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CONSOLIDATED VERSION

INTERNATIONAL STANDARD

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

IEC TS 62600-1:2011-12+AMD1:2019-03 CSV(en)

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Part 1: Terminology

FOREWORD

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IEC TS 62600-1 edition 1.1 contains the first edition (2011-12) [documents 114/65/DTS and 114/76/RVC] and its amendment 1 (2019-03) [documents 114/289/DTS and 114/302/RVDTS].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

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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 62600-1, which is a technical specification, has been prepared by IEC technical committee 114: Marine energy – Wave, tidal and other water current converters.

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

The committee has decided that the contents of this publication and its amendment will remain unchanged until the stability date indicated on the IEC web site 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- withdrawn,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 publication using a colour printer.

INTRODUCTION

This Technical Specification has been developed as a tool for the international marine energy community, to assist in creating clarity and understanding. The wave, tidal and water current energy industry has recently experienced a period of rapid growth and sector development. With this expansion, it became apparent that a glossary of terms for the sector was required. The aim of this Technical Specification is to present clear and consistent language that will aid the development of programs, projects, and future standards.

This Technical Specification lists the terms that the marine energy industry commonly uses. It is an evolving document that will change as new terms and symbols are added. The terminologies herein have been harmonized with IEC 60050 and other IEC documents as far as possible.

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

Part 1: Terminology

1 Scope

This part of IEC 62600 defines the terms relevant to ocean and marine renewable energy. For the purposes of this Technical Specification, sources of ocean and marine renewable energy are taken to include wave, tidal current, and other water current energy converters.

Terms relating to conventional dam and tidal barrage, offshore wind, marine biomass, ocean thermal and salinity gradient energy conversion are not included in the scope of this Technical Specification.

This Technical Specification is intended to provide uniform terminology to facilitate communication between organizations and individuals in the marine renewable energy industry and those who interact with them.

2 Terms and definitions

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

2.1
added mass
extra mass associated with the additional force necessary to accelerate a body through a fluid compared to the same acceleration in a vacuum

NOTE 1 In general, added mass is a variable that depends on the state of the unsteady motion and is not a constant.

NOTE 2 In a viscous (real) fluid, the added mass would include kinetic energy of a fluid layer entrained by the accelerating body.

2.2
added mass at infinity
limit of the mass corresponding to the added mass as the frequency tends to infinity

NOTE The value of added mass at infinity is normally necessary for time domain modelling of wave-body interaction.

2.3
added mass coefficient
ratio between added mass and the mass of the water displaced by the submerged body

2.4
amplitude control
method to obtain the optimum oscillatory motion amplitude to capture a maximum of wave energy

NOTE For a simple oscillating system, the object of amplitude control is to obtain a given oscillatory velocity amplitude that should be related with the wave excitation force.

2.5

annual energy production (marine energy converter)

estimate of total energy production of a marine energy converter system during a one-year period obtained by applying its power performance assessment to a prospective marine energy resource characterization and assuming 100 % availability

NOTE Actual annual energy production is unlikely to exceed this estimate.

[IEC 60050-415:1999, 415-05-09, modified]

2.6

array (marine energy)

farm of marine energy converters arranged specifically so as to enhance energy capture

NOTE Array spacing is dictated by hydrodynamic considerations and may be very closely packed so as to constitute a single platform or an arrangement of identical devices.

2.7

attenuator device

energy converter which is aligned parallel to the predominant direction of wave incidence

2.8

availability (marine energy converter)

ability of a marine energy conversion system to be in a state to perform a necessary function under given conditions at a given instant of time or over a given duration, assuming that the necessary external resources are provided

NOTE 1 For continuously running equipment availability equates to: uptime/(uptime + downtime).

NOTE 2 Where reliability is specified in Mean Time Between Failures (MTBF) and maintainability in Mean Time To Repair (MTTR), availability also equates to: MTBF/(MTBF + MTTR).

