
Agricultural machinery — Safety —

Part 7:

**Combine harvesters, forage
harvesters, cotton harvesters and
sugar cane harvesters**

Matériel agricole — Sécurité —

*Partie 7: Moissonneuses-batteuses, récolteuses-hacheuses-chargeuses
de fourrage, récolteuses de coton et récolteuses de cannes à sucre*



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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

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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 on 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 the following URL: 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 third edition cancels and replaces the second edition (ISO 4254-7:2008), which has been technically revised.

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

- additions to the Scope and of requirements for sugar cane harvesters;
- replacement of the reference to ISO 4254-1:2008 by ISO 4254-1:2013;
- addition of references to ISO 3776-3 and ISO 10975;
- deletion of the references to ISO 12100-1:2003 and ISO 12100-2:2003 and replacement with ISO 12100:2010;
- list of significant hazards (Clause 4) as new informative [Annex A](#);
- in [Clause 4](#), for all machines, replacement of requirements by reference to ISO 4254-1:2013 for the following:
 - operator's seat and addition of a references to ISO 3776-3;
 - handrails and handholds with a modification;
 - operator platform;
 - other boarding means;

- supports for service and maintenance;
- modification of the requirements for the following:
 - visibility — view to front and rear;
 - disconnection of the battery;
 - greasing;
 - boarding means;
- addition of requirements for the following:
 - forward and rearward facing work lights;
 - cleaning the machine;
 - header hold-up;
- instructional seat: deletion of the requirement that anchorage points for a restraint system have to be provided and addition for a requirement that a restraint system has to be provided in the event of a rollover;
- replacement of the requirements for automatic guidance systems by a reference to ISO 10975;
- in [Clause 5](#), for combine harvesters:
 - clean grain and returns handling systems: addition of information for explanation for better understanding of the requirements;
 - straw choppers: addition of requirement for replacing blades;
- in [Clause 6](#), for forage harvesters:
 - modification of the requirements for run-down of rotating functional elements in the crop flow system.

A list of all parts in the ISO 4254 series can be found on the ISO website.

This corrected version of ISO 4254-7:2017 incorporates the following corrections:

- [Figure 2](#) has been replaced to show the correct dimensions.

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 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 the 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 and systems 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 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.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the Scope of this document. These hazards are specific to combine harvesters, forage harvesters, cotton harvesters and sugar cane harvesters.

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

Agricultural machinery — Safety —

Part 7:

Combine harvesters, forage harvesters, cotton harvesters and sugar cane harvesters

1 Scope

This document, when used together with ISO 4254-1, specifies the safety requirements and their verification for the design and construction of combine harvesters, forage harvesters, cotton harvesters and sugar cane harvesters. It describes methods for the elimination or reduction of hazards arising from the intended use 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.

When provisions of this document are different from those which are stated in ISO 4254-1, the provisions 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, taken together with ISO 4254-1, deals with all the significant hazards (as listed in [Table A.1](#)), hazardous situations and events relevant to combine harvesters, forage harvesters, cotton harvesters and sugar cane harvesters, when they are used as intended and under the conditions of misuse that are reasonably foreseeable by the manufacturer (see [Annex A](#)). It is not applicable to hazards arising from the presence of persons other than the operator, cleaning of the grain tank, and hazards related to vibrations and moving parts for power transmission, except for strength requirements for guards and barriers. In respect of braking and steering, it is applicable only to the ergonomic aspects (e.g. location of brake pedal and steering wheel); no other aspects related to braking and steering are covered. In the case of trailed harvesters, it is applicable only to hazards related to the working process.

Design requirements for roll-over protective structures (if applicable) are not specified in this document.

Performance levels (or categories) for safety-related parts of control systems in accordance with ISO 25119 or ISO 13849 are not given in this document.

NOTE Specific requirements related to road traffic regulations are not taken into account in this document.

This document is not applicable to 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 3600, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Operator's manuals — Content and format*

ISO 3767-1, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays — Part 1: Common symbols*

ISO 3767-2, *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 3776-1, *Tractors and machinery for agriculture — Seat belts — Part 1: Anchorage location requirements*

ISO 3776-2, *Tractors and machinery for agriculture — Seat belts — Part 2: Anchorage strength requirements*

ISO 3776-3, *Tractors and machinery for agriculture — Seat belts — Part 3: Requirements for assemblies*

ISO 4254-1:2013, *Agricultural machinery — Safety — Part 1: General requirements*

ISO 5131:2015, *Tractors for agriculture and forestry — Measurement of noise at the operator's position — Survey method*

ISO 5353, *Earth-moving machinery, and tractors and machinery for agriculture and forestry — Seat index point*

ISO 5687, *Equipment for harvesting — Combine harvesters — Determination and designation of grain tank capacity and unloading device performance (under revision)*

ISO 9533, *Earth-moving machinery — Machine-mounted audible travel alarms and forward horns — Test methods and performance criteria*

ISO 10975, *Tractors and machinery for agriculture — Auto-guidance systems for operator-controlled tractors and self-propelled machines — Safety requirements*

ISO 11684, *Tractors, machinery for agriculture 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 15077, *Tractors and self-propelled machinery for agriculture — Operator controls — Actuating forces, displacement, location and method of operation*

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.

3.1

basket

container used to receive, hold, compact and unload harvested cotton crop material

3.2

clean grain and returns handling systems

systems for conveying of clean grain and returns within the machine by augers and/or elevators to the grain tank or threshing/re-threshing system

3.3

combine harvester

mobile grain-harvesting machine for cutting, stripping or picking up crops, threshing, separating, cleaning and conveying grain into a grain tank and depositing harvest residue onto the ground

3.4

cotton harvester

mobile cotton seed harvesting machine for cleaning, as required, handling and conveying seed cotton into a *basket* (3.1) and depositing harvest residue onto the ground

3.5

forage harvester

mobile agricultural machine used to harvest or gather the crop, cut the crop into short parallel lengths and deliver the chopped crop into containers or separate vehicles

Note 1 to entry: ISO 8909-1 gives detailed definitions of terms related to forage harvesters.

3.6**guidance system**

automatic system to control machine steering during the harvesting operation

3.7**header**

portion of the harvester comprising the mechanism for gathering, cutting, stripping or picking up the crop

3.8**instructional seat**

integral or separate seat to allow a trainer or trainee to be seated

3.9**operator's work station**

location on the self-propelled machine from which the operator controls the travel and work functions

3.10**sugar cane harvester**

mobile agricultural machine used to harvest or gather sugar cane crop, cut the crop and deliver the chopped crop into containers or separate vehicles

4 Safety requirements and/or protective/risk reduction measures for all machines

4.1 General

4.1.1 Machinery shall comply with the safety requirements and/or protective/risk reduction measures of this clause.

4.1.2 In addition, the machine shall be designed according to the principles of ISO 12100 for relevant but not significant hazards which are not dealt with by this document.

4.1.3 Except where otherwise specified in this document, the machine shall be in accordance with ISO 4254-1.

4.2 Controls

4.2.1 Location and identification of controls

4.2.1.1 Controls such as steering wheels or steering levers, gear levers, control levers, cranks, pedals and switches shall be chosen, designed, constructed and arranged according to the following:

- a) their locations and method of operation shall be in accordance with ISO 15077;
- b) unless otherwise specified in this document, the controls referred to in [B.3.1](#), [B.3.2](#) and [B.3.3](#) shall be located within hand and foot reach of the operator in the operator's work station. The locations for all other controls shall be in accordance with ISO 15077;
- c) the controls and their different positions shall be identified [see [10.2.2 a\)](#)]. These identities shall be explained in the operator's manual [see [10.1.2 a\)](#)]. If symbols are used, they shall be in accordance with ISO 3767-1 and ISO 3767-2. If different colours for identification of controls are used, they shall be in accordance with the provisions of [Annex B](#).

4.2.1.2 Additional requirements for specific controls are given in [4.3.3](#), [4.3.8](#), [4.3.9](#), [4.12](#), [4.13.3](#), [5.4.5.2](#), [6.2.5](#), [7.1.2.1](#), [7.2.2.1](#) and [8.5](#).

4.2.1.3 The controls, excluding the operator presence control, if fitted, shall be arranged such that in any of their positions, they do not hinder access to the operator's position and shall be located so that they cannot be used as handholds during boarding or exiting the machine excluding the steering wheel (see also 4.3.8).

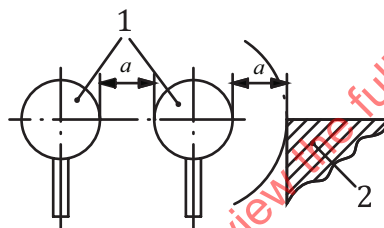
4.2.1.4 For normal operation, the controls used to activate the ground propulsion system shall be located such that they can only be actuated when being in the operator's work station. Pedals shall have an appropriate size, shape and be adequately spaced. The pedals shall have a slip-resistant surface and be easy to clean.

4.2.1.5 Where clutch, brake and accelerator pedals have the exact same function as those of passenger vehicles, the order of location shall be the same as in the passenger vehicles.

4.2.2 Control clearances

Controls requiring an actuating force ≥ 100 N measured at the grip shall have a minimum clearance, a , of 50 mm between their outer contours and adjacent parts. Controls requiring an actuating force of < 100 N shall have a minimum clearance, a , of 25 mm (see Figure 1). Fingertip controls are excluded from these requirements providing there is no risk of inadvertent operation of adjacent controls.

Dimensions in millimetres



Key

- a minimum clearance
- 1 manual control
- 2 adjacent part

Figure 1 — Control clearances

4.2.3 Starting and stopping the engine

The provisions of ISO 4254-1:2013, 5.1.8 apply.

4.3 Operator's work station

4.3.1 Operator's seat

4.3.1.1 For operator's seats, the provisions of ISO 4254-1:2013, 5.1.2.1 and 5.1.2.2 apply.

4.3.1.2 If the design of the machine provides protection in the event of a rollover, a restraint system in accordance with ISO 3776-1, ISO 3776-2 and ISO 3776-3 shall be provided.

