



# SLOVENSKI STANDARD

## SIST EN 62116:2014

01-oktober-2014

Nadomešča:  
SIST EN 62116:2011

---

**Fotonapetostni razsmerniki, povezani na omrežje - Postopki za preskušanje ukrepov proti otočnemu delovanju (IEC 62116:2014)**

Utility-interconnected photovoltaic inverters - Test procedure of islanding prevention measures

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

Procédure d'essai des mesures de prévention contre l'ilotage pour onduleurs photovoltaïques interconnectés au réseau public

<https://standards.iteh.ai/catalog/standards/sist/dd4c1440-8118-41a1-bdb6-869f0ad66fd/sist-en-62116-2014>

**Ta slovenski standard je istoveten z: EN 62116:2014**

---

**ICS:**

27.160      Sončna energija      Solar energy engineering

**SIST EN 62116:2014**      **en**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN 62116:2014](#)

<https://standards.iteh.ai/catalog/standards/sist/dd4c1440-8118-41a1-bdb6-869f60ad66fd/sist-en-62116-2014>

EUROPEAN STANDARD

EN 62116

NORME EUROPÉENNE

EUROPÄISCHE NORM

July 2014

ICS 27.160

Supersedes EN 62116:2011

English Version

## Utility-interconnected photovoltaic inverters - Test procedure of islanding prevention measures (IEC 62116:2014)

Onduleurs photovoltaïques interconnectés au réseau public  
- Procédure d'essai des mesures de prévention contre  
l'îlotage  
(CEI 62116:2014)

Photovoltaik-Wechselrichter für den Anschluss an das  
Stromversorgungsnetz - Prüfverfahren für Maßnahmen zur  
Verhinderung der Inselbildung  
(IEC 62116:2014)

This European Standard was approved by CENELEC on 2014-04-02. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

SIST EN 62116:2014

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

## Foreword

The text of document 82/813/FDIS, future edition 2 of IEC 62116, prepared by IEC/TC 82 "Solar photovoltaic energy systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62116:2014.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2015-01-25
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2017-04-02

This document supersedes EN 62116:2011.

EN 62116:2014 includes the following significant technical changes with respect to EN 62116:2011:

	Previous edition	Present edition
3.7	<p><b>iTeh STANDARD PREVIEW</b> (standards.iteh.ai)</p> <p><a href="https://standards.iteh.ai/catalog/standards/sist/d4c1440-8118-41a1-bdb6-09760ad66fd/sist-en-62116-2014">https://standards.iteh.ai/catalog/standards/sist/d4c1440-8118-41a1-bdb6-09760ad66fd/sist-en-62116-2014</a></p> <p>SIST EN 62116:2014</p> <p>Real power      Active power</p>	
5.1		
5.4		
6.1 b)		
6.1 d)		
6.1 e)		
6.1 g)		
Table 1		
Table 6		
Table 7		
Table 9		
5.2	<p>A PV array or PV array simulator (preferred) may be used.</p> <p>If the EUT can operate in utility-interconnected mode from a storage battery, a DC power source may be used in lieu of a battery as long as the DC power source is not the limiting device as far as the maximum EUT input current is concerned.</p>	<p>A DC power source, such as a PV array simulator, a PV array, or a current and voltage limited DC power supply with series resistance may be used.</p> <p>If the EUT can operate in utility-interconnected mode from a storage battery, a DC power source may be used in lieu of a battery as long as the DC power source shall not be the limiting device as far as the maximum EUT input current is concerned.</p>

Table 5	EUT input voltage 90 %	EUT input voltage 75 %
	EUT input voltage 10 %	EUT input voltage 20 %
	EUT Trip Settings Manufacturer specified voltage and frequency trip settings	Voltage and frequency trip settings according to National standards and/or local code
Tables 6 & 7 (Heading)	Percent change in real load, reactive load from nominal	Percent change in active load, reactive load from nominal output power

Major changes with respect to the previous edition concern the DC power source and test conditions.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

### Endorsement notice

The text of the International Standard IEC 62116:2014 was approved by CENELEC as a European Standard without any modification.

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 62116:2014](#)

<https://standards.iteh.ai/catalog/standards/sist/dd4c1440-8118-41a1-bdb6-869f60ad66fd/sist-en-62116-2014>

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

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.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: [www.cenelec.eu](http://www.cenelec.eu).

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC/TS 61836	-	Solar photovoltaic energy systems - Terms, definitions and symbols	CLC/TS 61836	-

## iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 62116:2014

<https://standards.iteh.ai/catalog/standards/sist/dd4c1440-8118-41a1-bdb6-869f0ad66fd/sist-en-62116-2014>



IEC 62116

Edition 2.0 2014-02

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



Utility-interconnected photovoltaic inverters – Test procedure of islanding prevention measures  
(standards.iteh.ai)

Onduleurs photovoltaïques interconnectés au réseau public – Procédure d'essai des mesures de prévention contre l'îlotage

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

PRICE CODE  
CODE PRIX

U

ICS 27.160

ISBN 978-2-8322-1442-8

**Warning! Make sure that you obtained this publication from an authorized distributor.  
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

## CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references .....	7
3 Terms and definitions .....	7
4 Testing circuit.....	9
5 Testing equipment.....	11
5.1 Measuring instruments.....	11
5.2 DC power source .....	11
5.2.1 General .....	11
5.2.2 PV array simulator .....	12
5.2.3 Current and voltage limited DC power supply with series resistance.....	12
5.2.4 PV array .....	12
5.3 AC power source .....	13
5.4 AC loads.....	13
6 Test for single or multi-phase inverter.....	13
6.1 Test procedure.....	13
6.2 Pass/fail criteria.....	17
7 Documentation .....	17
Annex A (informative) Islanding as it applies to PV systems .....	20
A.1 General.....	20
A.2 Impact of distortion on islanding.....	21
Annex B (informative) Test for independent islanding detection device (relay) .....	22
B.1 General.....	22
B.2 Testing circuit .....	22
B.3 Testing equipment .....	22
B.3.1 General .....	22
B.3.2 AC input source.....	22
B.4 Testing procedure.....	23
B.5 Documentation.....	23
Annex C (informative) Gate blocking signal.....	24
C.1 General.....	24
C.2 Gate blocking signal used in photovoltaic systems.....	24
C.3 Monitoring the gate blocking signal .....	24
Bibliography.....	25
Figure 1 – Test circuit for islanding detection function in a power conditioner (inverter) .....	11
Figure B.1 – Test circuit for independent islanding detection device (relay) .....	22
Table 1 – Parameters to be measured in real time .....	10
Table 2 – Specification of array simulator (test conditions).....	12
Table 3 – PV array test conditions .....	13
Table 4 – AC power source requirements .....	13
Table 5 – Test conditions.....	14



Table 6 – Load imbalance (real, reactive load) for test condition A (EUT output = 100 %) .....	16
Table 7 – Load imbalance (reactive load) for test condition B (EUT output = 50 % to 66 %) and test condition C (EUT output = 25 % to 33 %) .....	16
Table 8 – Specification of the EUT provided by the manufacturer (example) .....	17
Table 9 – List of tested condition and run on time (example).....	18
Table 10 – Specification of testing equipment (example).....	19

## **iTeh STANDARD PREVIEW** **(standards.iteh.ai)**

[SIST EN 62116:2014](https://standards.iteh.ai/catalog/standards/sist/dd4c1440-8118-41a1-bdb6-869f60ad66fd/sist-en-62116-2014)

<https://standards.iteh.ai/catalog/standards/sist/dd4c1440-8118-41a1-bdb6-869f60ad66fd/sist-en-62116-2014>

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**UTILITY-INTERCONNECTED PHOTOVOLTAIC INVERTERS – TEST  
PROCEDURE OF ISLANDING PREVENTION MEASURES**

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62116 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

This second edition cancels and replaces the first edition issued in 2008 and constitutes a technical revision.

The main technical changes with regard to the previous edition are as follows:

Previous edition		Present edition
Clause	Real power	Active power
3.7		
5.1		
5.4		
6.1 b)		
6.1 d)		
6.1 e)		
6.1 g)		
Table 1		
Table 6		
Table 7		
Table 9		
5.2	A PV array or PV array simulator (preferred) may be used. If the EUT can operate in utility-interconnected mode from a storage battery, a DC power source may be used in lieu of a battery as long as the DC power source is not the limiting device as far as the maximum EUT input current is concerned.	A DC power source, such as a PV array simulator, a PV array, or a current and voltage limited DC power supply with series resistance may be used. If the EUT can operate in utility-interconnected mode from a storage battery, a DC power source may be used in lieu of a battery as long as the DC power source shall not be the limiting device as far as the maximum EUT input current is concerned.
Table 5	EUT input voltage 90 %	EUT input voltage 75 %
	EUT input voltage 10 %	EUT input voltage 20 %
	EUT Trip Settings Manufacturer specified voltage and frequency trip settings	Voltage and frequency trip settings according to National standards and/or local code
Tables 6 & 7 (Heading)	Percent change in real load, reactive load from nominal	Percent change in active load, reactive load from nominal output power

## SIST EN 62116:2014

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

FDIS	Report on voting
82/813/FDIS	82/827/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 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

Islanding is a condition in which a portion of an electric power grid, containing both load and generation, is isolated from the remainder of the electric power grid. This situation is one which electric power providers (utilities) regularly contend with. When an island is created purposely by the controlling utility – to isolate large sections of the utility grid, for example – it is called an intentional island. Conversely, an unintentional island can be created when a segment of the utility grid containing only customer-owned generation and load is isolated from the utility control.

Normally, the customer-owned generation is required to sense the absence of utility-controlled generation and cease energizing the grid. However, when the generation and load within the segment are well balanced prior to the isolation event, the utility is providing little power to the grid segment, thus making it difficult to detect when the isolation occurs. Damage can occur to customer equipment if the generation in the island, no longer under utility control, operates outside of normal voltage and frequency conditions. Customer and utility equipment can be damaged if the main grid recloses into the island out of synchronization. Energized lines within the island present a shock hazard to unsuspecting utility lineworkers who think the lines are dead.

The PV industry has pioneered the development of islanding detection and prevention measures. To satisfy the concerns of electric power providers, commercially-available utility-interconnected PV inverters have implemented a variety of islanding detection and prevention (also called anti-islanding) techniques. The industry has also developed a test procedure to demonstrate the efficacy of these anti-islanding techniques; that procedure is the subject of this document.

(standards.iteh.ai)

This standard provides a consensus test procedure to evaluate the efficacy of islanding prevention measures used by the power conditioner of utility-interconnected PV systems. Note that while this document specifically addresses inverters for photovoltaic systems, with some modifications the setup and procedure may also be used to evaluate inverters used with other generation sources or to evaluate separate anti-islanding devices intended for use in conjunction with PV inverters or other generation sources acting as or supplementing the anti-islanding feature of those sources.

Inverters and other devices meeting the requirements of this document can be considered non-islanding, meaning that under reasonable conditions, the device will detect island conditions and cease to energize the public electric power grid.