

Agricultural machinery — Agricultural self-propelled mounted, semi-mounted and trailed machines — Common safety requirements

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 37 and a back cover.

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**Agricultural machinery - Agricultural self-propelled, mounted,
semi-mounted and trailed machines - Common safety
requirements**

Matériel agricole - Machines automotrices, portées, semi-
portées et traînées - Prescriptions communes de sécurité

Landmaschinen - Selbstfahrende, angebaute, aufgesattelte
und gezogene Landmaschinen - Gemeinsame
Sicherheitsanforderungen

This European Standard was approved by CEN on 3 October 1999.

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COMITÉ EUROPÉEN DE NORMALISATION
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Contents

Foreword	4
Introduction	5
1 Scope.....	5
2 Normative references	5
3 Definitions.....	7
4 Safety requirements and/or measures.....	7
4.1 Requirements applicable to all machines	7
4.1.1 Fundamental principles, design guidance	7
4.1.2 Noise.....	7
4.1.3 Vibration.....	7
4.1.4 Actuating forces on controls	7
4.1.5 Operator stations	8
4.1.6 Other boarding means	10
4.1.7 Protection against mechanical hazards	11
4.1.8 Protection against other hazards	12
4.1.9 Service and maintenance - Manual operation of individual assemblies	13
4.2 Requirements applicable to self propelled ride-on machines.....	13
4.2.1 Controls.....	13
4.2.2 Operator station	13
4.2.3 Access to the driver's seat.....	15
4.2.4 Protection against mechanical hazards	16
4.2.5 Protection against other hazards	16
4.2.6 Service and maintenance	17
4.3 Requirements applicable to mounted, semi-mounted and trailed machines	17
4.3.1 Controls.....	17
4.3.2 Protection against mechanical hazards	18
4.3.3 Protection against other hazards - Hydraulic, pneumatic and electrical links with a self-propelled machine	19
4.3.4 Service and maintenance	19
5 Information for use	20
5.1 Instruction handbook	20
5.2 Warnings	21
5.3 Marking.....	21
Annex A (normative) List of hazards	22
Annex B (normative) Test for strength of guards and barriers.....	28
B.1 Guards.....	28
B.1.1 Test equipment.....	28
B.1.2 Test procedure	28
B.1.3 Test acceptance	29
B.2 Barriers.....	29
B.2.1 Test equipment.....	29
B.2.2 Test procedure	29
B.2.3 Test acceptance	29
Annex C (normative) Use of the ISO standards 3789-1:1982, 3789-2:1982.....	30
Annex D (informative) Measurement, declaration and verification of noise emission values	31
D.0 Introduction	31
D.1 Scope.....	31
D.2 Emission sound pressure level determination	31
D.3 Sound power level determination	32

D.4	Installation and mounting conditions	32
D.5	Operating conditions	32
D.6	Measurement uncertainties	33
D.7	Information to be recorded and reported	33
D.8	Declaration and verification	33
Annex E (informative) Data sheet and test report form		35
Annex ZA (informative) Relationship of this European Standard with EU Directives		36
Bibliography Lists of standards or draft standards to which it is referred in 4.1.4 and in annexes A and D		37

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 144, Tractors and machinery for agriculture and forestry, the Secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2000, and conflicting national standards shall be withdrawn at the latest by May 2000.

This European Standard 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 standard.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Annexes A, B and C are normative. Annexes D and E are informative.

Introduction

The extent to which hazards are covered is indicated in the scope of this standard.

1 Scope

This standard deals with safety requirements and their verification for the design and construction of common aspects of all kinds of agricultural self-propelled ride-on machines and mounted, semi-mounted or trailed machines, with the exclusion of tractors (as defined in article 1(1) of Council Directive 74/150/EEC), agricultural aircraft and air cushion vehicles.

The application of this standard alone will not be sufficient to deal with all the significant risks for most machines. Additional safety requirements and deviations are given in the C standard dealing with a specific machine. The combined application of this standard and the machine specific standard will give relevant requirements, and where a C standard exists its requirements and deviations shall prevail over this standard.

This standard does not deal with harmful substances such as chemicals or dust.

This standard does not deal with machines having a nominal supply voltage greater than 50 V.

The stability of the machine in dynamic condition is not dealt with in this standard.

The list of significant common hazards dealt with in this standard is given in annex A. Annex A also indicates the hazards which have not been dealt with, or that have been partly dealt with. This annex is a list of significant hazards that have been identified as common to self-propelled, mounted, semi-mounted and trailed agricultural machines. A number of hazards for a specific machine may not have been dealt with in this annex A.

