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BSI Standards Publication

Marine energy — Wave, tidal and other water current converters

Part 102: Wave energy converter power performance assessment at a second location using measured assessment data

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National foreword

This Published Document is the UK implementation of IEC/TS 62600-102:2016.

The UK participation in its preparation was entrusted to Technical Committee PEL/114, Marine energy - Wave, tidal and other water current converters.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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

IEC TS 62600-102, which is a technical specification, has been prepared by IEC technical committee 114: Marine energy – Wave, tidal and other water current converters.

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

Enquiry draft	Report on voting
114/179/DTS	114/187A/RVC

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

A list of all parts in the IEC 62600 series, published under the general title *Marine energy – Wave, tidal and other water current converters*, can be found on the IEC website.

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- withdrawn,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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication 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 technical specification, IEC TS 62600-102, provides a uniform methodology for estimating and reporting the performance of a Wave Energy Converter (WEC) at a prospective new deployment location. The performance estimation methodology is based primarily on observations and measurement results gathered during field deployment of the WEC at a primary location (as per IEC TS 62600-100) with different metocean conditions compared to the prospective new location. Further, it is possible that the WEC design will incorporate changes to accommodate the new site conditions. To assess the performance, inclusion of additional information based on validated numerical and physical models is specified. In this technical specification the completed field deployment location is referred to as “Location 1” and the prospective deployment location is referred to as “Location 2.”

The specification provides a methodology for arriving at the mean annual energy production (MAEP) for the WEC at Location 2. Other Technical Specifications in this series (IEC TS 62600) are drawn upon to provide the wave resource and WEC performance information needed to enable this analysis. The methodology involves:

- assessment of the wave resource at Location 1 and Location 2,
- characterization of the WEC performance at Location 1,
- assessment and compensation for the impact of discrepancies in the metocean conditions between Location 1 and Location 2 on the WEC performance characterization,
- assessment of the impact of changes to the WEC configuration between Location 1 and Location 2 on the WEC performance characterization,
- complementing the performance observations from Location 1 with fit, experimental or numerically modelled data,
- estimating the MAEP based on the composite performance characterization of the WEC.

This technical specification provides:

a) guidance on the use of observations from Location 1,

b) methods for assessing and reporting the validity of numerical and physical models,

c) limits on the permissible changes to the WEC between Locations 1 and 2,

d) limits on the use of data fitting techniques, and

e) requirements for reporting.

The wave power industry is at an early stage of development. There is little practical experience with field-scale WECs deployment. Because of this, the present document is designated as a technical specification and will be subject to change as more data is collected and experience with wave energy converters develops. This Technical Specification, when used in conjunction with other Technical Specifications in this series (IEC TS 62600), is intended for several types of users, including, but not limited to, the following:

- Project developers – income, return on investment
- Device developers – performance of device
- Utilities/investors – reliability/predictability of supply, return on investment
- Policy-makers/Planners – usage of seascape, optimisation of resource, power supply issues
- Consultants to produce resource data/due diligence – compatible/readable data format

MARINE ENERGY – WAVE, TIDAL AND OTHER WATER CURRENT CONVERTERS –

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1 Scope

Wave Energy Converters (WEC) need to be designed to operate efficiently at different locations. Systematic methods should be used to evaluate the power performance of a WEC at a second location (hereinafter Location 2) based on power performance assessment at a first location (hereinafter Location 1). The degree of similarity of the measured WEC (WEC 1) and the metocean conditions at Location 1 to the secondary WEC (WEC 2) at Location 2 determine the methodology and the applicability of this technical specification.

This part of IEC 62600, which is a Technical Specification, describes the required methods and the required conditions to determine the power performance of the WEC 2 in Location 2, possibly at a different scale and with configuration changes to accommodate the new site conditions, in all cases based on measured power performance of WEC 1 in Location 1. This technical specification allows for assessment at Location 2 for Location 2 based on limited/incomplete data material, as long as this is accompanied by a validated numerical model or physical model and assessment of the uncertainty involved. Another key element is transparency in the assessment.

This technical specification includes:

a) Specification of data requirements needed from the original measurements at Location 1 including an assessment of the uncertainty involved (if based on limited/incomplete data material) in addition to those specified in IEC TS 62600-100 and IEC TS 62600-101.

b) Limitation on the changes that are allowed to the WEC and the specification of the location.

c) Wave data required at Location 2, as a minimum the requirements found in IEC TS 62600-101.

d) Development of the power matrix at Location 2.

e) Validation of the power matrix at Location 2.

f) Assessment of uncertainties in the derived performance parameters at Location 2.

g) Requirements for the allowable power performance transfer by geometric, kinematic and dynamic similarity.

h) Requirements for the allowable incorporation of additional empirical model data.

i) Requirements for the allowable incorporation of additional numerical model data.

The technical specification does not cover the following items:

j) The original data measurement at Location 1 (see IEC TS 62600-100).

k) Environmental concerns.

l) Operation and maintenance.

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