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**Machinery for forestry — General safety  
requirements**

*Matériel forestier — Exigences de sécurité générales*

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 11850 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 15, *Machinery for forestry*.

This third edition cancels and replaces the second edition (ISO 11850:2003), which has been technically revised.

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## Introduction

This document is a type-C standard as stated in ISO 12100.

The machinery 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.

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# Machinery for forestry — General safety requirements

## 1 Scope

This International Standard specifies general safety requirements for self-propelled forestry machines and machines configured as forestry machines. It deals with all significant hazards, hazardous situations and events common to fellers, bunchers, delimiters, forwarders, log loaders, skidders, processors, harvesters, mulchers and multi-function versions of these machine types, as defined in ISO 6814, when used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer.

It does not deal with hazards specific to individual machines, such as those related to specific attachments, and therefore its use will not alone be sufficient to address all significant hazards for a majority of the machines it covers.

It does not deal with hazards related to chain shot, chain breakage on the upper side of the bar, lifting operation, remote control operation, the need for work lights or road safety. For vibration measurement, the test setup and work cycles are not dealt with; nor is the verification method for noise measurement addressed. It is not applicable to hazards related to maintenance or repairs carried out by professional service personnel.

The list of significant hazards dealt with is given in Annex A.

This International Standard is not applicable to machines manufactured before its date of publication.

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## 2 Normative references

The following referenced documents are indispensable for the application 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 2631-1, *Mechanical vibration and shock — Evaluation of human exposure to whole-body vibration — Part 1: General requirements*

ISO 2860, *Earth-moving machinery — Minimum access dimensions*

ISO 2867:2011, *Earth-moving machinery — Access systems*

ISO 3411:2007, *Earth-moving machinery — Physical dimensions of operators and minimum operator space envelope*

ISO 3450, *Earth-moving machinery — Wheeled or high-speed rubber-tracked machines — Performance requirements and test procedures for brake systems*

ISO 3457, *Earth-moving machinery — Guards — Definitions and requirements*

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

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*

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ISO 3767-4, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays — Part 4: Symbols for forestry machinery*

ISO 3795, *Road vehicles, and tractors and machinery for agriculture and forestry — Determination of burning behaviour of interior materials*

ISO 4413, *Hydraulic fluid power — General rules and safety requirements for systems and their components*

ISO 5010, *Earth-moving machinery — Rubber-tyred machines — Steering requirements*

ISO 5349-2, *Mechanical vibration — Measurement and evaluation of human exposure to hand-transmitted vibration — Part 2: Practical guidance for measurement at the workplace*

ISO 6682, *Earth-moving machinery — Zones of comfort and reach for controls*

ISO 6683, *Earth-moving machinery — Seat belts and seat belt anchorages — Performance requirements and tests*

ISO 6405-1, *Earth-moving machinery — Symbols for operator controls and other displays — Part 1: Common symbols*

ISO 6750, *Earth-moving machinery — Operator's manual — Content and format*

ISO 6814, *Machinery for forestry — Mobile and self-propelled machinery — Terms, definitions and classification*

ISO 8082-1, *Self-propelled machinery for forestry — Laboratory tests and performance requirements for roll-over protective structures — Part 1: General machines*

ISO 8082-2, *Self-propelled machinery for forestry — Laboratory tests and performance requirements for roll-over protective structures — Part 2: Machines having a rotating platform with cab and boom on the platform*

ISO 8083:2006, *Machinery for forestry — Falling-object protective structures (FOPS) — Laboratory tests and performance requirements*

ISO 8084:2003, *Machinery for forestry — Operator protective structures — Laboratory tests and performance requirements*

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

ISO 10263-4, *Earth-moving machinery — Operator enclosure environment — Part 4: Heating, ventilating and air conditioning (HVAC) test method and performance*

ISO 10263-5:2009, *Earth-moving machinery — Operator enclosure environment — Part 5: Windscreen defrosting system test method*

ISO 10265:2008, *Earth-moving machinery — Crawler machines — Performance requirements and test procedures for braking systems*

ISO 10532, *Earth-moving machinery — Machine-mounted retrieval device — Performance requirements*

ISO 10533, *Earth-moving machinery — Lift-arm support devices*

ISO 10570, *Earth-moving machinery — Articulated frame lock — Performance requirements*



ISO 11112, *Earth-moving machinery — Operator's seat — Dimensions and requirements*

ISO 11169, *Machinery for forestry — Wheeled special machines — Vocabulary, performance test methods and criteria for brake systems*

ISO 11512, *Machinery for forestry — Tracked special machines — Performance criteria for brake systems*

ISO 11837, *Machinery for forestry — Saw chain shot guarding systems — Test method and performance criteria*

ISO 11839, *Machinery for forestry — Glazing and panel materials used in operator enclosures for protection against thrown sawteeth — Test method and performance criteria*

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

ISO 13849-1, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*

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

ISO 14269-2, *Tractors and self-propelled machines for agriculture and forestry — Operator enclosure environment — Part 2: Heating, ventilation and air-conditioning test method and performance*

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

ISO 15818, *Earth-moving machinery — Lifting and tying-down attachment points — Performance requirements*

ISO 15998:2008, *Earth-moving machinery — Machine control systems (MCS) using electronic components — Performance criteria and tests for functional safety*

ISO 19472:2006, *Machinery for forestry — Winches — Dimensions, performance and safety*

EN 779:2002, *Particulate air filters for general ventilation — Determination of the filtration performance*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12100 and ISO 6814 apply.

