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ASABE, 2950 Niles Road, St. Joseph, MI 49085-9659, USA, phone 269-429-0300, fax 269-429-3852, hq@asabe.org

Agricultural machinery — Safety — Part 12: Rotary disc and drum mowers and flail mowers

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Developed by the ASABE Machinery Systems Harvest subcommittee. Adoption with deviations of ISO 4254-12:2012 approved by ASABE and ANSI July 2016.

Keywords: Disc mowers, Drum mowers, Flail mowers, Safety

0 Foreword

0.1 ASABE/ISO 4254-12:2012, Agricultural machinery — Safety — Part 12: Rotary disc and drum mowers and flail mowers, is an adoption with deviations of the identically titled ISO standard ISO 4254-12:2012, Agricultural machinery — Safety — Part 12: Rotary disc and drum mowers and flail mowers. Deviations noted in the following Foreword sections pertain to those provisions where harmonization could not be achieved between ASABE and the International Standard.

Deviations from the subsequently printed international standard are noted with underscore (additions) or strikethrough (deletions) text. Deviations from the international standard figures and equations are clearly marked.

0.2 This part of ISO 4254, where used with ISO 4254-1, specifies the safety requirements and their verification for the design and construction of rotary disc mowers, rotary drum mowers, as used for forage crop harvesting in agriculture only, and flail mowers with a horizontal axis for use in agriculture only, that are mounted, semi-mounted, trailed or self-propelled. 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.

Flail mowers with a horizontal axis that can be opened at the rear only for maintenance reasons are included.

This part of ISO 4254 is also applicable to mowers equipped with a conditioning device.

This part of ISO 4254 is applicable only to mowers intended to work at ground level, examples of which are given in A.1.

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

This part of ISO 4254, taken together with ISO 4254-1, deals with all the significant hazards (as listed in Table 1), hazardous situations and events (with the exception of noise and vibrations) relevant to rotary disc mowers, rotary drum mowers and flail mowers, when they are used as intended and under the conditions of misuse that are reasonably foreseeable by the manufacturer (see Clause 4).

It is not applicable to (see examples in A.2)

- flail mowers that have the rear part which can be opened for particular field use operations,
- mowers with an articulated arm,
- mowers with one or more vertical axes designed for mulching,
- pedestrian-controlled motor mowers,
- lawn mowers,
- inter-row mowing units, or
- machines specifically designed for highway and road maintenance.

This part of ISO 4254 does not deal with environmental hazards, road safety and hazards related to moving parts for power transmission. It does not deal with hazards related to maintenance or repairs to be carried out by professional service personnel.

NOTE 1 Specific requirements related to road traffic regulations are not taken into account in this part of ISO 4254.

This part of ISO 4254 is not applicable to machines manufactured before the date of its publication.

0.3 Ten normative references are listed in ISO 4254-12:2012. The responsible ASABE committee has reviewed these references and approved the following deviations:

0.3.1 Replace ISO 3600:1996, Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Operator's manuals — Content and presentation, with ANSI/ASABE AD3600:2015, Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Operator's manuals — Content and presentation. Any reference to ISO 3600:1996 in the printed portion of ISO 4254-12 shall be replaced by ANSI/ASABE AD3600:2015, Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Operator's manuals — Content and presentation.

0.3.2 Replace ISO 11684:1995, Tractors, machinery for agricultural and forestry, powered lawn and garden equipment — Safety signs and hazard pictorials — General principles, with ANSI/ASABE AD11684:1995, Tractors, machinery for agricultural and forestry, powered lawn and garden equipment — Safety signs and hazard pictorials — General principles. Any references to ISO 11684:1995 in the printed portion of ISO 4254-12 shall be replaced by ANSI/ASABE AD11684:1995, Tractors, machinery for agricultural and forestry, powered lawn and garden equipment — Safety signs and hazard pictorials — General principles.

