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Renewable energy off-grid systems -
Part 301: Generators - Integration of solar with other forms of power generation within hybrid power systems

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CONTENTS

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Renewable energy off-grid systems - Part 301: Generators - Integration of solar with other forms of power generation within hybrid power systems

FOREWORD

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IEC TS 62257-301 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems. It is a Technical Specification.

This first edition cancels and replaces IEC TS 62257-7-4, published in 2019.

The text of this Technical Specification is based on the following documents:

Draft	Report on voting
82/2408/DTS	82/2463/RVDTS

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

The language used for the development of this Technical Specification is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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 off-grid systems*, 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 webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

The IEC 62257 series provides technical standardization to different stakeholders (including but not limited to project developers, financing agencies, testing agencies, installers, etc.) involved in electrification projects for access to electricity for those not solely connected to the regional grid, through the setting up of off-grid renewable energy and hybrid systems (including micro-grids) with a voltage less than or equal to 1 000 V for AC (alternating current) or a voltage less than or equal to 1 500 V for DC (direct current).

Access to electricity is one of the predominant policy actions designed to increase the well-being of populations, together with access to clean water, improved healthcare, education, personal advancement, and economic development. Increasing access to electricity through utilization of renewable off-grid electricity also directly or indirectly supports various United Nations Sustainable Development Goals (https://sdgs.un.org/goals), depending on the application.

The IEC 62257 technical specifications focus on enabling access to electricity by concentrating on, but not being specific to, developing countries. This series should not be considered as all-inclusive for access to electricity. That means that the technical specifications could be used for rural electrification, also for electrification of remote sites in developed countries, or any requirement for electricity access that cannot be met by attaching solely to the national utility grid.

One of the main objectives of this series is to provide the minimum sufficient recommendations, including items for safety, sustainability of systems, and at the lowest life cycle cost, relevant to the renewable energy and hybrid off-grid systems field of application.

Where connection to a national or regional electricity grid is not possible or reliable enough to provide the desired level of electrification, renewable energy off grid and hybrid systems are typically used to provide it. These autonomous renewable energy and hybrid systems can provide electricity without connection to the larger utility grid.

Using renewable energy off-grid and hybrid systems to create “access to electricity” applies to cases where the regional grid is too far away and/or too costly for the user(s) to connect to the regional grid, and where autonomous power systems can be used to supply these services.

1 Scope

This part of IEC 62257, which is a technical specification, specifies the design and implementation of hybrid off-grid solar systems, where solar energy provides energy to a load in conjunction with other sources of energy. Such systems can either include or not include an energy storage system. There are a variety of different system architectures and applications, and many ways in which these energy sources can be combined. This document distinguishes between different sorts of hybrid system applications and gives guidance on the design and integration of these systems.

It applies to single-phase and three-phase applications, and it covers situations where grid is available as an additional source of power for charging batteries and maintaining system reliability, but this document does not cover situations in which energy is fed back into a utility grid, although such systems can incidentally possess this function.

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

IEC TS 62257-7-2, *Recommendations for renewable energy and hybrid systems for rural electrification - Part 7-2: Generator set - Off-grid wind turbines*

IEC TS 62257-7-3, *Recommendations for renewable energy and hybrid systems for rural electrification - Part 7-3: Generator set - Selection of generator sets for rural electrification systems*

IEC TS 62257-350[1], *Renewable energy off-grid systems - Part 350: Recommendations for selection of inverters*

IEC 62509, *Battery charge controllers for photovoltaic systems - Performance and functioning*

IEC 62548-1, *Photovoltaic (PV) arrays - Part 1: Design requirements*

IEC TS 62738, *Ground-mounted photovoltaic power plants - Design guidelines and recommendations*

[1] Under preparation. Stage at the time of publication: IEC DTS 62257-350:2025.