
**Ships and marine technology — Model
test method for propeller cavitation
noise evaluation in ship design —**

**Part 2:
Noise source localization**

*Navires et technologie maritime — Méthode d'essai sur modèle
pour évaluer le bruit de cavitation des hélices dans la conception des
navires —*
Partie 2: Localisation de la source de bruits

<https://standards.iteh.ai>
Document Preview

[ISO 20233-2:2019](https://standards.iteh.ai/catalog/standards/iso/b9ebed27-3e03-433f-a744-53569301ec78/iso-20233-2-2019)

<https://standards.iteh.ai/catalog/standards/iso/b9ebed27-3e03-433f-a744-53569301ec78/iso-20233-2-2019>



iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[ISO 20233-2:2019](https://standards.iteh.ai/catalog/standards/iso/b9ebed27-3e03-433f-a744-53569301ec78/iso-20233-2-2019)

<https://standards.iteh.ai/catalog/standards/iso/b9ebed27-3e03-433f-a744-53569301ec78/iso-20233-2-2019>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2019

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Model test setup and conditions	2
5 Noise measurement instrumentation	2
5.1 Hydrophone array.....	2
5.1.1 General.....	2
5.1.2 Hydrophone.....	2
5.1.3 Array types.....	3
5.1.4 Array setup.....	3
5.1.5 Array calibration.....	3
5.2 Data acquisition.....	3
5.2.1 General.....	3
5.2.2 Sampling frequency.....	4
5.2.3 Resolution.....	4
5.2.4 Synchronization for multiple channel sampling.....	4
5.2.5 Filtering.....	4
5.2.6 Acquisition time.....	4
6 Noise measurement procedure	4
6.1 Propeller cavitation noise measurement.....	4
6.2 Background noise measurement.....	4
6.3 Reference field measurement.....	4
7 Post processing	5
7.1 Array signal processing.....	5
7.1.1 Bartlett processor.....	5
7.1.2 MV processor.....	6
7.1.3 Other option for the processors.....	6
7.2 Graphical display of the output.....	6
7.3 Spatial resolution.....	6
Annex A (informative) Hydrophone array design method	7
Annex B (informative) Signal model for array signal processing	8
Bibliography	10

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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 8, *Ship design*.

A list of all parts in the ISO 20233 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Propeller cavitation is the major noise source in commercial ships. The propeller cavitation noise can be assessed by experimental and/or numerical methods in propeller design stage. The numerical methods, such as computational fluid dynamics (CFD) or empirical formulae, might be a good alternative to propeller cavitation noise evaluations. However, the model tests are still used widely for research on propeller cavitation noise.

The objective of the model test is to reduce the propeller noise in ship design by evaluating propeller cavitation noise characteristics at the design phase. Localizing the noise sources in the design stage, as well as predicting its noise levels, might be very helpful. ISO 20233-1 addresses the prediction of propeller noise levels. In order to specify the location of noise source, visual observation of cavitation is the most practical way in view of spatial resolution and efficiency, as the main source of hydrodynamic noise in merchant ship is cavitation. In addition to this observation, noise source localization technique using hydrophone array is under development for verifying the observed noise source location^[1]. Thus this document devotes to the source localization method as a new part of a model test method for propeller cavitation noise evaluation in ship design.

The estimation methods of the propeller noise via model tests were widely studied for a long time and can be used in the shipbuilding industry nowadays. However, the noise source localization is easily accomplished by cavitation observation. This document also serves to provide an example of protocols for acoustic localization which is a relatively new research area.

iTeh Standards (<https://standards.iteh.ai>) Document Preview

[ISO 20233-2:2019](https://standards.iteh.ai/catalog/standards/iso/b9ebed27-3e03-433f-a744-53569301ec78/iso-20233-2-2019)

<https://standards.iteh.ai/catalog/standards/iso/b9ebed27-3e03-433f-a744-53569301ec78/iso-20233-2-2019>