0.4 This standard has been approved as an American National standard by ANSI (American National Standards Institute).

0.5 This standards deviated from ISO 4254-12:2012 as follows:

0.5.1 See Section 0.3 for Normative reference deviations.

0.5.2 Section 3.1.3, change to:

<disc, ~~and~~ drum, and flail mowers> distance from the ground to the active cutting edge of the cutting element when the cutting element is in the ~~forward-most~~ lowest position of rotation

Text of ISO 4254-12:2012, Agricultural machinery — Safety — Part 12: Rotary disc and drum mowers and flail mowers, with deviations noted, follows.

1 Scope

This part of ISO 4254, where used with ISO 4254-1, specifies the safety requirements and their verification for the design and construction of rotary disc mowers, rotary drum mowers, as used for forage crop harvesting in agriculture only, and flail mowers with a horizontal axis for use in agriculture only, that are mounted, semi-mounted, trailed or self-propelled. 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.

Flail mowers with a horizontal axis that can be opened at the rear only for maintenance reasons are included.

This part of ISO 4254 is also applicable to mowers equipped with a conditioning device.

This part of ISO 4254 is applicable only to mowers intended to work at ground level, examples of which are given in A.1.

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

This part of ISO 4254, taken together with ISO 4254-1, deals with all the significant hazards (as listed in Table 1), hazardous situations and events (with the exception of noise and vibrations) relevant to rotary disc mowers, rotary drum mowers and flail mowers, when they are used as intended and under the conditions of misuse that are reasonably foreseeable by the manufacturer (see Clause 4).

It is not applicable to (see examples in A.2)

- flail mowers that have the rear part which can be opened for particular field use operations,
- mowers with an articulated arm,
- mowers with one or more vertical axes designed for mulching,
- pedestrian-controlled motor mowers,
- lawn mowers,
- inter-row mowing units, or
- machines specifically designed for highway and road maintenance.

This part of ISO 4254 does not deal with environmental hazards, road safety and hazards related to moving parts for power transmission. It does not deal with hazards related to maintenance or repairs to be carried out by professional service personnel.

NOTE 1 Specific requirements related to road traffic regulations are not taken into account in this part of ISO 4254.

This part of ISO 4254 is not applicable to machines manufactured before the date of its publication.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

~~ISO 3600:1996, Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Operator's manuals — Content and presentation~~

~~ANSI/ASABE AD3600:2015, Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Operator's manuals — Content and format~~

ISO 4254-1:2008, Agricultural machinery — Safety — Part 1: General requirements

ISO 5718:2002, Harvesting equipment — Blades for agricultural rotary mowers — Requirements

~~ISO 11684:1995, Tractors, machinery for agricultural and forestry, powered lawn and garden equipment — Safety signs and hazard pictorials — General principles~~

~~ANSI/ASABE AD11684:1995, Tractors, machinery for agricultural and forestry, powered lawn and garden equipment — Safety signs and hazard pictorials — General principles~~

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

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

ISO 14982:1998, Agricultural and forestry machinery — Electromagnetic compatibility — Test methods and acceptance criteria

ISO 17101-1:—³⁾, Agricultural machinery — Thrown-object test and acceptance criteria — Part 1: Rotary mowers

ISO 17101-2:—³⁾, Agricultural machinery — Thrown-object test and acceptance criteria — Part 2: Flail mowers

ISO 17103:2009, Agricultural machinery — Rotary disc mowers, rotary drum mowers and flail mowers — Test methods and acceptance criteria for protective skirts

³⁾ To be published. (Revision of ISO 17101:2004)

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12100 and ISO 4254-1 and the following apply.

NOTE For illustrations of mowers and components, see A.1.

3.1

rotary mower

mower in which one or more functional components cut or shear forage crop by impact without mulching and rotate about a vertical axis

3.1.1

rotary disc mower

rotary mower (3.1) where the drive line is below the path of the cutting elements

3.1.2

drum mower

rotary mower (3.1) where the drive line is above the path of the cutting elements

3.1.3

cutting height

<disc, ~~and~~ drum, ~~and~~ flail mowers> distance from the ground to the active cutting edge of the cutting element when the cutting element is in the ~~forward-most~~ lowest position of rotation

3.2

flail mower

mower with a multiplicity of free-swinging cutting elements that rotate about a horizontal axis, which cuts the crop by impact and mulches it with the same working elements

3.3

conditioning device

mechanical device allowing the acceleration of the crop-drying process

NOTE Examples of acceleration of the crop-drying process are crushing, impact, abrasion and lamination.