[IEC 60050-191:1990, 191-02-05, modified]

2.9

capture area (tidal)

equal to the power captured by the hydrodynamically functional part of a TEC divided by power per square metre of the incident tidal stream

2.10

capture length (wave)

capture width

equal to the power captured by the hydrodynamically functional part of a WEC divided by power per metre of the incident wave field

2.11

centre of buoyancy

centroid of the submerged volume

2.12

centre of flotation

point coinciding with the centroid of the water-plane area

NOTE The water-plane area is the cross-sectional area of the floating body at mean water level in calm water.

2.13

chart datum

reference level of water, typically from a selected phase of the tide at a specific location

NOTE Different hydrographic organizations have differing conventions for defining chart datum.

2.14
conversion efficiency (resource to wire)

measure of the overall effectiveness of a marine energy converter calculated as the ratio of electrical power output in relation to the incident power in the water resource

NOTE 1 For WECs, conversion efficiency (resource to wire) is sometimes referred to as wave-to-wire conversion efficiency.

NOTE 2 Conversion efficiency (resource to wire) is normally calculated over extended periods (e.g. tidal cycle, years, etc.).

2.15
current profile

variation in velocity throughout the water column, typically displayed as a function of height above the sea bed

2.16
deep water (offshore)

spatial location where the depth of the water is greater than or equal to half the wave length

NOTE The deep water (offshore) spatial location is based on the kinematic properties of waves. The dispersion equation is

$$L = \frac{gT^2}{2\pi} \tanh \frac{2\pi d}{L}$$

where

L is the wave length;

d is the water depth;

T is the period;

g is the gravitation acceleration.

In deep water, the dispersion equation may be simplified to

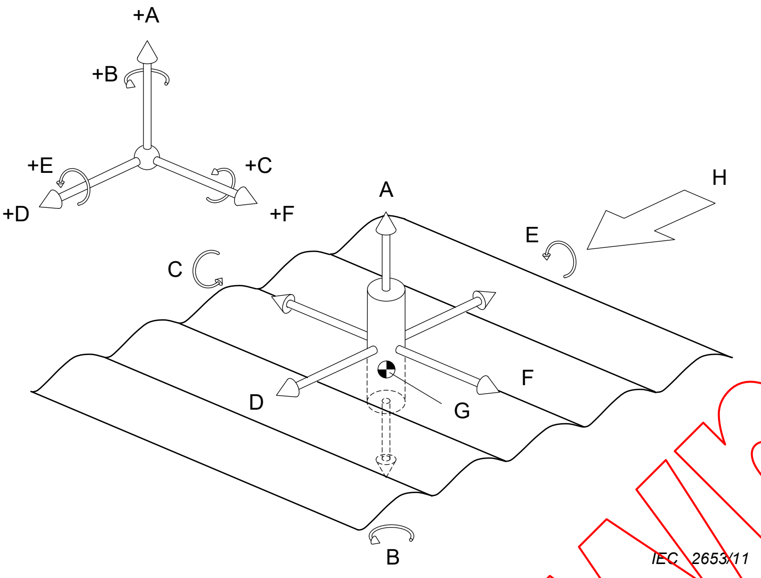
$$L = \frac{gT^2}{2\pi} = 1{,}56\,T^2$$

2.17
degree of freedom

independent displacements and/or rotations that specify the orientation of a body or system

NOTE 1 A marine body may experience three linear and three rotational motions as depicted in Figures 1 and 2.

NOTE 2 The principal axis is parallel to the mean water surface and aligned with the direction of incident energy, and the rotations act about the centre of gravity.



