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Ships and marine technology — Measurement of changes in hull and propeller performance —

Part 2: Default method

Navires et technologie maritime — Mesurage de la variation de performance de la coque et de l'hélice —

Partie 2: Méthode par défaut

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 8, *Ships and marine technology*, Subcommittee SC 2, *Marine environment protection*.

A list of all parts in the ISO 19030 series can be found on the ISO website.

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Introduction

Hull and propeller performance refers to the relationship between the condition of a ship's underwater hull and propeller and the power required to move the ship through water at a given speed. Measurements of changes in ship specific hull and propeller performance over time make it possible to indicate the impact of hull and propeller maintenance, repair and retrofit activities on the overall energy efficiency of the ship in question.

The aim of this document is to prescribe practical methods for measuring changes in ship specific hull and propeller performance and to define a set of relevant performance indicators for hull and propeller maintenance, repair and retrofit activities. The methods are not intended for comparing the performance of ships of different types and sizes (including sister ships) nor to be used in a regulatory framework.

This document consists of three parts.

— ISO 19030-1 outlines general principles for how to measure changes in hull and propeller performance and defines a set of performance indicators for hull and propeller maintenance, repair and retrofit activities.

— ISO 19030-2 defines the default method for measuring changes in hull and propeller performance and for calculating the performance indicators. It also provides guidance on the expected accuracy of each performance indicator.

— ISO 19030-3 outlines alternatives to the default method. Some will result in lower overall accuracy but increase applicability of the standard. Others may result in same or higher overall accuracy but include elements which are not yet broadly used in commercial shipping.

The general principles outlined, and methods defined, in this document are based on measurement equipment, information, procedures and methodologies which are generally available and internationally recognized.

Clause 4 defines the primary and secondary parameters as well as external information needed. Clause 5 defines how measurement data are to be acquired, stored and prepared. Clause 6 defines how the performance indicators are to be calculated. Clause 7 provides guidance on the expected accuracy of each performance indicator.

Annex A illustrates the process in terms of a flow chart.

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Ships and marine technology — Measurement of changes in hull and propeller performance —

Part 2: Default method

1 Scope

This document defines the default method for measuring changes in hull and propeller performance and calculating a set of basic performance indicators. Finally, it provides guidance on the expected accuracy of each performance indicator.

This document is applicable for commercial ship types of the displacement type driven by conventional fixed pitch propeller(s) where the objective is to compare the hull and propeller performance of the same ship to itself over time.

NOTE Support for additional configurations (e.g. variable pitch propellers) will, if justified, be included in later revisions of this document.

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.

ISO 3046-1, *Reciprocating internal combustion engines — Performance — Part 1: Declarations of power, fuel and lubricating oil consumptions, and test methods — Additional requirements for engines for general use*

ISO 15016:2015, *Ships and marine technology — Guidelines for the assessment of speed and power performance by analysis of speed trial data*

ISO 19030-1:2016, *Ships and marine technology — Measurement of changes in hull and propeller performance — Part 1: General principles*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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
changes in hull and propeller performance
changes in delivered power required to move the ship through water at a given speed or equivalently changes in speed through water at a given delivered power, given unchanged transmission efficiency, and the same environmental conditions and operational profile

3.2
reference period
period in time of a certain length used to establish a baseline

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3.3
evaluation period
period in time after the *reference period* (3.2), used for comparing with the baseline

3.4
reference conditions
set of comparable conditions of environmental and/or operational factors or a set of ranges of such conditions

3.5
tabular format
formatting data in rows and columns, to break down specific data into a quickly scanable layout

3.6
unique identifier
identifier which is guaranteed to be unique among all identifiers used for those objects and for a specific purpose

4 Measurement parameters

4.1 General

This clause describes the primary and secondary parameters for measuring changes in hull and propeller performance.

4.2 Primary parameters

In ISO 19030-1, ship speed through water, V, and delivered power, P_D, are defined as the two primary measurement parameters for measuring changes in hull and propeller performance.

Ship speed through water shall be measured directly, in knots, using a speed log with a minimum sensor accuracy of ±1 %, at 1σ[1)] of the speed of the ship, or ±0,1 knots, at 1σ (both as specified by the sensor manufacturer) whichever is greater.

NOTE Since the overall accuracy associated with measurements of hull and propeller performance is highly sensitive to uncertainties in the measurement of speed, this requirement is intentionally stricter than current SOLAS requirements.

Delivered power shall be approximated based on calculations of shaft power, P_S, from measurements of shaft torque and shaft revolutions following Annex B or, if a torque meter with required signal quality is not available and the conditions defined in Annex C are fulfilled, shall be based on calculations of brake power, P_B, from an engine-specific SFOC (specific fuel oil consumption) reference curve defined in Annex D, continuous measurements of fuel flow and temperature and bunker analysis data (calorific value, density and density change rate for the fuel being consumed).

The approaches to calculating shaft power and brake power, as well as minimum required sensors and sensor accuracies for each, are specified in Annex B and Annex C, respectively.

The same approach to approximating delivered power shall be used throughout both the reference and evaluation periods.

1) Confidence interval of 66 %.

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