UL 62841-4-1

STANDARD FOR SAFETY

Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 4-1: Particular Requirements For Chain Saws

UL Standard for Safety for Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 4-1: Particular Requirements For Chain Saws, UL 62841-4-1

First Edition, Dated March 6, 2020

Summary of Topics

This revision of ANSI/UL 62841-4-1 dated May 5, 2021 includes the following changes in requirements:

- ***Revisions To Clause 101.DVA.1.14 To Correct The Longitudinal Balance Test Method For Top-Handle Saws***

- ***Addition Of National Difference To Clause K.1 To Delete Reference To Chain Saws As Not Applicable; K.1DV***

- ***Editorial correction to title of Clause K.14.301 to match IEC document***

This standard is an adoption of IEC 62841-4-1, Edition 1, published by the IEC October 2017. The national difference document incorporates all of the U.S. national differences for UL 60745-4-1.

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated January 15, 2021.

No Text on This Page

CSA Group
CSA C22.2 No. 62841-4-1:20
First Edition
(IEC 62841-4-1:2017, MOD)

Underwriters Laboratories Inc.
UL 62841-4-1
First Edition

Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 4-1: Particular Requirements For Chain Saws

March 6, 2020

(Title Page Reprinted: May 5, 2021)

This national standard is based on publication IEC 62841-4-1, First Edition (2017).

Approved American National Standard

ANSI/UL 62841-4-1-2021

Commitment for Amendments

This standard is issued jointly by the Canadian Standards Association (operating as “CSA Group”) and Underwriters Laboratories Inc. (UL). Comments or proposals for revisions on any part of the standard may be submitted to CSA Group or UL at any time. Revisions to this standard will be made only after processing according to the standards development procedures of CSA Group and UL. CSA Group and UL will issue revisions to this standard by means of a new edition or revised or additional pages bearing their date of issue.

ISBN 978-1-4883-2590-8 © 2020 Canadian Standards Association

This Standard is subject to review within five years from the date of publication, and suggestions for its improvement will be referred to the appropriate committee. The technical content of IEC and ISO publications is kept under constant review by IEC and ISO. To submit a proposal for change, please send the following information to inquiries@csagroup. org and include "Proposal for change" in the subject line: Standard designation (number); relevant clause, table, and/or figure number; wording of the proposed change; and rationale for the change.

To purchase CSA Group Standards and related publications, visit CSA Group's Online Store at www.csagroup.org/store/ or call toll-free 1-800-463-6727 or 416-747-4044.

This ANSI/UL Standard for Safety consists of the First Edition including revisions through May 5, 2021. The most recent designation of ANSI/UL 62841-4-1 as an American National Standard (ANSI) occurred on May 5, 2021. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface. The National Difference Page and IEC Foreword are also excluded from the ANSI approval of IEC-based standards.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at https://csds.ul.com.

To purchase UL Standards, visit UL's Standards Sales Site at http://www. shopulstandards. com/HowToOrder.aspx or call toll-free 1-888-853-3503.

CONTENTS

Preface **7**

NATIONAL DIFFERENCES **9**

FOREWORD **11**

1 Scope 15
1DV Modification: Add the following to Clause 1 of the Part 4: 15
2 Normative references 15
2DV Modification: Add the following reference standards to Clause 2 of the Part 4: 16
3 Terms and definitions 16
4 General requirements 18
5 General conditions for the tests 18
6 Radiation, toxicity and similar hazards 18
7 Classification 18
8 Marking and instructions 18
9 Protection against access to live parts 22
10 Starting 22
11 Input and current 22
12 Heating 22
13 Resistance to heat and fire 23
14 Moisture resistance 23
15 Resistance to rusting 23
16 Overload protection of transformers and associated circuits 23
17 Endurance 23
18 Abnormal operation 23
19 Mechanical hazards 24
19.101 Handles 25
19.102 Front hand guard 25
19.103 Rear hand guard 25
19.104 Drive sprocket cover 26
19.105 Chain catcher 26
19.106 Void 26
19.107 Protection against injury by kickback 26
19.108 Guide bar cover 28
19.109 Saw chain tension 29
19.110 Saw chain lubrication 29
19.111 Balance 29
19.112 Run down time 29
20 Mechanical strength 30
20.101 Handles 30
20.102 Front and rear hand guard 30
21 Construction 31
21.18.102DV Modification: Replace the second paragraph of Clause 21.18.102 of the Part 4 with the following: 32
21.101 Determination of cutting length 32
21.102 Operator presence sensor 32
21.103 Spiked bumper 33
21.104 Bar tip guard 33
22 Internal wiring 33
23 Components 33
24 Supply connection and external flexible cords 34
25 Terminals for external conductors 35

