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Agricultural machinery — Safety — Part 13: Large rotary mowers

Matériel agricole — Sécurité — Partie 13: Grandes faucheuses rotatives

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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 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 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 7, —*Equipment for harvesting and conservation*.

This second edition cancels and replaces the first edition (ISO 4254-13:2012), which has been technically revised.

The main changes ~~compared to the previous edition~~ are as follows:

- ~~Additional~~additional information has been added to the Scope regarding applicability;
- ~~the~~ Normative references have been updated;
- ~~In~~ Clause 3:
 - some terms and definitions have been modified, added or removed;
 - former ~~figure~~Figure 1 has been removed and subsequent figures have been renumbered;
- ~~Blade~~blade test and performance requirements have been moved to ISO 5718-2;
- ~~In~~ Clause 4:

- subclauses 4.8, 4.9, 4.10 and 4.11 have been revised to reflect the strength and performance requirements in the standards concerned;
- ~~in~~ Clause 5:
 - title has been revised;
 - ~~figure~~Figure 2 (former Figure 3) has been modified;
 - ~~figure~~Figure 3 (former Figure 4) has been modified;
 - 5.2.2.3 has been added to indicate a test condition;
 - 5.3.1.4 has been modified to indicate new requirements for test equipment;
 - 5.4.1.4 has been added to indicate new requirements for test equipment;
 - 5.4.5 test acceptance criteria has been modified;
 - 5.5.4 test acceptance criteria has been modified;
 - ~~Subclauses~~subclause 5.7 and succeeding subclauses have been removed;
 - ~~Subclauses~~subclause 5.8 and succeeding subclauses, including Table 1 and Figure 12, have been removed;
 - 5.6.2.6 has been modified to correct an error in the sand particle size requirements for test equipment;
- ~~the~~ Bibliography has been updated;
- ~~Document has been editorially revised.~~

A list of all parts of ISO 4254 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

Introduction

The structure of safety standards in the field of machinery is as follows:

- type-A standards (basis safety standards) giving basic concepts, principle for design, and general aspects that can be applied to machinery;
- type-B standards (generic safety standards) dealing with one safety aspect or one type of safeguards that can be used across a wide range of machinery;
- type-B1 standards on particular safety aspects (for example, safety distances, surface temperature, noise);
- type-B2 standards on safeguards (for example, two-hands controls, interlocking devices, pressure sensitive devices, guards);
- type-C standards (machinery safety standards) dealing with detailed safety requirements for a particular machine or group of machines.

This Standard is a type C standard as stated in ISO 12100:2010.

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

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

Significant hazards that are common to all agricultural machines (self-propelled ride-on, mounted, semi-mounted and trailed) are dealt with in ISO 4254-1.

Agricultural machinery — Safety — Part 13: Large rotary mowers

1 Scope

This document, when used together with ISO 4254-1, specifies the safety requirements and their verification for the design and construction of towed, semi-mounted, or mounted large rotary mowers with single or multiple cutting elements which have a cutting element tip circle of 1 000 mm or greater for any single cutting-element assembly, mounted on a propelling tractor or machine, intended for agricultural mowing equipment and designed for shredding crop residue, grass and small brush by impact. It describes methods for the elimination or reduction of hazards arising from the intended use and reasonably foreseeable misuse of these machines by one person (the operator) in the course of normal operation and service. In addition, it specifies the type of information on safe working practices to be provided by the manufacturer.

NOTE 1 When used outside of agriculture, additional requirements not specified in this ~~part of ISO 4254 document~~ can be applicable.

This document is not applicable to:

- rotary disc mowers, rotary drum mowers, and flail mowers designed for forage crop harvesting as covered by ISO 4254-12;
- arm-type large rotary mowers;
- pedestrian-controlled motor mowers;
- lawn mowers covered by the ISO 5395 (all parts) series.

When requirements of this document are different from those which are stated in ISO 4254-1, the requirements of this document take precedence over the provisions of ISO 4254-1 for machines that have been designed and built according to the provisions of this document.

This document is also not applicable to environmental hazards, road safety, electromagnetic compatibility, vibration and hazards related to moving parts for power transmission. It is also not applicable to hazards related to maintenance or repairs to be carried out by professional service personnel.

This document, taken together with ISO 4254-1, deals with all the significant hazards, hazardous situations and events relevant to large rotary mowers used as intended and under the conditions foreseen by the manufacturer. (A list of significant hazards is provided in Annex A.)

NOTE 2 Example illustrations of two mowers (a rigid-deck large rotary mower and a trail-type multi-section, foldable-wing large rotary mower) dealt with in this document are shown in Annex C, C.1.

