
**Agricultural and forestry machinery —
Portable hand-held combustion engine
driven brush cutters and grass trimmers —
Safety**

*Matériel agricole et forestier — Débroussailleuses et coupe-herbe portatifs
à moteur thermique — Sécurité*

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ISO 11806:1997

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Foreword

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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.

International Standard ISO 11806 was prepared by the European Committee for Standardization (CEN) in collaboration with ISO Technical Committee TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 17, *Manually portable forest machinery*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Annexes A, B, C and D form an integral part of this International Standard. Annexes ZA and ZZ are for information only.

Annex ZZ provides a list of corresponding International and European Standards for which equivalents are not given in the text.

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Foreword

The text of EN ISO 11806:1997 has been prepared by Technical Committee CEN/TC 144 "Tractors and machinery for agriculture and forestry", the secretariat of which is held by AFNOR, in collaboration with Technical Committee ISO/TC 23 "Tractors and machinery for agriculture and forestry".

This Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 1997, and conflicting national standards shall be withdrawn at the latest by December 1997.

This Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

The annex A is normative and contains the "List of hazards".

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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0 Introduction

The extent to which hazards are covered is indicated in the scope of this standard. In addition, machinery shall comply as appropriate with EN 292 for hazards which are not covered by this standard.

This Standard covers brush cutters as well as grass trimmers, because the design of both machines is basically identical. Frequently one and the same unit can be either a brush cutter or a grass trimmer, depending on what type of cutting attachment is used. As grass trimmers are often used in forestry, the relevant requirements have been included in this standard.

1 Scope

This Standard specifies safety requirements and their verification for design and construction of portable hand-held, combustion engine driven brush cutters and grass trimmers.

This standard is not applicable to backpack powered units, to lawn edge trimmers or to brush cutters equipped with metallic blades consisting of more than one part.

It describes methods for the elimination or reduction of risks 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 however give any technical requirement to reduce noise and vibration hazards. Indeed the different means available to reduce these risks are a matter for the technical information to which the manufacturer may resort, through specialised books or specific bodies.

The list of significant hazards dealt with is given in Annex A. Annex A also indicates the hazards which have not been dealt with.

Environmental aspects have not been considered in this standard.

This Standard applies primarily to machines which are manufactured after the date of issue of the standard.

2 Normative References

This Standard incorporates by dated or undated references, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to apply.

| | | |
|-----------------------|------|---|
| EN 292-1 | 1991 | Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology |
| EN 292-2 | 1991 | Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications |
| EN 292-2:1991/A1:1995 | | |
| EN 563 | 1994 | Safety of machinery - Temperatures of touchable surfaces - Ergonomics data to establish temperature limit values for hot surfaces |
| EN 27917 | 1991 | Acoustics - Measurement at the operator's position of airborne noise emitted by brush saws |
| ISO 7112 | 1982 | Machinery for forestry - Portable brush saws - Vocabulary |

| | |
|-----------|--|
| ISO 7113 | 1991 Forestry machinery - Portable brush saws - Saw blades |
| ISO 7916 | 1989 Forestry machinery - Portable brush saws - Measurement of hand-transmitted vibration |
| ISO 7918 | 1995 Forestry machinery - Portable brush cutters and grass trimmers - Cutting attachment guard dimensions |
| ISO 8380 | 1993 Forestry machinery - Portable brush cutters and grass trimmers - Cutting attachment guard strength |
| ISO 8893 | 1989 Forestry machinery - Portable brush-saws - Engine performance and fuel consumption |
| ISO 10884 | 1995 Manually portable brush cutters and grass trimmers with internal combustion engine - Determination of sound power levels - Engineering method (Grade 2) |

3 Definitions

For the purposes of this Standard, the following definitions and figures 1 and 2 apply :

3.1 brush cutter

Unit fitted with a rotating blade made of metal or plastic intended to cut weed, brush, small trees and similar vegetation.

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- 1 engine stopping device
- 2 throttle trigger lockout
- 3 suspension point
- 4 handle
- 5 throttle trigger
- 6 shaft tube
- 7 harness - quick release mechanism
- 8 harness - hip pad
- 9 cutting attachment guard
- 10 blade
- 11 silencer