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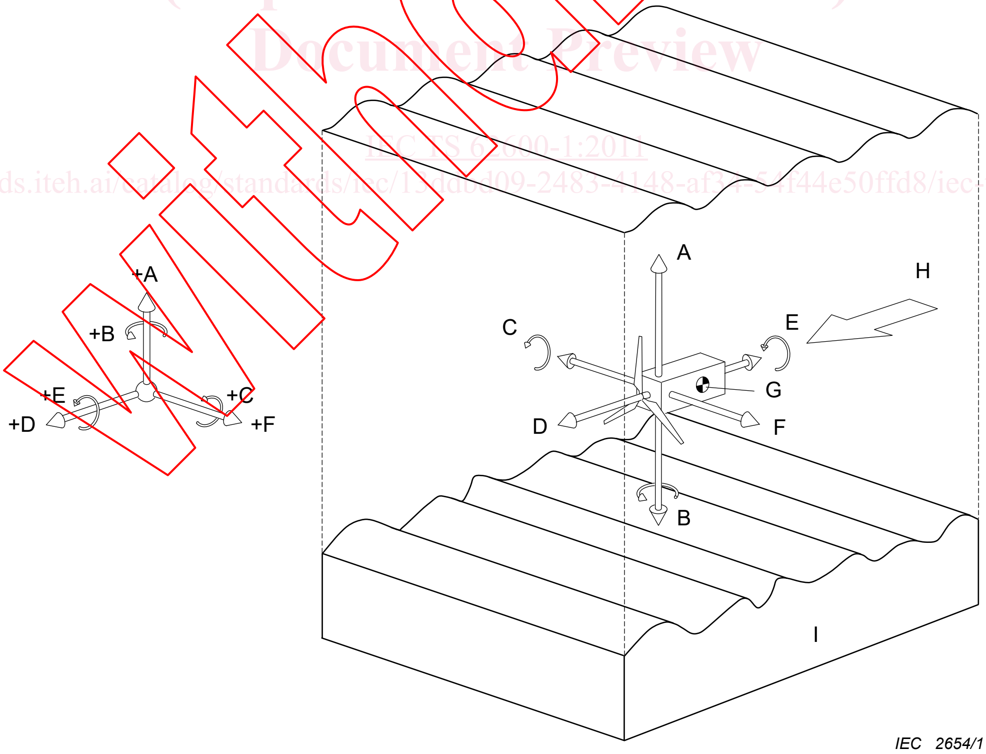
Key

A	Heave	D	Surge	G	Centre of gravity
B	Yaw	E	Roll	H	Incident energy
C	Pitch	F	Sway		

Figure 1 – Six degrees of freedom – Floating device



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Key

A	Heave	D	Surge	G	Centre of gravity
B	Yaw	E	Roll	H	Incident energy
C	Pitch	F	Sway	I	Seabed

Figure 2 – Six degrees of freedom – Submerged device

2.17.1
heave
motion in a direction perpendicular to the mean water surface

2.17.2
pitch
rotation about the sway axis

2.17.3
roll
rotation about the surge axis

2.17.4
surge
motion parallel to the principal axis

2.17.5
sway
motion perpendicular to the principal axis and parallel to the mean water surface

2.17.6
yaw
rotation about the heave axis

2.18
directionally resolved power (wave)
distribution of wave power in a given sea state as a function of the angle of incidence

2.19
directional spreading function
normalized distribution of wave energy, D, for a given frequency, f, over the angle of incidence, θ

NOTE Since $\int_0^{2\pi} D(\theta,f)\,d\theta = 1$ it may be considered to be a probability density function over direction.

2.20
directional wave spectrum
distribution of the spectral density as a function of incident wave frequency and direction

NOTE The directional wave spectrum is calculated as the product of the spectral density, as a function of incident wave frequency, multiplied with the directional spreading function.

2.21
diurnal tides
occurrence of only one high water and one low water in each tidal day

NOTE A tidal day is equal to 24,8 h.

2.22
energy period (wave)
T_e
characteristic wave period associated with energy propagation expressed as the group velocity weighted mean period of the frequency spectrum

NOTE 1 A monochromatic wave in deep water, whose variance and period match the variance and energy period of a specified polychromatic sea state, will also have the same wave power.