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**Powered hand-held hedge  
trimmers — Safety**

*Taille-haies portatifs à moteur — Sécurité*

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# Contents

	Page
Foreword .....	v
Introduction .....	vi
<b>1 Scope .....</b>	<b>1</b>
<b>2 Normative references .....</b>	<b>1</b>
<b>3 Terms and definitions .....</b>	<b>2</b>
<b>4 List of significant hazards .....</b>	<b>5</b>
<b>5 Safety requirements and/or verification of safety measures .....</b>	<b>7</b>
5.1 General .....	7
5.2 Handles and cutting device .....	7
5.2.1 Handles .....	7
5.2.2 Hand protection .....	8
5.2.3 Handle strength .....	10
5.2.4 Cutting device and blunt extensions .....	11
5.2.5 Shoulder harness requirements .....	15
5.2.6 Holding moment .....	15
5.2.7 Blade stopping time .....	18
5.2.8 Cutting device cover .....	20
5.2.9 Cutting device accessories .....	20
5.3 Starting and idling .....	20
5.4 Controls .....	20
5.4.1 Marking .....	20
5.4.2 Throttle control .....	20
5.4.3 Engine stop .....	21
5.5 Power driven parts protection .....	21
5.6 Heat protection .....	21
5.6.1 General .....	21
5.6.2 Test equipment, test conditions and test method .....	21
5.6.3 Test acceptance .....	22
5.7 Fuel tank .....	22
5.8 Engine exhaust .....	22
5.9 Electrical requirements of ignition system .....	23
5.9.1 General .....	23
5.9.2 Ignition circuit .....	23
5.9.3 Test method .....	23
5.9.4 Test acceptance .....	23
5.10 Vibration .....	23
5.10.1 Reduction by design and protective measures .....	23
5.10.2 Reduction by information .....	24
5.10.3 Vibration measurement .....	24
5.11 Noise .....	24
5.11.1 Reduction by design and by information .....	24
5.11.2 Noise emission measurement .....	24
<b>6 Information for use .....</b>	<b>24</b>
6.1 Instructions for use .....	24
6.2 Marking .....	25
6.3 Warnings .....	26
6.4 Test of labels .....	26
6.4.1 Preparation of test specimens and control specimens .....	26
6.4.2 Wipe resistance test .....	27
6.4.3 Adhesion test .....	27
<b>Annex A (informative) Safety instructions .....</b>	<b>28</b>

<b>Annex B (informative) Examples of safety signs, symbols and pictorials</b> .....	<b>31</b>
<b>Bibliography</b> .....	<b>33</b>

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 13, *Powered lawn and garden equipment*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

This third edition cancels and replaces the second edition (ISO 10517:2009), which has been technically revised. It also incorporates the Amendment ISO 10517:2009/Amd 1:2013. The main changes compared to the previous edition are as follows:

- the noise measurement procedure has been removed from the body of the document and has been replaced with the reference to ISO 22868;
- the vibration measurement procedure has been removed from the body of the document and has been replaced with the reference to ISO 22867;
- handle strength requirement has been added;
- extended-reach hedge trimmers have been better implemented in the body of the document;
- a test for the labels has been added;
- several text changes have been made for better understanding.

## Introduction

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

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

- machine manufacturers (small, medium and large enterprises);
- health and safety bodies (regulators, accident prevention organisations, market surveillance, etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

- machine users/employers (small, medium and large enterprises);
- machine users/employees (e.g. trade unions, organizations for people with special needs);
- service providers, e.g. for maintenance (small, medium and large enterprises);
- consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate in the drafting process of this document.

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 the type-A or type-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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# Powered hand-held hedge trimmers — Safety

## 1 Scope

This document specifies safety requirements and measures for the verification of the design and construction of hand-held, integrally-driven combustion engine hedge trimmers (hereafter referred to as “hedge trimmers”) designed to be used by a single operator for trimming hedges and bushes while utilizing one or more linear reciprocating cutter blades.

This document is also applicable to “split-boom” type hedge trimmers and to multi-purpose machines when configured as a hedge trimmer.

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

This document deals with all significant hazards, hazardous situations and events relevant to powered hand-held hedge trimmers when they are used as intended and under the conditions of misuse that are reasonably foreseeable by the manufacturer (see [Clause 4](#)).

This document is not applicable to hedge trimmers with an engine displacement over 80 cm<sup>3</sup>, nor is it applicable to hedge trimmers manufactured before the date of its publication.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 3767-1, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays — Part 1: Common symbols*

ISO 3767-3, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays — Part 3: Symbols for powered lawn and garden equipment*

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 3864-2, *Graphical symbols — Safety colours and safety signs — Part 2: Design principles for product safety labels*

ISO 7010, *Graphical symbols — Safety colours and safety signs — Registered safety signs*

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

ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

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

ISO 22867, *Forestry and gardening machinery — Vibration test code for portable hand-held machines with internal combustion engine — Vibration at the handles*

ISO 22868, *Forestry and gardening machinery — Noise test code for portable hand-held machines with internal combustion engine — Engineering method (Grade 2 accuracy)*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

#### 3.1

##### **hedge trimmer**

machine fitted with reciprocating blades made of metal, intended to cut and form hedges, bushes and similar vegetation

#### 3.2

##### **cutting device**

part of the assembly consisting of cutter blade and shear plate, or of the cutter blades together with any supporting part, which performs the cutting action and that can be single- or double-sided

Note 1 to entry: See [Figure 2](#).

#### 3.3

##### **cutter blade**

part of the cutting device having blade teeth which cut by a shearing action either against other blade teeth or against a shear plate

Note 1 to entry: See [Figure 2](#).

#### 3.4

##### **blade tooth**

part of the cutter blade which is sharpened to perform the shearing action

Note 1 to entry: See [Figure 2](#).

#### 3.5

##### **cutting length**

effective cutting length of the cutting device measured from the inside edge of the first blade tooth or shear plate tooth to the inside edge of the last blade tooth or shear plate tooth

Note 1 to entry: See [Figure 3](#).

Note 2 to entry: Where both blades move, the measurements are taken when the first and last teeth are furthest apart.

#### 3.6

##### **front handle**

handle located at or towards the cutting device

Note 1 to entry: See [Figure 1](#).

#### 3.7

##### **rear handle**

handle located furthest from the cutting device

Note 1 to entry: See [Figure 1](#).

#### 3.8

##### **throttle lock**

device for temporarily setting the throttle in a partially open position to aid starting

**3.9****throttle control lock-out**

device which prevents the unintentional activation of the throttle trigger unless the operator releases it

**3.10****throttle control**

blade control

device activated by the operator's hand or finger for controlling the cutter blade movement

Note 1 to entry: This can require a single or a two-stage operation depending on the application.

**3.11****blunt extension**

extending blunt part of the cutting device or an extending part of an unsharpened plate fitted to the cutting device to prevent contact with the moving cutter blade

**3.12****adjustable handle**

handle whose position can be modified either by movement or by rotation

**3.13****drive shaft**

shaft used to transmit power from the engine to the cutting device

**3.14****drive shaft tube**

tube which contains the drive shaft and connects the engine to the cutting device

Note 1 to entry: It can be fixed, extendable or telescopic in length. For ease of storage and transportation, the drive shaft tube can be detachable.

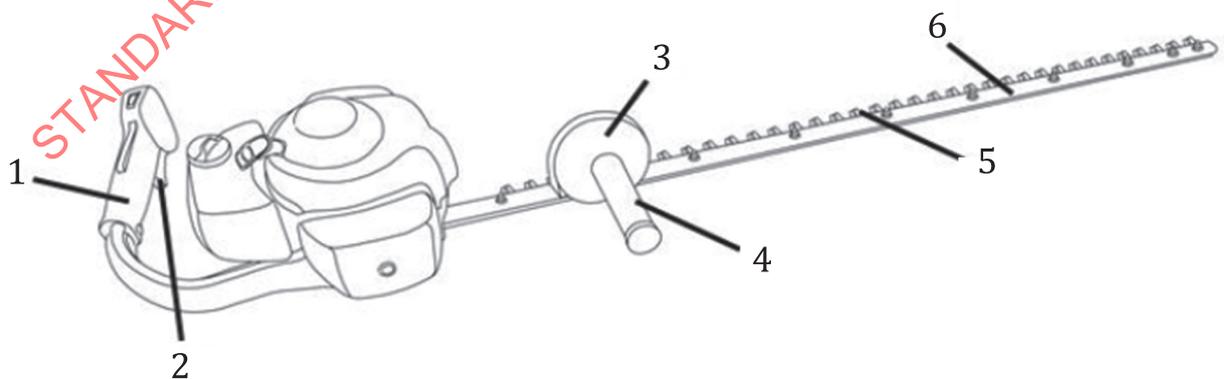
**3.15****split-boom**

design feature which permits the separation of the drive shaft tube for ease of storage and transportation

