INTERNATIONAL STANDARD

ISO 21131

First edition
2019-06

Ships and marine technology — Marine cranes — Noise limits and measuring method

Navires et technologie maritime — Grues marines — Limites de bruit et méthodes de mesure

Reference number
ISO 21131:2019(E)

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Published in Switzerland

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Foreword

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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).

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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 4, *Outfitting and deck machinery*.

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.

Ships and marine technology — Marine cranes — Noise limits and measuring method

IMPORTANT — The colours represented in the electronic file of this document can be neither viewed on screen nor printed as true representations. For the purposes of colour matching, see ISO 3864-4 which provides colorimetric and photometric properties together with, as a guideline, references from colour order systems.

1 Scope

This document specifies noise limits, noise measurement methods and hearing protection for marine cranes, including electro-hydraulic cylinder luffing cranes, electro-hydraulic wire rope luffing cranes and electric wire rope luffing cranes.

This document is applicable to the noise assessment of marine cranes and for the protection of their operators.

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 3746, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane*

ISO 3828, *Shipbuilding and marine structures — Deck machinery — Vocabulary and symbols*

ISO 4306-1, *Cranes — Vocabulary — Part 1: General*

IEC 61672-1, *Electroacoustics — Sound level meters — Part 1: Specifications*

3 Terms and definitions

For the purposes of this document, the terms and definition given in ISO 4306-1 and ISO 3828 and following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
operating console
location at which the crane's operator activates the motions of the crane

3.2
engine room
location inside the crane's structure that contains the drives, *power units* (3.5) and *drive mechanisms* (3.6)

3.3
structure exterior
exterior of the crane tower body and boom structure

3.4
base exterior
exterior of the crane base flange, acting as the interface between the crane and the hull structure

3.5
power unit
electric motors and pump stations

3.6
drive mechanism
reduction gears, drums, motors and hydraulic cylinders

3.7
noise level
A-weighted sound pressure level
quantity measured by a sound level meter in which the frequency response is weighted according to the A-weighting curve

Note 1 to entry: See IEC 61672-1.

[SOURCE: 1.4.4 in MSC. 337(91).]

4 Area classification

Marine cranes are often subdivided into to the following areas: operating console, engine room, structure exterior and base exterior.

5 Noise level limits and personnel noise exposure duration

Noise level limits are defined to protect against injury resulting from noise level and exposure duration. Noise level limits and maximum exposure duration for different noise areas in marine cranes are given in Table 1.

Table 1 — Noise level limits and maximum exposure duration

Noise areas	Operating console	Engine room	Structure exterior	Base exterior
Noise level limits	85 dB(A)	110 dB(A)	110 dB(A)	85 dB(A)
Maximum exposure duration	8 h	8 h	8 h	8 h
Protection requirements	Hearing protection advised	Hearing protection required	Hearing protection required	Hearing protection advised
NOTE Hearing protection should reduce the noise level to ≤85 dB(A).				
It is recommended that the noise limits of operating console/cab space be up to 75 dB(A).				

6 Measurement methods

6.1 Measurement equipment

6.1.1 General

All measurement equipment shall be within its calibration period.

6.1.2 Sound level meter

Noise level measurements shall use an integral sound level meter meeting the requirements of IEC 61672-1 or an equivalent standard recognised by national regulation.

6.2 Measurement condition

Perform a single-action operation of hoisting, luffing and slewing at 80 % rated load condition in hook operation mode to check the noise sound level.

Perform a single-action operation of hoisting, luffing and slewing at 100 % rated load condition in grab operation mode to check the noise sound level.

6.3 Measurement position

Noise measurements shall be carried out as follows.

a) The sound level meter shall be located at the position, between 1,2 m (seated personnel) and 1,6 m (standing personnel) above the platform, while the measurement is carried out. The distance between two measurement points shall be of at least 1 m. The measurement shall not proceed within 0,1 m from the space boundary in any case.

b) During the measurement, the angle between the sound level meter position and the airflow direction shall not be less than 30°, and the distance between the sound level meter position and the power units, drive mechanism and cooling vent edge shall not be less than 1 m, as far away from a reflection face as possible.

c) The intervals between measurement points shall not exceed 3 m.

d) Measurements shall be taken on at least 3 points.

e) Measurements only need to be taken in normal access areas where personnel would be while the crane is running.