26 Provision for earthing 35
27 Screws and connections 35
28 Creepage distances, clearances and distances through insulation 35

Annexes

Annex I (informative) Measurement of noise and vibration emissions

I.2.2.4 Lawn and garden machinery 45

Annex K (normative) Battery tools and battery packs

K.1 Scope 52
K.1DV Modification: Delete the first dashed item in Clause K.1 of the Part 4 (U.S. Only): 52
K.8.14.1.101 Safety instructions for chain saws 52
K.8.14.1.101DV.1 Modification: Replace Item e) of Clause 8.14.1.101 with the following: 52
K.8.14.1.101DV.2 Modification: Add Item nDV) to Clause K.8.14.1.101: 53
K.8.14.1.301 General chain saw safety warnings 53
K.14 Moisture resistance 53
K.14.301 Battery-powered chain saw moisture resistance 53
K.24 Supply connection and external flexible cords 57

Annex L (normative) Battery tools and battery packs provided with mains connection or non-isolated sources

L.1 Scope 58

Annex AA (normative) Safety signs

Annex BB (informative) Examples of instructions concerning the proper techniques for basic felling, limbing, and cross-cutting

BB.1 Felling a tree 63
BB.2 Notching undercut 63
BB.3 Felling back cut 63
BB.4 Limbing a tree 63
BB.5 Cross-cutting/bucking a log 64

Annex CC (informative) Example of a material and construction for fulfilling the requirements for an artificial surface

CC.1 Material 68
CC.2 Construction 68

Annex 101.DVA (normative) (U.S. Only) Additional Requirements for Battery-Operated Top-Handle Chain Saws

101.DVA.1 Add a new Annex 101.DVA as follows: 70
101.DVA.1.3 Apply Clause 2 of the Part 4 and the following: 70
101.DVA.1.4 Addition: Add Clause K.3.301DV to Annex K of the Part 4: 70
101.DVA.1.5 Addition: Add Figure K.301DV to Annex K of the Part 4: 71
101.DVA.1.6 Addition: Add Clause K.3.302DV to Annex K of the Part 4: 71

101.DVA.1.7 Addition: Add Clause K.5.301DV to Annex K of the Part 4: 71
101.DVA.1.8 Addition: Add Clause K.5.302DV to Annex K of the Part 4: 71
101.DVA.1.9 Modification: Replace 19.101 with the following: 71
101.DVA.1.10 Modification: Apply Clause 19.103 of the Part 4 and add the following: 72
101.DVA.1.11 Modification: Apply Clause 19.107.1.1 of the Part 4 and replace the first paragraph with the following: 72
101.DVA.1.12 Modification: Replace Clause 19.107.2 of the Part 4 with the following: 72
101.DVA.1.13 Modification: Apply Clause 19.107.4 of the Part 4 and replace the first paragraph with the following: 72
101.DVA.1.14 Modification: Apply Clause K.19.111 of the Part 4 and replace the fourth and fifth paragraphs with the following: 72
101.DVA.1.15 Addition: Add Clause K.19.301DV to Annex K of the Part 4: 72
101.DVA.1.16 Modification: Apply Clause 19.112 of the Part 4 and the following: 73
101.DVA.1.17 Addition: Add Clause K.21.302DV to Annex K of the Part 4: 73
101.DVA.1.18 Addition: Add Clause K.19.302DV to Annex K of the Part 4: 73
101.DVA.1.19 Addition: Add Clause K.21.303DV to Annex K of the Part 4: 73

Annex 101.DVB (normative) Additional Requirements For Battery-Operated Pruning Saws

