

TECHNICAL SPECIFICATION

**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 62257-7-3:2018

<https://standards.iteh.ai/catalog/standards/sist/28d4fce6-93ec-4700-897c-f97b6fcb2fc3/iec-ts-62257-7-3-2018>



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**RECOMMENDATIONS FOR RENEWABLE ENERGY AND
HYBRID SYSTEMS FOR RURAL ELECTRIFICATION –****Part 7-3: Generator set – Selection of generator sets
for rural electrification systems**

FOREWORD

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- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- 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 62257-7-3, which is a technical specification, has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

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

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

- Increased the voltage and power levels to which this TS applies.
- Added descriptions of four different types of micropower systems and their relevant requirements.

This technical specification is to be used in conjunction with other parts of this series or future parts as and when they are published.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
82/1329/DTS	82/1383A/RVDTS

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.

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

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

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

INTRODUCTION

The IEC 62257 series of documents intends to provide to different players involved in rural electrification projects (such as project implementers, project contractors, project supervisors, installers, etc.) documents for the setting up of renewable energy and hybrid systems with AC voltage below 1 000 V, and DC voltage below 1 500 V.

These documents are recommendations:

- to choose the right system for the right place;
- to design the system;
- to operate and maintain the system.

These documents are focused only on off-grid rural electrification concentrating on, but not specific to, developing countries. They are not considered as all-inclusive to rural electrification. The documents try to promote the use of renewable energies in rural electrification; they do not deal with clean development mechanisms at this time (CO₂ emission, carbon credit, etc.). Further developments in this field could be introduced in future steps.

This consistent set of documents is best considered as a whole with different parts corresponding to items for safety, sustainability of systems and at the lowest life-cycle cost possible. One of the main objectives is to provide the minimum sufficient requirements, relevant to the field of application, that is, renewable energy and hybrid off-grid systems.

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RECOMMENDATIONS FOR RENEWABLE ENERGY AND HYBRID SYSTEMS FOR RURAL ELECTRIFICATION –

Part 7-3: Generator set – Selection of generator sets for rural electrification systems

1 Scope

This part of IEC 62257 specifies the general requirements for the selection, sizing, erection and operation of generator sets in decentralized rural electrification systems.

It applies to all low voltage combustion engine electricity generator sets energized by renewable energy such as biomass gasifier or biogas, or fossil fuel such as gasoline or diesel fuel, and designed for supplying electrical power to isolated sites used in systems as described in IEC TS 62257-2.

This document is not an exhaustive resource for the design, installation, operation or maintenance of generator sets, but is more focused on recommendations to provide strategies on selection and criteria which may affect the use of such generation systems in a rural electrification project.

Four cases of micropower plant will be considered as illustrated by Figure 1 to power a collective electrification system (microgrid) or an individual electrification system.

- the micropower plant is composed of one generator set;
- the micropower plant is composed of multiple generator sets, which may have a single energy source or multiple energy sources;
- the micropower plant which is a hybrid energy system between one generator set and a Power Conditioning Sub-system (PCS) which is powered by other energy source including renewable energy source or energy storage;
- the micropower plant which is a hybrid energy system between multiple generator sets and multiple Power Conditioning Sub-systems (PCSs) which are powered by other energy sources including renewable energy sources or energy storage systems.