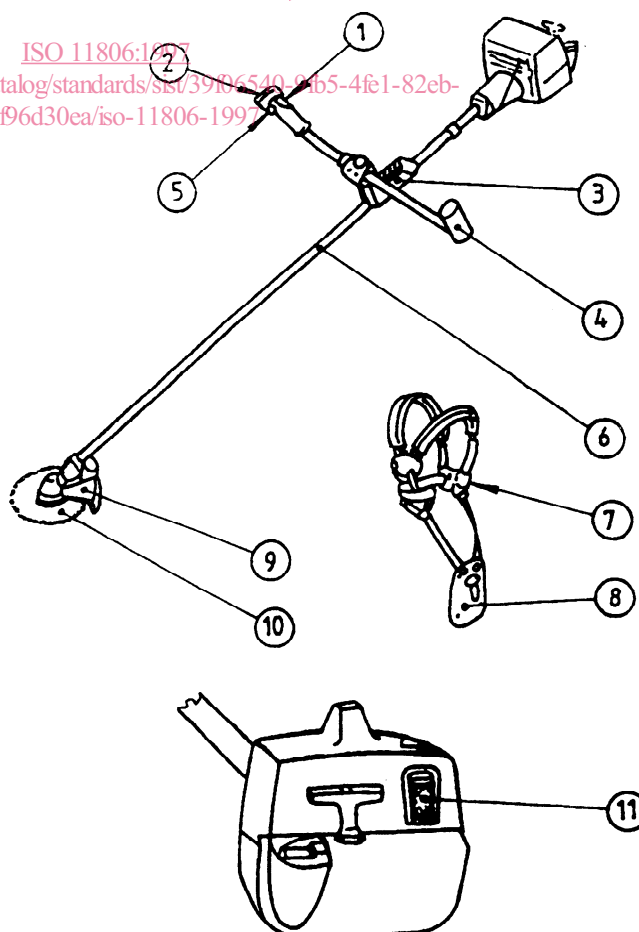


Figure 1 : Brush cutter

3.2 brush saw

Brush cutter fitted with a circular saw blade.

3.3 grass trimmer

Unit fitted with flexible line(s), string(s), or similar non-metallic flexible cutting elements, such as pivoting cutters, intended to be used to cut weed, grass or similar soft vegetation.

- 1 choke
- 2 handle
- 3 engine stopping device
- 4 throttle trigger
- 5 barrier
- 6 shaft tube
- 7 cutting attachment guard
- 8 silencer

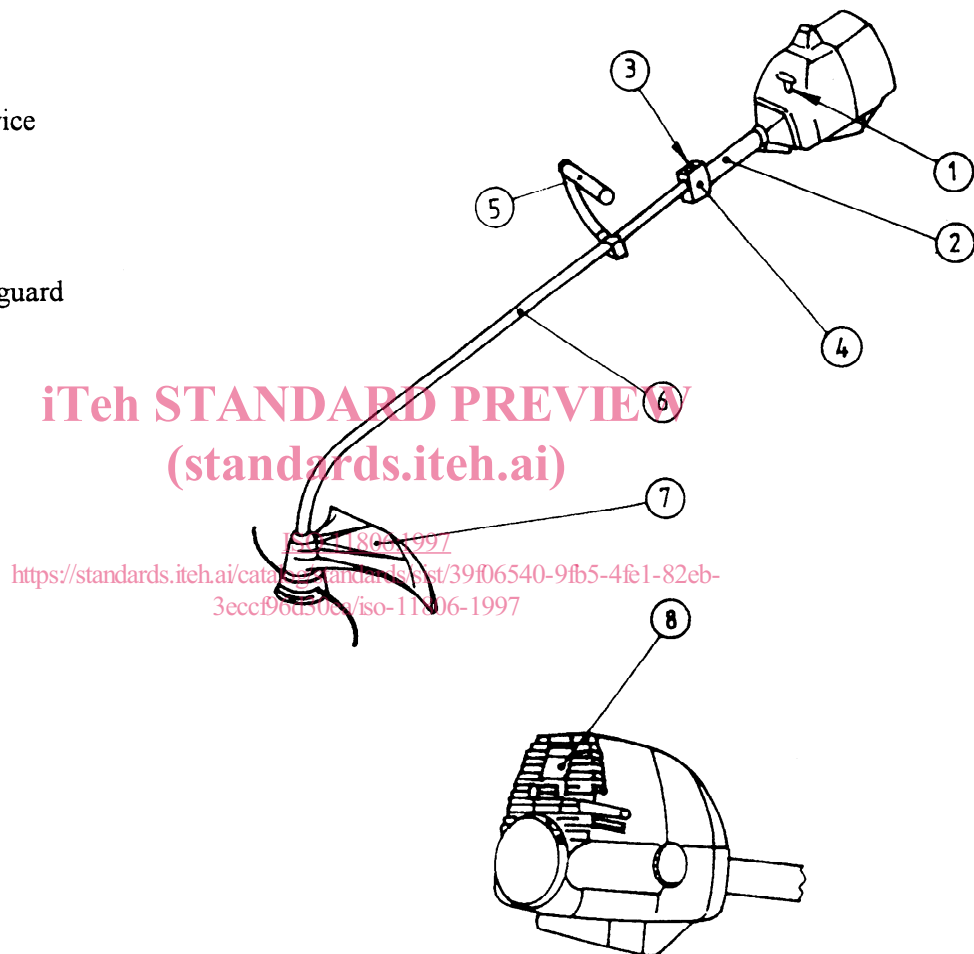


Figure 2: Grass trimmer

3.4 lawn edge trimmer

Grass trimming machine where the cutting means operate in a plane approximately perpendicular to the ground.