NOTE 3 Example illustrations of mowers not dealt with in this document are shown in Annex C, C.2.

NOTE 4 ISO 14982 specifies test methods and acceptance criteria for evaluating the electromagnetic compatibility of all kinds of mobile agricultural machinery.

This document is not applicable to large rotary mowers which are manufactured before the date of publication ~~of this document by ISO.~~

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. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 730, *Agricultural wheeled tractors — Rear-mounted three-point linkage — Categories 1N, 1, 2N, 2, 3N, 3, 4N and 4*

ISO 4254-1, *Agricultural machinery — Safety — Part 1: General requirements*

ISO 5673-1, *Agricultural tractors and machinery — Power take-off drive shafts and power-input connection — Part 1: General manufacturing and safety requirements*

ISO 5718-2:XXXX, *Harvesting equipment – Requirements for cutting elements – Part 2: Blades for large rotary mowers (under development)*

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

ISO 13857:2008/2019, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4254-1, ISO 12100 and the 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/> <https://www.electropedia.org/>.

3.1 Rotary mowers

3.1.1

large rotary mower

mower, which may include mulching, with single or multiple cutting-element assemblies which have a *cutting-element tip circle* (3.2.4) of 1 000 mm or greater powered by a propelling machine in which one or more functional components rotate(s) about a vertical axis to cut or shear crop residue, grass and small brush by impact

3.1.1.1

rigid-deck large rotary mower

large rotary mower (3.1.1) with single or multiple cutting-element assemblies on a common rigid deck

3.1.1.2

multi-section, foldable-wing large rotary mower

large rotary mower (3.1.1) with multiple cutting-element assemblies and with a single wing or multiple wings that are capable of following the terrain

Note 1 to entry: The wings are foldable for transport and to clear obstacles, but are intended to operate only with all sections in close proximity to the ground surface when mowing.

3.2 Cutting elements

3.2.1

cutting element

mower tool designed to cut or shear crop residue, grass and small brush by impact

Note 1 to entry: This can include mulching.

Note 2 to entry: Blades are common cutting-elements used on large rotary mowers.

3.2.2

cutting-element holder

rotating part of the mower to which the *cutting element* (3.2.1) is fastened

3.2.3

cutting-element assembly

rotating group of parts including *cutting element(s)* (3.2.1), *cutting-element holder* (3.2.2), cutting-element fasteners

3.2.4

cutting-element tip circle

maximum cutting diameter of the *cutting-element assembly* (3.2.3)

3.2.5

cutting-element enclosure

housing for the cutting-element assembly including the top deck, side deck, rigid or flexible guards designed to minimize thrown objects or inadvertent blade contact

3.3 Thrown-object testing

3.3.1

projectile impact

rupture of the front layer but not the back layer of the *target material* (3.3.3) by a *test projectile* (3.3.4)

3.3.2

projectile hit

rupture of all layers of the *target material* (3.3.3) by a *test projectile* (3.3.4)

3.3.3

target material

material used for the thrown-object test

Note 1 to entry: See Annex D

3.3.4

test projectile

common steel nail or steel wire with the approximate dimensions shown in Figure 1

Note 1 to entry: The wire projectile should be capable of bending 180° with no cracks or breaks.