3.3.1

roll type conditioner

conditioning device (3.3) that enhances the crop-drying process by passing crop material between, at least, two rollers

3.3.2

impeller type conditioner

conditioning device (3.3) that enhances the crop-drying process by utilizing tines or spokes to scrub off the wax coating from the crop or bend the stems

3.4

mulching

operation intended to chop the crop and leave the material on the ground to naturally decompose

3.5

protective skirt

skirt used on the machine to provide protection from thrown objects

4 List of significant hazards

Table 1 specifies the significant hazards, the significant hazardous situations and significant hazardous event(s) covered by this part of ISO 4254, that have been identified by risk assessment as being relevant to this type of machine, and which require specific action by the designer or manufacturer to eliminate or to reduce the risk.

Attention is drawn to the necessity to verify that the safety requirements specified in this part of ISO 4254 apply to each significant hazard presented by a given machine and to validate that the risk assessment is complete.

Table 1 – List of significant hazards associated with rotary disc mowers, rotary drum mowers and flail mowers

No. ^a	Hazard	Hazardous Situation and Event	Clause/subclause of ISO 4254-1:2008	Clause/subclause of this part of ISO 4254
A.1 Mechanical hazards				
A.1.1	Crushing	Persons in danger zone; Coupling area of machines	4.4.3; 4.5.1.1.2; 4.5.1.2.5; 4.5.2; 4.5.2.2; 4.6; 4.7; 4.8; 4.14.1; 4.14.3; 4.14.5; 4.14.6; 5.1.2.3; 5.1.3.2; 5.1.4; 5.1.8; 5.2; 6.1; 6.2; 6.2.2; 6.2.3; 6.3; 6.4	5.1; 5.4; 5.5; 5.6; 7.1; 7.2
A.1.2	Shearing	Operating area of rotating/oscillating tools; Moving elements; Slewing area of machines and machine parts	4.4.3; 4.5.1.1.2; 4.5.1.2.5; 4.5.2; 4.5.2.2; 4.6; 4.7; 4.8; 4.14.1; 4.14.3; 4.14.5; 4.14.6; 5.1.2.3; 5.1.3.2; 5.1.4; 5.1.8; 5.2; 6.1; 6.2; 6.2.2; 6.2.3; 6.3; 6.4	5.1; 5.2; 5.5; 5.6; 5.7; 7.1; 7.2
A.1.3	Cutting or severing	Operating area of cutting machinery	4.7	5.2; 5.3; 5.5; 5.6; 5.7; 5.8; 5.9
A.1.4	Entanglement	Operating area of rotating machinery; Rotating or oscillating machine parts	4.7; 5.1.8; 6.4	5.1; 5.2; 5.5; 5.6; 7.1
A.1.5	Drawing-in or trapping	Operating area of rotating machinery; Rotating or oscillating machine parts	4.7; 5.1.8; 6.4	5.4; 5.5; 5.8; 5.9; 7.1; 7.2
A.1.6	Impact	Operating area of rotating machinery;	4.5.1.2.5; 4.14.5; 4.14.6; 5.1.3.1	5.2; 5.3; 5.4; 5.5; 5.6; 7.1; 7.2
A.1.10	Ejection of parts		4.7; 4.8	5.3; 5.5; 5.7; 7.1; 7.2
A.6	Hazards generated by neglecting ergonomic principles in machinery design.			
A.6.1	Unhealthy postures or excessive efforts	Manual control of the machinery	4.4; 4.4.5; 4.5; 4.6; 4.14.2; 4.14.4; 5.1.1; 5.1.2.1; 5.1.3; 5.1.5.2	5.4; 6.1
A.6.6	Human error	Operating area of the machines	4.4; 8.1; 8.2	7.1; 7.2
A.8	Unexpected start-up, unexpected overrun/overspeed			
A.8.1	Failure/disorder of the control system		4.4; 6.1	
A.11	Failure of power supply	Operating area of the machines; Starting and stopping devices	4.8; 4.8.2; 4.9; 5.1.8; 6.1.1; 6.5 4.4; 5.1.8; 6.1	5.4; 5.5; 5.6
A.13	Errors of fitting			
A.13.1	All kinds of guard		4.7	5.1; 5.5; 5.6; 7.1; 7.2
A.13.2	All kind of safety-related (pretention) devices		4.7; 4.14.5; 4.14.6; 5.1.2.3; 6.4	5.1; 5.5; 5.6; 7.1; 7.2
A.13.3	Safety signs and signals		8.2	7.1; 7.3
A.13.4	Essential equipment and accessories for safe adjusting and maintenance		4.8; 4.14	7.1; 7.2

