
**Machinery for forestry — Safety
requirements and testing for pole-mounted
powered pruners —**

**Part 1:
Units fitted with an integral combustion
engine**

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*Matériel forestier — Exigences de sécurité et essais pour les perches
élagueuses à moteur —*

Partie 1: Machines équipées d'un moteur à combustion interne intégré
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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 3.

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 part of ISO 11680 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 11680-1 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 17, *Manually portable forest machinery*.

ISO 11680 consists of the following parts, under the general title *Machinery for forestry — Safety requirements and testing for pole-mounted powered pruners*:

— Part 1: *Units fitted with an integral combustion engine*

— Part 2: *Units for use with a back-pack power unit*

Annex A to D form a normative part of this part of ISO 11680. Annex E is for information only.

For the purposes of this part of ISO 11680, the CEN annex regarding fulfilment of European Council Directives has been removed.

Introduction

The extent to which hazards are covered is indicated in the scope of this part of ISO 11680. In respect of hazards not covered by this part of ISO 11680, it is intended that machinery comply as appropriate with ISO/TR 12100.

Certain noise- and vibration-reduction measures are covered in this part of ISO 11680 for the type of machinery concerned. It is the intention of ISO/TC 23/SC 17 to collect noise and vibration values for each forestry-machine type in accordance with relevant measurement standards. These values will be used to define the “state of the art” levels based on principles to be established by SC 17. The interaction of noise and vibration on the machine characteristics will be assessed, and the relationship between “state of the art” values and exposure limits considered.

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Machinery for forestry — Safety requirements and testing for pole-mounted powered pruners —

Part 1: Units fitted with an integral combustion engine

1 Scope

This part of ISO 11680 specifies safety requirements, and the verification of those requirements, for the design, fabrication and use of portable, hand-held, pole-mounted powered pruners, having an integral combustion engine as the power source and using a drive shaft to transmit power to cutting attachments. The cutting attachments covered are saw chains, and reciprocating and circular saw blades.

This part of ISO 11680 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 does not cover the risk of electric shock from overhead electric power lines during use of the pruners, with the exception of warnings and advice intended for inclusion in instruction handbooks. A test method and safety requirements addressing this risk are yet to be developed.

The list of significant hazards which require action to reduce the risk is given in annex A.

Environmental aspects have not been considered.

This part of ISO 11680 applies primarily to pruners manufactured after its date of issue.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 11680. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 11680 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 266:1997, *Acoustics — Preferred frequencies*.

ISO 3744:1994, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering method in an essentially free field over a reflecting plane*.

ISO 3767-5:1992, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays — Part 5: Symbols for manual portable forestry machinery*.

ISO 6531:1999, *Machinery for forestry — Portable hand-held chain-saws — Vocabulary*.

ISO 7112:1999, *Machinery for forestry — Portable hand-held brush-cutters and grass-trimmers — Vocabulary*.

ISO 7113:1999, *Portable hand-held forestry machines — Cutting attachments for brush cutters — Single-piece metal blades*.

ISO 11680-1:2000(E)

ISO 8662-1:1988, *Hand-held portable power tools — Measurement of vibrations at the handle — Part 1: General.*

ISO 8893:1997, *Forestry machinery — Portable brush cutters and grass-trimmers — Engine performance and fuel consumption.*

ISO 11201:1995, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Engineering method in an essentially free field over a reflecting plane.*

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

ISO/TR 12100-1:1992, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology.*¹⁾

ISO/TR 12100-2:1992, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles and specifications.*²⁾

ISO 13852:1996, *Safety of machinery — Safety distances to prevent danger zones being reached by the upper limbs.*³⁾

IEC 60651, *Sound level meters.*

IEC 60804, *Integrating-averaging sound level meters.*

IEC 60335-1:1991, *Safety of household and similar electrical appliances — Part 1: General requirements (third edition).*

IEC 61260:1995, *Electroacoustics — Octave-band and fractional-octave-band filters.*

3 Terms and definitions

ISO 11680-1:2000

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For the purposes of this part of ISO 11680, the following terms and definitions apply.

3.1

pole-mounted powered pruner pruner

portable, hand-held machine fitted with a cutting attachment mounted on a pole to enable an operator to cut the branches of standing trees

NOTE See example, Figure 1.

