TECHNICAL SPECIFICATION

Renewable energy and hybrid systems for rural electrification –
Part 9-7: Recommendations for selection of inverters
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

RENEWABLE ENERGY AND HYBRID SYSTEMS
FOR RURAL ELECTRIFICATION –

Part 9-7: Recommendations for selection of inverters

FOREWORD

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• the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC TS 62257-9-7, which is a Technical Specification, has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.
The text of this Technical Specification is based on the following documents:

<table>
<thead>
<tr>
<th>Enquiry draft</th>
<th>Report on voting</th>
</tr>
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<tbody>
<tr>
<td>82/1473/DTS</td>
<td>82/1546A/RVDTDS</td>
</tr>
</tbody>
</table>

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

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

This part of IEC 62257 is to be used in conjunction with IEC 62257 (all parts).

A list of all parts in the IEC 62257 series, published under the general title *Renewable energy and hybrid systems for rural electrification*, can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

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

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- withdrawn,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

A bilingual version of this publication may be issued at a later date.
1 Scope

This part of IEC 62257, which is a technical specification, specifies the criteria for selecting and sizing inverters suitable for different off-grid applications integrating solar as an energy source.

As well as off-grid system, this document can also apply to inverters where a utility grid connection is available as a backup for charging batteries, but it is not intended to cover applications in which inverters synchronize and inject energy back into a utility grid, even though this capability may incidentally be a part of the functionality of the inverters.

Single and multi-phase applications are included.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60529, Degrees of protection provided by enclosures (IP Code)

IEC 61683, Photovoltaic systems – Power conditioners – Procedure for measuring efficiency

IEC 61800, (all parts), Adjustable speed electrical power drive systems

IEC 61800-3, Adjustable speed electrical power drive systems – Part 3: EMC requirements and specific test methods

IEC 61800-5-1, Adjustable speed electrical power drive systems – Part 5-1: Safety requirements – Electrical, thermal and energy

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

IEC 62109, (all parts), Safety of power converters for use in photovoltaic power systems

IEC 62109-1, Safety of power converters for use in photovoltaic power systems – Part 1: General requirements

IEC TS 62257-2, Recommendations for renewable energy and hybrid systems for rural electrification – Part 2: From requirements to a range of electrification systems

IEC TS 62257-7-1:2010, Recommendations for small renewable energy and hybrid systems for rural electrification – Part 7-1: Generators – Photovoltaic generators
3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

• IEC Electropedia: available at http://www.electropedia.org/
• ISO Online browsing platform: available at http://www.iso.org/obp

3.1 renewable energy

energy from a source that is not depleted when used

3.2 hybrid power plants

multi-sources system with at least two kinds of energy generation technology

3.3 storage

storage of electrical energy produced by one of the generators of the system in a battery

3.4 DC bus

node of the electrical system to which the DC input of the battery inverter is connected to

3.5 AC bus

node of the electrical system to which the AC output of the battery inverter is connected to

3.6 black start

process of starting an electrical power supply without relying on any other external generating source

4 Overview

Inverters are used to convert DC power into AC power. For off-grid renewable applications, there are different types of inverters that may be used depending upon the architecture of the system.

Some systems work with batteries and use the firm energy they provide to form the conditions of the micro-grid (grid-forming inverters) and some inverters synchronize to an existing grid. In addition, some inverters are bi-directional inverter/chargers, which not only convert DC battery current into AC, but also reverse the process and transform the AC current into a DC battery charging current to permit battery charging from the AC side of the inverter.

IEC TS 62257-7-4: Recommendations for renewable energy and hybrid systems for rural electrification – Part 7-4: Generators – Integration of solar with other forms of power generation within hybrid power systems

IEC 62548, Photovoltaic (PV) arrays – Design requirements