



DPC: 24 / 30446844 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

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Interested committees:

Title: BS EN IEC 62116 Utility-interconnected photovoltaic inverters - Test procedure of islanding prevention measures

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Responsible Committee Secretary: Lilly Malik (BSI)

Direct tel:

E-mail: lilly.malik@bsigroup.com

Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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UK Vote

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



82/2335/CD

COMMITTEE DRAFT (CD)

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82/1967/RR

IEC TC 82 : SOLAR PHOTOVOLTAIC ENERGY SYSTEMS

SECRETARIAT:

United States of America

SECRETARY:

Mr George Kelly

OF INTEREST TO THE FOLLOWING COMMITTEES:

HORIZONTAL FUNCTION(S):

ASPECTS CONCERNED:

Safety

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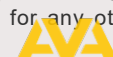
TITLE:

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

NOTE FROM TC/SC OFFICERS:

This project was discussed and supported by WG6 during their meeting in 2024-10.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

FOREWORD

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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:

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

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

107
108 Full information on the voting for the approval of this standard can be found in the report on
109 voting indicated in the above table.

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

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

- 114 • reconfirmed,
115 • withdrawn,
116 • replaced by a revised edition, or
117 • amended.

118

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121

INTRODUCTION

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

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

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

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

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

154

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

1 Scope

The purpose of this International Standard is to provide a test procedure to evaluate the performance of islanding prevention measures used with utility-interconnected PV systems.

This standard describes a guideline for testing the performance of automatic islanding prevention measures installed in or with single or multi-phase utility interactive PV inverters connected to the utility grid. The test procedure and criteria described are minimum requirements that will allow repeatability. Additional requirements or more stringent criteria may be specified if demonstrable risk can be shown. Inverters and other devices meeting the requirements of this standard are considered non-islanding as defined in IEC 61727.

This standard may be applied to other types of utility-interconnected systems (e.g. inverter-based microturbine and fuel cells, induction and synchronous machines). However, technical review may be necessary for other than inverter-based PV systems.

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/TS 61836, *Solar photovoltaic energy systems – Terms, definitions and symbols*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61836 as well as the following apply.

3.1

PV array simulator

DC power source used to simulate PV array output

3.2

EUT

equipment under test

inverter or anti-islanding device on which these tests are performed

Note 1 to entry: This note applies to the French language only.

converters, etc.

3.3

MPPT

maximum power point tracking

PV array control strategy used to maximize the output of the system under the prevailing conditions

Note 1 to entry: This note applies to the French language only.

3.4**non-islanding inverter**

inverter that will cease to energize a utility distribution system that is out of the nominal operation specifications for voltage and/or frequency

[SOURCE: IEC 61727:2004, 3.8.1]

3.5**island**

state in which a portion of the electric utility grid, containing load and generation, continues to operate isolated from the rest of the grid

Note 1 to entry: The generation and loads may be any combination of customer-owned and utility-owned.

3.6**intentional island**

island that is intentionally created, usually to restore or maintain power to a section of the utility grid affected by a fault

Note 1 to entry: The generation and loads may be any combination of customer-owned and utility-owned, but there is an implicit or explicit agreement between the controlling utility and the operators of customer-owned generation for this situation.

3.7**quality factor** **Q_f**

a measure of the strength of resonance of the islanding test load

Note 1 to entry: In a parallel resonant circuit, such as a load on a power system

$$Q_f = R \sqrt{\frac{C}{L}}$$

where

Q_f is quality factor

R is effective load resistance

C is reactive load capacitance (including shunt capacitors)

L is reactive load inductance

With C and L tuned to the power system fundamental frequency, Q_f for the resonant circuit drawing active power, P , reactive powers Q_L , for inductive load and Q_C for capacitive load, Q_f can be determined by

$$Q_f = (1/P) \sqrt{|Q_L| \cdot |Q_C|}$$

where

P is active power, in W

Q_L is inductive load, in VAR_L

Q_C is capacitive load, in VAR_C

3.8**run-on time** **t_R**

amount of time that an unintentional island condition exists, calculated as the interval between the opening of the switch S1 (Figure 1) and the cessation of EUT output current