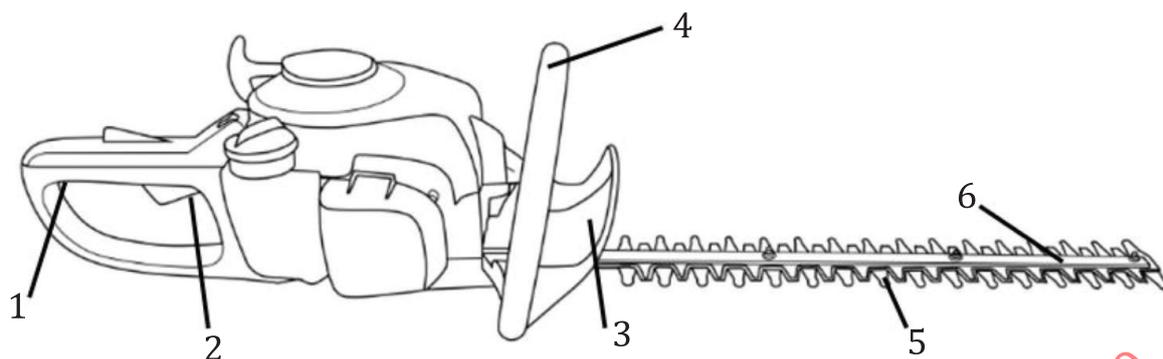
**3.16****dry weight**

weight of the unit with empty fuel/oil tank(s) and without cutting device cover

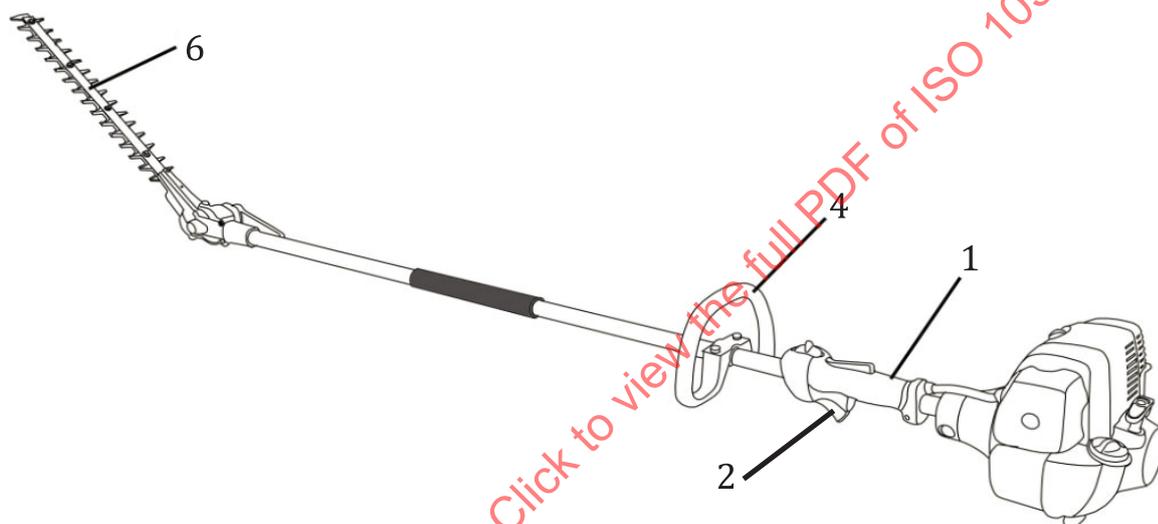
Dimensions in millimetres



a) Single-sided hedge trimmer



b) Double-sided hedge trimmer

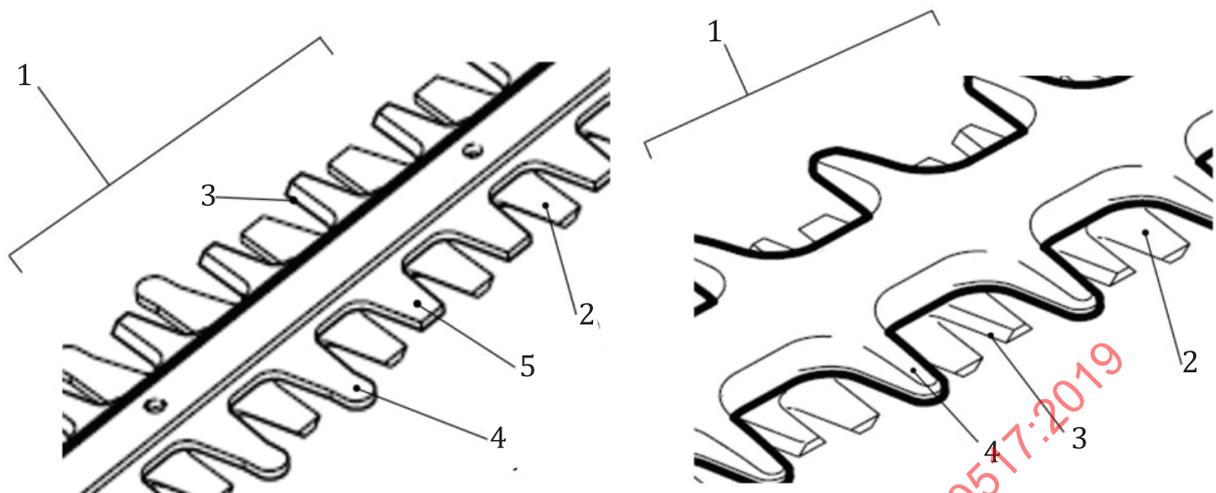


c) Extended-reach hedge trimmer

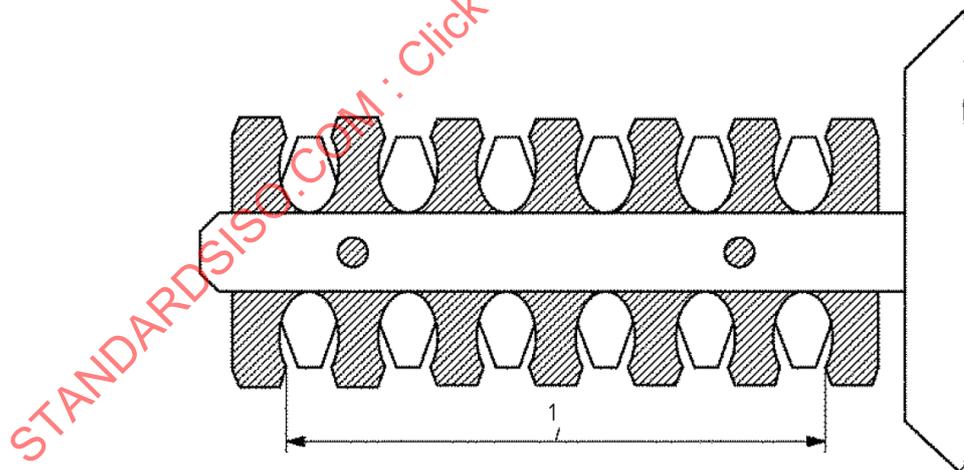
**Key**

- 1 rear handle
- 2 throttle control
- 3 front hand barrier
- 4 front handle
- 5 cutter blade
- 6 cutting device

**Figure 1 — Examples of types of hedge trimmers**

**Key**

- 1 cutting device
- 2 cutter blade
- 3 blade tooth
- 4 blunt extension
- 5 unsharpened plate

**Figure 2 — Cutting device****Key**

- 1 cutting length

**Figure 3 — Cutting length****4 List of significant hazards**

For defined danger zones, this clause contains all the significant hazards, hazardous situations and events, as far as they are dealt with in this document. They are identified by risk assessment as significant for these types of hedge trimmer and which require specific action by the designer or

manufacturer to eliminate or to reduce the risk (see [Table 1](#)). It is the responsibility of the manufacturer to check whether or not the safety requirements given by this document apply to each significant hazard presented by the specific hedge trimmer and to confirm that the risk assessment is complete with particular attention to

- the intended use of the hedge trimmer including maintenance, setting and cleaning and its foreseeable misuse, and
- identification of all significant hazards associated with the hedge trimmer.