Environmental aspects have not been considered in this standard.

This standard applies primarily to machines which are manufactured after the date of issue of the standard.

NOTE Agricultural machinery can travel on public roads. In such circumstances additional specific rules - not incorporated in this standard - will apply.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

EN 292-1:1991, *Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology.*

EN 292-2:1991, *Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications.*

EN 292-2:1991/A1:1995, *Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications.*

EN 294:1992, *Safety of machinery - Safety distances to prevent danger zones being reached by the upper limbs.*

EN 982:1996, *Safety of machinery - Safety requirements for fluid power systems and their components - Hydraulics.*

EN 983:1996, *Safety of machinery - Safety requirements for fluid power systems and their components - Pneumatics.*

EN 1032:1996, *Mechanical vibration - Testing of mobile machinery in order to determine the whole-body vibration emission value - General.*

EN 1088:1995, *Safety of machinery - Interlocking devices associated with guards - Principles for design and selection.*

EN 1152:1994, *Tractors and machinery for agriculture and forestry - Guards for power take-off (PTO) drive shafts - Wear and strength tests.*

prEN 12965:1997, *Tractors and machinery for agriculture and forestry - Power take-off drive shafts and their guards - Safety.*

EN 25353:1988, *Earth moving machinery and tractors and machinery for agriculture and forestry - Seat index point.*

EN ISO 3767-1:1995, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment - Symbols for operator controls and other displays - Part 1: Common symbols (ISO 3767-1:1991).*

EN ISO 3767-2:1995, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment - Symbols for operator controls and other displays - Part 2: Symbols for agricultural tractors and machinery (ISO 3767-2:1991).*

EN ISO 11688-1:1998, *Acoustics - Recommended practice for the design of low-noise machinery and equipment - Part 1: Planning.*

EN ISO 14982:1998, *Agricultural and forestry machines - Electromagnetic compatibility - Test methods and acceptance criteria.*

ISO 3789-1:1982, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment - Location and method of operation of operator controls - Part 1: Common controls.*

ISO 3789-2:1982, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment - Location and method of operation of operator controls - Part 2: Controls for agricultural tractors and machinery.*

ISO 5006-1:1991, *Earth-moving machinery - Operator's field of view - Part 1: Test method.*

ISO 5006-2:1993, *Earth-moving machinery - Operator's field of view - Part 2: Evaluation method.*

ISO 5006-3:1993, *Earth-moving machinery - Operator's field of view - Part 3: Criteria.*

ISO 5008:1979, *Agricultural wheeled tractors and field machinery - Measurement of whole-body vibration of the operator.*

ISO 5721:1989, *Tractors for agriculture - Operator's field of vision.*

ISO 11684:1995, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment - Safety signs and hazard pictorials - General principles.*

ISO/TR 3778:1987, *Agricultural tractors - Maximum actuating forces required to operate controls.*

prEN ISO 11688-2:1998, *Acoustics - Recommended practice for the design of low-noise machinery and equipment - Part 2: Introduction into physics of low-noise design.*

3 Definitions

For the purpose of this standard the definitions given in EN 292-1:1991 and EN 292-2:1991/A1:1995 apply together with the following:

3.1

three point contact support

system which permits a person to simultaneously use two hands and a foot or two feet and one hand when boarding, or dismounting from, a machine

4 Safety requirements and/or measures

4.1 Requirements applicable to all machines

4.1.1 Fundamental principles, design guidance

The machinery shall comply as appropriate with EN 292 for hazards which are not dealt with and especially with annex A of EN 292-2:1991/A1:1995 when EN 292 does not give precise requirements.

Unless otherwise specified in this standard, the machines shall comply with Tables 1, 3, 4 and 6 of EN 294:1992.

4.1.2 Noise

4.1.2.1 Noise reduction at the design stage

General technical information on means to design low-noise machinery is given in EN ISO 11688-1 and prEN ISO 11688-2.

NOTE The way noise is generated is dependent on the design and use of each machine type. Therefore it is not possible to deal with noise reduction methods in this standard.

4.1.2.2 Declaration of noise

The informative annex D provides all the information necessary to carry out the determination, declaration and verification of noise emission values.

