IEC 63277

Edition 1.0 2021-11

INTERNATIONAL STANDARD

colour inside

Binary power generation systems with capacity less than 100 kW – Performance test methods

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 27.190

ISBN 978-2-8322-1046-6

Warning! Make sure that you obtained this publication from an authorized distributor.

® Registered trademark of the International Electrotechnical Commission

CONTENTS

FOREWORD 3
INTRODUCTION 5
1 Scope 6
2 Normative references 6
3 Terms and definitions 6
4 Construction, power of binary power generation system 8
4.1 General construction of binary power generation system 8
4.2 Net power (Sending-end output) / Gross power (Generating power) 8
5 Test condition 8
5.1 General test condition 8
5.2 Rated test condition 9
5.2.1 General 9
5.2.2 Tolerance of the rated net power 9
5.3 Accuracy of instruments used for measurement 9
5.3.1 Thermometer 9
5.3.2 Flowmeter 9
5.3.3 Three-phase power meter 9
5.3.4 Calibration 10
6 Measurement and calculation method of power output and power generation efficiency 10
6.1 Measurement method of net power (sending-end output) 10
6.2 Measurement method of flow rate and temperature of hot water 11
6.2.1 Temperature measurement of hot water 11
6.2.2 Flow rate measurement of hot water 12
6.3 Measurement method of flow rate and temperature of cooling water 12
6.4 Calculation method of power output and power generation efficiency 12
6.4.1 Receiving heat amount from hot water in the evaporator Q_{H} (kW) 12
6.4.2 Net power (sending-end output) L_{net} (kW) 12
6.4.3 Power generation efficiency η_{eout} 13
7 Marking documentation 13
7.1 Marking on the product 13
7.2 Description in the technical documentation 13
Annex A (informative) Specification of grid-connected inverter for power generation systems 15
A.1 Outline of the equipment 15
A.2 Required specification 15
Annex B (informative) Calculation of electric power efficiency 16
Annex C (informative) Items of test report 17

Figure 1 – Binary power generation system 8
Figure 2 – Performance measuring method 11
Figure 3 – Example of arrangement of hot water flowmeter 12
Figure A.1 – Interconnection circuit diagram using grid-connect inverter 15

Table 1 – Test conditions 9

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

BINARY POWER GENERATION SYSTEMS WITH CAPACITY LESS THAN 100 KW – PERFORMANCE TEST METHODS

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 63277 has been prepared by IEC project committee 126: Binary power generation systems.

The text of this International Standard is based on the following documents:

Draft	Report on voting
126/35/FDIS	126/38/RVD

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 International Standard 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/standardsdev/publications.

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

IMPORTANT – The "colour inside" logo on the cover page of this document 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

This document deals with the performance test methods for binary power generation systems.

Binary power generation systems are capable of generating electric power even with a relatively low temperature heat source, such as factory waste heat as well as renewable energy, such as hot spring water, geothermal heat, solar heat, etc..

The system utilizes the heat of said heat source by transferring it to a working fluid via a heat transport medium, instead of directly heating working fluid. Hence, it is called “binary system.”

By standardizing the performance measuring method of binary power generation systems, energy conservation performance can be assessed legitimately, and it will also be reflected in energy saving measures based on actual use. Increase of suppliers motivation for realizing high energy saving performance is expected, and energy saving products will be promoted around the world.

In addition, the world demand for binary power generation systems is also rising, and it is expected to grow rapidly in the future.

BINARY POWER GENERATION SYSTEMS WITH CAPACITY LESS THAN 100 KW – PERFORMANCE TEST METHODS

1 Scope

This document specifies the performance test methods for binary power generation systems.

It defines the normalized test conditions and estimates the power generation efficiency of binary power generation systems.

It specifies the binary power generation systems having heating medium of non-pressurized hot water, with a maximum temperature less than 100 °C created by renewable energy or wasted heat in the industrial field and cold water as cooling medium.

It is applied to binary power generation systems with electric power generation capacity of less than 100 kW.

This document specifies performance testing, the standard conditions and the test methods for determining the electric power output and power generation efficiency of binary power generation systems.

It includes heating conditions (temperature, flow rate) and cooling conditions (temperature, flow rate).

The requirements of testing and rating contained in this document are based on the use of matched assemblies.

This document does not include binary power generation systems more than 100 kW in electric power generation capacity.

The subject heating medium here is non-pressurized hot water with a temperature of less than 100 °C.

2 Normative references

There are no normative references in this document.