INTERNATIONAL STANDARD

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Machinery for forestry — Portable chain-saw safety requirements and testing —

Part 1: Chain-saws for forest service

Matériel forestier — Exigences de sécurité et essais des scies à chaîne portatives —
Partie 1: Scies à chaîne pour travaux forestiers

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a world-wide 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 11681-1 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 17, *Manually portable forest machinery*.

This second edition cancels and replaces the first edition (ISO 11681-1:1996), which has been technically revised.

ISO 11681 consists of the following parts, under the general title *Machinery for forestry — Portable chain-saw safety requirements and testing*:

— *Part 1: Chain-saws for forest service*

— *Part 2: Tree service chain-saws*

Introduction

This document is a type C standard as defined in ISO 12100-2.

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

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

Machinery for forestry — Portable chain-saw safety requirements and testing —

Part 1: Chain-saws for forest service

1 Scope

This part of ISO 11681 deals with the significant hazards and specifies safety requirements and their verification for design and construction of portable combustion-engine, hand-held chain-saws, designed only for use by one operator and intended for forest work.

It describes methods for the elimination or reduction of hazards arising from their use. In addition it specifies the type of information on safe working practices to be provided by the manufacturer.

It deals with all significant hazards. It does not cover the hazard from kickback for machines with an engine displacement over 80 cm^3. The environmental aspects, except for noise, have not been considered.

Chain-saws covered by this part of ISO 11681 are designed for use by persons having read and understood the safety requirements in the instruction handbook and using the appropriate personal protective equipment (PPE). The chain-saws covered are designed only to be operated with the right hand on the rear handle and the left hand on the front handle.

This part of ISO 11681 is not applicable to chain-saws which are manufactured before the date of publication of this document.

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 6531:1999, *Machinery for forestry — Portable chain-saws — Vocabulary*

ISO 6533:2001, *Forestry machinery — Portable chain-saw front hand-guard — Dimensions and clearances*

ISO 6534:1992, *Portable chain-saws — Hand guards — Mechanical strength*

ISO 6535:1991, *Portable chain-saws — Chain brake performance*

ISO 7293:1997, *Forestry machinery — Portable chain-saws — Engine performance and fuel consumption*

ISO 7914:2002, *Forestry machinery — Portable chain-saws — Minimum handle clearance and sizes*

ISO 7915:1991, *Forestry machinery — Portable chain-saws — Determination of handle strength*

ISO 8334:1985, *Forestry machinery — Portable chain-saws — Determination of balance*

ISO 9518:1998, *Forestry machinery — Portable chain-saws — Kickback test*

ISO 10726:1992, *Portable chain-saws — Chain catcher — Dimensions and mechanical strength*

ISO/TR 11688-1:1995, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning*

ISO 13772:1997, *Forestry machinery — Portable chain-saws — Non-manually actuated chain brake performance*

ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology*

ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles*

ISO 22867:—[1)], *Portable hand-held forestry machines with internal combustion engine — Vibration test code — Measurement of vibration at the handles*

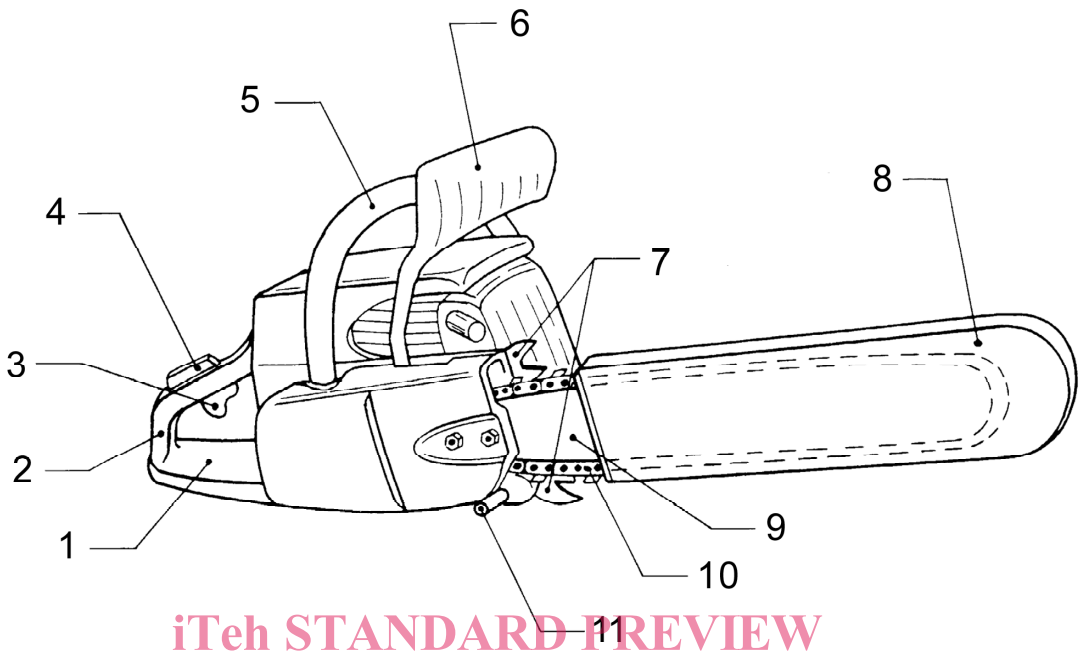
ISO 22868:—[1)], *Noise test code for portable hand-held forestry machines with an internal combustion engine — Determination of A-weighted emission sound pressure levels at the operator's position, and the sound power level — Engineering method (grade 2)*

IEC 60335-1, *Household and similar electrical appliances — Safety — Part 1: General requirements*

1) To be published.