**Table 1 — Significant hazards associated with powered hand-held hedge trimmers**

	Hazard	Location or event	Clause/subclause of this document
1	<b>Mechanical hazards due to:</b>		
	a) shape	Holding and operating the hedge trimmer	<a href="#">5.2.1</a>
	b) relative locations	Safe positioning in use	<a href="#">6.1; Annex A</a>
1.2	Shearing hazard	Clearing processed material from cutting device	<a href="#">5.2.2, 5.2.4, 5.2.7, 6.1; Annex A</a>
1.3	Cutting or severing hazard	Inadvertent contact with cutting device	<a href="#">5.2.2, 5.2.4, 5.2.6, 5.2.7,, 6.1; Annex A</a>
1.4	Entanglement hazard	Loose clothing entering cutting device	<a href="#">6.1; Annex A</a>
1.10	Ejection of parts (of machinery and processed materials/workpieces)	Processed material ejected from cutting device	<a href="#">6.1; Annex A</a>
2	<b>Electrical hazards due to:</b>		
2.1	Contact of persons with live parts (direct or indirect)	High voltage and ignition parts Damage to cables due to oil, fuel and abrasion	<a href="#">5.9.1, 5.9.2, 5.9.3</a>
3	<b>Thermal hazards, resulting in</b>		
3.1	Burns, scalds and other injuries, by possible contact of persons with objects or materials with an extremely high or low temperature, by flames or explosions and also by the radiation of heat sources	Contact with hot parts	<a href="#">5.6</a>
4	<b>Hazards generated by noise, resulting in</b>		
4.1	Hearing loss (deafness), other physiological disorders (e.g. loss of balance, loss of awareness)	Hearing damage due to hedge trimmer and/or processing of material	<a href="#">5.11, 6.1, 6.2; Annex A</a>
5	<b>Hazards generated by vibration</b> (resulting in a variety of neurological and vascular disorders)	Hand/arm damage due to hedge trimmer and/or processing of material	<a href="#">5.10, 6.1, 6.2; Annex A</a>
7	<b>Hazards generated by materials and substances</b> processed, used or exhausted by machinery, including:		
7.1	Hazards resulting from contact with or inhalation of harmful fluids, gases, mists, fumes and dusts	Breathing in of engine exhaust fumes	<a href="#">5.8, 6.1; Annex A</a>
7.2	Fire or explosion hazard	Refuelling	<a href="#">5.7, 6.1; Annex A</a>
8	<b>Hazards generated by neglecting ergonomic principles in hedge trimmer design</b> (mismatch of machinery with human characteristics and abilities) caused, for example, by:		
8.1	Unhealthy postures or excessive efforts	Handling during use	<a href="#">6.1; Annex A</a>
8.3	Neglected use of personal protection equipment	Protect against noise and vibration, vision	<a href="#">5.10, 5.11, 6.1, 6.2; Annex A</a>

Table 1 (continued)

Hazard		Location or event	Clause/subclause of this document
8.6	Human error	Incorrect use, etc. Danger to bystanders	<a href="#">6.1; Annex A</a>
8.7	Inadequate design, location of manual controls	Location of stop/start control	<a href="#">5.4.2, 5.4.3</a>
		Identification of control(s)	<a href="#">5.4.1, 5.4.3</a>
10	<b>Hazards caused by failure of energy supply, breaking down of machinery parts and other functional disorders</b> , including:		
10.3	Failure, malfunction of control system (unexpected start-up, unexpected overrun)	Unexpected movement of cutting device	<a href="#">5.2.4, 5.2.6, 5.2.7, 5.3</a>
		Run-down of cutting device	
10.4	Errors of fitting	Fitting an incorrect blade or fitting blade incorrectly	<a href="#">5.2.7; 6.1; Annex A</a>
11	<b>Hazards caused by (temporary) missing and/or incorrectly positioned safety-related measures/means</b> , for example:		
11.1	All kinds of guards	Protection against access to hazardous parts	<a href="#">5.2.2, 5.2.6, 5.5, 5.6, 5.9</a>
11.3	Starting and stopping devices	Control of hedge trimmer	<a href="#">5.2, 5.3, 5.4</a>
11.4	Safety signs and signals	User awareness of hazards	<a href="#">6.2, Annex B</a>
11.5	All kinds of information or warning devices	User awareness and safe use	<a href="#">Clause 6; Annexes A and B</a>
11.6	Energy supply disconnecting devices	Engine stop	<a href="#">5.4.3</a>

## 5 Safety requirements and/or verification of safety measures

### 5.1 General

The hedge trimmer shall comply with the safety requirements and/or protective measures of this clause. In addition, the hedge trimmer shall be designed according to the principles of ISO 12100 for relevant but not significant hazards which are not dealt with by this document.

### 5.2 Handles and cutting device

#### 5.2.1 Handles

The hedge trimmer shall at least have a handle for each hand. A handle can be an integral part of the drive shaft tube or part of the engine housing.

The handles shall be designed and constructed in such a way as to have control of the hedge trimmer and so that each one can be grasped (held) with one hand. The gripping surface of handles shall be at least 100 mm long. On bail or closed handles (U-shaped handles), this dimension is related to the inner width of the gripping surface. The gripping length of a bail or closed handle shall comprise any length that is straight or curved at a radius of greater than 100 mm, together with any blend radius, but not more than 10 mm at either or both ends of the gripping surface.

There shall be a minimum radial clearance of 25 mm around the gripping length.

If a straight handle is supported centrally (i.e. "T" type), the gripping length shall be calculated as follows:

- a) for handles with a periphery (not including the support) of less than 80 mm, the gripping length is the sum of the two parts either side of the support;

- b) for handles with a periphery (not including the support) of 80 mm or more, the gripping length is the complete length from end to end.

Where appropriate, the part of the handle containing the throttle control actuator shall be counted as part of the handle gripping length. Finger grip or similar superimposed profiles shall not affect the method of calculating handle gripping length.

If handles are adjustable to different positions, it shall not be possible to fix them in a position which contravenes other provisions of this document.

For handles with throttle control which are adjustable without the use of a tool, it shall not be possible to alter the handle position when the cutting device is powered. When altering the position of a handle with throttle control, the throttle control shall be disabled such that the cutting device cannot be powered until the handle is locked into one of its designated operating positions (e.g. the control is automatically disengaged from the throttle of the engine if the handle is not locked into one of the positions of use).

Compliance is checked by inspection and by measurement.

## 5.2.2 Hand protection

### 5.2.2.1 General

It shall not be possible to touch the moving cutter blade with fingers spread out from any handle.

All handles shall be located such that the reach distance from the cutter blade to the side furthest from the cutter blade of any handle is not less than 120 mm. The distance shall be measured along the shortest path from the side of the handle furthest from the cutter blade to the nearest cutting edge of the cutter blade [see [Figure 4 a\)](#)]. If there is a barrier, the distance shall be measured from the furthest side of the handle to the barrier and from there to the nearest cutting edge of the cutter blade measured as a chain measurement as shown in [Figure 4 b\)](#).

A front hand barrier shall not have any openings with a dimension larger than 10 mm or the distance from the handle through the opening in the front hand barrier to the closest cutter blade shall be greater than 120 mm.

In addition, the openings in the front hand barrier shall not allow accessibility to the cutting device using the procedure outlined in [5.2.2.2](#).

If a handle is an integral part of the drive shaft tube, the minimum distance from the end of the handle closest to the cutting device to the nearest cutting edge shall be greater than 120 mm, measured as a chain measurement as indicated in [Figure 4 c\)](#).

If the cutting device can be adjusted or altered for length, distance from handles or angle with respect to the handles, then this measurement shall be taken in the position in which any part of the cutter blade is nearest to the front handle. Positions where the cutting device will not operate are not included.

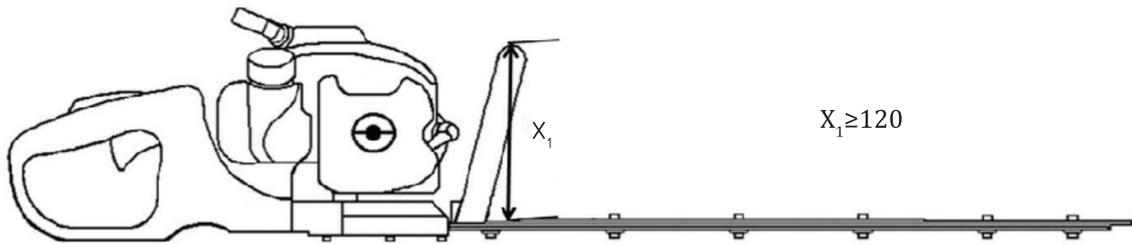
Compliance is checked by inspection and by measurement.

