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Mobile road construction machinery — Safety —

Part 2: Specific requirements for road-milling machines

Machines mobiles pour la construction de routes — Sécurité —

Partie 2: Prescriptions spécifiques pour fraiseuses routières

Reference number
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Contents

Page

Foreword ... **iv**
Introduction ... **v**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **1**
4 Safety requirements and/or protective/risk reduction measures ... **4**
4.1 General ... 4
4.1.1 Context ... 4
4.1.2 Specific relation to ISO 20500-1 ... 4
4.2 Visibility ... 4
4.2.1 General ... 4
4.2.2 Visibility performance criteria ... 4
4.2.3 Visibility performance criteria for the RB ... 6
4.3 Operation and handling ... 7
4.3.1 General ... 7
4.3.2 Road-milling machines with emission reducing device by evacuation (EVAC-ERD) ... 7
4.4 Operator's station ... 7
4.5 Stopping ... 7
4.6 Access system to operator's station and to maintenance points ... 7
4.7 Protection ... 8
4.7.1 General ... 8
4.7.2 Milling equipment ... 8
4.7.3 Lowering the milling equipment ... 10
4.8 Signal devices and warning signs ... 10
4.9 Conveyors ... 10
4.10 Electro-magnetic compatibility (EMC) ... 10
4.11 Noise ... 10
5 Verification of the safety requirements and/or protective/risk reduction measures ... **11**
6 Information for use – Operator´s manual ... **12**
Annex A (normative) **Noise test code for road-milling machines** ... **13**
Annex B (informative) **Examples of road-milling machines** ... **19**
Annex C (normative) **Emission reducing device by evacuation (EVAC-ERD) – Test procedures** ... **21**
Annex D (informative) **List of significant hazards** ... **42**
Bibliography ... **45**

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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 document 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 195, *Building construction machinery and equipment*.

A list of all parts in the ISO 20500 series can be found on the ISO website.

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.

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Introduction

This document is a type-C standard as stated in 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 organisations, 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.

The machinery concerned and the extent to which hazards, hazardous situations or hazardous events are covered are indicated in the Scope of this document.

When requirements of this type-C standard are different from those which are stated in type-A or type-B standards, the requirements of this type-C standard take precedence over the requirements of the other standards for machines that have been designed and built according to the requirements of this type-C standard.

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Mobile road construction machinery — Safety —

Part 2:
Specific requirements for road-milling machines

1 Scope

This document, together with ISO 20500-1:2026, deals with all significant hazards, hazardous situations and events relevant to road-milling machines when used as intended and under the conditions of misuse which are reasonably foreseeable by the manufacturer (see Annex D) associated with the whole lifetime of the machine as described in ISO 12100:2010, 5.4.

The requirements of this document are complementary to the common requirements formulated in ISO 20500-1:2026. This document does not repeat the requirements of ISO 20500-1:2026 but supplements or modifies the requirements for road-milling machines.

The following significant and relevant hazards are not covered in this document:

— lightning;

— vibration.

NOTE A vibration test code is under preparation.

This document is not applicable to road-milling machines manufactured before the date of its 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.

ISO 3744:2025, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane*

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 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 15645:2018, *Road construction and maintenance equipment — Road milling machinery — Terminology and commercial specifications*

ISO 20500-12026, *Mobile road construction machinery — Safety — Part 1: Common requirements*

ISO 29042-4:2009, *Safety of machinery — Evaluation of the emission of airborne hazardous substances — Part 4: Tracer method for the measurement of the capture efficiency of an exhaust system*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12100:2010, ISO 15645:2018, ISO 20500-1:2026 and the following apply.

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

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

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

3.1
road-milling machine
mobile road construction machine used to mill material from paved surfaces

Note 1 to entry: Examples can be found in Figures B.1, B.2 and B.3.

3.2
milling equipment
power-driven tool-carrier, equipped with tools for the milling process, to cut the material to be removed in an abrasive manner

3.3
milling drum
power-driven tool-carrier comprising a cylindrical body, equipped with tools at the drums perimeter and cutting the material to be erased by an upcut-milling-process during the milling operation

Note 1 to entry: Examples can be found in Annex B.

3.4
emission reducing device
ERD
system to extract or reduce emissions of airborne particles generated by the milling process from the area of the operator's stations of a road-milling machine

3.5
emission reducing device by evacuation
EVAC-ERD
ERD (3.4) system based on fluid-dynamic evacuation of airborne particles by technical means establishing an accelerated airflow or negative pressure in the rotor chamber

Note 1 to entry: Rotor chamber is shown in ISO 15645:2018, Figure A.3.