3.5 backpack power unit

Power source designed to be mounted on the operator's back by means of a support frame.

3.6 barrier

Device attached to the unit, to ensure that the operator maintains a minimum distance from the cutting attachment when the unit is being operated.

3.7 blade

Rotating device with cutting edges, made of rigid material.

3.8 saw blade

Circular metal blade with peripheral cutting teeth.

3.9 blade retainer

Mechanism which holds the brush cutter blade to the driving member.

3.10 cutting attachment

Cutting device such as a blade with its retainer, a cutting head etc.

3.11 dry mass

Total unit mass without fuel, cutting attachment and guard.

3.12 cutting attachment guard

Device for the purpose of protecting the operator from unintentional contact with the cutting attachment and from thrown objects.

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3.13 transport guard

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Device covering the cutting edges of the blade while the machine is transported or stored in a non operational mode.

3.14 handle

Device fitted to the unit to enable the operator to hold and manoeuvre the unit.

3.15 harness

Adjustable strap(s) used to suspend the unit from the operator.

3.16 hip pad

Strap or pad of flexible material attached either to the unit or the harness to cushion the operator from impacts from the unit and to reduce transmission of vibration.

3.17 power transmission shaft

Shaft inside the shaft tube for transmitting the power from the engine to the cutting attachment.

3.18 shaft tube

Part of the unit that provides a casing for the power transmission shaft.

3.19 silencer

Device for reducing engine exhaust noise and directing the exhaust gases.

3.20 engine stopping device

Control fitted to the unit which electrically stops the engine.

3.21 suspension point

Device on the unit to which the harness can be attached.

3.22 throttle trigger, throttle control

Device, usually a lever, activated by the operator's hand or finger, for controlling the engine speed.

3.23 throttle lock

Device for temporarily setting the throttle in a partially open position, to aid starting.

3.24 throttle trigger lockout

Device that prevents unintentional activation of the throttle trigger until manually released.

3.25 unit

Complete brush cutter (or grass trimmer) including power head, power transmission shaft, cutting attachment and guard, but excluding the harness.

4 Safety requirements

4.1 General

Each brush cutter or grass trimmer shall conform with the requirements below. If a grass trimmer can be converted to a brush cutter then the converted unit shall comply with requirements for a brush cutter and vice versa.

4.2 Vibration

4.2.1 General

The weighted acceleration sum shall be measured according to 4.2.2 and 4.2.3 and with all cutting attachments recommended by the manufacturer. The achievable values at each handle is normally below 15 m/s^2 for machines with an engine displacement of 35 cm^3 or less and $7,5 \text{ m/s}^2$ for machines with an engine displacement of more than 35 cm^3 (see table 1).

Table 1 : Achievable vibration values

| Engine displacement | |
|------------------------|----------------------|
| $\leq 35 \text{ cm}^3$ | $> 35 \text{ cm}^3$ |
| 15 m/s ² | 7,5 m/s ² |

These achievable values do not constitute personal exposure limits, but the emission values from a machine under defined test conditions (for example speed, load, material to be used ...) and according to the measurement method of the corresponding vibration levels.

NOTE: The achievable vibration values given in table 1 are not a barrier to innovation, and they should not prevent the achievement of better values. With this in view, they will have to be revised when the state of the art evolves.

4.2.2 *Brush cutter*

The weighted acceleration sum shall be measured in the idling and racing modes in accordance with ISO 7916.

4.2.3 *Grass trimmer*

The weighted acceleration sum shall be measured at idling and with wide open throttle and maximum length in case of flexible line with the guard in place. Other measuring conditions shall be in accordance with ISO 7916.

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4.3 Noise emission

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4.3.1 *Sound pressure level* standards.iteh.ai/catalog/standards/sist/39f06540-9fb5-4fe1-82eb-3eccf96d30ea/iso-11806-1997

4.3.1.1 *General*

The sound pressure level shall be measured in accordance with 4.3.1.2 and 4.3.1.3 at the operator's ear.