### 5.2.2.2 Accessibility through front hand barrier

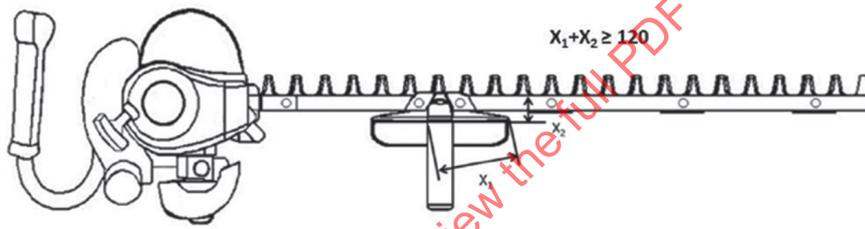
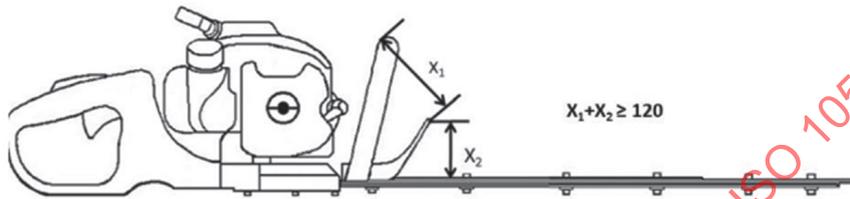
The probe specified in IEC 61032:1997, Probe 11, is applied to any opening and if it can be inserted, a force of  $(10 \pm 2)$  N shall be applied. The probe is inserted on the side away from the cutter blade. The probe at the inserted force shall not contact the cutting device when rotated or angled around the perimeter of the opening. The ambient test temperature shall be  $(20 \pm 5)$  °C.

Compliance is checked by inspection and by measurement.

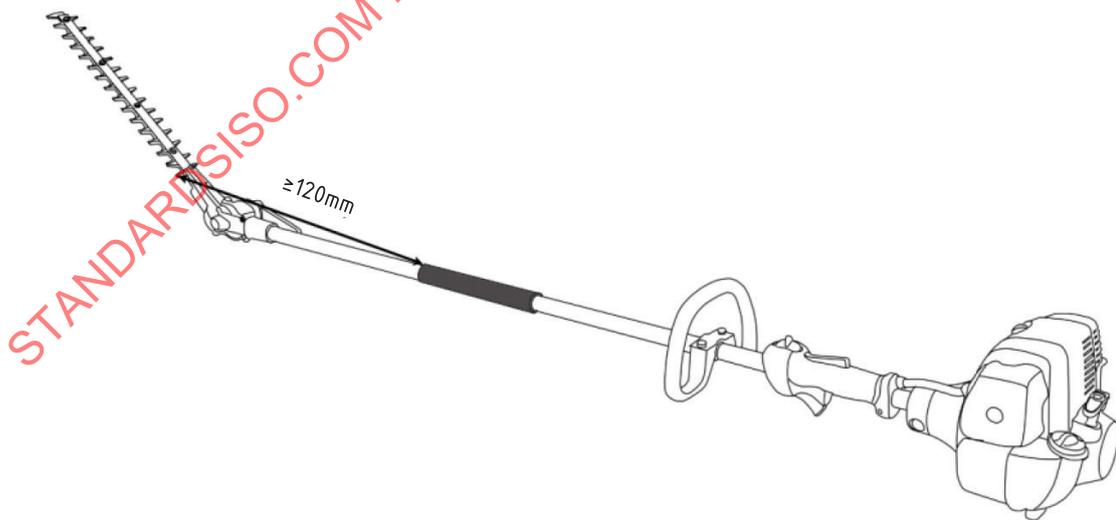
Dimensions in millimetres



a) Example of the reach distance of 120 mm



b) Examples of the reach distance of 120 mm as a chain measurement



c) Example of the reach distance of 120 mm of a handle as an integral part of the drive shaft tube

Figure 4 — Examples of measurement method for reach distance

### 5.2.3 Handle strength

#### 5.2.3.1 Acceptance criteria

Handles shall have adequate strength. The following test procedure applies to all handles except for handles being an integral part of the drive shaft tube.

The hedge trimmer handles shall not break and shall not show any crack when tested in accordance with [5.2.3.2](#).

Before and after the test, the dimensions of the handles shall comply with [5.2.1](#).

The latching mechanism of handles that are adjustable shall not be damaged and shall still be functional after the test.

If while attempting to apply the required test load, in any of the orthogonal directions, the cutter blade becomes permanently deformed such that it no longer reciprocates as intended, the load applied to the handle shall be limited to that which caused this deformation. The handle integrity for that orthogonal direction shall be assessed following this level of loading.

Compliance is checked by inspection and by test of [5.2.3.2](#)

NOTE In practical use, it would be impossible for a user to apply any load greater than this to the handle following the trapping of the blade by a branch.

#### 5.2.3.2 Test procedure

The ambient test temperature shall be  $(20 \pm 5)$  °C. The test loads specified below are applied for a duration of 15 s.

The hedge trimmer handles shall be subject to static loads as specified in [Table 2](#), separately applied at the handle grip midpoint, in each of the six directions illustrated in [Figure 5](#). In each case, the hedge trimmer shall be fixed rigidly by the cutting device so that the cutting device does not deflect at a point any further away from the body of the hedge trimmer than 15 mm, and the clamping device shall not contact the engine during the test.

For single-sided hedge trimmers, when testing the blade mounted handle the clamping means securing the cutting device shall not contact the blade mounted handle during the test.

For extended-reach hedge trimmers with handles not integral to the shaft, clamp the unit on the drive shaft tube within 15 mm in either direction of the handle.

The load is applied over an area of not more than 75 mm in width, centred on the normal handgrip area for both the front and the rear handles. Where necessary, a bracket can be clamped to the handles to facilitate side loading or loading in the Z direction.

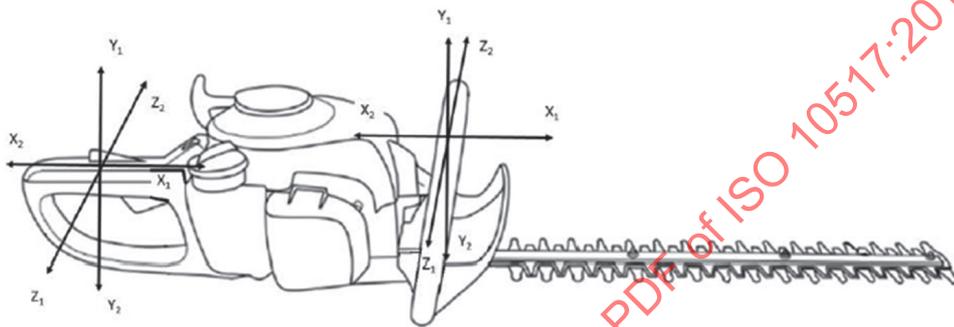
The load direction shall remain constant relative to the mounting, despite any deflections of the handle or blade.

If the hedge trimmer has an adjustable handle the test shall be performed with the handle in the most unfavourable position regarding handle strength.

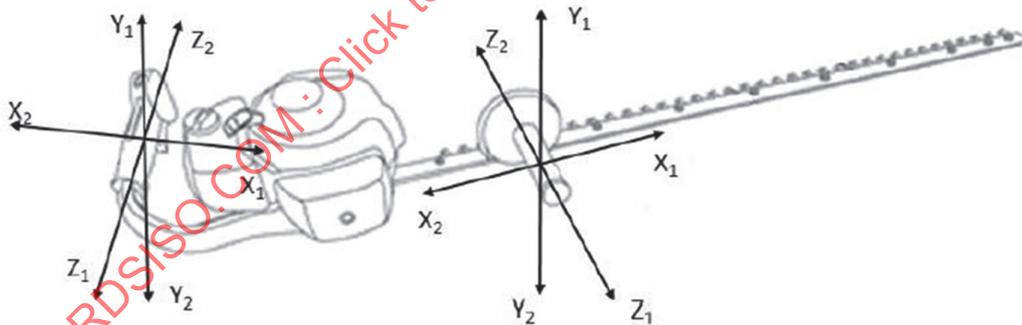
## 5.2.3.3 Test requirements

Table 2 — Test loads

Test loads		
Forwards and backwards $X_1$ and $X_2$	Up and down $Y_1$ and $Y_2$	Right and left $Z_1$ and $Z_2$
$(150 \pm 2)$ N	$(150 \pm 2)$ N	$(150 \pm 2)$ N



a) Double-sided hedge trimmer



b) Single-sided hedge trimmer

Figure 5 — Directions of load application

## 5.2.4 Cutting device and blunt extensions

5.2.4.1 The requirement for blunt extensions shall be determined in accordance with the following.

## a) Single-sided hedge trimmers

Blunt extensions are not required for single-sided hedge trimmers that can only be operated from the side opposite from the cutter blade [see Figure 1 a)]. Single-sided hedge trimmers that can be operated from either side shall meet the requirements for double-sided [Figure 1 b)] or extended-

reach hedge trimmers [Figure 1 c)] whichever is applicable. Positions where the cutting device will not operate are excluded.

b) Double-sided hedge trimmers

Double-sided hedge trimmers [see Figure 1 b)], other than extended-reach hedge trimmers, shall have a blunt extension according to Figure 7 a). Blunt extensions shall reach a distance of at least 400 mm from any point of the rear face of the front handle [see Figure 7 a)]. If the front handle is located part way along the cutting device, the blunt extensions shall start at the first blade tooth and continue until the 400 mm minimum distance beyond the rear of the front handle is reached [see Figure 7 b)]. Positions where the cutting device will not operate are excluded.