3.2

unit

complete machine including power source, drive shaft, cutting attachment and guard, but excluding harness

3.3

cutting attachment

cutting device in the form of a reciprocating blade, circular saw blade with its retainer, or saw chain with its guide bar

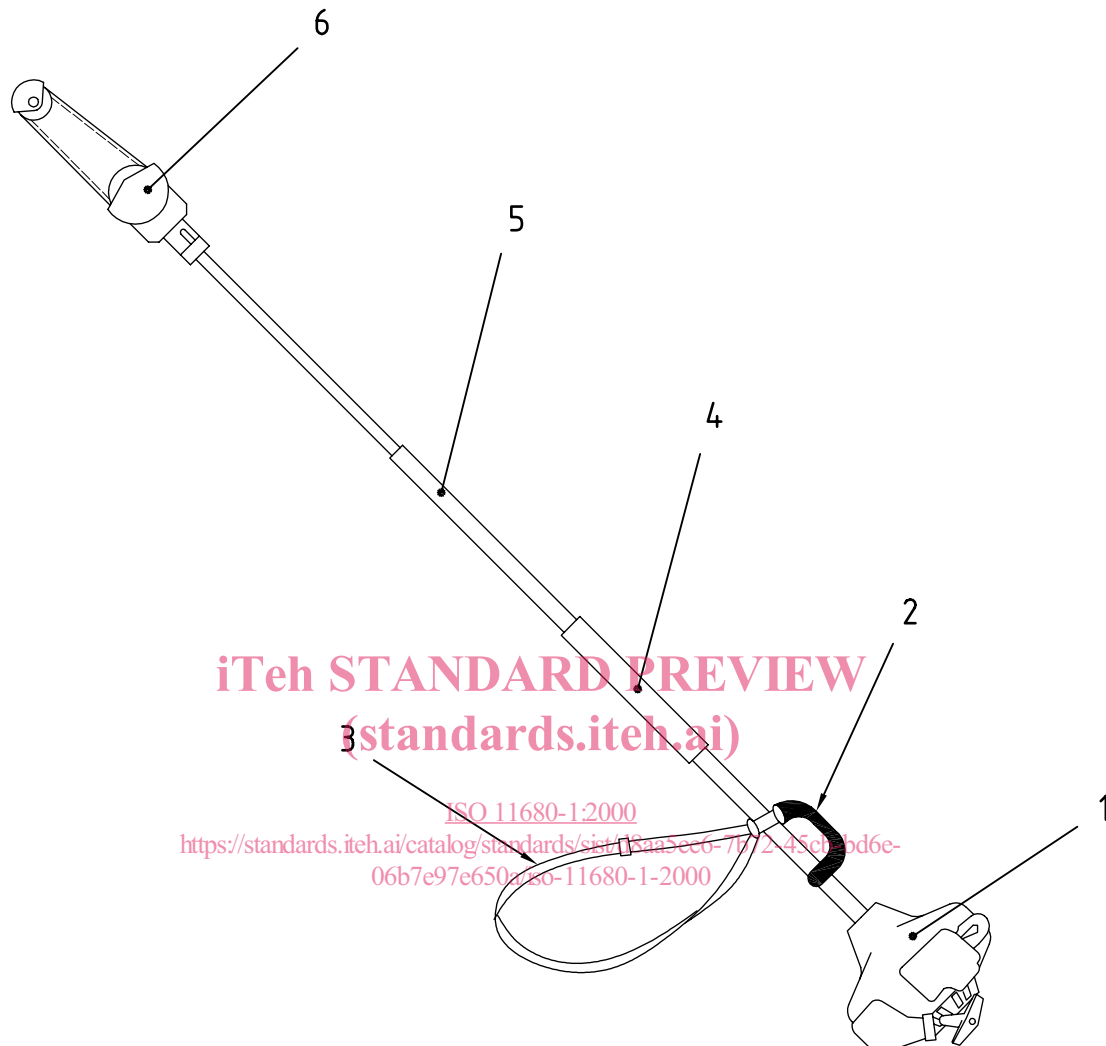
1) Equivalent to EN 292-1:1991.

2) Equivalent to EN 292-2:1991.

3) Equivalent to EN 294:1992.

3.4 handgrip

part of the machine designed to be held by the operator to enable the unit to be manoeuvred



Key

- 1 Combustion engine
- 2 Rear hand-grip
- 3 Harness
- 4 Front hand-grip
- 5 Outer shaft tube
- 6 Cutting attachment

Figure 1 — Pole-mounted powered pruner with integral combustion engine and saw-chain cutting attachment

4 Safety requirements

4.1 General

The safe operation of the pole-mounted powered pruner (hereafter called pruner) depends not only on the following safety requirements, but also on the safe environment associated with the use of personal-protection equipment (PPE) such as gloves, slip-resistant footwear, and eye-, ear- and head-protection equipment.

Annex E gives certain ergonomic factors that should be taken in account.

4.2 Noise

4.2.1 Reduction by design and protective measures

The pruner shall be designed to generate a noise level as low as practicable. The main sources of noise from combustion-engine-driven pruners are the following:

- air intake system,
- engine cooling system,
- engine exhaust system,
- cutting system,
- vibrating surfaces.

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ISO/TR 11688-1^[1] gives general technical information on widely recognized technical rules and means to be followed in the design of machines with low-noise emission. In the case of combustion-engine driven machines, special care shall be taken in the design of the exhaust system and selection of the silencer.

NOTE ISO 11691^[2] and ISO 11820^[3] can be used for the testing of the silencer.