Table 2 : Achievable sound pressure values

| Engine displacement | |
|------------------------|---------------------|
| $\leq 35 \text{ cm}^3$ | $> 35 \text{ cm}^3$ |
| 102 dB(A) | 105 dB(A) |

These achievable values do not constitute personal exposure limits, but the emission values from a machine under defined test conditions (for example speed, load, material to be used ...) and according to the measurement method of the corresponding noise levels.

NOTE : The achievable sound pressure values given in table 2 are not a barrier to innovation, and they should not prevent the achievement of better values. With this in view, they will have to be revised when the state of the art evolves.

4.3.1.2 *Brush cutter*

The sound pressure level shall be measured at idling and racing in accordance with EN 27917.

4.3.1.3 *Grass trimmer*

The sound pressure level shall be measured at idling and with wide open throttle and maximum length in case of flexible line with the guard in place. Other measuring conditions shall be in accordance with EN 27917.

4.3.2 *Sound power level*

The sound power level shall be measured in accordance with ISO 10884 with all cutting attachments recommended by the manufacturer and at the same operating conditions as given in 4.3.1.

4.4 Exhaust system

The exhaust outlet shall be so located as to direct exhaust emissions away from the operator in normal operating position indicated in figure D.3.

4.5 Handles

4.5.1 Two handles, one for each hand, shall be provided for all units.

4.5.2 The handles shall be designed so that the distance L (see figure D.2) between the centre of the handles is at least 500 mm for those units which are intended to be equipped with metal saw blades, and 250 mm for all others. For other details see figures D.1 and D.3.

The handles shall be adjustable so that a suitable ergonomic working position can be achieved. An adjustment below the minimum dimensions shall be prevented by design.

NOTE : The position of the operator relative to the cutting attachment is defined by the suspension point (see 4.11 and 4.15) and the barrier (see 4.6)

4.5.3 All handles shall be designed so that they can be fully gripped by an operator when wearing different types of gloves, provide the necessary sureness of grip by their shaping and surface and have a length of at least 100 mm.

4.6 Barrier

Brush cutters shall be equipped with a barrier to prevent an unintentional contact with the cutting attachment. The barrier shall project at least 200 mm horizontally perpendicularly from the centre-line of the shaft tube. The handle assembly may serve as a barrier. See also figure D.2. Adjustable barriers shall be in accordance with 4.5.2.

4.7 Throttle control

4.7.1 The throttle control linkage shall be so constructed that a force equal to three times the weight of the unit (without cutting attachment and with empty tanks), applied in any direction to the handle with the throttle trigger, shall not increase the engine speed to a point where the clutch engages and cutting attachment engages.

4.7.2 A unit shall be provided with a constant pressure throttle trigger that automatically reverts to the idling position. Brush cutters shall either have a throttle trigger lockout or be so designed that a gauge of 10 mm diameter and 200 mm length shall not move the throttle trigger to an extent that the cutting attachment becomes engaged.

4.7.3 The throttle trigger shall be positioned so that it can be pressed and released with a gloved hand when holding the handle to which the throttle trigger is mounted.

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

4.8 Clutch

All units to which a blade can be attached shall have a clutch which ensures that no power is transmitted to the cutting attachment until the engine speed exceeds 1,25 times the manufacturers' recommended idling speed.

4.9 Engine stopping device

The machine shall be fitted with an engine stopping device which brings it to a final stop and does not depend on sustained manual effort for its operation. The control for this device shall be so positioned that it can be operated while the machine is being held with both hands by an operator wearing gloves. The purpose and method of operation of the device shall be clearly and durably marked. The colour of the control shall clearly contrast with the background.

4.10 Harness

4.10.1 General

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A double shoulder harness shall be provided for all units exceeding a dry weight of 7,5 kg and for all brush saws. The double shoulder harness shall be designed so that pressure is evenly distributed on both shoulders of the operator. The design of the double shoulder harness shall prevent slipping in any direction.

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All double shoulder harnesses shall be equipped with a quick release mechanism positioned either at the connection between the unit and harness or between the harness and operator. Either the design of the harness or the use of the quick release mechanism shall ensure that the unit can be released quickly from the operator in the event of emergency.

The harness shall be adjustable to the size of the operator.

For units having a double shoulder harness a hip pad shall be supplied.

4.10.2 Brush cutter

For units other than brush saws having a dry weight of 7,5 kg or less, at least a single shoulder harness shall be supplied.

4.10.3 Grass trimmer

4.10.3.1 For units having a dry weight below 6 kg, no harness is required.

4.10.3.2 For units having a dry weight of 6 kg to 7,5 kg, at least a single shoulder harness shall be supplied.