4.3.2 Instructional seat

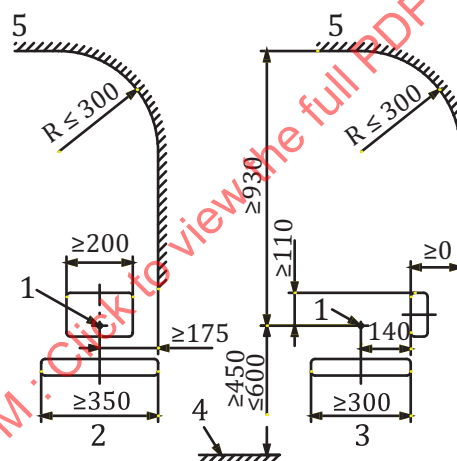
The instructional seat, if provided, shall meet the following requirements.

- a) The instructional seat shall be located as shown in Figure 2. The instructional seat shall be placed such that the trainer or trainee seated in it creates minimal potential impact on operation and

visibility under the usage conditions specified in [Clause 1](#), consistent with machine function and other design considerations;

- b) The instructional seat shall have the minimum dimensions shown in [Figure 2](#). The seat shall also have a backrest of the minimum dimensions shown in [Figure 2](#). A non-glazing component at the rear of the enclosed cabin may be used as a backrest;
- c) At least one handgrip or handrail shall be provided in a conveniently located position for the trainer or trainee while seated in the instructional seat;
- d) A suitable area, which does not interfere with the operator, shall be provided for the lower extremities of the trainer or trainee seated in the instructional seat;
- e) If the design of the machine provides protection in the event of a rollover, a restraint system in accordance with ISO 3776-1, ISO 3776-2 and ISO 3776-3 shall be provided;
- f) The instructional seat and the trainer or trainee seated in the instructional seat shall be inside the enclosed cabin structure, if a cabin is provided;
- g) The operator's manual shall include an appropriate notice regarding the intended use of the instructional seat [see [10.1.2 c\)](#)].

Dimensions in millimetres



Key

- 1 SIP
- 2 front view
- 3 side view
- 4 foot rest
- 5 clearance zone

Figure 2 — Instructional seat dimensions

4.3.3 Steering wheel

The centre of the steering wheel shall be on the longitudinal centreline of the seat within a maximum lateral offset (either side) of 50 mm. The clearance between the fixed parts and the steering wheel shall be in accordance with [4.3.12.3](#) (see [Figure 5](#)).

4.3.4 Shearing and pinching points

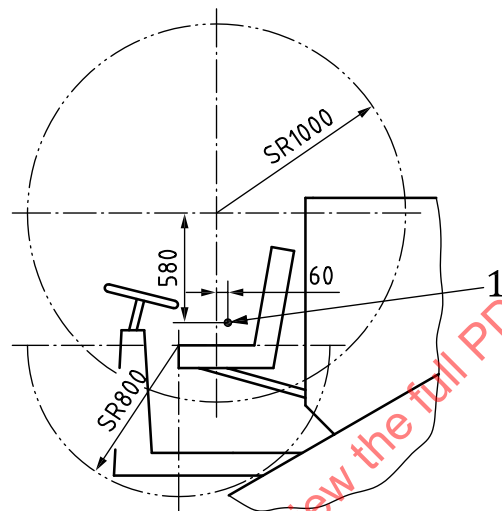
4.3.4.1 In the operator's work station, there shall be no shearing or pinching points within hand or foot reach of the operator or occupant of the instructional seat when seated in the seat provided.

4.3.4.2 A clearance of at least 25 mm shall be maintained between a moving seat and adjacent components.

4.3.4.3 For machines not equipped with a cabin, hand reach is defined by a sphere of 1 000 mm radius, centred on the seat centreline, 60 mm in front of, and 580 mm above, the SIP as defined in ISO 5353. Foot reach is defined by a hemisphere of 800 mm radius centred on the seat centreline at the front edge of the cushion and extending downwards, with the seat in its central position (see [Figure 3](#)).

4.3.4.4 For machines equipped with a cabin, hand and foot reach are defined by the portions of the sphere and hemisphere described above, which are within the cabin.

Dimensions in millimetres



Key

1 SIP

NOTE For cabin-equipped machines, the cabin limits the space defined in [Figure 3](#).

Figure 3 — Arm and foot reach

4.3.5 Boarding means

For boarding means, the provisions of ISO 4254-1:2013, 4.7.1.1 and 4.7.1.2 apply with the following modifications:

- the height of the first step shall not exceed 550 mm with the specified tyres and with the maximum diameter at specified inflation pressure or specified tracks;
- for boarding means capable of pivoting for transport, lateral stops are not required on the uppermost surface (step) of the movable ladder.

4.3.6 Handrails and handholds

For handrails and handholds, the provisions of ISO 4254-1:2013, 4.7.1.3 apply with the following modification: the lower end of the handrail/handhold shall be located not higher than 1 600 mm from the ground surface.

4.3.7 Platforms

For operator platforms, the provisions of ISO 4254-1:2013, 4.7.2 shall apply.

4.3.8 Access to operator's seat

Access to the operator's seat shall be possible by the alternate use of each foot. For this purpose, the floor area shall have a minimum width of 300 mm. Devices, including controls in any of their positions, shall be arranged such that they do not hinder access to the operator's position, except for any devices intended to restrict the operator from encountering hazards during operation.

4.3.9 Automatic header disengagement control

4.3.9.1 Self-propelled machines which have an electrically activated header engagement mechanism shall have a system that:

- prevents engagement of the header mechanism if the operator is not in the operator's work station, and
- automatically disengages the header mechanism when the operator leaves the operator's work station.

The maximum delay time for triggering the disengagement shall be 7 s. Header starting shall require intentional reactivation by means other than the automatic header disengagement control after stopping.

4.3.9.2 In case of self-propelled machines with mechanically activated header engagement, the control lever for engagement shall act as an impediment for egress from the operator's seat when in the engaged position.

4.3.10 Warnings

If audible or visual means are provided to inform the operator about malfunctions or a special status of the machine, for example

- grain tank extensions raised above 4 m,
- cotton basket raised,
- sugar cane harvester discharge chute raised above 4 m,
- guidance systems activated,
- the body levelling system in its maximum position,
- unloading auger swung out, and
- knife sharpening in process,

then the information given shall be unambiguous and easily understood. The operator's manual shall provide detailed information about such means [see [10.1.2 d](#)]).

4.3.11 Visibility — View to front and rear

4.3.11.1 For the view to the front and to the rear, the provisions of ISO 4254-1:2013, 5.1.7 apply.

4.3.11.2 Machines shall be equipped with at least two rear-view mirrors, one on each side of the machine.

4.3.11.3 Mirrors shall be adjustable manually while at the same time maintaining three-point contact, or by remote control. Cleaning of these mirrors shall be possible while at the same time maintaining three-

point contact. Alternatively, other provisions shall be made for cleaning and adjusting of the mirrors from the ground, including the following:

- adjusting and cleaning tool provided with and stored on the machine;
- tool shall be easily accessible.

4.3.11.4 Instructions on how to clean the windscreen and to adjust and clean the rear-view mirrors shall be provided in the operator's manual [see [10.1.2 e\)](#) and [10.1.2 f\)](#)].

4.3.11.5 If it is not possible to see the area just behind the machine from the operator's seat position, an audible reverse warning alarm, which shall be automatically engaged and in accordance with ISO 9533, shall be provided.

4.3.11.6 If a cabin is provided, provisions to install devices for defrosting and demisting the front window(s) shall be made.

4.3.11.7 Forward- and rearward-facing work lights for use in the field shall be provided.

4.3.12 Cabins

4.3.12.1 General

When the operator's work station is equipped with a cabin, it shall meet the following requirements.

4.3.12.2 Doors and door openings

4.3.12.2.1 The door opening shall conform to [Figure 4](#), provided that the angles between the lower horizontal limitation (dimension ≥ 300 mm) and the lateral vertical limitations shall not be smaller than 90° . The dimension shown in [Figure 4](#) shall be the aperture measured with the door open. It shall be possible for the door to remain in the open position (gas struts, effect of gravity or by mechanical means, etc.).

4.3.12.2.2 Opening and closing the door shall be possible from the ground/platform or while keeping three-point contact with the boarding means.

Dimensions in millimetres

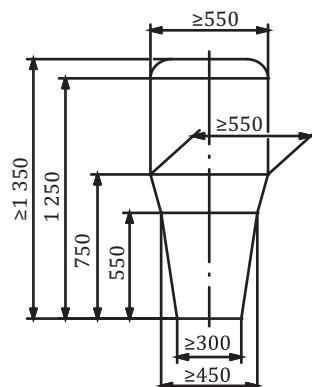


Figure 4 — Main dimensions of door opening

4.3.12.3 Interior dimensions

The interior dimensions shall be as shown in [Figure 5](#). The dimensions specified apply when the seat is at the SIP position, as defined in ISO 5353.

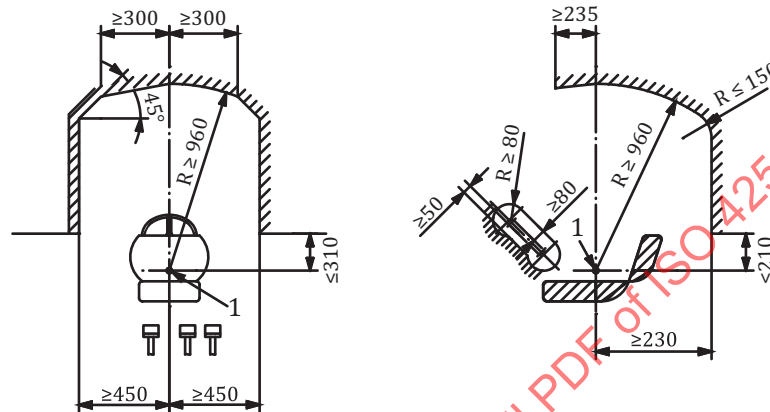
4.3.12.4 Emergency exit

For emergency exit(s), the provisions of ISO 4254-1:2013, 5.1.5 apply.