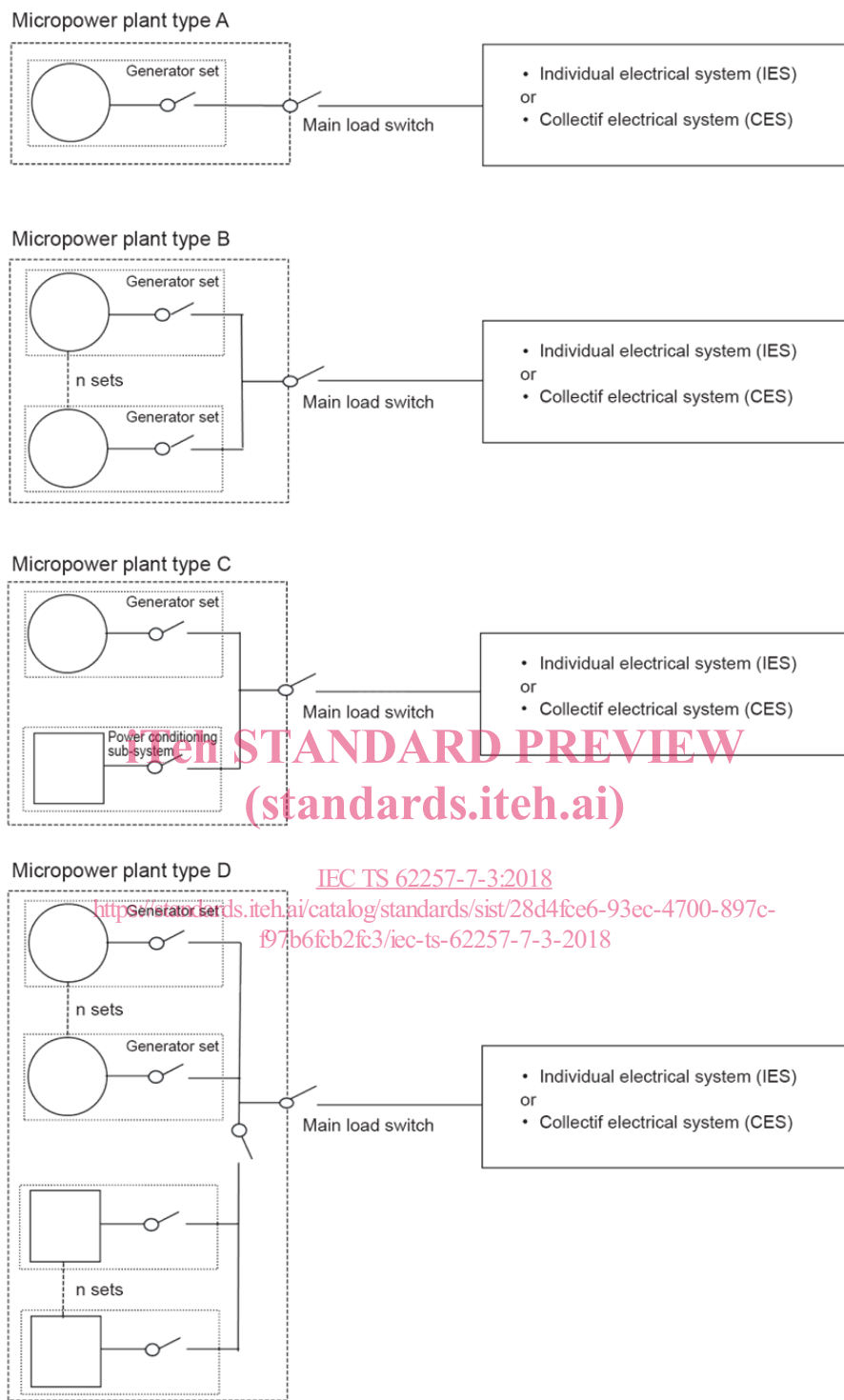


Figure 1 – General functional configuration of micropower plant in micropower system

The aim of this document is to provide users with the appropriate guide to select generator sets for using in micropower plant with different configurations and levels of reliability and safety of the equipment during its estimated service lifespan.

It describes the minimum requirement of generator set functionality and safety requirements and does not claim to be an exhaustive instruction manual or design specification.

Compliance with this document does not exempt any person, organization or corporation from the responsibility to comply with all other relevant requirements including what is indicated in maker user manuals and local electrical regulations.

This document gives recommendations for the following types of generator sets:

- a) single phase;
- b) three phase;
- c) LV range up to 500 V – 50/60 Hz (see IEC TS 62257-9-2).

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 60034-1, *Rotating electrical machines – Part 1: Rating and performance*

IEC 60034-9, *Rotating electrical machines – Part 9: Noise limits*

IEC 60034-22, *Rotating electrical machines – Part 22: AC generators for reciprocating internal combustion (RIC) engine driven generating sets*

IEC 60364 (all parts), *Low-voltage electrical installations*

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

IEC 61009-1, *Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) – Part 1: General rules*

IEC TS 62257-2:2015, *Recommendations for renewable energy and hybrid systems for rural electrification – Part 2: From requirements to a range of electrification systems*

IEC TS 62257-5, *Recommendations for renewable energy and hybrid systems for rural electrification – Part 5: Protection against electrical hazards*

IEC TS 62257-6, *Recommendations for renewable energy and hybrid systems for rural electrification – Part 6: Acceptance, operation, maintenance and replacement*

IEC TS 62257-9-2, *Recommendations for renewable energy and hybrid systems for rural electrification – Part 9-2: Microgrid*

IEC TS 62257-9-4, *Recommendations for renewable energy and hybrid systems for rural electrification – Part 9-4: Integrated systems – User installation*

ISO 8528-1, *Reciprocating internal combustion engine driven alternating current generating sets – Part 1: Application, ratings and performance*

ISO 8528-5, *Reciprocating internal combustion engine driven alternating current generating sets – Part 5: Generating sets*

ISO 8528-7, *Reciprocating internal combustion engine driven alternating current generating sets – Part 7: Technical declarations for specification and design*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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

environmental conditions

environment characteristics (altitude, temperature, humidity, etc.) which may affect the performance

3.2

generator set

equipment producing electricity from a fossil fuel; it consists basically of an internal combustion engine producing mechanical energy and a generator which converts the mechanical energy into electrical energy and mechanical transmission, support and assembly components

3.3

identification file

IF

document provided by the manufacturer which guarantees the conformity of the equipment supplied with that which has undergone the type tests

3.4

lifespan

effective period of functioning taking into account the probability of a catastrophic failure

3.5

non-routine maintenance

maintenance necessary in addition to that pre-planned

3.6

rated frequency

frequency at which the generator set is designed to operate

3.7

routine maintenance

preventive maintenance carried out to an established plan

3.8

rated electrical power

nominal power

rated capacity

maximum continuous power supplied by a generator set in compliance with its specifications, and under standard operating conditions

Note 1 to entry: This is expressed in VA (volt-ampere), or more usually in kVA.

3.9

rated rotation speed

alternator rotation speed necessary to produce the voltage at the rated frequency