
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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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.

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.

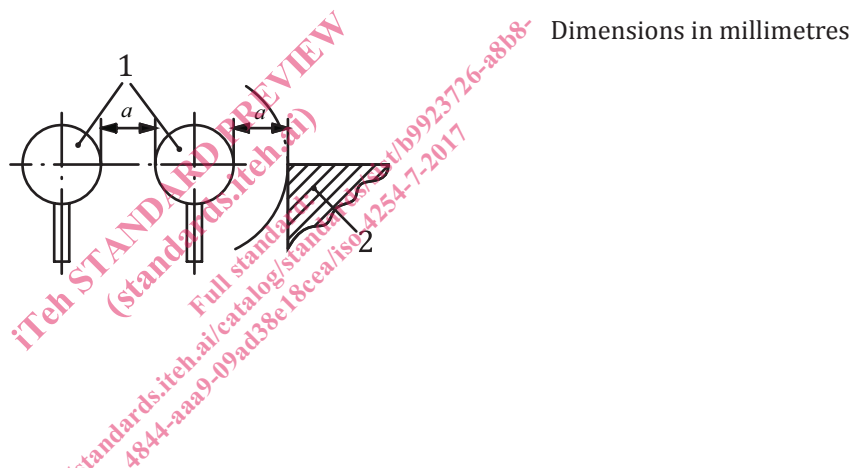


Figure 1 — Control clearances

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

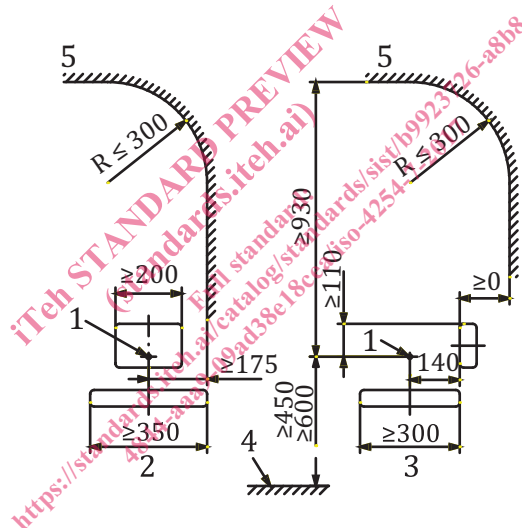
The instructional seat, if provided, shall meet the following requirements.

- 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.