



SLOVENSKI STANDARD
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Vozila za talni transport - Terenska vozila - Varnostne zahteve in preverjanje - 7. del: Preskusna metoda in določanje emisije hrupa

Rough-terrain trucks - Safety requirements and verification - Part 7: Test method and determination of noise emission

Geländegängige Stapler - Sicherheitstechnische Anforderungen und Verifizierung - Teil 7: Testmethode und Bestimmung von Geräuschemissionen

Chariots tout-terrain - Prescriptions de sécurité et vérification - Partie 7 : Partie 7 : Méthode d'essai et détermination de l'émission sonore

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Rough-terrain trucks - Safety requirements and verification - Part 7: Test method and determination of noise emission

Chariots tout-terrain - Prescriptions de sécurité et vérification - Partie 7 : Partie 7 : Méthode d'essai et détermination de l'émission sonore

Geländegängige Stapler - Sicherheitstechnische Anforderungen und Verifizierung - Teil 7: Testmethode und Bestimmung von Geräuschemissionen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 150.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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prEN 1459-7:2017 (E)**European foreword**

This document (prEN 1459-7:2017) has been prepared by Technical Committee CEN/TC 150 "Industrial Trucks - Safety", the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

EN 1459, *Rough-terrain trucks — Safety requirements and verification*, consists of the following parts:

- *Part 1: Variable-reach trucks*
- *Part 2: Slewing variable-reach trucks*
- *Part 3: Interface between the variable-reach truck and the work platform*
- *Part 4: Additional requirements for variable reach trucks handling suspended loads*
- *Part 5: Attachments and attachment interface*
- *Part 6: Application of EN ISO 13849-1 to slewing and non-slewing variable-reach rough-terrain trucks (CEN/TR)*
- *Part 7: Test method and determination of noise emission*
- *Part 8: Variable-reach tractors (CEN/TS)*

Introduction

This document is a type-C standard as stated in EN ISO 12100.

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

- machine manufacturers (small, medium and large enterprises);
- health and safety bodies (regulators, accident prevention organizations, market surveillance, etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

- machine users/employers (small, medium and large enterprises);
- machine users/employees (e.g. trade unions, organizations for people with special needs);
- service providers, e.g. for maintenance (small, medium and large enterprises);
- consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this document.

This noise-test code specifies all the information necessary to carry out efficiently and under standardized conditions the determination, declaration and verification of the noise-emission characteristics of trucks.

Noise-emission characteristics include the emission sound pressure levels at workstations and the sound power level.

The determination of those values is necessary for:

- manufacturers to declare the noise emitted from their machines;
- the design stage and to ensure conformity of production.

The test codes here described are taken from the Working Group 7 position paper – Summary of information gathered to contribute to the Article 20 report (version NOISE/13/01/2 rev.1 adopted June 2013).

The use of these test codes ensures that the tests are conducted and the data is processed in a reliable and reproducible manner.

Test codes defines the limits accuracies and are conducted in engineering methods (grade 2).

Main sources of noise in trucks are:

- internal combustion engine;
- hydraulic components (cylinders, pump...);
- motor fans;
- control valves;
- exhaust gas emission point;
- transmission components.

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Typical measures to reduce noise at design stage are:

- selection of low noise components;
- use of exhaust silencers for engine.

Typical measures to reduce noise by protective measures are:

- the use of sound insulating covers and enclosures around noisy components;
- the use of a sound insulating enclosed cab;
- place the noisy components away from the normal operator's position.

Other measures of identical or better efficiency can be used.

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1 Scope

This European Standard specifies the noise emission measurement methods and the configuration and conditions that are intended to be used for the tests in order to define:

- the Sound Power Level (L_{WA}) of the truck; and
- the Sound Pressure Level (L_{pA}) at the operator's position.

This European Standard applies to:

- rough-terrain variable-reach trucks covered by EN 1459-1; and
- slewing rough-terrain variable-reach trucks covered by EN 1459-2.

It is intended that these tests and measurements are conducted on new machines, taken from the production line.

This standard applies to trucks manufactured after the date of publication.

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.

