
**Underwater acoustics — Quantities
and procedures for description and
measurement of underwater sound
from ships —**

Part 1:
**Requirements for precision
measurements in deep water used for
comparison purposes**

*Acoustique sous-marine — Grandeurs et modes de description et de
mesurage de l'acoustique sous-marine des navires —*

*Partie 1: Exigences pour les mesurages en eau profonde utilisées pour
des besoins de comparaison*





COPYRIGHT PROTECTED DOCUMENT

© ISO 2016, Published in Switzerland

All rights reserved. Unless otherwise specified, 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
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Instrumentation	6
4.1 General.....	6
4.2 Hydrophone and signal conditioning.....	7
4.3 Data acquisition, recording, processing and display.....	7
4.4 Distance measurement.....	7
5 Measurement requirements and procedure	8
5.1 General.....	8
5.2 Test site requirements.....	8
5.3 Sea surface conditions.....	8
5.4 Hydrophone deployment.....	9
5.5 Test course and ship operation.....	10
5.6 Test sequence.....	11
6 Post-processing	12
6.1 General.....	12
6.2 Background noise adjustments.....	13
6.3 Sensitivity adjustments.....	14
6.4 Distance normalization.....	14
6.5 Hydrophone and run combination post-processing.....	15
7 Measurement uncertainty	16
8 Reporting example	17
Bibliography	20

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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 43, *Acoustics*, Subcommittee SC 3, *Underwater acoustics*.

This first edition cancels and replaces ISO/PAS 17208-1:2012, which has been technically revised.

ISO 17208 consists of the following parts, under the general title *Underwater acoustics — Quantities and procedures for description and measurement of underwater sound from ships*:

— *Part 1: Requirements for precision measurements in deep water used for comparison purposes*

The following part is under preparation:

— *Part 2: Determination of source levels*

A third part on measurement of radiated noise levels in shallow water is planned.

Introduction

This part of ISO 17208 was developed to provide a standardized measurement method for the quantification and qualification of a ship's underwater radiated noise level. This procedure measures a sector average for a certain beam aspect. It promotes the consistency of reported sound measurements from shipping sources. This part of ISO 17208 provides users with the necessary procedure to compare a ship's radiated noise level to criteria established by others or to contract specifications.

Reduction of all types of ship emissions, most notably ballast water and engine emissions, became an issue in the decade prior to publication of ISO/PAS 17208-1:2012. ISO/PAS 17208-1:2012 was developed in response to growing international concerns about underwater noise and its impact on marine animals.

Excessive underwater noise has the potential to interfere with a marine animal's ability to perform a variety of critical life functions, including navigation, communication and finding food. Because of this, the environmental impact statements of underwater projects such as pile driving, pipe laying and oil exploration now include assessments of underwater noise impact.

This part of ISO 17208 converts the PAS to an International Standard and limits its focus to a precision grade of measurement.

Underwater acoustics — Quantities and procedures for description and measurement of underwater sound from ships —

Part 1:

Requirements for precision measurements in deep water used for comparison purposes

1 Scope

This part of ISO 17208 specifies the general measurement system, procedure, and methodology used for the measurement of underwater sound from ships under a prescribed operating condition. It does not specify or provide guidance on underwater noise criteria or address the potential effects of noise on marine organisms.

The resulting quantities are based on the root-mean-square sound pressure levels (SPL), herein used synonymously with sound pressure level or SPL measured in the far field of the ship and normalized to a distance of 1 m and reported in one-third octave bands (see 4.3). In this part of ISO 17208, the result of these measurements is called “radiated noise level”. The underwater sound pressure level measurement is performed in the geometric far field and then adjusted to the 1 m normalized distance for use in comparison with appropriate underwater noise criteria.

This part of ISO 17208 is applicable to any and all underway surface vessels, either manned or unmanned. It is not applicable to submerged vessels or to aircraft. The method has no inherent limitation on minimum or maximum ship size. It is limited to ships transiting at speeds no greater than 50 kn (25,7 m/s).

The measurement method smooths the variability caused by Lloyd’s mirror surface image coherence effects, but does not exclude a possible influence of propagation effects like bottom reflections, refraction and absorption. No specific computational adjustments for these effects are provided in this part of ISO 17208. A specific ocean location is not required to use this part of ISO 17208, but the requirements for an ocean test site are provided.

The intended uses of the method described in this part of ISO 17208 are: to show compliance with contract requirements or criteria, for comparison of one ship to another ship, to enable periodic signature assessments, and for research and development. The intended users include government agencies, research vessel operators, and commercial ship owners.

Additional post-processing would be required to use the data obtained from this measurement method for determination of the ship source levels to perform far field noise predictions such as needed for most environmental impact studies or for creating underwater noise contour maps.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 18405:—¹⁾, *Underwater acoustics — Terminology*

1) To be published.