4.1.3 Vibration

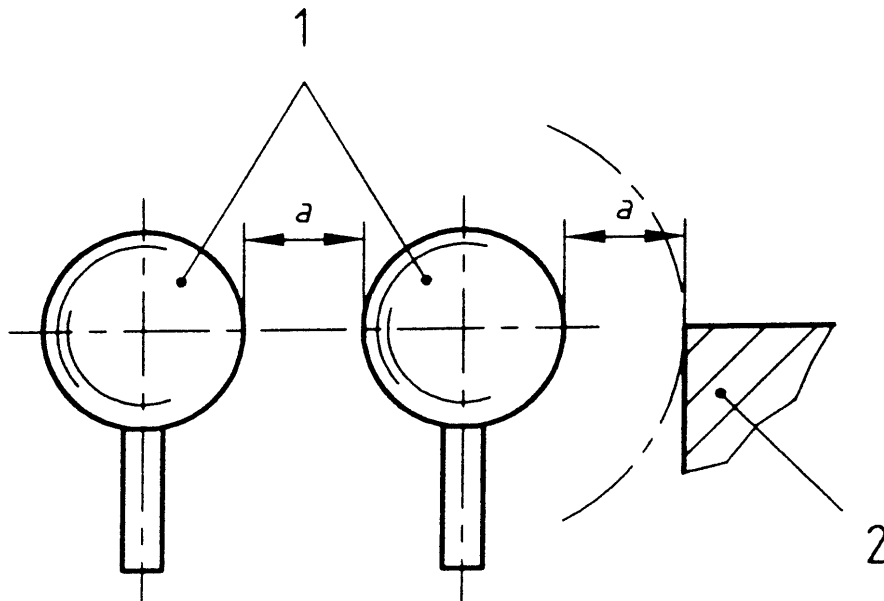
The weighted root mean square acceleration value to be given by the manufacturer should be measured following EN 1032 and/or ISO 5008 or other specific relevant ISO standards in preparation.

Vibration measurements are not needed for machines that do not require a ride-on operator.

NOTE The way vibrations are generated is dependent on the design and use of each machine type. Therefore it is not possible to deal with vibration reduction methods in this standard.

4.1.4 Actuating forces on controls

Manual controls requiring an actuating force ≥ 100 N shall have a minimum clearance a of 50 mm between the outer contours or from other parts of the machine (see Figure 1). Controls requiring an actuating force < 100 N shall have a minimum clearance of 25 mm.



- 1 - manual controls
2 - fixed part

Figure 1 - Clearance around controls

Fingertip operation controls, e.g. push-buttons, electric switches, are excluded.

Actuating forces shall comply with ISO/TR 3778.

NOTE ISO/TR 15077 is being developed and will replace ISO/TR 3778.

4.1.5 Operator stations

Risks arising from the possible contact with moving parts of the machine or a wheel from the means of access are not dealt with in this standard.

Relevant C standards for particular machines shall give specific requirements.

4.1.5.1 Boarding means

If the vertical height of the work station floor and/or the floor of the cabin above ground level exceeds 550 mm a boarding means shall be provided. The dimensions shall be as shown in Figure 2.

If ladders are used, their inclination α shall be between 70° and 90° from the horizontal (see Figure 2).

For other operator station boarding means with an inclination from the horizontal of less than 70° , the sum of $2B + G$ shall be ≤ 700 mm where B is the vertical distance and G the horizontal distance between steps. The remaining dimensions shall be as shown in Figure 2.

The vertical distance between successive steps shall be equal within a tolerance of ± 20 mm.

Each step shall have a slip-resistant surface, a lateral stop at each end and be so designed that accumulation of mud and snow is minimized in the normal conditions of work.

When any movable parts of the means of boarding are operated they shall not cause shearing, pinching or uncontrollable movement (e.g. gravitational force) hazard. The operating force shall not exceed 200 N.

On track machines, the track shoes and track pad surfaces can be used as access steps if three-point contact support is provided for the operator.

