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TECHNICAL SPECIFICATION

Marine energy – Wave, tidal and other water current converters – Part 301: River energy resource assessment

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Part 301: River energy resource assessment

FOREWORD

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- 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 TS 62600-301, 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
114/285/DTS	114/301/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.

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.

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

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document 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- withdrawn,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 extraction of energy from flowing water in rivers and canals is gaining acceptance around the world as a means of generating electricity without the use of conventional hydropower dams. The purpose of this document is to provide a uniform methodology that will ensure consistency and accuracy in the estimation, measurement, characterisation, and analysis of the river-velocity resource at sites that could be suitable for the installation of an individual or array of River Energy Converters (RECs), 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 equitable manner. This document presents techniques that are expected to provide fair and suitably accurate results that can be replicated by others. This document is intended to be updated as understanding of the resource and its response to power extraction improves.

The overall goal of the methodology is to enable calculation of the Annual Energy Production (AEP) for the proposed individual or array of river energy converters either as part of a feasibility study (generic river energy converter) or a full study. For the full study, this methodology is employed in conjunction with IEC TS 62600-300 applied at each river energy converter location. Consistency is also maintained with IEC TS 62600-201 wherever possible.

In this document, the river energy resource (undisturbed or disturbed by power extraction) is defined by the velocity duration curve. This document describes only the aspects of the resource required to calculate the velocity duration curve and 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 may be relevant for a 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.

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

Part 301: River energy resource assessment

1 Scope

This part of IEC 62600 provides:

- Methodologies that ensure consistency and accuracy in the determination of the theoretical river energy resource at sites that may be suitable for the installation of River Energy Converters (RECs);
- Methodologies for producing a standard current speed distribution based on measured, historical, or numerical data, or a combination thereof, to be used in conjunction with an appropriate river energy power performance assessment;
- Allowable data collection methods and/or modelling techniques; and
- A framework for reporting results.

The document explicitly excludes:

- Technical or practical resource assessments;
- Resource characterisation;
- Power performance assessment of river energy converters; and
- Environmental impact studies, assessments, or similar.

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 62600-1, *Marine energy – Wave, tidal and other water current converters – Part 1: Terminology*

IEC TS 62600-201, *Marine energy – Wave, tidal and other water current converters – Part 201: Tidal energy resource assessment and characterization*

IEC TS 62600-300*, Marine energy – Wave, tidal and other water current converters – Part 300: Electricity producing river energy converters – Power performance assessment*

ISO 1100-2:2010, *Hydrometry – Measurement of liquid flow in open channels – Part 2: Determination of the stage-discharge relationship*

ISO 9825:2005, *Hydrometry – Field measurement of discharge in large rivers and rivers in flood*

ISO 15769:2010, *Hydrometry – Guidelines for the application of acoustic velocity meters using the Doppler and echo correlation methods*

ISO 18365:2013, *Hydrometry – Selection, establishment and operation of a gauging station*

ISO TS 19130-2:2014, *Geographic information – Imagery sensor models for geopositioning – Part 2: SAR, InSAR, lidar and sonar*

ISO TR 24578:2012 *Hydrometry – Acoustic Doppler profiler – Method and application for measurement of flow in open channels*

ISO/IEC 98-1;2009, *Uncertainty of measurement – Part 1: Introduction to the expression of uncertainty in measurement*

ISO/IEC 98-3:2008, *Uncertainty of measurement – Part 3: Guide to the expression of uncertainty in measurement (GUM: 1995)*

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

ICES, 2006, *Guidelines for Multibeam Echosounder Data*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC TS 62600-1 and the following 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
equivalent diameter
<of a river energy converter> diameter of a circle with area equal to the device **projected capture area**

3.2
power-weighted speed
<of a river energy converter> mean current speed derived with the weighted function of the cube of the speed across the **projected capture area**

3.3
principal flow direction
<of a river current> primary orientation or heading of the **river current**

3.4
project blockage ratio
<of a river energy converter> ratio of the sum total of the flow-facing area of the moving and non-moving parts of all **river energy converters** divided by the average channel cross-sectional area

Note 1 to entry: The average cross-sectional area is calculated by dividing the volume of the fluid in the river energy converter site, determined from bathymetry subject to the lowest operational flow, by the length of the project site along the direction of flow.

3.5
project site
<of a river energy converter> portion of the river within which **river energy converters** and their entire supporting infrastructure are located