(continued)

Table 1 (continued)

No. ^a	Hazard	Hazardous Situation and Event	Clause/subclause of ISO 4254-1:2008	Clause/subclause of this part of ISO 4254
A.16	Loss of stability	Prohibited combinations; Supporting equipment	5.1.2.3; 6.2	7.1
A.16.1	Hazards due to sudden movement, instability, etc.		5.1.2.3; 6.2	5.1, 5.4, 5.5, 7.1, 7.2
A.23	From/to third persons			
A.23.1	Hazards to exposed persons due to uncontrolled movement		5.1.2.3; 5.1.8; 6.2	5.4; 5.5; 5.8; 7.1; 7.2
^a With reference to ISO 4254-1:2008, Table A.1.				

5 Safety requirements and/or protective measures

5.1 General

5.1.1 Machinery shall comply with the safety requirements and/or protective measures of this clause. In addition, the machine shall be designed according to the principles of ISO 12100 for hazards relevant but not significant, which are not dealt with by this part of ISO 4254. The instruction handbook to be provided with the machine shall comply with 7.1. The machine shall also be marked and carry safety signs according to 7.2

5.1.2 Except where otherwise specified in this part of ISO 4254, the machine shall comply with the requirements of ISO 4254-1 and with Tables 1, 3, 4 and 6 of ISO 13857:2008 as appropriate.

5.1.3 Machinery shall comply with ISO 14982 for evaluating the electromagnetic compatibility.

5.2 Protection against inadvertent contact with the cutting elements

5.2.1 General

The mower shall be designed or guarded in such a way that inadvertent contact during normal operation with the cutting elements from the front, and at the rear, the sides and the top is prevented.

5.2.1.1 Rotary disc mowers and rotary drum mowers

Contact with the cutting elements from the top shall be prevented by an imperforate guard or by the device used to prevent thrown objects (see 5.3), providing it maintains at least an equivalent level of protection.

At any location along the cutting element path that is not either a crop inlet or a crop discharge area, typically the sides and a portion of the rear, the protection shall be achieved by either one or both of the following:

- a) barrier located in such a way that the distances defined in Figure 1 and Figure 2 are respected. These distances are measured from the cutting element path and with the mower in working position, the cutting height, h , being adjusted at 50 mm or as near as possible to 50 mm.

NOTE 1 See Figure 2 (Detail A) for the correct method of measuring the cutting height.

This barrier can be movable (e.g. removable, foldable) for transport or maintenance purposes. The removal of the barrier shall only be possible by the use of a tool. Movable barriers shall be kept in the fixed working position by means of a device. Unlocking this device shall only be the result of an intentional action;

- b) a rigid imperforate guard, located near the cutting elements and in such a way that its lower edge extends below the working elements path by a minimum of 3 mm (see Figure 1 and Figure 2). This measurement shall be carried out in static conditions, keeping the cutting elements parallel to the plane of the disc or drum.

At the crop inlet area and the crop discharge area, the protection shall be achieved by a barrier located in such a way that the minimum distances as defined in Figure 2 are respected, with the mower in the working position and the cutting height, h , being adjusted at 50 mm or as near as possible to 50 mm.

