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TECHNICAL SPECIFICATION

**Marine energy - Wave, tidal and other water current converters -
Part 201: Tidal energy resource assessment and characterization**

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Marine energy - Wave, tidal and other water current converters - Part 201: Tidal energy resource assessment and characterization

FOREWORD

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IEC TS 62600-201 has been prepared by IEC technical committee 114: Marine energy – Wave, tidal and other water current converters. It is a Technical Specification.

This second edition cancels and replaces the first edition published in 2015. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) Includes clauses on assessing wave and current interaction;
b) Expands turbulence data collection;
c) Expands the measurement only method to include a combination of static and mobile surveys;
d) Includes a method for combined tidal and river flow;
e) Adds more description for treating uncertainty;
f) Includes two case study examples.

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

Draft	Report on voting
114/573/DTS	114/590/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.

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 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– withdrawn, or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 development of the tidal power industry is at an early stage and the significance of particular tidal energy resource characteristics is not well understood. This document is intended to be updated as understanding of the resource and its response to power extraction becomes better understood. It is noted that it is presently particularly difficult to derive the uncertainty (within specified confidence limits) of the resource, given lack of field and model data for a statistically significant number of sites. However, within this document, guidance regarding the assessment of uncertainty within tidal resource assessment is given. Additionally, Annex C provides an overview of proposed loss and uncertainty categories, to help users better understand the key areas to be included in an energy yield assessment.

The purpose of this document is to provide a uniform methodology that will ensure consistency and accuracy in the estimation, measurement, characterization and analysis of the theoretical tidal current resource at sites that could be suitable for the installation of individual or arrays of Tidal Energy Converters (TECs), together with defining a standardised methodology with which this resource can be described and reported. Application of the estimation, measurement and analysis techniques recommended in this document will ensure that resource assessment is undertaken in a consistent and accurate manner. This document presents techniques that are expected to provide fair and suitably accurate results that can be replicated by others.

The overall goal of the methodology is to enable calculation of the Annual Energy Production (AEP) for the proposed array of TECs at each TEC location in conjunction with IEC TS 62600–200.

In this document, the theoretical tidal energy resource (undisturbed or disturbed by power extraction) is defined by the velocity probability distribution that is used to compute the AEP. For projects where the proposed AEP (converted to average power production) is less than 2 % of the theoretical undisturbed tidal energy resource (or in the case of headlands less than 10 MW installed capacity), AEP can be estimated from direct resource measurements, without requiring hydrodynamic modelling. In all other cases, the velocity probability distribution is assessed by hydrodynamic modelling that includes the effects of energy extraction, with appropriate verification of the baseline model by measurements. The methodology for measuring the required data is also defined. The direct resource measurement approach may use measured data at each TEC location, using either data from a stationary survey or hybrid mobile-stationary surveys, or both.

This document describes only the aspects of the resource required to calculate AEP and assess its uncertainty; e.g. it does not describe aspects of the resource required to evaluate design loads or to satisfy environmental regulations. Furthermore, this document is not intended to cover every eventuality that can be relevant for any particular project. Therefore, this document assumes that the user has access to, and reviews, other relevant IEC documentation before undertaking work (e.g. surveys and modelling) which could also satisfy other requirements.

Further background reading can be found here: IEC TS 62600-101:2015 [1], Coles and Blunden (2017) [2], Kreyszig (1983) [3], Batten et al., (2013) [4], Burton et al., (2011) [5], Roache (1994) [6].

1 Scope

This part of IEC 62600 establishes a system for analysing and reporting, through estimation or direct measurement, the theoretical tidal current energy resource in oceanic areas including estuaries (to the limit of tidal influence) that can be suitable for the installation of one or more TECs.

It is intended to be applied at various stages of project life cycle to provide suitably accurate estimates of the tidal resource to enable the arrays' projected annual energy production to be calculated at each TEC location in conjunction with IEC TS 62600–200.

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 60050-417, *International Electrotechnical Vocabulary (IEV) - Part 417: Marine energy - Wave, tidal and other water current converters*

IEC 61400–12–1, *Wind turbines – Part 12-1: Power performance measurements of electricity producing wind turbines*

IEC TS 62600–200, *Marine energy – Wave, tidal and other water current converters – Part 200: Electricity producing tidal energy converters – Power performance assessment*

IHO (International Hydrographic Organization), 2008, Standards for Hydrographic Surveys. Special Publication No. 44. 5th Edition