Dimensions in millimetres

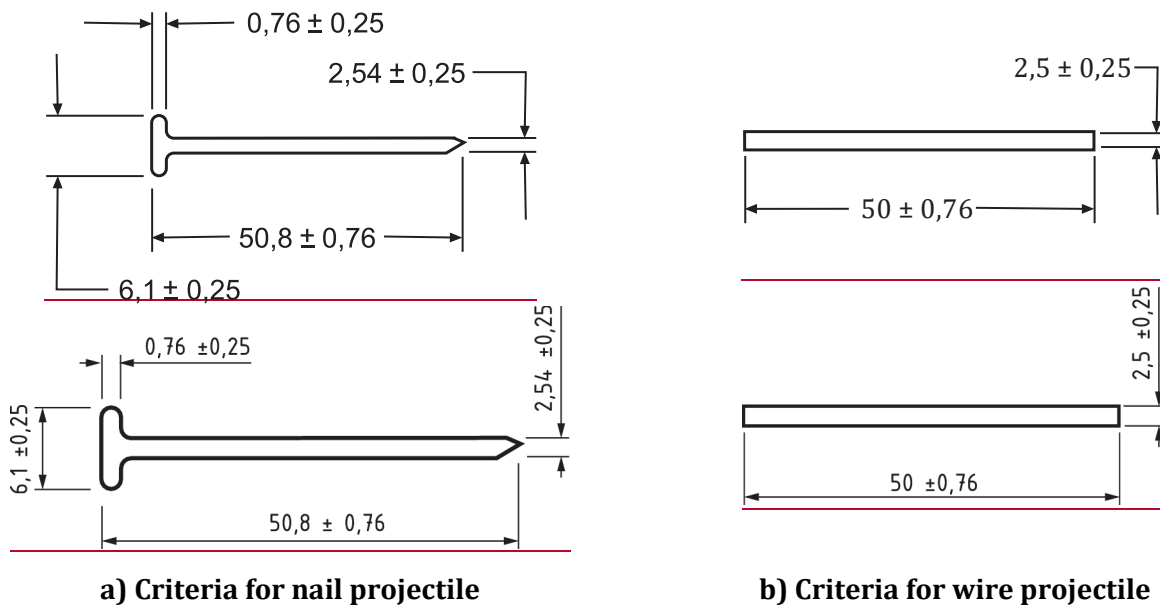


Figure 1 — Test projectile
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3.3.5 target wall

arrangement of target material and supports

Note 1 to entry: See the cross-section in Figure 8 with configuration shown in Figures 6 and 7.

3.3.6 operator zone

space on the *target wall* (3.3.5) representing the area in which operator is seated on the propelling machine with hands on the steering controls and feet on controls or areas provided for foot placement while operating the mower

Note 1 to entry: For examples of target configurations, see Figures 6 and 7.

4 Safety requirements and/or protective/risk reduction measures

4.1 General

4.1.1 Machinery shall be in accordance with the safety requirements and/or protective/risk reduction measures of Clauses 4 and 5. Machinery shall meet the test requirements and acceptance criteria as specified in ~~clauses~~ 5.3, 5.4 and 5.5. In addition, the machine shall be designed in accordance with according to the principles of ISO 12100 for relevant but not significant hazards which are not dealt with by this document.

4.1.2 Unless otherwise specified in this document, the machine shall be in accordance with the requirements of ISO 4254-1 and with ISO 13857:~~2008~~2019, Tables 1, 3, 4 and 6.

4.1.3 The maximum tip speed for cutting elements shall not exceed 96,5 m/s.

4.2 Protection against thrown objects

The mower shall be designed to minimize thrown objects so that tests defined in 5.6 are satisfied.

Protective devices, for example, protective skirts, chains or rubber strips may be used.

4.3 Protection against inadvertent contact with the cutting elements

4.3.1 The mower shall be designed or guarded in such a way that any inadvertent contact with the cutting elements at the sides and on the top is prevented when the mower is operated according to the manufacturer's instructions in the operator's manual.

4.3.2 The mower shall be designed or guarded in such a way that any inadvertent contact with the cutting elements at the front (normally the intake) and at the rear (normally the exhaust) is minimized when the mower is operated according to the manufacturer's instructions in the operator's manual.

4.3.3 The top protection shall be achieved by a rigid guard or by the device used to prevent thrown-objects.

4.3.4 At the sides, at the front (intake area) and at the rear (exhaust area), there shall be protection by rigid or flexible guard; the device used to minimize projectiles; or a combination of these devices so when tested according to 5.2, there will be no contact between the foot-probe and the cutting element or the cutting-element assembly.

4.4 Rotating power component guarding and shielding

4.4.1 The mower shall be designed or guarded in such a way that any inadvertent contact with the rotating power component is minimized when the mower is operated according to the manufacturer's instructions in the operator's manual.

4.4.2 Drive shafts and their connecting points shall be guarded per ISO 5673-1. Other moving parts for power transmission shall be guarded against contact to comply with the safety distances of ISO 13857:2008/2019, Tables 1, 3, 4 and 6.

4.5 Overrunning clutch or freewheel device

4.5.1 Mowers equipped with an overrunning clutch or a free-wheel device shall be guarded as described in 4.4.

4.5.2 Rotating elements that can be inadvertently contacted shall have evidence of rotation and a suitable safety sign to warn of the hazard.

4.5.3 There shall be instructions in the operator's manual stating to wait until all movement is stopped before servicing.

4.6 Attachment means for trailed mowers

Any trailed unit shall be designed in such a manner that there is a remaining downward load of 3 % of the total weight, or at least 500 N on the hitch point, in order to avoid an uncontrolled upward movement when it is disconnected.

4.7 Attachment means for mounted and semi-mounted mowers

Three-point hitch-mounted and semi-mounted mowers shall be attached to the propelling machine by means of one or a combination of the standardized attachment methods in accordance with ISO 730.