4.3.12.5 Ventilation

The cabin shall be equipped with a ventilation system providing an over pressure of 50 Pa. The ventilation system shall be able to filter the incoming air. Information about the selection of the air filter, its cleaning and replacement intervals shall be given in the operator's manual [see 10.1.2 g)].

Dimensions in millimetres



Key

1 SIP

Figure 5 — Interior dimensions

4.4 Other than operator's work station

4.4.1 For boarding means and locations for other than operator's work station, the provisions of ISO 4254-1:2013, 4.8 apply.

4.4.2 For minimizing the risk of falling during normal operation and service

- handholds, and/or handrails allowing three point contact,
- guard rails, or
- barrier type protection

shall be provided unless the same level of protection is provided by other parts of the machine. For cleaning of the windscreens of combine harvesters, see 5.2, and sugar cane harvesters, see 8.3.

4.4.3 For access into the grain tank, see 5.4.2.

4.5 Folding elements

4.5.1 Folding elements to reduce transport width and/or height shall have a means of retaining in the transport position, either mechanically or by other means (e.g. hydraulically). The change from transport position to working position, and vice versa, shall be possible without exposing the operator to crushing and pinching.

4.5.2 For reduction of transport width, guards of working tools as dealt with in this document may be folded from the functional/protection position to a transport position. These working tools shall not be operable with the guards in transport position.

4.5.3 Handle(s), located at least 300 mm from the nearest articulation, shall be provided for manually folded elements. The force required for the manual folding operation shall not exceed 250 N as the average value when moving from the start to the stop position. The peak(s) shall not exceed 400 N. There shall be no shearing, pinching or uncontrollable movement hazards to the operator. The handle(s) may be integral parts of the machine, provided they are suitably designed and clearly identified [see [10.2.2](#), b)].

4.6 Interchangeable and detachable harvesting devices

4.6.1 The interchangeable and detachable (e.g. for transport) harvesting devices (e.g. the grain/corn header or the pick-up and stripping heads) shall be so designed that they can be attached to and, detached from the machine, and loaded on and unloaded from a transport trailer by one operator. Means shall be provided for retaining these devices on the transport trailer.

4.6.2 Mechanical drives shall be designed and constructed so that they do not constitute any hazard zones when the attachments are dismounted. The interface between the mechanical drive and the attachment shall be designed so that incorrect mounting is not possible.

4.6.3 If the machine is equipped with a coupling device, this device shall be designed and mounted such that the coupling action is possible by one operator.

4.7 Automatic guidance systems

When provided, automatic guidance systems shall meet the provisions of ISO 10975.

4.8 Hot surfaces

Hot surfaces which can be reached by the operator during normal operation of the machine (with the exclusion of servicing, maintenance and repair) shall be covered or insulated. Covering and insulation applies to hot surfaces which are near steps, handrails, handholds, working areas and integral machine parts used as boarding means, and which can be inadvertently touched. Warning shall be included in the operator's manual regarding the hot surfaces of the engine and associated parts [see [10.1.2](#) i)].

4.9 Service and maintenance

4.9.1 Manual operation of individual assemblies

If special tools are required for manual operation, e.g. turning the threshing mechanism of a combine harvester, they shall be supplied with the machine; provision shall be made for storage on the machine and their use shall be explained in the operator's manual [see [10.1.2](#) j)].

4.9.2 Electric — Battery

4.9.2.1 For the battery, the provisions of ISO 4254-1:2013, 5.3 apply.

4.9.2.2 In regard to ISO 4254-1:2013, 5.3.2, the operation of this disconnection means shall be possible from the ground level or a platform.

4.9.3 Operating fluids

4.9.3.1 Provisions shall be made for the safe filling, draining and collection of operating fluids such as engine oil, hydraulic fluids and coolants. Filler necks for fuel shall be located at a height of not more than 1 500 mm from the ground surface or from a platform, and shall be located such that spilled fuel contact with hot surfaces is avoided. Engine and hydraulic oil drainage points shall be arranged such that fluids can be drained in an appropriate common container.

4.9.3.2 Specific instructions for the changing of operating fluids, including safety aspects, shall be given in the operator's manual [see [10.1.2 k](#)].

4.9.4 Supports for service and maintenance of raised machine parts

For supports for service and maintenance of raised machine parts, the provisions of ISO 4254-1:2013, 4.11 apply.

4.9.5 Tie-down and jacking points

4.9.5.1 Tie-down and jacking points shall be provided. Appropriate machine parts may also be used for these purposes. The points shall be marked and their location and procedure for use shall be described in the operator's manual [see [10.1.2 n](#)) and [10.2.2 d](#)].

4.9.5.2 For the use of lifting jacks, the provisions of ISO 4254-1:2013, 5.2.3 apply.

4.9.6 Greasing

4.9.6.1 As far as possible, greasing points shall be centralized. The manufacturer shall specify in the operator's manual those parts which need to be greased or lubricated. If parts need to be greased or lubricated while in motion, the greasing/lubrication points shall be located outside of the hazard zone.

4.9.6.2 If greasing points are centralized, these greasing points shall be reachable from the ground or a platform.

4.9.6.3 Specific instructions about greasing and lubrication shall be provided in the operator's manual [see [10.1.2 o](#)].

4.10 Fire hazard

4.10.1 Provision shall be made for the attachment of portable fire extinguishers located near the operator's work station.

4.10.2 The manufacturer shall give in the operator's manual recommendations about the number, type and location of the fire extinguishers. If only one fire extinguisher is specified, then it shall be located near the operator's work station and that it contains at least 6 kg (dry) or 9,5 l (liquid) of extinguishing agent [see [10.1.2 p](#)].

NOTE Concerning the type of extinguisher and classification of fires, national regulations or codes can apply.

4.10.3 For cabin interior material burning rate, the provisions of ISO 4254-1:2013, 5.1.6 apply.

4.11 Overhead power lines

4.11.1 A safety sign shall be provided on the machine, clearly visible from the operator's position to inform of the risk of possible overhead power line contact when the machine exceeds 4,00 m in height during any mode of operation [see [10.2.3.2 a](#))].

4.11.2 A suitable safety message warning of the hazard of contact with overhead power lines shall be included in the operator's manual [see [10.1.2 q](#))].

4.12 Header drive

4.12.1 All drives associated with the main header drive shall be disengaged by the same control and together with the main header drive.

4.12.2 The control for the header drive shall be designed, positioned or guarded such that the risk of unintentional activation from the off or neutral position is avoided. For single-hand controls, two separate actions are required, for example,

- a push and hold control,
- a switch that requires a secondary motion,
- a switch that requires the combined action of thumb and fingers,
- a switch guard,
- etc.

4.13 Header/feeding elements drive reverser

4.13.1 In order to minimize associated functional hazards which can occur when removing blockages in the header and feeding elements, a drive reverser shall be provided.

4.13.2 If this drive reverser is an electrical device, the circuits, including the supply terminals, shall be protected against intentional short circuiting.

4.13.3 It shall not be possible to operate the reverser controls while within reach of moving components on the header.

4.14 Header hold-up

The controls in the operator station shall not allow the header to drop when the engine is stopped.

4.15 Noise

4.15.1 For noise, the provisions of ISO 4254-1:2013, 4.3 apply.

4.15.2 For the determination of noise emission values, the noise test code given in ISO 4254-1:2013, Annex B, together with [Annex C](#) to this document, shall be used.

4.15.3 For machines equipped with a cabin, the operator's manual shall include a recommendation to operate the machine with all the doors and windows closed [see [10.1.2 r](#))].

4.16 Hydraulic components and fittings

For hydraulic components and fittings, the provisions of ISO 4254-1:2013, 4.13 apply.

4.17 Electric equipment

4.17.1 For electrical equipment, the provisions of ISO 4254-1:2013, 4.12 apply.

4.17.2 For additional requirements for electrical drive reversers of header and feeding elements, see [4.13.2](#).

5 Additional requirements for combine harvesters

5.1 General

5.1.1 In case of rollover of a self-propelled combine harvester, the protection of the operator is considered sufficient if the design of the machine (shape and integrated structure, or cabin in combination with or without the structure of the machine), in combination with a restraining system in accordance with ISO 3776-1, ISO 3776-2 and ISO 3776-3, gives sufficient space to avoid significant injury.

5.1.2 An audible or visual warning for combines with slope compensation shall be provided at the operator's work station. The warning shall be activated when the slope compensation reaches its limit.

5.2 Cabin

Where a combine harvester is equipped with a cabin, means shall be provided to enable the operator to clean the windscreen from the outside while maintaining three-point contact. The requirements of ISO 4254-1:2013, 4.8.2.1 and 4.8.2.2 apply. Alternatively, other provisions shall be made for cleaning the windscreen from the ground including the following:

- a cleaning tool shall be provided with and stored on the machine;
- the tool shall be easily accessible.

Instructions on how to clean the windscreen shall be provided in the operator's manual [see [10.1.2 e](#)].

5.3 Cutting mechanism, feed augers, reel

5.3.1 Between the outer components of the reel and adjacent fixtures, a clearance of at least 25 mm shall be maintained, provided the presence of a shield does not cause a collection of crop debris.

5.3.2 In the operator's manual, as well as on the machine, reference shall be made to function-related shearing and pinching regions of the gathering and/or cutting mechanisms, such as reel arms, reel, cutting table, vertical cutter bar, cutter bar, pick-up attachment, crop lifters [see [10.1.3 a](#)) and [10.2.3.2 b](#))].

5.3.3 If there are shearing and pinching points outside the cutting table side panels caused by the cutter bar or its drive mechanism, they shall be protected from inadvertent contact by guards to the extent that the guards do not affect the performance of the machine or cause a collection of crop debris. A safety sign shall be provided on the machine [see [10.2.3.2 c](#))].