EN 1459-2:2015, *Rough-terrain trucks - Safety requirements and verification - Part 2: Slewing variable-reach trucks*

EN ISO 3744:2010, *Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Engineering methods for an essentially free field over a reflecting plane (ISO 3744:2010)*

EN ISO 4871:2009, *Acoustics - Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*

EN ISO 11201:2010, *Acoustics - Noise emitted by machinery and equipment - Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections (ISO 11201:2010)*

EN ISO 11204:2010, *Acoustics - Noise emitted by machinery and equipment - Determination of emission sound pressure levels at a work station and at other specified positions applying accurate environmental corrections (ISO 11204:2010)*

EN 12053:2001+A1:2008, *Safety of industrial trucks - Test methods for measuring noise emissions*

EN ISO 12100:2010, *Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)*

IEC 61260:1995, *Electroacoustics - Octave-band and fractional-octave-band filters*

IEC 61672-1:2002, *Electroacoustics - Sound level meters - Part 1: Specifications*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 3744:2010, EN ISO 4871:2009 and EN ISO 11201:2010 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>

4 Safety requirements

4.1 Instrumentation

4.1.1 General

The instrumentation system, including the microphones, cables and windscreen, if used, shall meet the requirements of IEC 61672-1:2002, class 1, and the filters shall meet the requirements of IEC 61260:1995, class 1.

4.1.2 Calibration

Unless national regulations dictate otherwise, it is recommended that the sound calibrator should be calibrated at intervals not exceeding 1 year, the reference sound source should be calibrated at intervals not exceeding 2 years, the compliance of the instrumentation system with the requirements of IEC 61672-1 should be verified at intervals not exceeding 2 years, and the compliance of the filter set with the requirements of IEC 61260 should be verified at intervals not exceeding 2 years.

4.2 Test environment

4.2.1 General

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Humidity, air temperature, barometric pressure, vibration and stray magnetic fields shall be within the limits specified by the manufacturer of the instrumentation.

4.2.2 Test site and environmental correction, K_{2A}

The test area bordered by the vertical projection of the microphones to the ground shall consist of concrete or non-porous asphalt.

The environmental correction, K_{2A} , shall be determined according to Annex A of EN ISO 3744:2010 (absolute comparison test), to account for deviations of the test environment from the ideal condition. Measurements in accordance with this European Standard are only valid where $K_{2A} \leq 4$ dB (accuracy grade 2).

For test-site measurement ground surfaces consisting of a hard reflecting plane, and having negligible sound-reflecting obstacles within a distance from the source equal to three times the measurement hemisphere radius, it may be assumed that the absolute value of environmental correction, K_{2A} , is less than or equal to 0.5 dB, and can therefore be disregarded. In this case, K_{2A} shall be equal to 0 dB.

4.2.3 Background noise correction, K_{1A}

The background noise correction, K_{1A} , shall be calculated using Formula (1):

$$K_{1A} = -10 \log_{10} \left(1 - 10^{-0.1 \cdot \Delta L_p} \right) \quad (1)$$

where

$$\Delta L_p = \overline{L'_{p(ST)}} - \overline{L_{p(B)}}$$

in which

$\overline{L'_{p(ST)}}$ is the A-weighted time-averaged sound pressure level from the array of microphone positions over the measurement surface, with the noise source under test in operation, in decibels;

$\overline{L_{p(B)}}$ is the A-weighted time-averaged sound pressure level of the background noise from the array of microphone positions over the measurement surface, in decibels.

If $\Delta L_p > 15$ dB, K_{1A} is assumed to be zero, and no correction for background noise shall be applied.

If $6 \text{ dB} \leq \Delta L_p \leq 15$ dB, corrections shall be calculated in accordance with Formula (1) and corrections shall be applied.

If $\Delta L_p < 6$ dB, the accuracy of the result(s) may be reduced and the background noise criteria is not satisfied.

4.2.4 Climatic conditions

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Measurements shall not be carried out under the following conditions:

- when there is precipitation, i.e. rain, snow or hail;
- when the ground surface is covered with snow;
- when the temperature is below -10 °C or above $+35$ °C;
- when the wind speed exceeds 8 m/s; for wind speeds in excess of 1 m/s, a microphone windscreen shall be used and appropriate compensation for the effect of its use allowed for when calibrating.

4.3 Measurement of A-weighted sound power level

4.3.1 General

The determination of the A-weighted sound-power level shall be according to EN ISO 3744.

For each mode of operation, as defined in paragraph 5.1, the sound power level shall be measured at all microphone positions (preferably simultaneously) at least three times.