4.2.2 Reduction by information

In addition to technical measures for noise reduction, the instruction handbook accompanying the pruner shall include:

- recommendation for limiting duration of operation, as appropriate
- warning of noise level with recommendation of the use of ear protection.

4.2.3 Noise measurement

For the measurement of sound power and emission sound pressure at the operator's position, the methods given in annex B shall be used.

4.3 Vibration

4.3.1 Reduction by design and protective measures

The pruner shall be designed to generate a vibration level as low as practicable. The main sources of vibration are:

- oscillating forces from the motor
- cutting parts

- unbalanced moving parts
- impact in gears, bearings and other mechanisms
- interaction between operator, machine and material being worked.

In addition to measures to reduce vibration at source, technical measures such as isolators and resonating masses shall be used to isolate, when appropriate, the vibration source from the hand-grip.

NOTE Technical information on widely recognized technical rules and means to be followed in the design of machines for low hand-arm vibration solutions is given in a variety of publications such as CEN CR 1030-1:1995^[4].

4.3.2 Reduction by information

In addition to all possible technical measures for vibration reduction, the instruction handbook shall include a recommendation for:

- limiting the duration of operation, as appropriate;
- the wearing of PPE such as gloves.

4.3.3 Vibration measurement

For the determination of hand-arm vibration the method given in annex C shall be used.

4.4 Hand-grips

The pruner shall have a hand-grip for each hand. The shape and surface of the hand-grips shall be designed to provide the necessary sureness of grip: this shall also apply when the operator is wearing gloves. If the hand-grip nearest the cutting attachment is an integrated part of the shaft tube, its periphery shall be within the diameters of 25 mm min and 50 mm max. The hand-grip length shall be at least 100 mm.

The gripping length of a bail or closed hand-grip shall comprise any length that is straight or curved at a radius greater than 100 mm together with any blend radius, but not more than 10 mm at either or both ends of the gripping surface.

NOTE If the shaft tube is used as a hand-grip, the entire shaft tube length can be considered as the grip area. The strength of the hand-grip is to be considered in a future revision.

4.5 Engine-starting device

The engine shall be provided with an integral starting device. This device can be a self-contained battery electric starter or a manual starter where the actuator is permanently attached to the pruner. The engine shall not be provided with a starter operated by means of a loose rope. To activate any electrical starting device two or more independent motions shall be required.

4.6 Engine-stopping device

The pruner shall have a control for stopping the engine able to be operated with a gloved hand and without releasing the hold on either of the hand-grips. The engine-stopping device shall not depend on sustained manual effort for its operation. The stop position shall be clearly marked.

The colour of the control shall be in contrast to its background.

4.7 Throttle trigger

A pruner shall be provided with a throttle trigger that, when released, automatically reverts to the idling position and is retained in that position by the automatic engagement of a throttle trigger lock-out.

The throttle trigger shall be positioned so that it can be pressed and released with a gloved hand while both hand-grips are held.

If a throttle lock is provided for cold starting, it shall be self-releasing when the throttle trigger is depressed. In the starting mode the cutting attachment could be engaged, therefore the throttle lock shall be designed so that two or more independent motions are required to engage it.

The throttle trigger shall not be able to be locked in any position other than the idling or the starting position.

4.8 Clutch

The unit shall have a centrifugal clutch or similar device, which ensures that no power is transmitted to the cutting attachment when the engine rotates $\leq 1,25$ times the idling speed recommended by the manufacturer.

4.9 Harness

All pruners shall be equipped with a harness to be worn by the operator. The harness is primarily for supporting the pruner during movement between cutting tasks and for reducing the risk of unintentional contact with the cutting attachment. The harness shall be adjustable to fit the operator.

A harness shall either be provided with a quick release mechanism or designed so that the harness can be removed quickly in the event of an emergency. Any such quick-release mechanism for emergency release shall enable rapid release of the pruner from the harness or the harness from the operator.

4.10 Power-driven components

All power-driven components, except for the cutting attachments, shall be guarded to prevent operator contact with these parts.

For openings, the requirements of 4.5.2 and 4.5.3 of ISO 13852:1996 shall be met.

4.11 Cutting attachment

4.11.1 Tools

If special tools are necessary to replace the cutting attachments, they shall be supplied with the pruner.

4.11.2 Saw-chain-cutting attachment

A saw-chain-cutting attachment shall be provided with means of adjustment to provide chain tension according to the manufacturer's recommendation.

A fixed guard shall be provided, enclosing the exposed sides of the drive sprocket.

The means shall be provided to lubricate the saw chain, either automatically or manually. If a manual oiler is provided, it shall be located so that it can be operated while holding the pruner by both hand-grips.

4.11.3 Circular-saw-blade cutting attachment

4.11.3.1 A circular saw blade shall be a single-piece blade in accordance with the specifications for blade surface quality and blade material given in ISO 7113.