5.4 Grain tank and grain handling systems

5.4.1 Grain tank design

5.4.1.1 The grain tank shall be self-emptying so as to avoid the need to enter the grain tank during the unloading process.

5.4.1.2 Drawing of grain samples and observing of the grain level shall be possible from outside the grain tank and from a non-hazardous position.

5.4.1.3 The grain tank shall be designed so that the need to enter the grain tank (e.g. raising extensions, opening covers, raising the grain tank filling auger) is minimized.

5.4.2 Access into the grain tank

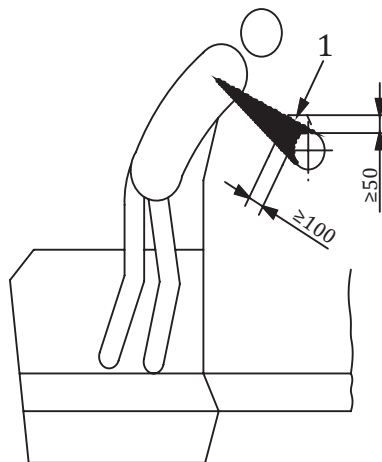
If these actions, or certain actions to start the harvesting or carry out other actions that need to be performed, such as for service, maintenance or adjustment purposes, are not possible from outside the grain tank and entry into the grain tank is required, means allowing safe access into the grain tank shall be provided. In order to allow safe access into the grain tank, means shall be provided such as foot supports and handholds, which may be structural part of the machine, provided they are suitably constructed and positioned and are slip-resistant. If parts or components have to be raised or lowered manually, the required force shall not exceed 400 N. The operator's manual shall provide instructions for safe access [see [10.1.3 b](#)].

5.4.3 Distribution auger

If the grain tank is equipped with an open distribution auger, it shall be protected against unintentional contact. This requirement shall be deemed to be fulfilled if distribution augers are provided with a cover, which prevents direct access from the driver's work station or from other working positions, and which is either

- fixed in position, swivelling or sliding, in the protection position during operation, and which has apertures measuring 80 mm by 80 mm maximum, provided the apertures are spaced at least 100 mm from the auger circumference within the direct reach zone, and at least 50 mm in the remaining reach zone (see [Figure 6](#)),
- at least 850 mm from the outer edge of the grain tank at the operator's work station or other working positions, or
- during normal operation, is made inaccessible by a fixed part of the combine harvester or, if equipped with a cabin, the rear side of the cabin.

Dimensions in millimetres

**Key**

1 guard

Figure 6 — Prevention of access to distribution auger**5.4.4 Filling auger**

If the grain tank is equipped with an enclosed central filling auger, the minimum distance between the auger circumference and the outer edge of the grain tank at the operator's work station or other working positions shall be

- 550 mm, if the auger flight ends at least 100 mm deep in the auger tube, or
- 850 mm, if the auger flight ends less than 100 mm deep in the auger tube or the auger flight extends beyond the enclosed tube.

5.4.5 Discharge auger**5.4.5.1 General**

Inside the grain tank, the discharge auger(s) shall be protected against inadvertent contact of the operator by a cover over its length.

5.4.5.2 Automatic discharge auger disengagement control

5.4.5.2.1 Self-propelled combine harvesters which have an electrically activated discharge auger engagement mechanism shall have a system that prevents engagement of that mechanism if the operator is not in the operator's work station and which automatically disengages the discharge auger mechanism

- when the operator enters the grain tank through the normal means provided for grain tank entry, or
- when the operator leaves the operator's work station.

The maximum delay time for triggering the disengagement shall be 7 s.

5.4.5.2.2 The automatic disengagement system shall apply when the combine harvester is stationary and is not required when the combine harvester is travelling.

5.4.5.2.3 For self-propelled combine harvesters with a mechanically activated discharge auger engagement, the control lever for engagement shall act as an impediment for egress from the operator's seat when in the engaged position, or shall be designed as a hold-to-run lever.

5.4.6 Clean grain and returns handling systems

Access to the moving parts of the clean grain and returns handling systems (elevator flights and augers), through clean-out openings, shall be prevented by covers which ensure sufficient pre-loading to achieve a durable sealing of the openings and allow handling without the use of tools. Information shall be provided in the operator's manual regarding cleaning of the clean grain and returns handling systems [see [10.1.3 c](#)].

NOTE The covers of clean grain and returns handling systems are functional components as they are parts of the housings of the elevators and augers. For proper function of the combine harvester, these covers are mounted in a specific way in order to avoid the complete loss of the harvested crop.

5.5 Maize harvesting attachment

5.5.1 Maize picker head

5.5.1.1 Upwardly swivelling covers shall be self-supporting and held in the opened position.

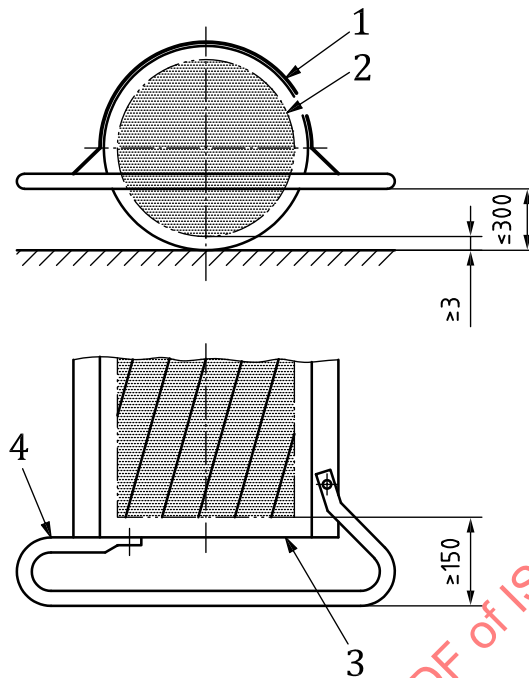
5.5.1.2 Information shall be provided in the operator's manual and on the machine regarding residual risks of shearing and pinching on a feeding mechanism which cannot be guarded for functional reasons (e.g. working components, rotary crop divider) [see [10.1.3 d](#)) and [10.2.3.2 d](#))].

5.5.2 Mid-mounted choppers

5.5.2.1 Horizontal axis

The distance between rotating working tools (e.g. knives) and the outer edge of the picking device or the protection bar shall be at least 150 mm at a height of 300 mm maximum. The lateral ends of the mid-mounted chopper shall be covered and the guard shall extend to at least 3 mm beyond the tip-circle of the working tools (see [Figure 7](#)).

Dimensions in millimetres

**Key**

- 1 guard (top)
- 2 tip circle of tool
- 3 guard (lateral end)
- 4 protection bar

Figure 7 — Mid-mounted chopper with horizontal arrangement of working tools

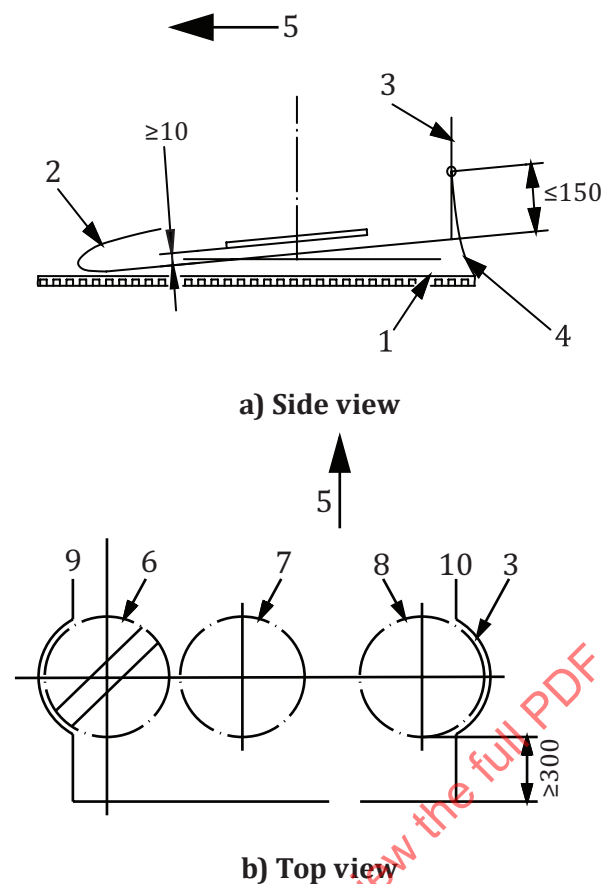
5.5.2.2 Vertical axis

5.5.2.2.1 The safety distance between rotating working tools (e.g. knives) and a rear-fixed closed barrier (e.g. imperforate barrier) shall be at least 300 mm at a maximum height of 150 mm above the plane of the path of the tools (see [Figure 8](#)).

5.5.2.2.2 At the sides, a fixed closed guard shall extend at least 10 mm below the path of the tools.

5.5.2.2.3 A protective device at the rear shall avoid ejected chopped material creating a hazard for exposed persons.

NOTE The following materials can be considered, for example, canvas, rigid imperforate guard, chains or rubber strips.

**Key**

- | | | | |
|---|----------------------|----|---------------------------|
| 1 | field | 6 | tip circle of tool, row 1 |
| 2 | crop gathering tools | 7 | tip circle of tool, row 2 |
| 3 | fixed closed guard | 8 | tip circle of tool, row n |
| 4 | rubber canvas | 9 | left hand |
| 5 | direction of travel | 10 | right hand |

Figure 8 — Mid-mounted chopper with vertical arrangement of working tools**5.6 Rear straw chopper, straw spreader and chaff spreader****5.6.1 General**

5.6.1.1 The straw chopper, straw spreader or chaff spreader shall disengage simultaneously with the threshing mechanism.

5.6.1.2 A safety sign or safety signs shall be provided near the chopper and/or the spreader to draw attention to the possibility of working parts running on (where this condition exists) and to the residual risks of thrown objects [see 10.1.3 e), 10.1.3 f), 10.2.3.2 e) and 10.2.3.2 f)].