101.DVB.1 Add a new Annex 101.DVB as follows: 74
101.DVB.1.2 Modification: Apply Clause 2 of the Part 4 and add the following: 74
101.DVB.1.3 Modification: Apply Clause 3 of the Part 4 and add the following: 74
101.DVB.1.4 Modification: Apply Clause K.8.14.2 b) of the Part 4 and the following: 77
101.DVB.1.5 Modification: Replace Clause 8.14.1.101 of the Part 4 with the following and apply: 77
101.DVB.1.6 Modification: Replace Clause 19.101 of the Part 4 with the following: 78
101.DVB.1.7 Modification: Replace Clause 19.102 of the Part 4 with the following: 78
101.DVB.1.8 Modification: Replace Clause 19.107 of the Part 4 with the following: 78
101.DVB.1.9 Modification: Replace Clause 19.111 of the Part 4 with the following: 80
101.DVB.1.10 Modification: Apply Clause 19.112 of the Part 4 and replace the fifth paragraph with the following: 80

Bibliography

No Text on This Page

Preface

This is the harmonized CSA Group and UL Standard For Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 4-1: Particular Requirements For Chain Saws. It is the First edition of CSA C22.2 No. 62841-4-1 and the First edition of UL 62841-4-1. This harmonized standard has been jointly revised on May 5, 2021. For this purpose, CSA Group and UL are issuing revision pages dated May 5, 2021.

This harmonized standard is based on IEC Publication 62841-4-1: First edition, Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 4-1: Particular Requirements For Chain Saws, issued October 2017. IEC 62841-4-1 is copyrighted by the IEC.

This harmonized standard was prepared by CSA Group and Underwriters Laboratories Inc. (UL). The efforts and support of the International Harmonization Committee (IHC) for the adoption of the IEC series of standards for Hand-Held, Motor-Operated, and Transportable Tools and Lawn and Garden Machinery are gratefully acknowledged.

This standard is considered suitable for use for conformity assessment within the stated scope of the standard.

This standard was reviewed by the CSA Subcommittee on Safety of Hand-Held Motor-Operated Electric Tools, under the jurisdiction of the CSA Technical Committee on Consumer and Commercial Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee. This standard has been developed in compliance with Standards Council of Canada requirements for National Standards of Canada. It has been published as a National Standard of Canada by CSA Group.

Application of Standard

Where reference is made to a specific number of samples to be tested, the specified number is to be considered a minimum quantity.

Note: Although the intended primary application of this standard is stated in its scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.

CSA C22.2 No. 62841-4-1 is to be used in conjunction with the First edition of CAN/CSA-C22.2 No. 62841-1. The requirements for chain saws are contained in this Part 4 Standard and CAN/CSA-C22.2 No. 62841-1. Requirements of this Part 4 Standard, where stated, amend the requirements of CAN/CSA-C22.2 No. 62841-1. Where a particular subclause of CAN/CSA-C22.2 No. 62841-1 is not mentioned in CSA C22.2 No. 62841-4-1, the CAN/CSA-C22.2 No. 62841-1 subclause applies.

UL 62841-4-1 is to be used in conjunction with the First edition of UL 62841-1. The requirements for chain saws are contained in this Part 4 Standard and UL 62841-1. Requirements of this Part 4 Standard, where stated, amend the requirements of UL 62841-1. Where a particular subclause of UL 62841-1 is not mentioned in UL 62841-4-1, the UL 62841-1 subclause applies.

Level of harmonization

This standard adopts the IEC text with national differences.

This standard is published as an equivalent standard for CSA Group and UL.

An equivalent standard is a standard that is substantially the same in technical content, except as follows: Technical national differences are allowed for codes and governmental regulations as well as those

recognized as being in accordance with NAFTA Article 905, for example, because of fundamental climatic, geographical, technological, or infrastructural factors, scientific justification, or the level of protection that the country considers appropriate. Presentation is word for word except for editorial changes.

All national differences from the IEC text are included in the CSA Group and UL versions of the standard. While the technical content is the same in each organization's version, the format and presentation may differ.

Reasons for Differences From IEC

National differences from the IEC are being added in order to address safety and regulatory situations present in the US and Canada.

Interpretations

The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

IEC Copyright

For CSA Group, the text, figures, and tables of International Electrotechnical Commission Publication 62841-4-1, Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery – Safety – Part 4-1: Particular requirements for chain saws, copyright 2017, are used in this standard with the consent of the International Electrotechnical Commission. The IEC Foreword is not a part of the requirements of this standard but is included for information purposes only.

