INTERNATIONAL STANDARD

ISO 14740

First edition
1998-05-15

Forest machinery — Backpack power units for brush-cutters, grass-trimmers, pole-cutters and similar appliances — Safety requirements and testing

Matériel forestier — Sources motrices portées à dos utilisées pour entraîner les débroussailleuses, les coupe-herbe, les scies à perche et autres appareils similaires — Exigences de sécurité et essais

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X.400 c=ch; a=400net; p=iso; o=isocs; s=central

Printed in Switzerland

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.

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 14740 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 17, *Manually portable forest machinery*.

Requirements for hazards not covered in this International Standard are given in ISO/TR 12100.

Annex A forms an integral part of this International Standard.

Forest machinery — Backpack power units for brush-cutters, grass-trimmers, pole-cutters and similar appliances — Safety requirements and testing

1 Scope

This International Standard specifies the safety requirements and their verification for the design and construction of backpack power units incorporating a combustion engine as a power source to power brush-cutters, grass-trimmers, pole-cutters and similar appliances.

It describes methods for the elimination or reduction of hazards arising from the use of the backpack power units, but does not cover hazards resulting from the use of the attached appliance. Therefore this International Standard cannot be used alone for the assessment of the machine safety aspects for a machine with a backpack power unit, and must only serve as a reference for specifications concerning the backpack power unit itself. It does not specify any technical requirements to reduce noise and whole body vibration hazards. Indeed the different means available to reduce these hazards are a matter for the technical aids to which the manufacturer may resort, through specialized books or specific bodies.

NOTE — An agreed method to measure whole body vibration from the backpack power unit is presently not available.

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

Environmental aspects have not been considered in this International Standard.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

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:—[1)], *Machinery for forestry — Portable hand-held chain-saws — Vocabulary.*

ISO 7112:—[2)], *Machinery for forestry — Portable hand-held brush-cutters and grass-trimmers — Vocabulary.*

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

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1) To be published. (Revision of ISO 6531:1982)

2) To be published. (Revision of ISO 7112:1982)

ISO/TR 12100-1:1992, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology.*[3)]

ISO/TR 12100-2:1992, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles and specifications.*[4)]

ISO 13852:1996, *Safety of machinery — Safety distances to prevent danger zones being reached by the upper limbs.*[5)]

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

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 6531 and ISO 7112 and the following apply.

3.1 backpack power unit
power source which is designed to be carried on the operator's body by means of a supporting device

3.2 brush-cutter
unit with a rotating blade made of metal or plastic, intended for cutting weeds, brush, small trees and similar vegetation

3.3 handgrip
surface or structure specifically designed for the operator's hand to grasp to enable manoeuvring of the backpack power unit

3.4 powered pole-cutter
portable unit designed to allow an operator to use a cutting device to cut branches of trees whilst remaining at a distance from the cutting zone

3.5 appliance
tool which includes a transmission shaft, cutting attachment, guard and handles

3.6 unit
complete machine including backpack power unit with harness and an appliance

4 Safety requirements

Each backpack power unit shall be in accordance with the requirements below.

4.1 Exhaust system

The exhaust outlet shall be located so as to direct exhaust emissions away from the operator when placed on his back or hips.

4.2 Controls

All controls shall be designed to be operable by an operator wearing gloves.

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3) Equivalent to EN 292-1:1991.

4) Equivalent to EN 292-2:1991.

5) Equivalent to EN 294:1992.

4.2.1 Throttle trigger

4.2.1.1 The backpack power unit shall either have a throttle trigger lockout or be designed so that a straight and rigid gauge of 10 mm diameter and 200 mm length shall not activate the throttle trigger to such an extent that the engine speed is raised above the idling speed.

4.2.1.2 The throttle trigger shall be possible to attach on the appliance so that it can be pressed and released with one hand holding the handle of the appliance on which the throttle trigger is mounted.

4.2.1.3 The throttle trigger shall, when released, automatically revert to the idling position and be retained in that position by the automatic engagement of a throttle trigger lockout.

4.2.1.4 If a throttle lock is provided for starting, it shall be automatically released when the throttle trigger is operated. The throttle lock shall be so designed that two or more independent motions are required to engage the throttle lock.

4.2.1.5 In the starting mode power can be transmitted to the appliance.

4.2.2 Engine-stopping device

The backpack power unit shall be fitted with an engine-stopping device by which the engine can be brought to a full stop and does not depend on sustained manual effort for its operation. The control for this device shall be attached adjacent to the throttle control so that it can be operated while the appliance is being held by an operator with both hands. 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.

4.3 Handgrip

A handgrip shall be available. It can be a part of the frame, and shall allow an operator alone to grasp the backpack power unit to place it on the back or hip.

4.4 Engine support

The engine shall be supported on a backpack frame designed to distribute the load evenly on the operator's back, shoulders, waist and/or hips.

4.5 Harness

4.5.1 A suitable harness shall be provided to carry the backpack frame. It shall be adjustable to the size of the operator.