Information shall be provided in the operator's manual on the procedure to be followed for safe replacement of blades of the straw chopper [see 10.1.3 g)].

5.6.2 Straw chopper with discharge chute

5.6.2.1 Guarding of moving parts of the straw chopper shall be provided similarly to the examples shown in [Figures 9](#) a) and b). This may be accomplished by a combination of barriers and fixed parts of the machine. The projection of these guards on a horizontal plane shall be continuous.

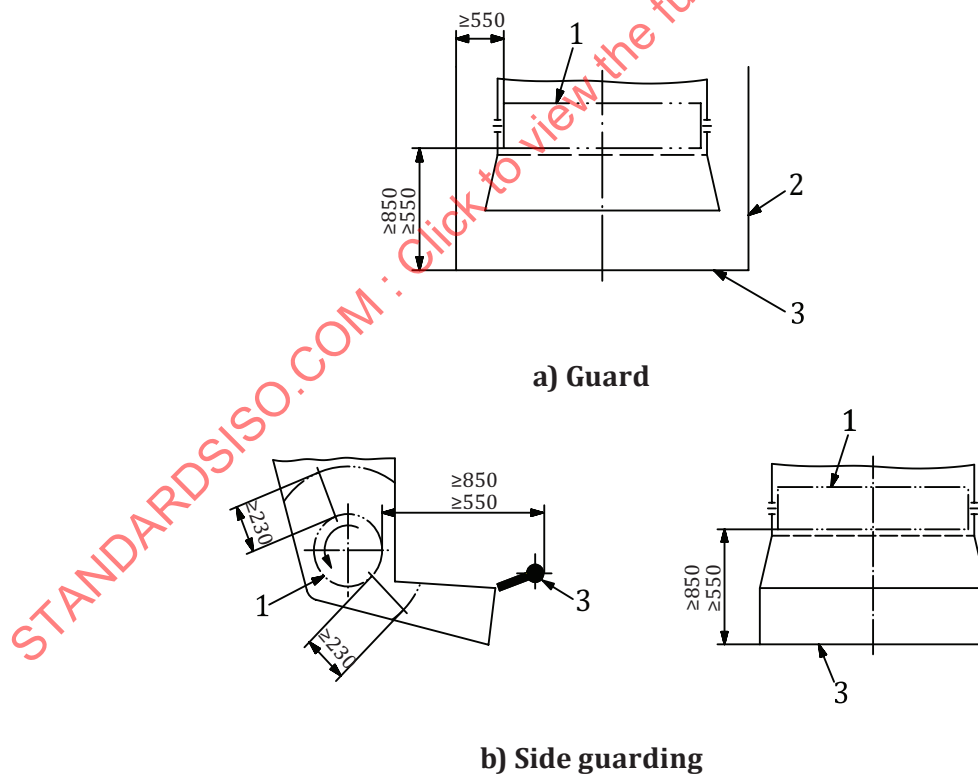
5.6.2.2 When the straw chopper is in the operating position, these guards shall be positioned

- at least 850 mm behind the tip path of the knives, or 550 mm if the lower edge of the guard is less than 1100 mm above ground level, and
- at least 550 mm from the sides of the tip path of the knives at a maximum height of 1 100 mm above ground level (this guard is not required if the sides of the chopper housing or other machine part extends at least 230 mm beyond the tip path of the knives).

5.6.2.3 Straw choppers with the facility of folding the guards in order to reduce transport width to allow travel and/or operation of a combine harvester without the straw chopper being in operation shall be designed such that normal operation of the straw chopper is prevented when the guards are in the folded position (e.g. blocking the discharge chute). It shall be possible to fold the guards without using a tool.

5.6.2.4 If the straw chopper knives cannot be disengaged when the straw chopper is in the windrow position, the guarding requirements for the straw chopper operating position apply.

Dimensions in millimetres



Key

- 1 tip path of knives
- 2 side barrier
- 3 rear barrier

Figure 9 — Guarding for straw choppers with discharge chute

5.6.3 Straw chopper with driven spreader

5.6.3.1 Guarding of the straw chopper itself shall be in accordance with 5.6.2.

5.6.3.2 Guards shall be provided to prevent inadvertent contact with moving parts of the driven spreader. This requirement may also be fulfilled by a combination of guards and barriers or other rigid machine parts providing at least an equal level of safety.

5.6.3.3 When the spreader is in the operating position, these guards shall be positioned at least 550 mm from the outer edges of the driven working tools, in the zone of the discharge apertures, at a maximum height of 1 100 mm above ground level.

5.6.3.4 If the spreader is open at the top or bottom for functional reasons, a guard to prevent inadvertent contact shall be mounted at the sides with a dimension extending at least 230 mm above/below the working tools, except in the outlet area (see Figure 10).

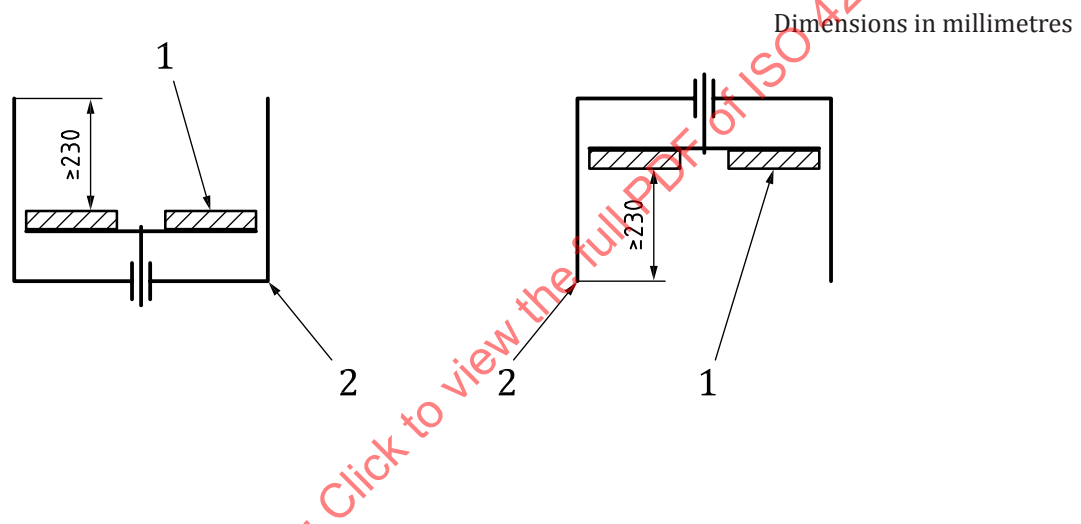


Figure 10 — Driven spreader guard

5.6.4 Chaff spreader

5.6.4.1 Moving parts of the chaff spreader shall be guarded to protect the operator from inadvertent contact. This requirement may also be fulfilled by a combination of guards and barriers or other rigid machine parts providing at least an equal level of safety.

5.6.4.2 When the spreader is in the operating position guards, barriers and rigid machine parts used for safeguarding shall be positioned

- at least 850 mm from the outer edges of the driven working tools if the lower edge of the guard is greater than or equal to 1 100 mm above ground level, or
- at least 550 mm from the outer edges of the driven working tools if the lower edge of the guard is less than 1 100 mm above ground level.

5.6.5 Straw spreader

A safety sign warning against the hazard from thrown objects shall be provided near the discharge chute [see 10.2.3.2 f)]. Reference to this shall be included in the operator's manual [see 10.1.3 f)].

5.7 Stone trap

It shall be possible to open the stone trap without the need to go under the combine harvester.

NOTE This requirement is not related to the cleaning of the stone trap.

5.8 Storage of sickle bars

Means shall be provided for safe storage of a replacement sickle bar on the sickle bar header.

6 Additional requirements for forage harvesters

6.1 Operator's work station

When the operator's work station is equipped with a cabin, a windscreen washer shall be provided.

6.2 Infeed mechanism

6.2.1 Shearing and pinching points shall be avoided or guarded where this is functionally possible.

6.2.2 In order to protect exposed persons against unintentional contact with any accessible moving parts at the front and sides of the pick-up devices, a barrier (e.g. a bar) shall be fitted. This requirement is also fulfilled by a combination of guards and barriers or other rigid machine parts providing at least an equal level of safety.

6.2.3 In the working position, this barrier shall be

- a minimum of 230 mm in front of the most forward point of the tine path and at a height, h , of between 500 mm and 1 000 mm above the ground, and
- a minimum of 150 mm from the sides of the tine path at a height of between 500 mm and 1 000 mm above the ground.

When a bar, or some other part of the machine, is also used then it shall be located at a height, h , of between 500 mm and 1 000 mm above the ground (see [Figure 11](#)).

6.2.4 The requirement of guarding the side of the tine path is also fulfilled where guards or fixed parts of the machine have at least the same dimension as the area covered by the tine tip path.