NATIONAL DIFFERENCES

National Differences from the text of International Electrotechnical Commission (IEC) Publication 62841-4-1, Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 4-1: Particular Requirements For Chain Saws, copyright 2017, are indicated by notations (differences) and are presented in bold text. The national difference type is included in the body.

There are five types of National Differences as noted below. The difference type is noted on the first line of the National Difference in the standard. The standard may not include all types of these National Differences.

DR – These are National Differences based on the **national regulatory requirements**.

D1 – These are National Differences which are based on **basic safety principles and requirements**, elimination of which would compromise safety for consumers and users of products.

D2 – These are National Differences from IEC requirements based on existing **safety practices**. These requirements reflect national safety practices, where empirical substantiation (for the IEC or national requirement) is not available or the text has not been included in the IEC standard.

DC – These are National Differences based on the **component standards** and will not be deleted until a particular component standard is harmonized with the IEC component standard.

DE – These are National Differences based on **editorial comments or corrections**.

Each national difference contains a description of what the national difference entails. Typically one of the following words is used to explain how the text of the national difference is to be applied to the base IEC text:

Addition / Add - An addition entails adding a complete new numbered clause, subclause, table, figure, or annex. Addition is not meant to include adding select words to the base IEC text.

Modification / Modify - A modification is an altering of the existing base IEC text such as the addition, replacement or deletion of certain words or the replacement of an entire clause, subclause, table, figure, or annex of the base IEC text.

Deletion / Delete - A deletion entails complete deletion of an entire numbered clause, subclause, table, figure, or annex without any replacement text.

No Text on This Page

FOREWORD

ELECTRIC MOTOR-OPERATED HAND-HELD TOOLS, TRANSPORTABLE TOOLS AND LAWN AND GARDEN MACHINERY – SAFETY – Part 4-1: Particular requirements for chain saws

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.

3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.

4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.

5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.

6) All users should ensure that they have the latest edition of this publication.

7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.

8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62841-4-1 has been prepared by IEC technical committee 116: Safety of motor-operated electric tools.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
116/339/FDIS	116/344/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

This Part 4-1 is to be used in conjunction with the first edition of IEC 62841-1 (2014).

This Part 4-1 supplements or modifies the corresponding clauses in IEC 62841-1, so as to convert it into the IEC Standard: Particular requirements for chain saws.

Where a particular subclause of Part 1 is not mentioned in this Part 4-1, that subclause applies as far as relevant. Where this standard states “addition”, “modification” or “replacement”, the relevant text in Part 1 is to be adapted accordingly.

The following print types are used:

– requirements: in roman type;

– *test specifications: in italic type*;

– notes: in small roman type.

– **terms defined in Clause 3: in bold typeface**.

Subclauses, notes, tables and figures which are additional to those in Part 1, except as described for Annex K and Annex L below, are numbered starting from 101.

Subclauses, notes, tables and figures in Annex K and Annex L which are additional to those in the main body of this Part 4-1 as well as Annex K and Annex L of Part 1 are numbered starting from 301.

A list of all parts of the IEC 62841 series, under the general title: *Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery – Safety*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore. iec. ch" in the data related to the specific document. At this date, the document will be

• reconfirmed,

• withdrawn,

• replaced by a revised edition, or

• amended.

NOTE The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

It is the recommendation of the committee that the content of this publication be adopted for implementation nationally not earlier than 36 months from the date of publication.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

101DV DE *Modification: Add the following to the IEC Foreword:*

The numbering system in the standard uses a space instead of a comma to indicate thousands and uses a comma instead of a period to indicate a decimal point. For example, 1 000 means 1,000 and 1,01 means 1.01.

102DV DE *Modification: Add the following to the IEC Foreword:*

For this Standard, all references to "Part 1" refer to CAN/CSA-C22.2 No. 62841-1 and UL 62841-1.

103DV DE *Modification: Add the following to the list of dashed items in the IEC Foreword:*

– terms defined in Annex 101.DVA and Annex 101.DVB appear in ALL CAPS.

