INTERNATIONAL STANDARD

ISO 20283-5

First edition
2016-12-15

Mechanical vibration — Measurement of vibration on ships —

Part 5: Guidelines for measurement, evaluation and reporting of vibration with regard to habitability on passenger and merchant ships

Vibrations mécaniques — Mesurage des vibrations à bord des navires —

Partie 5: Lignes directrices pour le mesurage, l'évaluation et l'établissement de rapports des vibrations affectant l'habitabilité à bord des navires de commerce et des paquebots

Reference number
ISO 20283-5:2016(E)

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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).

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 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 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 first edition of ISO 20283-5 cancels and replaces ISO 6954:2000, which has been technically revised with the following changes:

— crew and passenger spaces were clearly defined;

— measurement conditions also include dynamic positioning (DP) mode;

— guideline values were changed from pairs of lower and upper values representing the range of commonly accepted vibration magnitude to just one maximum value. This gives a clearer indication when this document is referred to in commercial contracts or similar. The actual guideline values are somewhat severer accounting for the technical progress made.

A list of parts in the ISO 20283 series can be found on the ISO website.

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Introduction

Shipboard vibration that interferes with duties or reduces comfort is objectionable and often results in adverse comments from crew and passengers. To quantify this vibration, this document gives guidelines for the measurement, evaluation and reporting of habitability for all persons on board, especially for the crew.

Vibration data acquired in accordance with this document are also useful for

— comparison with ship specifications,

— comparison with other ships, and

— further development and improvement of vibration regulations.

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Mechanical vibration — Measurement of vibration on ships —

Part 5: Guidelines for measurement, evaluation and reporting of vibration with regard to habitability on passenger and merchant ships

1 Scope

This document gives guidelines for the measurement, evaluation and reporting of vibration with regard to habitability for all persons on-board passenger and merchant ships, especially for crew. Overall frequency-weighted r.m.s. vibration values in the frequency range 1 Hz to 80 Hz are given as guideline values for different areas on ships.

This document is applicable to passenger and merchant ships with intended voyages of 24 h or more.

This document specifies requirements for the instrumentation and the procedure of measurement in normally occupied spaces. It also contains analysis specifications and guidelines for the evaluation of ship vibration with respect to habitability.

The evaluation of low-frequency ship motion which can result in motion sickness is covered by ISO 2631-1. For the evaluation of the global structural vibration of a ship, however, see ISO 20283-2.

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 2631-1, *Mechanical vibration and shock — Evaluation of human exposure to whole-body vibration — Part 1: General requirements*

ISO 2631-2, *Mechanical vibration and shock — Evaluation of human exposure to whole-body vibration — Part 2: Vibration in buildings (1 Hz to 80 Hz)*

ISO 8041, *Human response to vibration — Measuring instrumentation*

3 Terms and definitions

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

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3.1 General

3.1.1
crew
persons on-board a ship who are responsible to keep running all functions necessary to safely navigate the ship

3.1.2
passenger
person on-board a ship not belonging to the *crew* (3.1.1)

Note 1 to entry: Passengers are also scientific personnel on research ships, temporary working crew, camera teams and similar.

3.1.3
free route
condition achieved when the ship is proceeding at a constant speed and course with helm adjustment of ±2° or less and no throttle adjustment

3.2 Crew and passenger spaces

3.2.1
crew accommodation space
space intended for *crew* (3.1.1) recreational and administration use, namely cabins including day and sleeping rooms, hospitals, mess rooms, recreation rooms

Note 1 to entry: Recreation rooms are lounges, smoke rooms, cinemas, gymnasiums, libraries, hobby rooms and game rooms.

3.2.2
office
area or room for carrying out a ship's business, namely deck office, ship office, meeting rooms

3.2.3
work space
area allocated for predominant manual work, namely workshops, laundries, galleys and laboratories, but except *machinery spaces* (3.2.4)

3.2.4
machinery space
space which contains steam or internal-combustion machinery, pumps, air compressors, boilers, oil fuel units, major electrical machinery, oil filling stations, thrusters, refrigerating, stabilizing, steering gear, ventilation and air conditioning machinery, etc. and trunks to such spaces

Note 1 to entry: Machinery spaces are not meant for longer stay, hence they are not considered in this document.

3.2.5
duty station
work space (3.2.3) where *crew* (3.1.1) members typically stay over prolonged periods of time (typically for a watch of 4 h) to monitor navigation or machinery

Note 1 to entry: Main duty stations are the navigation bridge and the engine control room (ECR).

3.2.6
open-deck recreation space
designated area on the open decks to be used by *crew* (3.1.1) and *passengers* (3.1.2) for the purpose of recreation

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3.2.7
cabin and public space
space primarily intended for *passenger* (3.1.2) use, namely passenger cabins, public spaces

Note 1 to entry: Public spaces are restaurants, lounges, reading and game rooms, gymnasiums, shops.

4 Instrumentation

4.1 General requirements

Measurements in accordance with this document may be carried out using different types of measuring and recording equipment, e.g. instruments of digital, spectral or time-based type. The measuring instrumentation shall meet the requirements of ISO 8041.

It is acceptable to use instruments manufactured in accordance with ISO 8041 that have frequency indications above 80 Hz provided that the filter characteristics comply with ISO 2631-2 (for frequency weighting, W_m, see Annex A).

The compliance of the instrumentation system with the specifications of ISO 8041 requires a calibration at least every 2 years. The date of the last calibration shall be reported.

If further data analysis is required following the measurement analysis as described in this document, the measurement data should be recorded with an electronic system which produces permanent records.

4.2 Functional test

Each channel of the instrumentation shall be checked by mechanical excitation of the transducer prior to and after each measurement series to ensure proper functioning.

5 Measurement locations and directions

5.1 Measurement locations

The classification to be applied to the various areas of a ship according to their type, the measurement locations or any deviations from the recommendations stated in this subclause should be mutually agreed between the interested parties (e.g. shipbuilder and shipowner) prior to the measurements.

NOTE These details constitute a measurement plan.

For practical reasons, it is advised to select the locations such that a sufficient amount of sample data are collected during the measurement phase. For large spaces, it can be necessary to distribute a number of measuring positions. Navigation bridges, engine control rooms, mess rooms and lounges, which are generally larger spaces, shall be measured on a reasonable number of positions.

Measurement locations shall be selected on all decks of occupied spaces in sufficient quantity in order to characterize satisfactorily the vibration behaviour of the ship with respect to habitability. The measurement locations shall be selected in accordance with the following criteria:

a) For each type of occupied space as listed in Table 1, measurements are to be taken preferably in ship sections and areas where vibration is expected. From a walk-through of the ship or during the measurement campaign, locations with apparently elevated vibration should be added to the measurement locations.

b) At least one space of each type of occupied space as listed in Table 1 shall be measured.

c) Where multiple instances of the same type of occupied space exist on a deck, a representative sample of rooms as recommended in Table 1 should be measured.

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