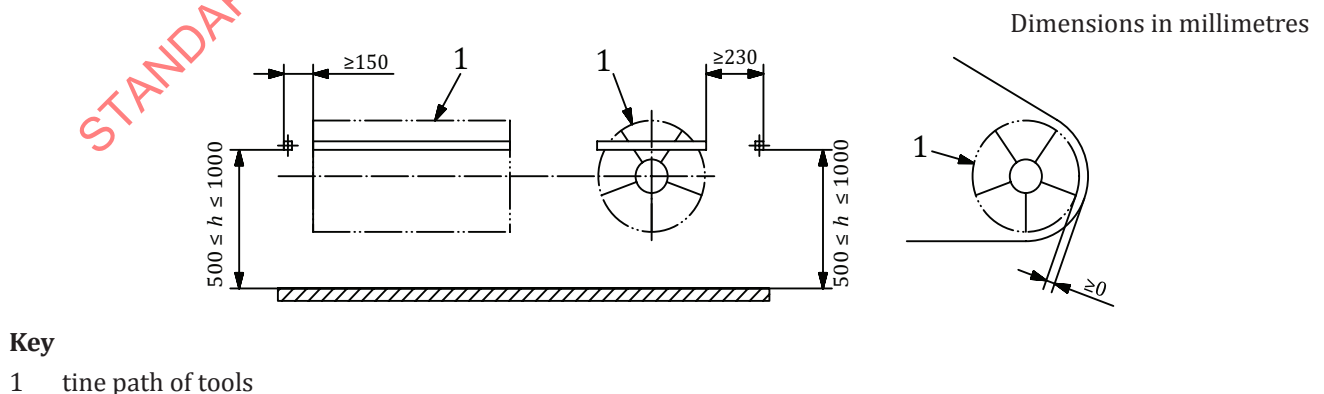
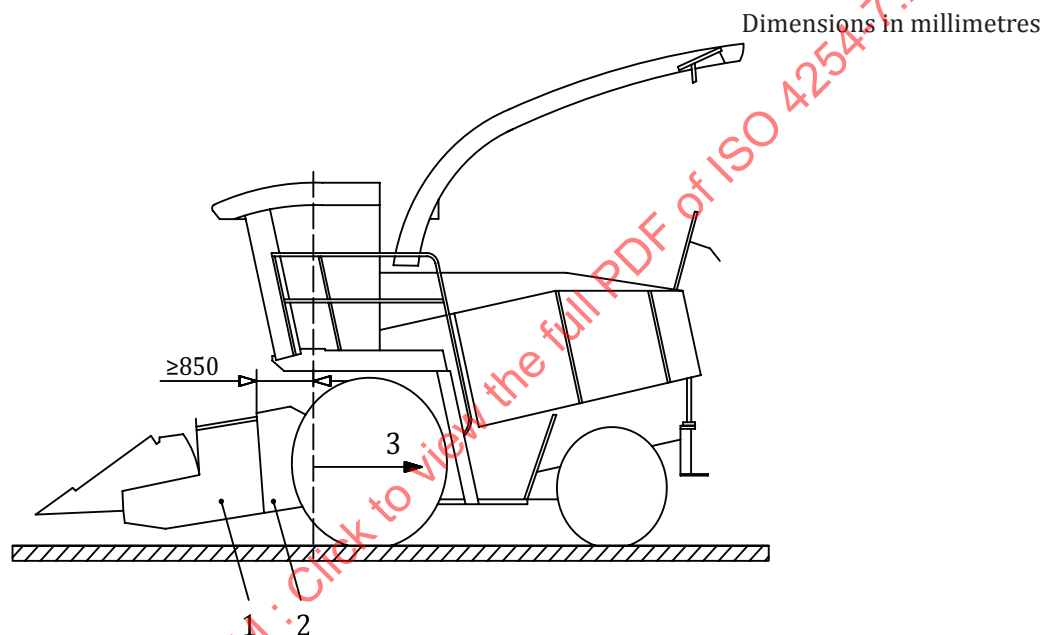


Figure 11 — Rotating pick-up device

6.2.5 If the forage harvester is equipped with an additional control for the reverser drive outside the operator's work station (see [Figure 12](#)), this additional control shall

- be a hold-to-run control,
- have only the reverse and stop function, and
- be located at the side of the machine (left or right side) in such a way, that the operator can only actuate the control when
 - standing on the ground,
 - he has an adequate direct visibility on the reverser work area, and
 - the distance between the control and the front edge of the feed roller housing is at least 850 mm.



Key

- 1 header
- 2 feeder housing
- 3 area for the additional control behind this line

Figure 12 — Additional control for reverser drive

6.2.6 Information shall be provided in the operator's manual and by safety signs on the forage harvester regarding shearing and pinching regions of the gathering and cutting mechanism such as cutterbar, pickup attachment and row crop gatherers [see [10.1.4.1 a](#)) and [10.2.3.2 b](#))]. If there are shearing and pinching points outside the function-related areas, they shall be protected from inadvertent contact by the use of guards, barriers or other protective devices.

6.2.7 Where forage harvesters are equipped with the combine harvester headers, the provisions set out in [5.5.1](#) apply.

6.3 Cutterhead drive

It shall not be possible to engage the infeed drive before engaging the cutterhead drive.

6.4 Run-down of rotating functional elements in the crop flow system

6.4.1 For protection against hazards by run-down rotating functional elements in the crop flow system (e.g. cutterhead, blower, crop processor), the following requirements apply:

- the run-down time of the rotating functional elements is limited to 10 s, or
- movable interlocking guards with guard locking according to ISO 12100:2010, 6.3.3.2.3, as defined in ISO 12100:2010, 3.27.5 shall be provided, or
- the parts of the crop flow system which shall be opened for clearing of disorders shall fulfil the requirements of ISO 12100:2010, 6.3.3.2.3, as defined in ISO 12100:2010, 3.27.5.

6.4.2 The device for limitation of the run-down time (e.g. brake), according to the first indent of [6.4.1](#), shall be automatically activated if the operator leaves the operator's work station and the drive of the rotating functional elements is disengaged. The maximum delay time for triggering the device for limitation of the run-down time of the rotating functional elements shall be 12 s following detection of the operator leaving the operator's work station.

NOTE The maximum 12 s delay before disengagement of the drive and activation of the run-down limiting device prevents nuisance tripping when traveling due to operator movement.

An additional manual activation of the device for limitation of the run-down time is allowed.

6.4.3 The device for limitation of the run-down time shall function regardless of whether or not the engine is running.

6.4.4 Specific instructions for safe clearing of disorders in the crop flow system shall be provided in the operator's manual [see [10.1.4.1](#) c)].

6.5 Knife sharpening device

6.5.1 Knife sharpening and adjustment of the shear bar, either automatic or manual, shall be possible with all guards which are protecting the cutterhead remaining in place.

6.5.2 However, if it is necessary on trailed forage harvesters with manual shear bar adjustment to visually check and adjust the knife to shear bar clearance with a stationary cutterhead. It shall be possible to rotate the cutterhead manually, without the need to touch the knives.

6.5.3 Specific instructions about the sharpening device shall be provided in the operator's manual [see [10.1.4.1](#) b)].

7 Additional requirements for cotton harvesters

7.1 Harvest mechanism, feed augers, reel

7.1.1 Cotton stripper and cotton picker

Information shall be provided in the operator's manual and on the machine regarding function-related shearing and pinching regions of the gathering mechanisms [see [10.1.5](#) a) and [10.2.3.2](#) b)].

7.1.2 Cotton picker only

7.1.2.1 Drums and module builder

7.1.2.1.1 The requirements of [4.3.9](#) apply to the engagement and disengagement of the cotton picker drums.

7.1.2.1.2 For inspection and lubrication of drum and fingers, a remote hold-to-run control that requires continuous actuation in order to maintain drum rotation shall be provided. If remote control is tethered, the tether shall be of sufficient length to allow the operator to inspect each drum with the remote control device in hand.

7.1.2.1.3 Machines equipped with a module builder: in order to service and inspect the module builder, a remote hold-to-run control that requires continuous actuation in order to maintain movement of the module builder components shall be provided. If remote control is tethered, the tether shall be of sufficient length to allow the operator to observe and inspect machine operation.

7.1.2.1.4 The operator's manual shall give instructions on how to safely inspect and service the drums and (if equipped) the module builder using the remote operating control device provided for that purpose [see [10.1.5 b](#))].

7.2 Basket (cotton stripper and cotton picker)

7.2.1 Lowering basket

It shall be possible to prevent inadvertent lowering of the basket from its raised position. A locking device shall be provided for service and maintenance work under the raised basket. If the locking device is controlled manually, a safety sign shall be provided on the machine drawing attention to the hazard of working under the raised basket without prior engagement of the locking device. Instructions on the use of the locking device shall be provided in the operator's manual [see [10.1.5 d](#))].

7.2.2 Compactor auger

7.2.2.1 The control system for the compactor auger drives shall be designed such that the augers will not engage unless

- the compactor auger's On/Off control is in the "On" position,
- the conveyor fan's On/Off control is in the "On" position, and
- the engine speed control is in the "High idle" position.

As an alternative to these three requirements, the design shall be such that the augers will not engage except through activation of a hold-to-run control that requires continuous actuation in order to maintain auger movement.

7.2.2.2 The operator's manual shall provide information for safe maintenance and servicing [see [10.1.5 e](#))].

7.2.3 Basket safety signs

7.2.3.1 Safety signs shall be provided for the basket unloading hazards of moving parts during the unloading cycle [see [10.2.3.2 g](#))].

7.2.3.2 Safety signs shall be provided for machine stability hazards when turning with the basket raised [see [10.2.3.2 h](#)].

7.2.3.3 If provided with a device for manual operation for lowering the basket, this device shall be located outside the hazard zone. A safety sign shall be provided near this device warning of the need to stay clear of the basket when lowering [see [10.2.3.2 i](#)].

7.2.4 Basket handrail

A handrail complying with ISO 4254-1:2013, 4.7.1.3 shall be provided on top of the basket for service and maintenance work.

7.3 Operating fluids

With reference to [4.9.3](#), filler necks on cotton harvesters that require high ground clearance for water tanks, fuel tank and engine shall be located at a height of not more than 2 000 mm from the ground surface, or not more than 1 500 mm from a platform or step.

8 Additional requirements for sugar cane harvesters

8.1 General

In case of tip-over of a self-propelled sugar cane harvester, the protection of the operator is considered sufficient if the design of the machine (shape and integrated structure or cabin in combination with or without the structure), in combination with a restraining system in accordance with ISO 3776-1, ISO 3776-2 and ISO 3776-3, gives sufficient space for survival.

8.2 Clearing of blockages or obstructions

All cutting, feeding, gathering and loading systems shall be reversible based upon operator command to assist on clearing chokes blockages or obstructions. The forward and reverse functions shall be disabled with the engine turned off when manual clearing is being performed.

8.3 Cabin

Where a sugar cane harvester is equipped with a cabin, means shall be provided to enable the operator to clean the windscreen from the outside while maintaining three-point contact. The requirements of ISO 4254-1:2013, 4.8.2.1 and 4.8.2.2 apply. Alternatively, other provisions shall be made for cleaning the windscreen from the ground including the following:

- a cleaning tool shall be provided with and stored on the machine;
- the tool shall be easily accessible.

