. Only by the provision of adequate documentation at the outset can the long term performance and safety of the PV system and works, on or adjacent to the PV system, be ensured.

This part of IEC 62446 is split into two sections:

- **System documentation requirements** – This section details the information that shall be provided within the documentation provided to the customer following installation of a grid connected PV system.
- **Verification** – This section provides the information expected to be provided following initial (or periodic) verification of an installed system. It includes requirements for inspection and testing.

This part of IEC 62446 references IEC TS 62548:2013, which is in the process of being converted into an International Standard. It is envisaged that work on the second edition of IEC 62446-1 will start when IEC 62548 is completed.

PHOTOVOLTAIC (PV) SYSTEMS – REQUIREMENTS FOR TESTING, DOCUMENTATION AND MAINTENANCE –

Part 1: Grid connected systems – Documentation, commissioning tests and inspection

1 Scope

This part of IEC 62446 defines the information and documentation required to be handed over to a customer following the installation of a grid connected PV system. It also describes the commissioning tests, inspection criteria and documentation expected to verify the safe installation and correct operation of the system. It can also be used for periodic retesting.

This part of IEC 62446 is written for grid connected PV systems only and not for AC module systems, nor for systems that utilize energy storage (e.g. batteries) or hybrid systems.

This part of IEC 62446 is for use by system designers and installers of grid connected solar PV systems as a template to provide effective documentation to a customer. By detailing the expected commissioning tests and inspection criteria, it is also intended to assist in the verification/inspection of a grid connected PV system after installation and for subsequent re-inspection, maintenance or modifications.

This part of IEC 62446 defines the different test regimes expected for different solar PV system types to ensure that the test regime applied is appropriate to the scale, type and complexity of the system in question.

NOTE 1 This part of IEC 62446 does not address CPV (concentrating PV) systems, however many of the parts may apply.

NOTE 2 It is expected that additional information and commissioning tests are required in some circumstances, e.g. for large commercial installations.

NOTE 3 This part of the standard does not deal with the integrity or deterioration of the structure and the mounting of the PV installation.

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 60364-6, *Low-voltage electrical installations – Part 6: Verification*

IEC 62548:2016, *Photovoltaic (PV) arrays – Design requirements*

NOTE In some countries IEC 60364-7-712 is preferred over IEC 62548. Both standards are expected to provide similar results.

IEC 61730 (all parts), *Photovoltaic (PV) module safety qualification*

IEC 61557 (all parts), *Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. – Equipment for testing, measuring or monitoring of protective measures*

IEC 61010 (all parts), *Safety requirements for electrical equipment for measurement, control, and laboratory use*

IEC 60891:2009, *Photovoltaic devices – Procedures for temperature and irradiance corrections to measured I-V characteristics*