Dimension in millimetres

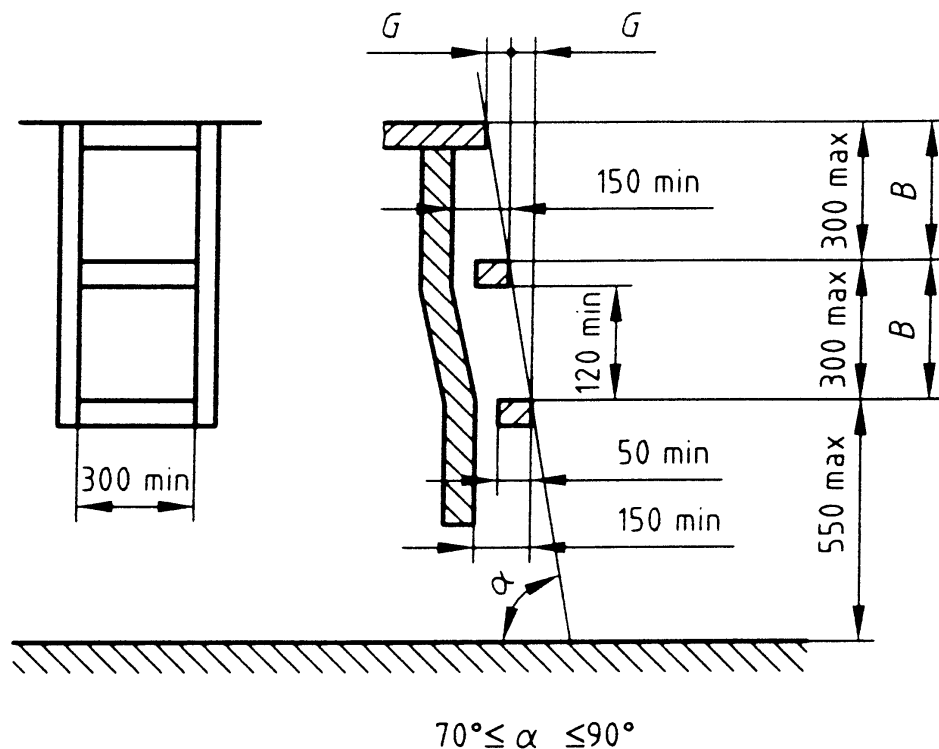


Figure 2 - Dimensions of boarding means

4.1.5.2 Handrails, handholds

Handrails or handholds shall be provided on both sides of the boarding means.

These shall be so designed that the operator can maintain three-point contact support at all times. The width of the handrail/handhold cross-section shall be between 25 mm and 35 mm. The lower end of the handrail/handhold shall be located no higher than 1 500 mm from the ground. A minimum clearance of 50 mm shall be provided for hand clearance all round the handrail/handhold.

A handrail/handhold grab shall be provided at a height of between 800 mm and 1 100 mm above the uppermost step/rung of the means of boarding. Handholds shall be at least 150 mm long.

4.1.5.3 Platforms

All platforms shall be flat and have a slip-resistant surface and, if necessary, drainage.

Any platform, except those only used when the machine is stationary and which are less than 1 000 mm above the ground, shall be fitted with a foot guard around the edge, or not more than 50 mm outside it, which shall be at least 75 mm high. No foot guard shall be provided at the entrance of the platform. A rail shall be provided not less than 1 000 mm and not more than 1 100 mm above the platform. An intermediate rail shall be provided so that the vertical distance between any two rails or between a rail and the foot guard does not exceed 500 mm.

NOTE Static parts of the machine that afford protection at least equal to that provided by a footguard or handrail and which do not present other hazards e.g. sharp edges, hot surfaces, etc., may be considered to fulfil these requirements.

If work and/or access platforms are provided for operators or for the loading of materials, the access to such platforms shall be capable of being closed when the machine is operating.

4.1.6 Other boarding means

Boarding means to locations other than the driver's or operator's workstation (e.g. leading to servicing or maintenance locations) shall be provided with foot supports (e.g. rungs or steps) and handholds.

NOTE Handholds and boarding means may be an integral part of the machine, provided they are suitably constructed and positioned.

Such boarding means shall comprise a series of successive steps in accordance with Figure 3 and as follows:

- the inclination α shall be between 80° and 90° from the horizontal (see Figure 3). Each step shall have a slip-resistant surface, a lateral stop at each end and be so designed that accumulation of mud and snow is minimized in the normal conditions of work. The vertical and horizontal distance between successive steps shall be within a tolerance of ± 20 mm;

or

- shall be designed as a ladder. The top side of each rung shall have a horizontal slip-resistant surface at least 30 mm from front to back. If rungs can be used as handholds then rectangular section rungs shall have corner radii ≥ 5 mm;

or

- shall comply with the requirements in **4.1.5.1**.

Servicing or maintenance locations shall have slip-resistant surfaces and suitable handholds.

For machines with a PTO drive shaft above the coupling device, the means of access shall not be above the PTO drive shaft.

By design PTO drive shafts and their guards shall not be considered as steps.