## 4 Safety requirements and/or protective measures

### 4.1 General

Machinery shall comply with the safety requirements and/or protective measures of this clause. The machine shall also be marked in accordance with 5.2 and carry safety signs in accordance with 5.3.

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

The operator's manual to be provided with the machine shall comply with 5.1.

Verification of conformity shall be by inspection.

## 4.2 Safety distances, guards, shields

Unless otherwise specified in this International Standard, safety distances shall comply with the requirements of ISO 13857, with the exception of ISO 13857:2008, 4.2.4.2. Guards and shields, including thermal guards, shall be in accordance with ISO 3457, except that fasteners which retain fixed guards and shields in position shall be attached either to the guard or the machine.

Verification of conformity shall be by measurement.

## 4.3 Operator station

### 4.3.1 Operator space envelope

The design and arrangement of the operator station shall be such as to allow the operator to perform all normal operations at each operating position without equipment or working attachments infringing on the operator space envelope, as defined in ISO 3411:2007, Clause 5, or on the space required for the operation of controls, see 4.5.

Verification of conformity shall be by inspection and measurement.

### 4.3.2 Structures for operator protection

#### 4.3.2.1 Falling object protective structure (FOPS)

All machines shall be equipped with a FOPS tested to the 11 600 J energy level specified in ISO 8083:2006, 4.3.

Verification of conformity shall be by testing in accordance with ISO 8083.

#### 4.3.2.2 Roll-over protective structure (ROPS) [ISO 11850:2011](#)

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All applicable machines within the scope of ISO 8082-1 and ISO 8082-2 shall be equipped with a ROPS meeting the requirements of ISO 8082-1 or ISO 8082-2, as applicable.

Verification of conformity shall be by testing in accordance with ISO 8082-1 or ISO 8082-2, as appropriate.

#### 4.3.2.3 Operator protective structure (OPS)

All applicable machines within the scope of ISO 8084 shall have an OPS in accordance with ISO 8084, including the constructional requirements of ISO 8084:2003, 5.2.

A device or devices intended to deflect saplings and branches by geometry, position and strength shall be installed on skidders ahead of or behind the operator's station, as appropriate.

The operator shall be protected from hazards caused by flying part(s) of failed saw chains or saw teeth by means of polycarbonate or equivalent glazing, or other appropriate guards or shields, or both.

All machines equipped with a circular saw head shall have operator protection in accordance with ISO 11839.

All machines equipped with a chain saw cutting system shall have a saw chain shot guarding system in accordance with ISO 11837.

For machines fitted with a front- or rear-mounted winch, the OPS protection shall cover at least any window opening on machines fitted with a cab and any opening as applicable for machines with a canopy.

Verification of conformity shall be carried out by checking for conformance with ISO 8084, ISO 11837 or ISO 11839, as appropriate.

#### 4.3.2.4 Load bunk headboard

The load bunk of all tree and log transporting machines shall be equipped with a headboard capable of withstanding a force of 35 000 N applied at any point perpendicular to the face of the load bunk headboard structure. The structure shall provide protection of the cab with the machine in an inline position and the operator station in its load transport position. The test force shall be applied to the structure through a steel plate of diameter 200 mm or 200 mm × 200 mm square, with edges rounded to R 13. The plate shall be placed on as few bars of the headboard as possible. Permanent deformation shall be a maximum of 100 mm. A 100 mm diameter straight timber test piece shall not pass through the load bunk headboard when applied with a force of a maximum of 100 N.

The headboard shall be located between the load and the operator's station, and its height in the load transport position shall be greater than or equal to the height of the operator station. The headboard width shall be no less than the width across the inside of the stakes in their widest position, minus 50 mm max. at each side.

Verification of conformity shall be by inspection, test and measurement.

#### 4.3.2.5 Fumes, spillage, hose guards and sharp edges

A person in the operator station shall be protected as follows.

- a) Engine exhaust and harmful gases from heating systems shall be directed away from the operator's station, including any of its air intakes.
- b) Fuel and other fluid fillers shall be located outside the operator's station. The design, sealing and location of these fillers shall be chosen to minimize the potential for spillage into the operator's station. Tanks shall have means for safely relieving internal pressure before opening or when being opened.
- c) Battery location or locations shall be within easy access and shall minimize the potential of fumes and acid entering the operator's station, even in the event of the machine overturning. Batteries shall have provisions for easy handling.
- d) Pressurized hoses, pipes and components shall be located or shielded so that in the event of rupture, the fluid cannot be discharged directly onto the operator in the operating position. This also applies to all operating positions for movable shields (e.g. doors or windows) designed to be open during machine operation.
- e) Structural edges and corners of metallic or non-metallic materials of hardness sufficient to cause contusions or penetration of the human skin shall meet the following requirements:
  - external corners, such as those on cab or service doors, and pointed objects shall have a minimum radius of 4 mm;
  - grab-handles and edges/corners of handholds shall have a minimum radius of 5 mm.

Verification of conformity shall be by inspection and measurement.

#### 4.3.2.6 Operator environment

If a closed cab is provided, the cab shall be equipped with heating and ventilation systems in accordance with ISO 14269-2 or ISO 10263-4.

The cab shall also be equipped with a filtration system with inlet air filter(s) of at least class F7 in accordance with EN 779:2002 or equivalent. The inlet air filter(s) shall be serviceable from inside the cab or from a service platform. If the intake air filter(s) are located before the fan, the system between the filter and fan shall be free from leakage.