
**Mechanical vibration — Measurement
of vibration on ships —**

Part 2:
Measurement of structural vibration

*Vibrations mécaniques — Mesurage des vibrations à bord
des navires —*

Partie 2: Mesurage des vibrations structurelles



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 20283-2 was prepared by Technical Committee ISO/TC 108, *Mechanical vibration, shock and condition monitoring*, Subcommittee SC 2, *Measurement and evaluation of mechanical vibration and shock as applied to machines, vehicles and structures*.

This part of ISO 20283 cancels and replaces ISO 4867:1984 and ISO 4868:1984, of which it constitutes a technical revision.

ISO 20283 consists of the following parts, under the general title *Mechanical vibration — Measurement of vibration on ships*:

- *Part 2: Measurement of structural vibration*
- *Part 3: Pre-installation vibration measurement of shipboard equipment*

The following parts are under preparation:

- *Part 1: General guidelines*
- *Part 4: Measurement and evaluation of vibration of the ship propulsion machinery*

Introduction

Vibration in a ship is generated by machinery, propeller and sea. The vibration responses of the ship structure at different locations are dependent on the dynamic forces and natural frequencies. The dynamic forces vary with the engine load, and the speed and draught of the ship. The natural frequencies vary with the loading condition and draught of the ship.

Global structural vibration in a ship is highly dependent on these parameters. This part of ISO 20283 gives guidance how to obtain an overall picture of the vibration behaviour of the ship by setting up guidelines for measurement of natural frequencies and vibration responses at selected positions under a given loading condition of the ship.

Such data are necessary to describe uniformly the vibration characteristics of ship hulls and the relevant excitation originating from the propulsion plant. This will provide a basis for improved vibration engineering, *i.e.*, systematic comparison against theoretical predictions, other ships and vibration reference levels.

Inclusion of this part of ISO 20283 in the building specification or the contract between purchaser and builder does not necessarily require the measurements and evaluations as described in this part of ISO 20283.

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Mechanical vibration — Measurement of vibration on ships —

Part 2: Measurement of structural vibration

1 Scope

This part of ISO 20283 gives guidelines, and specifies requirements and procedures for the measurement, diagnostic evaluation and reporting of structural vibration of ships, excited by the propulsion plant. Structural vibration can be of global or of local nature. Here, primarily global vibration is dealt with.

Local vibration of deck structures from a habitability point of view is dealt with in ISO 6954. Occurrence of local vibration leading to fatigue damage is rare and strongly related to the individual configuration. Therefore, no general guideline for the measurement of such type of vibration is provided within the scope of ISO 20283 (all parts). For reference, some basic information regarding the design of structures with respect to local structural vibration is provided in Annex D.

This part of ISO 20283 does not consider transient ship vibration phenomena, e.g., as excited by slamming.

Even though torsional shaft or crankshaft vibration can in some cases cause relevant structural vibration, they are not considered here. In this connection, reference can be made to the relevant classification rules and ISO 20283-4.

2 Normative references

The following referenced documents are indispensable for the application 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 2041: *Mechanical vibration, shock and condition monitoring — Vocabulary*¹⁾

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 2041 and the following apply.

3.1

global structural vibration

vibration deflection shapes involving major structural parts of the ship

NOTE Major parts of a ship include: hull girder, superstructure, and aft body.

1) To be published. (Revision of ISO 2041:1990)