3.5.1
tracer gas test method
use of substances with an aerodynamic behaviour comparable to the pollutant under consideration and which can be reliably measured

3.5.2
EVAC-ERD design volume flow
Q_{design}
mean volume flow of air discharged by the *EVAC-ERD* (3.5) and as specified by the manufacturer during design phase

3.5.3
effective EVAC-ERD volume flow
$Q_{effective}$
mean volume flow of air discharged by the *EVAC-ERD* (3.5) as measured under specific test conditions

Note 1 to entry: The test conditions are specified in Annex C.

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3.5.4
effective tracer gas volume flow
Q_{SF_6}
mean volume flow of *tracer gas* (3.5.10), e.g. SF_6 injected into the *EVAC-ERD* (3.5) either via direct injection or via the injection lance under specific test conditions

Note 1 to entry: The test conditions are specified in Annex C.

Note 2 to entry: SF_6 is identified to have a high potential as green-house-gas. It can be substituted by alternative tracer gases in the future.

3.5.5
measured capture efficiency of an EVAC-ERD
η**c**
ratio of the mean concentration of *tracer gas* (3.5.10) measured in the *EVAC-ERD* (3.5) discharge during the capture efficiency test to the mean concentration of tracer gas measured in the EVAC-ERD discharge during the 100 % capture test

3.5.6
effective capture efficiency of an EVAC-ERD
$\eta_{c,effective,\ EUT}$
average of several samples of the ratio of the mass-flow rate of a specified pollutant directly collected by the *EVAC-ERD* (3.5) to the uncontrolled mass-flow rate of this pollutant emitted from the machine with a Student-T-correction for a confidence level of 90 % applied

Note 1 to entry: This value is the significant parameter of an EVAC-ERD.

3.5.7
ambient gas concentration
C_1,
C_1'
concentration measured at the point of sampling when no *tracer gas* (3.5.10) is actually released

Note 1 to entry: These concentrations represent the background concentrations and are used to correct the measured concentration values C_2 (3.5.8) and C_3 (3.5.9) when determining the *measured capture efficiency of an EVAC-ERD*, η_c (3.5.5). C_1 designates the pre-test ambient gas concentration whereas C_1' represents the post-test ambient gas concentration once the purge cycle is complete.

Note 2 to entry: Each test requires determination of the ambient gas concentrations C_1 and C_1'. These values can be higher than earlier ambient gas concentration measurements if precedent measurements have been carried out in advance or if residual concentration of tracer gas is present.

3.5.8
scaled tracer gas concentration
C_2
concentration measured at the point of sampling when the *tracer gas* (3.5.10) is directly released into the *EVAC-ERD* (3.5) and diluted by the system volume-flow

Note 1 to entry: This concentration is used as 100 %-reference-value for determining the *measured capture efficiency of an EVAC-ERD*, η_c (3.5.5).

3.5.9
EVAC-ERD-characteristic tracer-gas concentration
C_3
concentration measured at the point of sampling when the *tracer gas* (3.5.10) is released at a characteristic point (e.g. under the distribution auger) and diluted by the system volume-flow

Note 1 to entry: For an example of a characteristic point, see Annex C.

Note 2 to entry: This concentration is used as a calculation-value for determining the *measured capture efficiency of an EVAC-ERD*, η_c (3.5.5).

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3.5.10
tracer gas
gas used for the purpose of the tests, that is non-toxic, chemically inert, low background concentration or environmental interferences, and is easily measured at low concentrations

Note 1 to entry: Historically SF_6 has been a commonly used tracer gas.

Note 2 to entry: Other tracer gases can be used if future research identifies an appropriate substitute.

Note 3 to entry: The use of tracer gas is described in Annex C.

3.5.11
equipment under test
EUT
representative road-milling machine equipped with an *EVAC-ERD* (3.5) establishing a test-setup to carry out a valid test

Note 1 to entry: The valid test is described in Annex C.

4 Safety requirements and/or protective/risk reduction measures

4.1 General

4.1.1 Context

Road-milling machines shall conform to the safety requirements and/or protective/risk reduction measures of this clause. In addition, the machines shall be designed according to the principles of ISO 12100:2010 for relevant but not significant hazards which are not dealt with by this document.

4.1.2 Specific relation to ISO 20500-1

Road-milling machines shall conform to the requirements of ISO 20500-1:2026, as far as not modified or replaced by the requirements of this document.

4.2 Visibility

4.2.1 General

ISO 20500-1:2026, 4.2 applies with the additions specified in 4.2.2 and 4.2.3.

4.2.2 Visibility performance criteria

The measurement result shall show no maskings, or maskings smaller than or equal to the performance criteria with direct or indirect view as specified in Table 1, when tested using the setup details as shown in Figure 1.

When there are two operator positions on the operator's station, each operator position shall be evaluated separately. The resulting maskings may be a combination (overlapping) of the individual maskings.

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