4.5.2 A double shoulder harness shall be provided for all backpack power units exceeding a dry mass of 7,5 kg.

4.5.3 The harness shall be designed to prevent slipping and so that pressure can be evenly distributed on the operator's back, shoulders and/or waist.

4.5.4 The harness design, or the quick release mechanism shall enable the backpack power unit to be released quickly from the operator in case of emergency. The design of the connection between the harness and those parts of the backpack power unit suspended from it shall be such that separation will only occur by deliberate action of the operator.

4.6 Power driven components

The backpack power unit shall be constructed to ensure that when used as intended, the operator is protected from power driven components such as sprockets, flexible drive lines, pulleys, shafts, gears, flywheels, fan blades and also drive belts and chains.

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

4.7 Hydraulic and pneumatic pipes and hoses

Hydraulic and pneumatic pipes and hoses subject to internal pressures greater than 500 kPa shall be shielded to prevent operator injury in the event of leakage.

4.8 Protection against contact with hot parts

[2]. They shall be considered accessible if they can be reached by the test cone, as shown in figure 1.

The temperature for the accessible parts shall not cause a hazard to the operator. For further information, see EN 563:1994[6], and especially its annex C.

Dimensions in millimetres

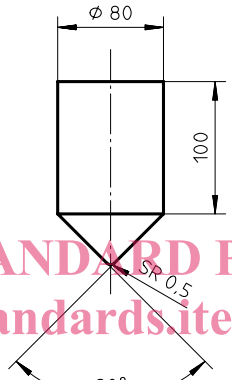

Figure 1 — Test cone

4.9 Protection against contact with parts under high voltage

Ignition interruption or short-circuiting devices shall be provided and shall be fitted on the lower voltage side.

All high voltage parts of the circuit, including spark plug terminals, shall be electrically protected in such a manner that the operator cannot make accidental contact with them. The requirements shall be checked by inspection and using a finger probe, as described in IEC 60335-1:1991, figure 1.

4.10.1 The fuel cap shall have a retainer. The diameter of the fuel tank opening shall be at least 20 mm.

4.10.2 The opening or cap shall be clearly marked.

4.10.3 The design of the cap shall be such that no apparent leakage occurs whilst the engine is at the normal operating temperature, in all working positions and while being transported. Seepage from any fuel tank ventilation system shall not constitute a leakage.

4.10.4 The filler openings shall be located so that the filling of the tanks with a suitable funnel is not obstructed by other components.

The cylinder and exhaust or parts being in direct contact with the cylinder and exhaust shall be guarded so that they are not accessible by unintentional contact during normal operation. If hot parts are accessible, they shall not have a contacted area greater than 10 cm

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6) *Safety of machinery — Temperatures of touchable surfaces — Ergonomics data to establish temperature limit values for hot surfaces.*

4.11 Starting device

A starting device shall be provided to allow the engine to be started without using separate independent auxiliary assistance (for example belts or cables).

When the backpack power unit is fitted with an electric starting device, two or more independent motions shall be required to engage the device.

4.12 Clutch

The backpack power unit shall have a clutch which ensures that no power is transmitted to the appliance powered by the unit when the engine rotation speed is less than or equal to 1,25 times the manufacturer's recommended idling speed.

5 Verification of safety requirements

The compliance with safety requirements shall be verified according to table 1.

Table 1 — Safety requirements and testing method

		Testing method		
Subclause	**Safety requirements**	**Inspection[1)]**	**Function test[2)]**	**Measurement[3)]**
4.1	Exhaust system	×	×	
4.2	Controls	×	×	
4.2.1	Throttle trigger	×	×	×
4.2.2	Engine-stopping device	×	×	
4.3	Handgrip	×	×	
4.4	Engine support	×		
4.5	Harness	×	×	
4.6	Power driven components	×		
4.7	Hydraulic and pneumatic pipes and hoses	×	×	
4.8	Protection against contact with hot parts		×	×
4.9	Protection against contact with parts under high voltage	×	×	×
4.10	Tank openings	×	×	×
4.11	Starting device	×	×	
4.12	Clutch		×	×

1) Consists of verifying that the machine has the relevant part.
2) Consists of verifying that the machine or component operates normally.
3) Consists of determining a value by using some form of device or instrument.

6 Markings

The markings shall be permanent, legible and located in a readily visible position on the backpack power unit and shall resist the anticipated service conditions, such as the effects of temperature, moisture, petrol, oil, abrasion and weathering exposure. Symbols should be in accordance with applicable ISO standards and shall be explained in the instruction handbook. All controls shall be marked with an appropriate symbol in accordance with ISO 3767-5, if applicable. Symbols relating to safety shall be in accordance with the requirements of ISO 11684.

Symbols shall have good contrast with their background. Embossed features shall be at least 0,5 mm in height.

The information and/or instructions provided by the symbols shall be clearly legible when viewed from a distance of at least 500 mm.