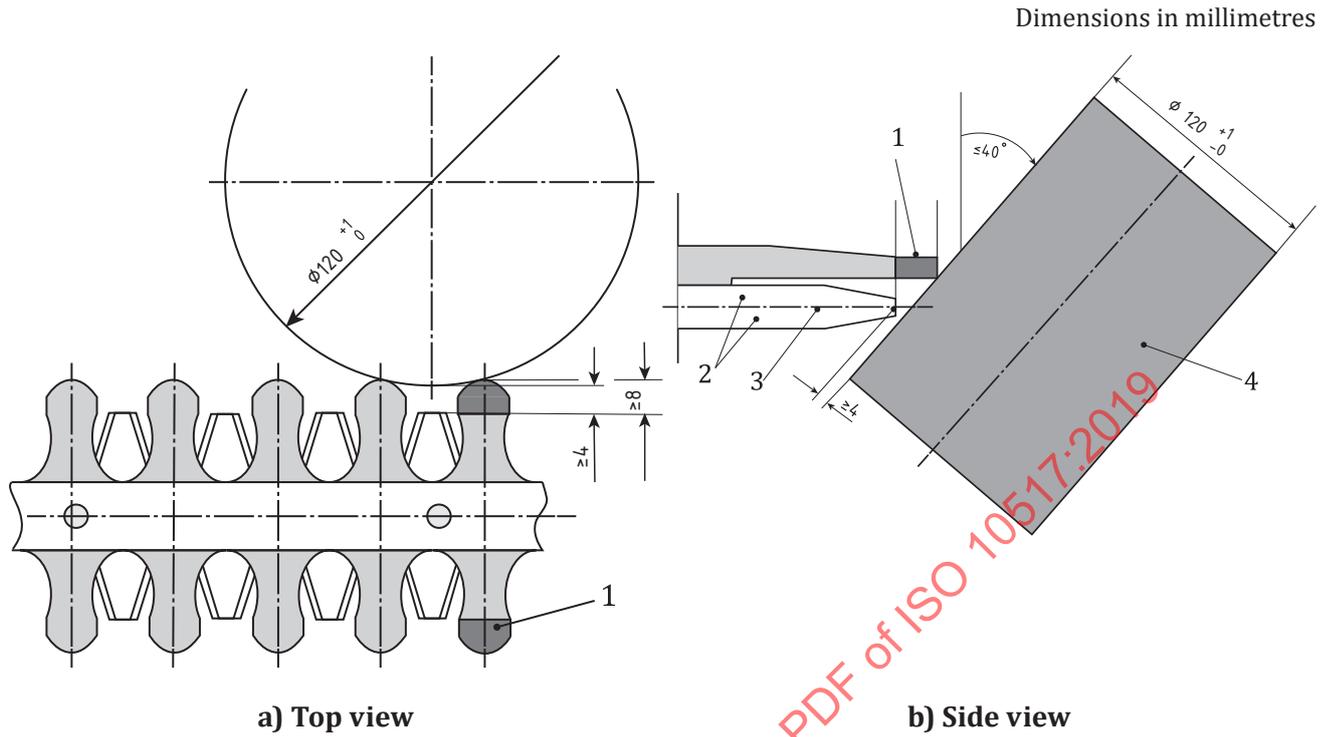
c) Extended-reach hedge trimmers

A blunt extension is required if the distance from the rear of the throttle control to the first blade tooth is less than 1 000 mm or if the distance from any point of the rear face of the front handle to the first blade tooth is less than 400 mm. If blunt extensions are needed, they shall start at the first blade tooth and continue until one of these two conditions are met [see Figure 7 c)]. Positions where the cutting device will not operate are excluded.

**5.2.4.2** Blunt extensions shall meet the following requirements.

The distance between the end of the cutting plane (3) and the tip of the blunt extension shall not be less than 8 mm. The distance between the cutter blades (2) and the side of the test cylinder (4) measured at the cutting plane (3) shall not be less than 4 mm when the test cylinder is positioned as shown in Figure 6 a) and then tilted around the ends of the blunt extensions (1) up to an angle of 40° as shown in Figure 6 b).

Compliance is checked by inspection and measurement in accordance with 5.2.4.1 and 5.2.4.2.

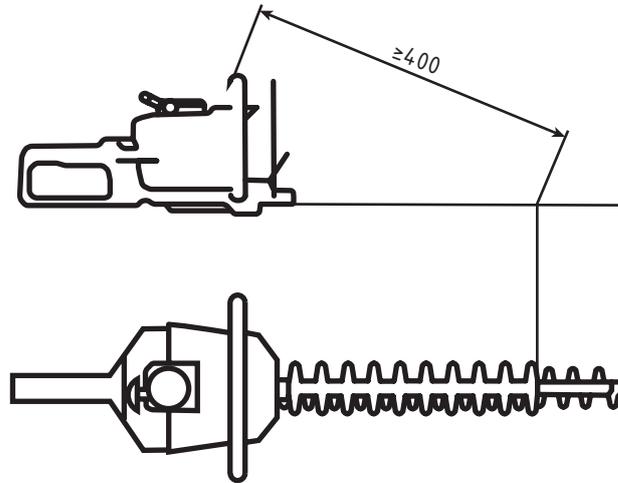


**Key**

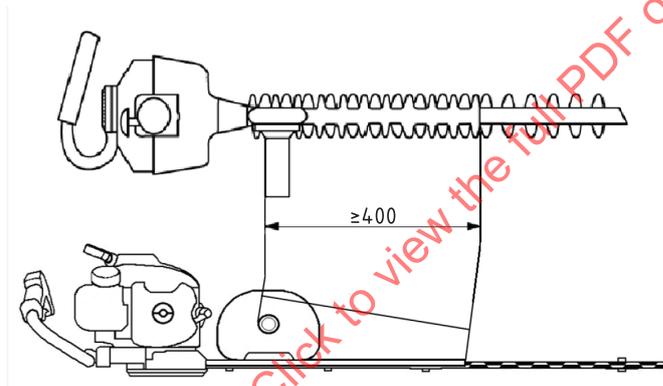
- 1 blunt extension
- 2 cutter blades
- 3 cutting plane
- 4 test cylinder

**Figure 6** Cutting device configuration

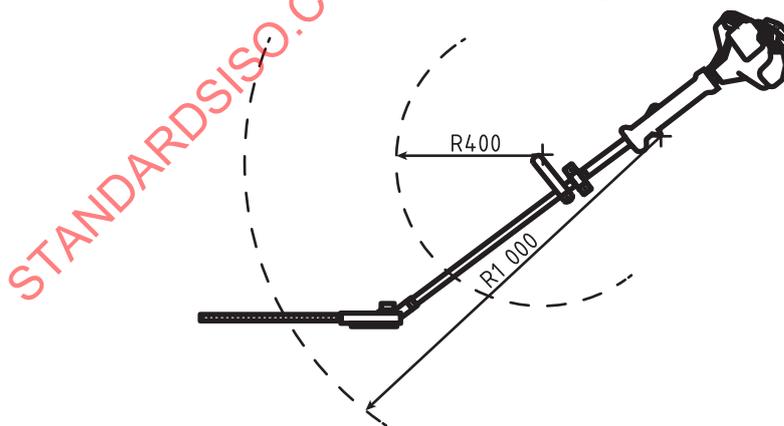
Dimensions in millimetres



a) Minimum distance of a blunt extension on a double-sided hedge trimmer



b) Minimum distance of a blunt extension on a double-sided hedge trimmer with the front handle along the cutting device



c) Minimum requirement(s) for a blunt extension on an extended-reach hedge trimmer

Figure 7 — Example of measurement method for minimum length of blunt extension

### 5.2.5 Shoulder harness requirements

A hedge trimmer with a dry weight of more than 6 kg and a distance from the throttle control to a moving cutter blade greater than 1 000 mm shall be equipped with a shoulder harness.

The harness shall be adjustable to the size of the operator and its operation shall be in accordance with the instructions.

The shoulder harness shall be

- designed in a way for easy removal, or
- equipped with a quick release mechanism that ensures that the hedge trimmer can be removed or released quickly from the operator.

NOTE 1 A single shoulder harness is considered to be designed in a way for easy removal.

NOTE 2 An example of a release point is a buckle that requires squeezing between the thumb and finger before releasing, e.g. side release buckles.

A quick release mechanism, if provided, shall be positioned either at the connection between the hedge trimmer and the harness or between the harness and the operator. The quick release mechanism shall only allow separation by deliberate action of the operator.

If a quick release mechanism is provided, it shall be possible to open it while under the weight of the hedge trimmer. It shall require the use of only one hand and have no more than two release points.

Compliance is checked by inspection and by a functional test using the heaviest configuration as identified in the instructions.