7 Measurement uncertainty and report

7.1 Measurement uncertainty

Noise measurement uncertainty shall meet the requirements of uncertainty given in ISO 3746, which depend on the measuring technique and environmental conditions. It should be taken as the positive square root of the sum of the squares of the standard deviation for condition uncertainty and repeatability deviation, according to this standard.

The standard deviation for condition uncertainty, including running and installation, is below 0,5 dB.

Repeatability results according to this standard have little differences for a single crane, and the standard deviation is no more than 1,5 dB.

7.2 Measurement report

The noise measurement report shall include the following items at least.

a) Measurement type.

b) Crane condition, including the power producer, rated power.

c) Running condition of crane.

d) Measurement environment.

e) Measurement equipment.

f) Measurement organization and personnel.

g) Background noise.

h) Measurement result.

8 Protection from noise

8.1 General

Areas where the noise level exceeds 85 dB(A) shall be demarcated as zones requiring hearing protection. Hearing protection shall be worn if the noise levels equal or exceed 85 dB(A), until additional measures have been taken to reduce the noise levels.

8.2 Protection from noise for the operating console

8.2.1 When the noise level of the operating console space exceeds 85 dB(A), a cab shelter shall be provided to reduce the noise in the operating console.

8.2.2 When the noise level of the cab exceeds 85 dB(A), insulation or other noise-reducing arrangement shall be installed between the cab and the installed structure to reduce the noise level below 85 dB(A).

8.3 Protection from noise for the engine room

If personnel need to enter the engine room where the noise level exceeds 85 dB(A) to inspect and maintain the equipment, hearing protection shall be worn.

9 Noise warning panels

Where noise level exceeds 85 dB(A), noise warning shall be fixed at the entrance of these areas (see Table 2). The warnings shall consist of descriptive text in the working language of the ship and additional safety signs (see Figure 1 and Figure 2) as specified by the administration. Where only a limited area reaches these noise levels, the warnings at these specific locations or equipment shall be fixed at eye-level, and they shall be easily seen from each direction of the passage.

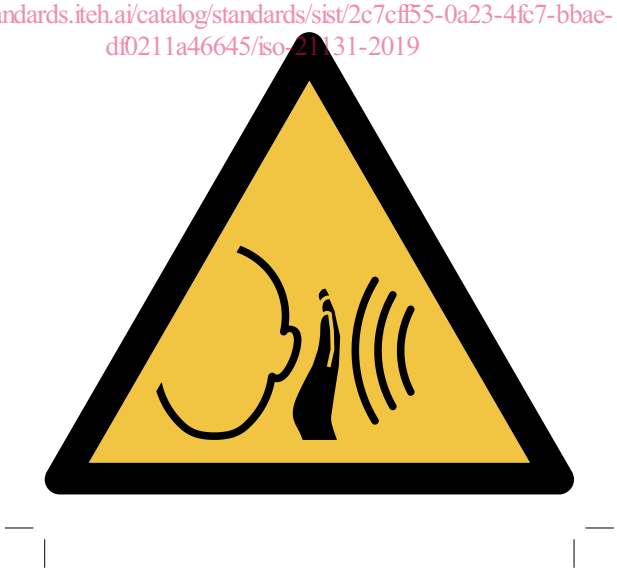
Table 2 — Text and safety signs to be affixed at the entrance of noise level areas

Noise levels	Text content
80 dB(A) to 85 dB(A)	High noise level – Hearing protection advised
85 dB(A) to 110 dB(A)	Dangerous noise level – Mandatory use of hearing protection
110 dB(A) to 115 dB(A)	Caution: Dangerous noise level – Mandatory use the hearing protection –stay only for a short period
>115 dB(A)	Caution: Very-high noise level – Mandatory use of hearing protection – stay no longer than 10 min.

Title: Wear ear protection

NOTE The symbol's registered title and description in ISO 7010 differ from the title and usage in this document.

Figure 1 — Examples of noise warning text and safety signs (ISO 7010-M003)



Title: Warning – Dangerous noise level

NOTE The symbol's registered title and description in ISO 7010 differ from the title and usage in this document.

Figure 2 — Examples of noise warning signs (ISO 7010-W038)