Instructions on how to clean the windscreen shall be provided in the operator's manual [see [10.1.2 e](#)].

8.4 Service and maintenance

The crop gathering, base cutter height control and topper systems shall be designed such that they are serviceable in the lowered position or shall be designed to prevent inadvertent lowering, as described in [4.9.4](#). The operator's manual shall identify normal servicing method [see [10.1.6 a](#)) and [10.1.6 b](#))].

8.5 Base cutting system

If equipped with an automated height control of the base cutting system, it shall be capable of being manually overridden. This operation shall comply with the requirements of ISO 4254-1:2013, 4.6 and shall be described in the operator's manual [see [10.1.6 c](#))].

8.6 Billet loading conveyor system

A support device for the billet loading conveyor system shall be provided so that no single point failure results in the conveyor falling to the ground.

9 Verification of the safety requirements and/or protective/risk reduction measures (see [Table 1](#))

Table 1 — List of safety requirements and/or protective/risk reduction measurements and their verification

Subclause	Inspection ^a	Verification measurement ^b	Test	Requirement
4.2.1	X	X	—	Shall be verified in accordance with ISO 15077 and ISO 3767-1 and ISO 3767-2.
4.2.2	—	X	—	Shall be verified by measuring the actuating force and the clearance of the controls.
4.3.1.2	X	—	X	Shall be verified in accordance with ISO 3776-1, ISO 3776-2 and ISO 3776-3.
4.3.3	—	X	—	Shall be verified by measuring the position and clearance.
4.3.4	X	X	—	Shall be verified by measuring the clearance, hand reach and foot reach.
4.3.9.1	X	X	X	Shall be verified by operating the header disengagement system.
4.3.11.5	X	—	X	Shall be verified in accordance with ISO 9533.
4.3.12.2	X	X	X	Shall be verified by operating the door and measuring the opening dimensions.
4.3.12.3	—	X	—	Shall be verified by measuring the interior dimensions.
4.3.12.5	—	X	—	Shall be verified by measuring the overpressure with all openings of the cabin closed.
4.4	X	X	—	Shall be verified by measuring the dimensions of the boarding means to other than operator's work station.
4.5.3	—	X	—	Shall be verified by measuring the force for folding the elements while using the handles or integral parts identified for that purpose.
4.7	X	—	X	Shall be verified by operating the automatic guidance system.
4.9.3.1	—	X	—	Shall be verified by measuring the height for carrying out the filling operation.
4.9.4	X	—	X	Shall be verified by carrying out maintenance or service operations.
4.9.6.1	X	—	X	Shall be verified by carrying out greasing or lubrication operations.
4.12	X	—	X	Shall be verified by operating the header drive.
4.15.2	—	X	X	Shall be verified in accordance with Annex B of ISO 4254-1:2013, and Annex C of this document.
5.3.1	—	X	—	Shall be verified by measuring the clearance between the outer components of the reel and adjacent fixtures.
5.4.1.1	X	X	X	Shall be verified in accordance with ISO 5687.
5.4.1.3	—	X	—	Shall be verified by measuring the operating force of the parts or components.
^a Visual check of the machine to see that all elements are in place.				
^b Determination of a value by using some form of device or instrument.				

Table 1 (continued)

Subclause	Inspection ^a	Verification measurement ^b	Test	Requirement
5.4.3	X	X	—	Shall be verified by measuring the position and dimensions of the cover.
5.4.4	—	X	—	Shall be verified by measuring distances between the auger circumference and the outer edge of the grain tank.
5.4.5.2.1	X	X	X	Shall be verified by operating the discharge auger disengagement system.
5.5.1.1	X	—	X	Shall be verified by swivelling the covers.
5.5.2.1	X	X	—	Shall be verified by measuring the distances between the working tools and the outer edge of picking device or guard and between the cover and the tip path of the working tools.
5.5.2.2	X	X	—	Shall be verified by measuring the safety distances between the working tools and the rear barrier and between the guard and the tool path
5.6.1	X	—	X	Shall be verified by operating the disengagement control for the threshing mechanism.
5.6.2	X	X	X	Shall be verified by operating the straw chopper and by measuring the safety distances.
5.6.3	X	X	—	Shall be verified by measuring the safety distances in the different positions.
5.6.4	X	X	—	Shall be verified by measuring the safety distances in the different positions.
5.7	X	—	X	Shall be verified by carrying out the emptying of the stone trap.
6.2.3	X	X	—	Shall be verified by measuring the safety distances.
6.2.5	X	X	X	Shall be verified by operating the additional control for the reverser and measuring the distance between the control and outer edge of feed roller housing.
6.3	X	—	X	Shall be verified by operating the cutterhead drive.
6.4	X	X	X	Shall be verified by disengaging the cutterhead drive and measuring the run down time.
7.1.2.1.2	X	—	X	Shall be verified by carrying out inspection and lubrication operations.
7.2.1	X	—	X	Shall be verified by carrying out maintenance or service operations.
7.2.2.1	X	—	X	Shall be verified by operating the compactor augers.
7.3	—	X	—	Shall be verified by measuring the height for carrying out the filling operation.
8.2	X	—	X	Shall be verified by operating the reversing function of all cutting, feeding, gathering and loading systems.
^a Visual check of the machine to see that all elements are in place.				
^b Determination of a value by using some form of device or instrument.				

10 Information for use

10.1 Operator's manual

10.1.1 General

10.1.1.1 Content and presentation shall be in accordance with ISO 3600.

10.1.1.2 Comprehensive instructions and information on all aspects of the safe use of the machine, including suitable clothing and personal protective equipment requirements and the need for training, if necessary, shall be provided by the manufacturer in the operator's manual. The following useful items to be included in the operator's manual are general:

- a) information relating to transport, handling and storage of the machine;
- b) information relating to installation and commissioning of the machine;
- c) information relating to the machine itself;
- d) information relating to the use of the machine;
- e) information for maintenance;
- f) information relating to de-commissioning, dismantling and disposal;
- g) information for emergency situations;
- h) maintenance instructions provided for skilled persons and for unskilled persons. They should be kept clearly separated from each other.

10.1.1.3 The information and items given in ISO 4254-1:2013, 8.2.3 apply.

10.1.2 All machines

In particular, the following information and points shall be provided:

- a) description and function of all controls, including an explanation of the identities and symbols used;
- b) instructions on how to adjust the operator's seat;
- c) intended use of the instructional seat (if provided);
- d) explanation of warnings used;
- e) instructions on how to clean the windscreen;
- f) instructions on how to adjust and clean the rear-view mirrors;
- g) information about selection, cleaning and replacement intervals of the air filter, if the machine is equipped with a cabin;
- h) explanation of the automatic guidance system (if provided);
- i) warnings regarding hot surfaces of the engine and associated parts;
- j) manual operation of individual assemblies and, if required, use of special tools;
- k) instructions on how to change operating fluids, including safety aspects;
- l) location and use of devices for maintaining machine parts in a raised position during service and maintenance;

- m) information on servicing and maintenance locations;
- n) location and method for use of tie-down and jacking points and if provided, retrieval points;
- o) instructions about greasing and lubrication;
- p) recommendations about number, type and location of fire extinguishers;
- q) residual risks associated with overhead power lines, when the machine exceeds 4 m in height during any mode of operation;
- r) recommendations on how to operate machines equipped with a cabin with all doors and windows closed;
- s) recommendations on the general cleaning of the machine and the proper use of PPE, if necessary.

10.1.3 Combine harvesters

In particular, the following information and points shall be provided:

- a) residual risks associated with the gathering and cutting mechanism;
- b) residual risks associated with, and instructions for, safe access into the grain tank;
- c) residual risks associated with, and instructions about, the cleaning of the clean grain and returns handling system;
- d) residual risks associated with the maize picker head;
- e) residual risks associated with run-down of moving functional elements of the rear straw chopper, straw spreader and chaff spreader;
- f) residual risks associated with thrown objects ejected by the rear straw chopper, straw spreader and chaff spreader;
- g) information on the procedure to be followed for safe replacement of blades of the straw chopper.

10.1.4 Forage harvesters

10.1.4.1 In particular, the following points shall be provided:

- a) information associated with the infeed mechanisms;
- b) information associated with the use of the knife sharpening device;
- c) information associated with the safe clearing of disorders in the crop flow system.

10.1.4.2 In addition, it is recommended to include the following information, as it can be useful:

- a) use of personal protection equipment when handling with silage additives and blade sharpening;
- b) residual risks associated with the replacement of knives.

10.1.5 Cotton harvesters

In particular, the following information and points shall be provided:

- a) residual risks associated with the gathering mechanisms;
- b) residual risks associated with, and instructions on, the safe inspection and servicing of the drums;

- c) instructions on how to safely inspect and service the module builder (if provided) using the remote operating control provided for that purpose;
- d) instructions on the use of the locking device for the basket;
- e) instructions for safe maintenance and servicing of the compactor auger.

10.1.6 Sugar cane harvesters

In particular, the following information and points shall be provided:

- a) residual risks associated with the crop gathering and cutting mechanism;
- b) normal servicing of the crop gathering system;
- c) information regarding the function of the height control of the cutting system;

10.2 Marking

10.2.1 General

All machines shall be marked legibly and indelibly with at least the following minimum information:

- a) name and address of the manufacturer;
- b) designation of series or type;
- c) serial number, if any.

10.2.2 Instructional signs

The following instructions shall be provided on the machine:

- a) identification of controls;
- b) identification of integral parts of the machine for use as handles;
- c) indications about the operating conditions of the automatic guidance system, if present;
- d) identification of tie-down and jacking points.

10.2.3 Safety signs

10.2.3.1 Safety signs shall conform to the requirements of ISO 11684 and shall be appropriately affixed to the machine as necessary to alert the operator and others of the potential hazard(s) that can cause personal injury during normal operations and servicing.