### 5.2.6 Holding moment

#### 5.2.6.1 General

If the distance between the rear of the throttle control and the cutting device in an operating position is  $\leq 1\ 000$  mm, the holding moment of the hedge trimmer shall be  $>20$  Nm determined according to [5.2.6.2](#).

NOTE The holding moment is to ensure the use of two hands.

#### 5.2.6.2 Test procedure

The holding moment,  $M$ , shall be calculated using [Formula \(1\)](#):

$$M = F \times L \quad (1)$$

where

$F$  is the force in newtons;

$L$  is the length in metres.

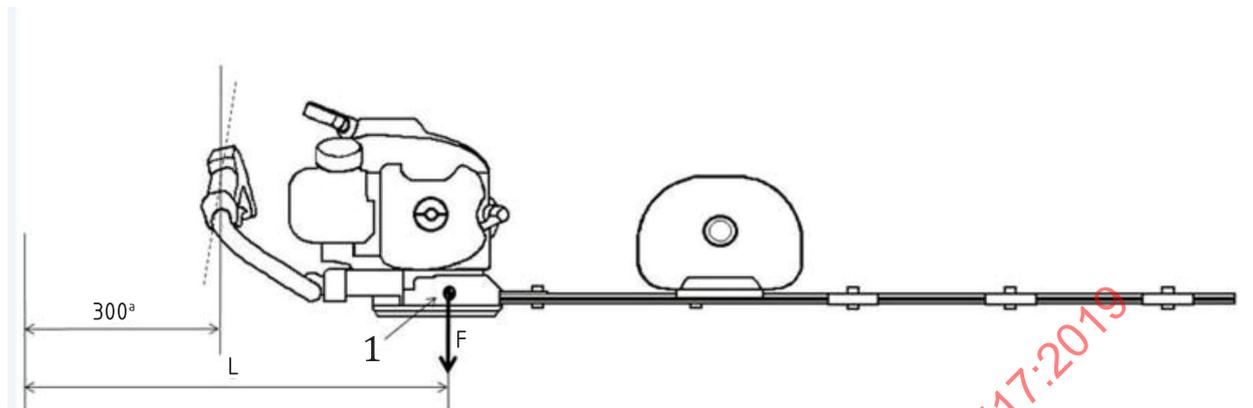
For a hedge trimmer with a lateral rear handle, the holding moment shall be calculated taking into account the dimensions and points of force application shown in [Figure 8 a\)](#). For a hedge trimmer with a longitudinal rear handle, the holding moment shall be calculated taking into account the dimensions and points of force application shown in [Figure 8 b\)](#) or [Figure 8 c\)](#) as appropriate. The distance,  $L$ , shall be greater than 350 mm.

For hedge trimmers with articulating blade configuration and/or adjustable length shaft configuration, the requirement shall be fulfilled in all positions in which the cutting device is engaged.

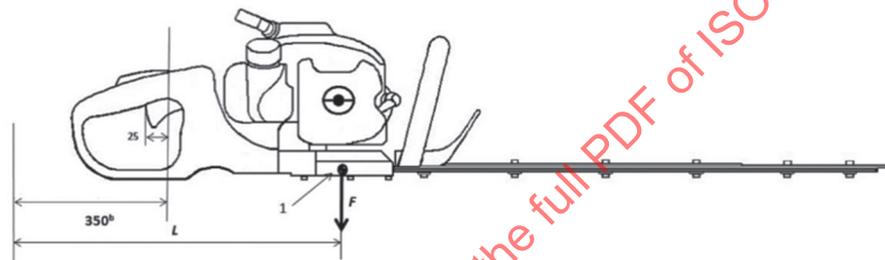
The holding moment shall be determined with the fuel tank half full and the oil tank filled to the level as defined in the manufactures instructions for use, as applicable.

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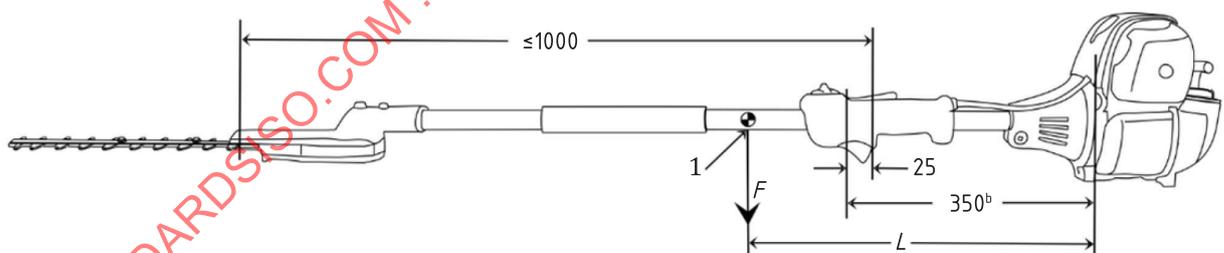
Dimensions in millimetres



a) Holding moment calculation on a single-sided hedge trimmer



b) Holding moment calculation on a double-sided hedge trimmer



c) Holding moment calculation on an extended-reach hedge trimmer with a distance between throttle control and first cutting tooth shorter than 1 000 mm

**Key**

- 1 centre of gravity
- a 300 mm dimension is from the centre of the rear handle.
- b 350 mm dimension is from a point 25 mm in front of the rear end of the blade control.

**Figure 8 — Calculation of the holding moment**

## 5.2.7 Blade stopping time

### 5.2.7.1 General

The blade stopping time shall not exceed 2 s.

Compliance shall be checked in accordance with [5.2.7.2](#) and [5.2.7.3](#).

### 5.2.7.2 Test procedure

The ambient test temperature shall be  $(20 \pm 5)$  °C.

The hedge trimmer shall be mounted and instrumented in such a manner that the results of the test are not affected. If an external starting device is used, it shall not influence the results.

Prior to the test the hedge trimmer shall be assembled and adjusted according to the manufacturer's instructions.

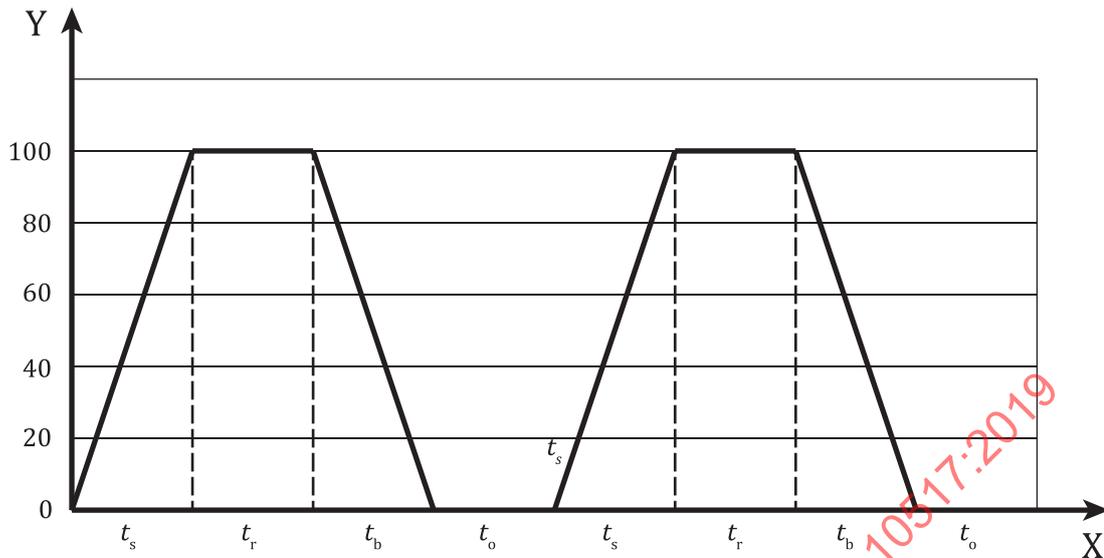
The means for operating the hedge trimmer during the test shall be such that the throttle control is released abruptly from the full ON position and returns to the idle or OFF position by itself. A device to detect the moment of release of the throttle control shall be provided.

The running speed during the test of ungoverned and governed hedge trimmers shall be 133 % of the speed corresponding to maximum power or the maximum speed, whichever is the lesser.

Tachometers shall have an accuracy of  $\pm 2,5$  % and the time-recording measurement system shall record the stopping time with a total accuracy of  $\pm 25$  ms.

[Figure 9](#) presents a schematic representation of two cycles. Each cycle shall consist of the following sequence:

- a) accelerate the blade from rest to the maximum speed (time equal to  $t_s$ );
- b) hold it at this speed for a short time to ensure that it is stable (time equal to  $t_r$ );
- c) release the throttle control and allow the blade to come to rest (time equal to  $t_b$ );
- d) allow a short time at rest before commencing the next cycle (time equal to  $t_c$ ).