No Text on This Page

ELECTRIC MOTOR-OPERATED HAND-HELD TOOLS, TRANSPORTABLE TOOLS AND LAWN AND GARDEN MACHINERY – SAFETY – Part 4-1: Particular requirements for chain saws

1 Scope

This clause of Part 1 is applicable, except as follows:

Addition:

This standard applies to **chain saws** for cutting wood and designed for use by one person. This standard does not cover **chain saws** designed for use in conjunction with a guide-plate and riving knife or in any other way such as with a support or as a stationary or transportable machine.

This standard does not apply to

– **chain saws** for tree service as defined in ISO 11681-2; or

– pole-mounted pruners.

NOTE 101 Pole-mounted pruners will be covered by a future part of IEC 62841.

The **chain saws** covered by this standard are designed only to be operated with the right hand on the **rear handle** and the left hand on the **front handle**.

1DV DE *Modification: Add the following to Clause 1 of the Part 4:*

Requirements applicable to battery-operated top-handle chain saws are specified in Annex 101.DVA and are applicable in the U.S. only. In Canada, battery-operated top-handle chain saws are covered in CSA Z62.1, as Class 2B chain saws.

Requirements applicable to battery-operated PRUNING SAWS are specified in Annex 101.DVB and are applicable in the U.S. and Canada.

2 Normative references

This clause of Part 1 is applicable, except as follows:

Addition:

IEC 61672-1, *Electroacoustics – Sound level meters – Part 1: Specifications*

ISO 354:2003, *Acoustics – Measurement of sound absorption in a reverberation room*

ISO 3744:2010, *Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Engineering methods for an essentially free field over a reflecting plane*

ISO 6533:2012, *Forestry machinery – Portable chain-saw front hand-guard – Dimensions and clearances*

ISO 6534:2007, *Forestry machinery – Portable chain-saw hand-guards – Mechanical strength*

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

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

ISO 9518, *Forestry machinery – Portable chain-saws – Kickback test*

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

ISO 11681-2:2011, *Machinery for forestry – Portable chain-saw safety requirements and testing – Part 2: Chain-saws for tree service*

ISO 13772:2009, *Forestry machinery – Portable chain saws – Non-manually actuated chain brake performance*

ISO 17080:2005, *Manually portable agricultural and forestry machines and powered lawn and garden equipment – Design principles for single-panel product safety labels*

ISO 22868:2011, *Forestry and gardening machinery – Noise test code for portable hand-held machines with internal combustion engine – Engineering method (Grade 2 accuracy)*

2DV DR *Modification: Add the following reference standards to Clause 2 of the Part 4:*

CSA Z62.1-15, *Chain saws*

3 Terms and definitions

This clause of Part 1 is applicable, except as follows:

3.101
bar tip guard
shield that prevents contact with the **saw chain** at the tip of the **guide bar**

3.102
chain brake
function or device for stopping the **saw chain** activated manually or non-manually when **kickback** occurs

3.102.1
manually activated chain brake
braking function triggered by the hand of the operator

3.102.2
non-manually activated chain brake
braking function triggered by **kickback** motion independent of operator activation

3.103
chain catcher
device for restraining the **saw chain** if it breaks or derails (see Figure 101)

3.104
chain saw
machine designed to cut wood with a **saw chain** and consisting of an integrated unit of handles, motor, **guide bar** and **saw chain**, designed to be supported with two hands (see Figure 101)

3.105
cutting length
approximate effective length of cut of the **chain saw**

Note 1 to entry: The method for determining **cutting length** is specified in 21.101.

3.106
drive sprocket
chain drive wheel with teeth

3.107
front hand guard
guard between the **front handle** and the **saw chain** for protecting the hand from injuries if the hand slips off the handle (see Figure 101)

3.108
front handle
support handle located at or towards the front of the machine (see Figure 101)

3.109
guide bar
attachment that supports and guides the **saw chain** (see Figure 101)

3.110
kickback
rapid upward and/or backward motion of the **chain saw** which can occur when the moving **saw chain** contacts an object such as a log or branch near the tip of the **guide bar** or when the wood closes in and pinches the moving **saw chain**

3.111
maximum speed
highest **saw chain** speed attainable under all conditions of **normal use**, including no-load

3.112
operator presence sensor
device to detect the presence of an operator's hand

3.113
rear hand guard
extension on the lower part of the **rear handle** for protecting the hand from the **saw chain** if it breaks or derails (see Figure 101)

3.114
rear handle
support handle located towards the rear of the machine (see Figure 101)