3 Terms and definitions

For the purposes of this document, the terms definitions given in ISO 6531 and ISO 12100-1 apply. Figure 1 provides an example of a chain-saw.



Key

1 rear hand-guard
2 rear handle
3 throttle trigger
4 throttle trigger lock-out
5 front handle
6 front hand guard
7 spiked bumper
8 guide-bar cover
9 guide bar
10 saw chain
11 chain catcher

Figure 1 — Example of chain-saw

4 List of significant hazards

This clause specifies the significant hazards, hazardous situations and events in as far as they are dealt with in this part of ISO 11681 (see Table 1), identified by risk assessment as significant for this type of machinery, and which require action to eliminate or reduce the risk.

Table 1 — Significant hazards, hazardous situations and events covered by this part of ISO 11681

	Hazard	Subclause
1	Mechanical hazards created by cutting and impact, related to the saw chain.	5.3; 5.5; 5.6; 5.9; 5.19
2	Electrical hazards, created by contact with parts under high voltage (direct contact) or parts which have become under high voltage under faulty conditions (indirect contact).	5.12
3	Thermal hazards resulting in burns, scalds and other injuries, created by possible contact of persons with objects or materials with high temperature including the radiation of heat sources.	5.15
4	Noise hazards, resulting in hearing losses (deafness) and other physiological disorders (e.g. loss of balance, loss of awareness).	5.21; 6.2; 6.4
5	Vibration hazards (resulting in peripheral circulatory and nervous functional disturbances in the hand-arm system, such as the white finger disease).	5.20; 6.2; 6.4
6	Hazards from contact with or inhalation of harmful fluids, gases, mists, fumes and dusts related to exhaust gases.	5.16
7	Fire or explosion hazards related to fuel spillage.	5.18; 6.2
8	Hazards from neglect of ergonomic principles in machine design, such as hazards from unhealthy postures or excessive efforts and inadequate consideration of human hand-arm anatomy, related to handle design, machine balance and the use of spiked bumper.	5.2; 5.4; 5.7; 5.10; 6.2
9	Hazards from unexpected start-up, unexpected overrun/over-speed from failure/disorder of the control system related to failure in the handles and position of the controls.	5.2; 5.10; 5.11; 5.13
10	Hazards from impossibility of stopping the machine in the best possible conditions related to the handle strength and position of the engine stopping device.	5.2; 5.11
11	Hazards from failure of the control system related to handle strength, position of controls and marking.	5.2; 5.10; 5.11; 5.13; 6.3
12	Hazards from break-up (chain) during operation related to saw chain.	5.2; 5.3; 5.6; 5.17
13	Hazards from ejection of objects or fluids related to chip discharge and fuel spillage.	5.8; 5.18

5 Safety requirements and verification

5.1 General

The safe running of chain-saws depends on both the safety requirements as given in this clause and the safe working conditions associated with the use of adequate personal protection equipment (PPE) such as gloves, leg protection, boots, and eye, ear and head protection equipment.

Chain-saws shall comply with the safety requirements and/or protective measures of this clause. Chain-saws shall also be marked according to 6.3 and carry warnings according to 6.4. In addition, the machine shall be designed according to the principles of ISO 12100-2 for hazards relevant but not significant, which are not dealt with by this document.

5.2 Handles

5.2.1 Requirements

Chain-saws shall have a handle for each hand. These handles shall be designed such that

— they can be fully gripped by an operator when wearing protective gloves,

— they provide the necessary sureness of grip by their shaping and surface, and

— they conform to the dimensions and clearances given in ISO 7914.

The strength of both handles shall at least comply with ISO 7915.

Chain-saws having a system for isolating the machine vibration from the handles shall be designed so that the operator has the possibility of stopping the engine in a controlled manner with the engine stopping device (see 5.11), even in case of failure of the vibration isolation system.

5.2.2 Verification

Dimensions shall be verified by measurement. Strength requirements shall be verified by functional test in accordance with ISO 7915. The possibility of stopping the chain-saw engine, if a failure has occurred in the vibration isolation system, shall be verified by inspection of the design.

5.3 Hand protection

5.3.1 Protection at the front handle

5.3.1.1 Requirements

A guard shall be fitted in the vicinity of the front handle to protect the operator's fingers from injury by contact with the saw chain.

The dimensions of this front hand-guard shall comply with ISO 6533. Its strength shall comply with ISO 6534.

5.3.1.2 Verification

Dimensions shall be verified by measurement. Strength requirements shall be verified by functional testing in accordance with ISO 6534.

5.3.2 Protection at the rear handle

5.3.2.1 Requirements

A guard shall be provided along the length of the right side of the bottom of the rear handle to protect the operator's hand from contact with a broken saw-chain.

This guard shall extend from the right edge of the handle for at least 30 mm at the guide bar side and at least 100 mm lengthwise (see Figure 2). This requirement may also be fulfilled by parts of the machine.

The strength of the rear hand guard shall comply with ISO 6534.

5.3.2.2 Verification

Dimensions shall be verified by measurement. Strength requirements shall be verified by functional testing in accordance with ISO 6534.