10.2.3.2 In particular, safety signs shall be provided on the machine in all appropriate places, drawing attention to the following:

- a) possible contact with overhead power lines, clearly visible from the operator's position;
- b) residual risks of shearing and pinching of the gathering and/or cutting mechanisms;
- c) shearing and pinching points outside the cutting table side panels caused by the cutter bar or its drive mechanism;
- d) residual risks of shearing and pinching on the feeding mechanism of maize picker head;
- e) residual risks due to run-down of moving functional elements of rear straw chopper, straw spreader, chaff spreader, cutterhead and blower;

- f) residual risks of thrown objects ejected by rear straw chopper, straw spreader and chaff spreader;
- g) residual risks of moving parts during basket unloading;
- h) residual risks of machine stability when turning with the basket raised;
- i) stay clear of the basket when operating the manual lowering valve of the basket.

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Annex A (informative)

List of significant hazards

Table A.1 shows the significant hazard(s), the significant hazardous situation(s) and event(s) covered by this document that have been identified by risk assessment as being significant for this type of machine, and which require specific action by the designer or manufacturer to eliminate or reduce the risk.

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

Table A.1 — List of significant hazards associated with combine harvesters, forage harvesters, cotton harvesters and sugar cane harvesters

Number ^a	Hazard	Hazardous situation and event	Clause/subclause of ISO 4254-1:2013	Clause/subclause of this document
A.1	Mechanical hazards			
A.1.1	Crushing hazard	Clearance to adjacent parts when actuating controls	4.5.3; 5.1.3.1; 5.1.3.4; 5.1.8; 6.1	4.2.1.4 ; 4.2.2 ; 4.2.3 ; 4.3.3 ; 6.2.5
		Movement of boarding means	4.7.1.1.2; 4.7.1.2.3; 4.7.1.2.4; 4.7.2.3	4.3.5 ; 4.3.7 ; 4.4
		Design of platforms	4.7.2.2	4.3.7
		Working tools	4.10	4.1.3
		Service points, service and maintenance operations, use of supports	4.11; 4.17.1	4.9.4
		Movement of folding elements	4.17.3; 4.17.5; 4.17.6	4.5
		Shearing and pinching points at the operator's work station	5.1.4	4.3.4
		Construction of jack-up points, moving the machine, tie down and jacking operations	5.2	4.9.5
		Lack of stability	6.2	4.1.3
		Mounting of machines	6.2.2; 6.2.3; 6.3	4.6
		Cutting mechanism, feed augers, reel	—	5.3
		Grain tank augers and grain handling systems	—	5.4.1 ; 5.4.2 ; 5.4.3 ; 5.4.4 ; 5.4.5.1 ; 5.4.6
		Maize harvesting attachment	—	5.5
		Rear straw chopper, straw spreader, chaff spreader	—	5.6.2 ; 5.6.3 ; 5.6.4
		Emptying of stone trap	—	5.7
		Infeed mechanism	—	6.2
		Inspection points, Inspection of drum and fingers	—	7.1.2.1.2
		Basket lowering	—	7.2.1
		Compactor auger operation	—	7.2.2

^a With reference to ISO 4254-1:2013, Table A.1.

Table A.1 (continued)

Number ^a	Hazard	Hazardous situation and event	Clause/subclause of ISO 4254-1:2013	Clause/subclause of this document
A.1.2	Shearing hazard	Clearance to adjacent parts when actuating controls	4.5.3; 5.1.3.1; 5.1.3.4; 5.1.8; 6.1	4.2.1.4 ; 4.2.2 ; 4.2.3 ; 4.3.3 ; 6.2.5
		Movement of boarding means	4.7.1.1.2; 4.7.1.2.4; 4.7.2.3; 4.8.3	4.3.5 ; 4.3.7 ; 4.4
		Design of platforms	4.7.2.2	4.3.7
		Working tools	4.10	4.1.3
		Service points, service and maintenance operations, use of supports	4.11; 4.17.1	4.9.4
		Movement of folding elements	4.17.3; 4.17.5; 4.17.6	4.5
		Shearing and pinching points at the operator's work station	5.1.4	4.3.4
		Construction of jack-up points, moving the machine, tie-down and jacking operations	5.2	4.9.5
		Lack of stability	6.2	4.1.3
		Mounting of machines	6.2.2; 6.2.3; 6.3	4.4.6
		Cutting mechanism, feed augers, reel	—	5.3
		Grain tank augers and grain handling systems	—	5.4.1 ; 5.4.2 ; 5.4.3 ; 5.4.4 ; 5.4.5.1 ; 5.4.6
		Maize harvesting attachment	—	5.5
		Rear straw chopper, straw spreader, chaff spreader	—	5.6.2 ; 5.6.3 ; 5.6.4
		Emptying of stone trap	—	5.7
		Infeed mechanism	—	6.2
		Operation of knife sharpening device	—	6.5.1 ; 6.5.2
		Inspection points, inspection of drum and fingers	—	7.1.2.1.2
		Basket lowering	—	7.2.1
		Compactor auger operation	—	7.2.2
A.1.3	Cutting or severing hazard	Working tools	4.10	4.1.3
		Cutting mechanism, feed augers, reel	—	5.3
		Grain tank augers and grain handling systems	—	5.4.1 ; 5.4.2 ; 5.4.3 ; 5.4.4 ; 5.4.5.1 ; 5.4.6
		Maize harvesting attachment	—	5.5
		Rear straw chopper, straw spreader, chaff spreader	—	5.6.2 ; 5.6.3 ; 5.6.4
		Storage of sickle bars	—	5.8
		Infeed mechanism	—	6.2
		Operation of knife sharpening device	—	6.5.1 ; 6.5.2
		Inspection points, inspection of drum and fingers	—	7.1.2.1.2
		Basket lowering	—	7.2.1
		Compactor auger operation	—	7.2.2

^a With reference to ISO 4254-1:2013, Table A.1.

Table A.1 (continued)

Number ^a	Hazard	Hazardous situation and event	Clause/subclause of ISO 4254-1:2013	Clause/subclause of this document
A.1.4	Entanglement hazard	Working tools	4.10	4.1.3
		Starting/stopping the engine with engaged drive(s)	5.1.8	4.2.3
		Cutting mechanism, feed augers, reel	—	5.3
		Grain tank augers and grain handling systems	—	5.4.1; 5.4.2; 5.4.3; 5.4.4; 5.4.5.1; 5.4.6
		Maize harvesting attachment	—	5.5
		Infeed mechanism	—	6.2
		Inspection points, inspection of drum and fingers	—	7.1.2.1.2
		Basket lowering	—	7.2.1
		Compactor auger operation	—	7.2.2
A.1.5	Drawing-in or trapping hazard	Working tools	4.10	4.1.3
		Starting/stopping the engine with engaged drive(s)	5.1.8	4.2.3
		Cutting mechanism, feed augers, reel	—	5.3
		Grain tank augers and grain handling systems	—	5.4.1; 5.4.2; 5.4.3; 5.4.4; 5.4.5.1; 5.4.6
		Maize harvesting attachment	—	5.5
		Infeed mechanism	—	6.2
		Inspection points, inspection of drum and fingers	—	7.1.2.1.2
		Basket lowering	—	7.2.1
		Compactor auger operation	—	7.2.2
A.1.6	Impact hazard	Movement of boarding means	4.7.1.2.4	4.3.5
		Movement of folding elements	4.9.2; 4.9.3	4.5
		Design of steering system	5.1.3.3	4.1.3
		Operator's seat, adjustment of suspension system	—	4.3.1
		Movement of cabin doors	—	4.3.12.2.1
		Interchangeable and detachable harvesting devices	—	4.6.1
		Maize picker head (covers)	—	5.5.1.1
A.1.7	Stabbing or puncture hazard	Working tools	4.10	4.1.3
A.1.8	Friction or abrasion hazard	Actuation of controls	4.5.3; 5.1.3.3	4.2.1.4; 4.2.2; 4.2.3; 4.3.3; 6.2.5
		Electrical equipment, location of cables	4.12.1	4.17.1
		Location of boarding means	4.7.1.1.2	4.3.5
A.1.9	High-pressure fluid injection or ejection hazard	Hydraulic components and fittings (e.g. rupture)	4.13; 6.5	4.16

^a With reference to ISO 4254-1:2013, Table A.1.

Table A.1 (continued)

Number ^a	Hazard	Hazardous situation and event	Clause/subclause of ISO 4254-1:2013	Clause/subclause of this document
A.2	Electrical hazards			
A.2.1	Contact of persons with live parts (direct contact)	Non-insulated electrical equipment	4.12; 5.3; 6.5	4.9.2 ; 4.11 ; 4.17 ; 4.13.2
A.2.2	Contact of persons with parts which have become live under faulty conditions (indirect contact)	Electrical equipment	4.12.1	4.11 ; 4.17 ; 4.13.2
A.2.3	Approach to live parts under high voltage	Contact with overhead power lines	8.2.3; 8.3.1	4.11 ; 10.1.2 ; 10.2.3.2
A.2.4	Thermal radiation or other phenomena such as the projection of molten particles and chemical effects from short circuits, overloads, etc.	Failure of electrical equipment	4.12.2	4.1.3
		Failure of battery	5.3.1	4.9.2
A.3	Thermal hazards			
A.3.1	Burns, scalds and other injuries by possible contact of persons with objects or materials with an extreme high or low temperature, by flames or explosions and also by the radiation of heat sources	Hydraulic system, operating fluids (e.g. fuel, hydraulic oil, engine coolant)	4.15	4.9.3 ; 10.1.2
		Cabin material (in case of fire)	5.1.6	4.10.3
A.4	Hazards generated by noise			
A.4.1	Hearing loss (deafness), other physiological disorders (e.g. loss of balance, loss of awareness), accidents due to interference with speech communication and acoustic warning signals	Working of the machine	4.3; 8.2.3	4.15
A.5	Hazards generated by materials and substances			
^a With reference to ISO 4254-1:2013, Table A.1.				