**Key**

Y percent of maximum blade speed

X time

**Figure 9 — Example of test cycles**

If the total time for one cycle is  $t_c$ , then  $t_c = t_s + t_r + t_b + t_o$ . The test cycle times for “ON” ( $t_s + t_r$ ) and “OFF” ( $t_b + t_o$ ) shall be decided by the manufacturer but shall not exceed 100 s “ON” and 20 s “OFF”.

The hedge trimmer shall be run in for 15 min prior to the test, in accordance with the manufacturer’s instructions, with the cutting device, carburettor/fuel injection system and ignition being adjusted and lubricated as appropriate, also in accordance with the manufacturer’s instructions.

Ten ON/OFF operations of the throttle control shall be carried out prior to the test.

The stopping time is measured from the moment of release of the throttle control until the cutter blade has reached the end of the last full stroke.

The test sequence shall consist of a total of 2 506 cycles; a measurement of the stopping time of the cutter blade shall be made for the first six cycles of every 500 cycles of operation and the final six cycles of the test sequence. A cycle of 500 shall not be interrupted for maintenance. The hedge trimmer shall be maintained and lubricated in accordance with the manufacturer’s instructions throughout the test. Adjustment of a stopping mechanism, if equipped, is not allowed.

No other stopping times shall be recorded.

**5.2.7.3 Acceptance**

Each of the measured stopping times shall comply with the requirements of [5.2.7.1](#).

If the sample fails to complete the full number of cycles, one further sample can be tested over the full 2 506 cycles which shall then comply fully with the requirements.

The test sequence need not be continuous; however, any period or periods of operation shall only be stopped after any of the required sets of six measured cycles.

### 5.2.8 Cutting device cover

A cover for the cutting device shall be provided. It shall be designed to cover the cutting device during transportation or when the hedge trimmer is stored.

The cover shall stay in its protective position when the hedge trimmer is held with the covered cutting device pointing vertically downwards.

Compliance is checked by inspection and by manual test.

### 5.2.9 Cutting device accessories

Cutting device accessories, if any, shall be designed so that they cannot be fitted incorrectly.

EXAMPLE Tip protector at the end of the cutting device to ensure a distance to the ground while cutting.

Compliance is checked by inspection.

## 5.3 Starting and idling

Hedge trimmers shall be designed to ensure hazards due to inadvertent starting are reduced to a minimum. The throttle control shall require two separate and dissimilar actions before the cutting device operates.

There shall be no arrangement to lock the throttle control in the ON position and the cutting device shall stop when the throttle control is released.

Starting the engine shall not be considered as one of these actions unless the engine stops when the control is released.

When starting the engine of hedge trimmers, the throttle control may be locked in a starting position (throttle lock). This position shall be unlocked automatically when the throttle control is operated.

There shall be a means which separates the driving mechanism from the cutter blades. The cutting device shall not move at any engine speed less than 1,25 times idling speed. When the throttle lock is engaged for starting the engine, movement of the cutting device is allowed.

Compliance is checked by inspection, measurement and functional test.

## 5.4 Controls

### 5.4.1 Marking

All controls shall be duly marked, indicating the function, direction and/or method of operation as appropriate.

Detailed instructions on the operation of all controls shall be provided in the instructions (see 6.1). Colours shall be in contrast to the background unless the symbols are cast, embossed or stamped, in which case colours are not required. Symbols according to ISO 3767-1 and ISO 3767-3 may be used as appropriate (see Annex B for additional information).

### 5.4.2 Throttle control

The throttle control shall be so positioned that it can be pressed and released while the handle on which the control is operated from is held in the designated operating position.

Compliance is checked by inspection and by manual test.

The cutter blade shall not engage or move when a force is applied to the throttle control without releasing the throttle control lock-out. The throttle control lock-out function shall be verified by applying a force

of  $(50 + 2)$  N or the dry weight of the hedge trimmer, whichever is higher, on the throttle control with the throttle control lock-out engaged.

During the test the hand grip shall be fixed, without contacting the throttle control lock-out. The force shall be applied gradually to the throttle control in the direction of travel and held for  $(5 \pm 1)$  s. For pivoting throttle control the force shall be applied at the point furthest from the pivot and for linear operating throttle control the force shall be applied at the midpoint of the throttle control.

Compliance is checked by inspection and functional test.

### 5.4.3 Engine stop

Hedge trimmers shall have a control for stopping the engine which can be operated without releasing the hold of either of the handles. The engine stopping device shall not depend on sustained manual pressure for its operation. The stop position shall be clearly marked. The control shall have a contrasting colour against its background.

Compliance is checked by inspection and by manual test.

## 5.5 Power driven parts protection

All moving parts other than the cutting device shall be guarded to prevent the operator's contact with these components.

Openings in guards or enclosures shall comply with ISO 13857:2008, 4.2.4.1 and 4.2.4.3.

## 5.6 Heat protection

### 5.6.1 General

Exposed components of the exhaust system of the engine having a surface temperature greater than  $80\text{ °C}$  at an ambient temperature of  $(20 \pm 3)\text{ °C}$  shall be considered hot and shall be guarded so that they are not accessible to unintentional contact during normal use. These parts, which shall also include any exhaust guard that can be fitted to the hedge trimmer, are considered accessible if the area contactable by the test cone (see 5.6.2.3) is larger than  $10\text{ cm}^2$ .

The temperature of handles and permanently held controls shall not exceed  $43\text{ °C}$  when measured at an ambient temperature of  $(20 \pm 3)\text{ °C}$ . Other controls and surfaces contacted during normal operation shall not exceed  $55\text{ °C}$  when measured at an ambient temperature of  $(20 \pm 3)\text{ °C}$ .

Compliance is checked by inspection, by measurement and by manual test.

### 5.6.2 Test equipment, test conditions and test method

#### 5.6.2.1 Temperature measuring equipment

The temperature measuring equipment for hot surfaces shall have an accuracy of  $\pm 4\text{ °C}$  or better.

#### 5.6.2.2 Test conditions

The test is conducted in the shade. The engine is operated at maximum no-load speed until the surface temperatures stabilize. The cutting device is lubricated as appropriate.

Identify the hot (see 5.6.1) surface area(s) on the exhaust system and guard. Temperatures are determined by correcting the observed temperature by the difference between  $20\text{ °C}$  and the ambient temperature at the time of the test, i.e. temperature ( $\text{°C}$ ) equals the observed temperature ( $\text{°C}$ ) minus the ambient temperature ( $\text{°C}$ ) plus  $20\text{ °C}$ .

**5.6.2.3 Test method**

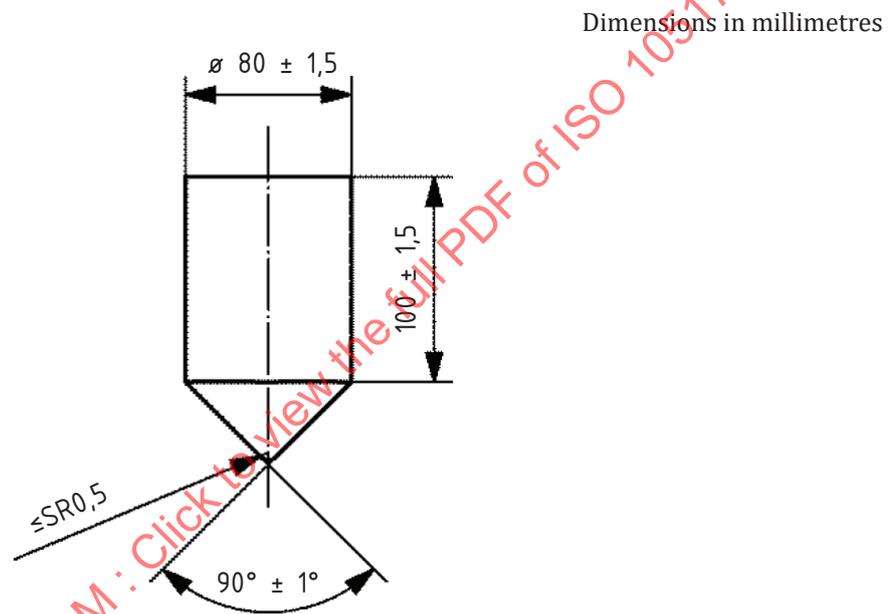
The cone (see [Figure 10](#)) is used with its axis in any direction and moved in any direction.

It is not necessary to test the accessibility of hot parts while they are hot. Allow the hedge trimmer to cool before using the cone.

When moving the cone, determine if contact is made with the hot surface area(s) by the cone tip or conical surface of the cone. The cylindrical surface of the cone and the flat surface of the cone shall not be considered.

**5.6.3 Test acceptance**

The tip or conical surface of the cone shall not be able to make contact with any hot surface area greater than 10 cm<sup>2</sup>.



**Figure 10 — Dimensions of cone**

**5.7 Fuel tank**

The fuel cap shall have a retainer. The fuel tank opening shall be at least 20 mm in diameter and shall be located so that filling of the tank by means of a suitable funnel is not obstructed by other components.