This barrier can be movable (e.g. removable, foldable) for transport or maintenance purposes. The removal of the barrier shall only be possible by the use of a tool. Movable barriers shall be kept in the fixed working position by means of a device. Unlocking this device shall only be the result of an intentional action.

NOTE 2 See Figure 2 (Detail A) for the correct method of measuring the cutting height.

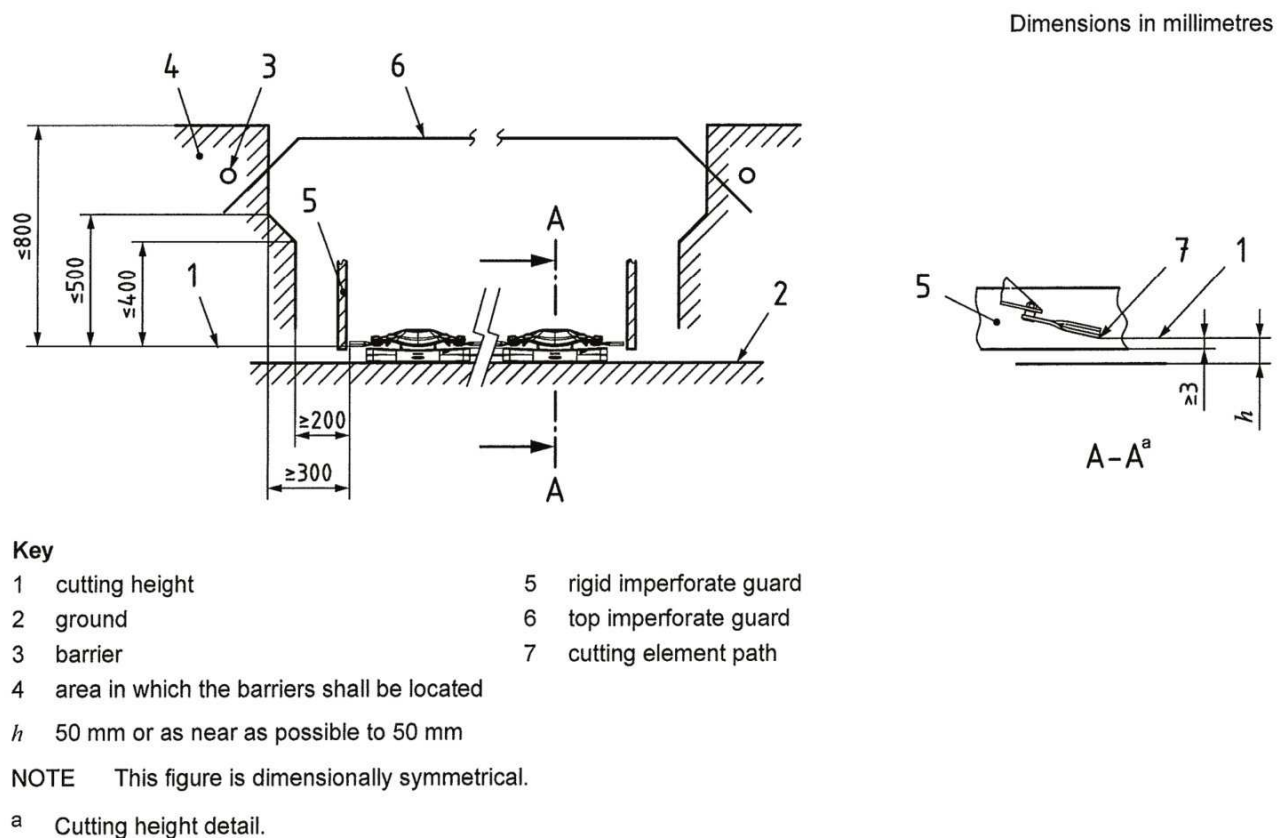


Figure 1 – Rotary disc mowers and rotary drum mowers — Location of the barrier and rigid imperforate guard — Front and rear views