The design of the fuel tank assembly shall be such that no leakage occurs while the hedge trimmer is at its normal operating temperature, in all working positions and while being transported. Seepage from any fuel tank venting system shall not constitute a leakage.

Compliance is checked by inspection, by measurement and by manual test.

**5.8 Engine exhaust**

The engine exhaust shall not be directed towards the operator in the normal working position.

Compliance is checked by inspection and by manual test.

## 5.9 Electrical requirements of ignition system

### 5.9.1 General

Electrical cables shall be protected if located in potentially abrasive contact with metal surfaces and shall be resistant to lubricants and fuel, or protected from contact with them.

Compliance is checked by inspection.

### 5.9.2 Ignition circuit

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

All high voltage parts of the circuit, including spark plug terminals, shall be electrically protected such that the operator cannot make accidental contact with them.

Compliance is checked by inspection and by test in accordance with [5.9.3](#).

### 5.9.3 Test method

Test probe 11 of IEC 61032:1997 is applied through openings with a force not exceeding 5 N, the hedge trimmer being in every possible orientation. The test probe is applied to any depth that the probe will permit, and it is rotated or angled before, during, and after insertion to any position.

If the opening does not allow the entry of the probe, a rigid test probe with the dimensions of test probe B of IEC 61032:1997, but without any articulations, is applied to such openings with a force not exceeding 20 N. If under this condition the probe enters the opening, the test with the articulated test probe B of IEC 61032:1997 is repeated applying sufficient force for the probe to enter the opening.

### 5.9.4 Test acceptance

The finger probe shall not make contact with high voltage parts of the circuit, including spark plug terminals or with live parts protected only by lacquer, enamel, ordinary paper, cotton, oxide film, beads or sealing compound.

Inspection shall show that cables are protected against abrasion by metal surfaces and the cables are either resistant to, or there is no contact with, lubricants and fuel.

NOTE Lacquer, enamel, ordinary paper, cotton, oxide film on metal parts, beads and sealing compound, except self-hardening resins, are not considered to give the required protection against contact with live parts.

## 5.10 Vibration

### 5.10.1 Reduction by design and protective measures

The hedge trimmer shall be designed to reduce vibration to a value as low as practicable. The main sources causing vibration are

- a) oscillating forces from the engine,
- b) the cutting means,
- c) unbalanced moving parts,
- d) the impact in gears, bearings and other mechanisms, and
- e) the interaction between operator, hedge trimmer and the material being worked.

Besides the vibration reduction of the source, technical measures for isolating the vibration source from the handle, such as isolators and resonating masses, can be used when appropriate.

### 5.10.2 Reduction by information

Even after the possible technical measures for vibration reduction have been taken, when appropriate, the instructions shall include recommendations for

- the use of low-vibration operating modes and/or limited time of operation, and
- the wearing of personal protection equipment (PPE).

### 5.10.3 Vibration measurement

The measurement of hand-arm vibration shall be in accordance with ISO 22867.

## 5.11 Noise

### 5.11.1 Reduction by design and by information

Hedge trimmers shall be so designed and constructed that risks resulting from the emission of airborne noise are reduced to the lowest level taking account of technical progress and available means of reducing noise, in particular at the source.

Special care shall be taken in the acoustical design of hedge trimmers, especially with regard to the exhaust system and the selection of the silencer. The main sources causing noise for combustion-engine-driven hedge trimmers are:

- a) the air intake system,
- b) the engine cooling system,
- c) the engine exhaust system,
- d) the cutting system, and
- e) vibrating surfaces.

NOTE 1 ISO/TR 11688-1 gives general technical information on widely recognized technical rules and means to be applied in the design of machines of low noise emission.

NOTE 2 ISO 11691 and ISO 11820 can be useful when testing the silencer.

NOTE 3 ISO/TR 11688-2 gives useful information on noise generation mechanisms in machinery.

The instruction shall recommend the use of low-noise operating modes and/or limited time of operation, and give instructions on the protective measures to be taken by the user, including, where appropriate, the type of ear protection to be provided.

### 5.11.2 Noise emission measurement

The sound power level and emission sound pressure level at the operator's position shall be measured in accordance with ISO 22868.

## 6 Information for use

### 6.1 Instructions for use

The hedge trimmer shall be provided with instructions written in one of the official languages of the country of sale, giving detailed instructions on the operation of all controls, servicing and maintenance as appropriate to comply with ISO 12100:2010, Clause 6. The instructions shall include those operations

that are meant to be performed by the user. The instructions shall be simple and clear such that they are suitable for unskilled users. They shall include the following:

- a) instructions for, and, where appropriate, illustrations of, the assembly and disassembly of the hedge trimmer, if the hedge trimmer is not supplied in a completely assembled form;
- b) instructions for, and, where appropriate, illustrations of, the use of the hedge trimmer, including detailed instructions on all controls;
- c) instructions for, and, where appropriate, illustrations of, adjustment and any necessary user maintenance of the hedge trimmer, including lubrication of the cutting device(s) and how to set the carburettor and ignition;
- d) instructions for, and, where appropriate, illustrations of, the designated operating position;
- e) instructions for, and, where appropriate, drawings giving, detailed explanations of all controls;
- f) instructions for safe handling of fuel;
- g) instructions and, where appropriate, drawings for the recommended replacement or repair of parts, or servicing and the specifications of the spare parts to be used, when these affect the health and safety of operators;
- h) explanation of any pictograms that are used on the hedge trimmer and a repeat of all other information except for the serial number;
- i) the essential characteristics of accessories which can be fitted to the hedge trimmer;
- j) the operating method to be followed in the event of accident and breakdown;
- k) where a blockage is likely to occur, the operating method to be followed so as to enable the equipment to be safely unblocked;
- l) a warning that hedge trimmers are not intended for use by children;
- m) warnings concerning ways in which the hedge trimmer should not be used where experience has shown that these might occur.

The instructions and the technical documentation describing the hedge trimmer shall:

- 1) give the declared noise emission values of the hedge trimmer in accordance with ISO 22868;
- 2) declare the values for the A-weighted sound power level and the A-weighted emission sound pressure levels at the operator position, determined in accordance with ISO 22868;
- 3) include separately information about uncertainty for the values dealing with both measurement uncertainty and production uncertainty;
- 4) declare the values for the equivalent vibration total value to which the hand-arm system is subjected, determined in accordance with ISO 22867 and the uncertainty of measurement (k), if the equivalent vibration total value exceeds 2,5 m/s<sup>2</sup>;
- 5) state that the values for the equivalent vibration total value to which the hand-arm system is subjected do not exceed 2,5 m/s<sup>2</sup>, where this is the case.

Compliance is checked by inspection.

## 6.2 Marking

All hedge trimmers shall be legibly and indelibly marked with the following minimum information:

- a) designation of the hedge trimmer;

- b) the business name and full address of the manufacturer and, where applicable, his authorized representative;
- c) year of construction, i.e. the year in which the manufacturing process is completed;
- d) designation of series or type;

NOTE The designation of machinery allows the technical identification of the product. This can be achieved by a combination of letters and/or numbers and combined with the designation of the series or type.

- e) serial number if any;
- f) clear identification of the function, direction and/or method of operation of controls for the engine stopping device, choke control, primer and heated handle switch (if provided).

The substance of the following warnings shall be marked on the hedge trimmer (in words or safety signs):

- **“Warning. Read the instructions”**;
- **“Wear ear protection”**;
- **“Wear eye protection”**.

If safety signs are used, they shall be explained in the instructions. Additional information on examples of safety signs are given in [Annex B](#). If additional safety signs are used, they shall follow examples from either ISO 11684 or ISO 7010.

Compliance is checked by inspection.

### 6.3 Warnings

Markings giving warning information shall be located as close as practicable to the relevant hazard. Such markings shall be in one of the official languages of the country in which the hedge trimmer is to be sold, or appropriate pictorials/symbols in contrasting colours shall be used. If the marking is cast, embossed or stamped, colours are not required. The pictorials/symbols used shall follow the conventions laid down in ISO 3767-1, ISO 3767-3, ISO 3767-4 and ISO 3864-2.

Compliance is checked by inspection.

### 6.4 Test of labels

#### 6.4.1 Preparation of test specimens and control specimens

##### 6.4.1.1 General

New test specimens shall be prepared for each of the tests given in [6.4.2](#) and [6.4.3](#). New control specimens shall also be prepared for any test that involves a visual inspection.

Compliance is checked by inspection and by manual test.

##### 6.4.1.2 Test panels

Test panels shall be made with a surface equal to that on which the label shall be mounted.

The test panels shall be carefully cleaned with an appropriate solvent, in order to remove all traces of adhesive, grease, oil and water, and then dried for at least 2 h.

##### 6.4.1.3 Test specimens

The number of test specimens and control specimens prepared for each test shall be a minimum of three.