3.115
saw chain
attachment, serving as a cutting tool, consisting of drive links and cutters (see Figure 101 and Figure 108)

3.116
spiked bumper
device, fitted in front of the **guide bar** mounting point, acting as a pivot when in contact with a tree or log (see Figure 101 and Figure 102)

4 General requirements

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable, except as follows:

5.14 *Addition:*

*For tests carried out at any percentage of **rated input** or **rated current**, except for no-load, the **saw chain** and the **guide bar** may be removed and the **chain saw** loaded by means of a brake.*

5.17 *Addition:*

*The mass of the machine includes the heaviest **guide bar** and **saw chain** combination in accordance with 8.14.2 c) 101) as well as the lubrication tank, if any, filled to the maximum specified level, but excludes the **guide bar** cover.*

5.101 *For tests that are performed at **maximum speed** and no-load, the manufacturer may need to provide special hardware and/or software.*

6 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.

7 Classification

This clause of Part 1 is applicable.

8 Marking and instructions

This clause of Part 1 is applicable, except as follows:

8.2 *Addition:*

Chain saws shall be marked with safety information which shall be written in one of the official languages of the country in which the machine is to be sold or marked with the appropriate symbol:

– “Wear eye protection” or a relevant safety sign of ISO 7010 or the safety sign specified in Annex AA;

– “Wear ear protection”, a relevant safety sign of ISO 7010 or the safety sign specified in Annex AA. This marking may be omitted if the measured sound pressure level at the operator’s ear in accordance with Annex I does not exceed 85 dB(A).

A combination of ISO safety signs, such as eye, ear, dust and head protection, is allowed. In addition, a combination of safety signs as specified in Annex AA is allowed.

– “Do not expose to rain” or the safety sign specified in Annex AA, unless the **chain saw** has a degree of protection of at least IPX4.

– "Beware of chain saw kickback and avoid contact with bar tip”, or A.1.3 of ISO 17080:2005.

– “Always use chain saw two-handed” or A.3.1 of ISO 17080:2005.

For mains supplied machines:

“Remove plug from the mains immediately if the cable is damaged or cut” or the safety sign specified in Annex AA.

8.3 *Addition:*

Chain saws shall be marked with the following:

– specified nominal **guide bar** size or size range;

NOTE 101 The nominal **guide bar** size is not necessarily the same as the **cutting length**.

– identification of the direction of rotation of the **saw chain** by a legible and durable mark on the body of the machine. This may be located under the **drive sprocket** cover.

8.14.1 *Addition:*

The additional safety instructions as specified in 8.14.1.101 shall be given. This part may be printed separately from the “General Machine Safety Warnings”.

8.14.1.101 **Safety instructions for chain saws**

1) General chain saw safety warnings:

a) **Keep all parts of the body away from the saw chain when the chain saw is operating. Before you start the chain saw, make sure the saw chain is not contacting anything.** *A moment of inattention while operating chain saws may cause entanglement of your clothing or body with the saw chain.*

b) **Always hold the chain saw with your right hand on the rear handle and your left hand on the front handle.** *Holding the chain saw with a reversed hand configuration increases the risk of personal injury and should never be done.*

c) **Hold the chain saw by insulated gripping surfaces only, because the saw chain may contact hidden wiring or its own cord.** *Saw chains contacting a "live" wire may make exposed metal parts of the chain saw "live" and could give the operator an electric shock.*

d) **Wear eye protection. Further protective equipment for hearing, head, hands, legs and feet is recommended.** *Adequate protective equipment will reduce personal injury from flying debris or accidental contact with the saw chain.*

e) **Do not operate a chain saw in a tree, on a ladder, from a rooftop, or any unstable support.** *Operation of a chain saw in this manner could result in serious personal injury.*

f) **Always keep proper footing and operate the chain saw only when standing on fixed, secure and level surface.** *Slippery or unstable surfaces may cause a loss of balance or control of the chain saw.*

g) **When cutting a limb that is under tension, be alert for spring back.** *When the tension in the wood fibres is released, the spring loaded limb may strike the operator and/or throw the chain saw out of control.*

h) **Use extreme caution when cutting brush and saplings.** *The slender material may catch the saw chain and be whipped toward you or pull you off balance.*

i) **Carry the chain saw by the front handle with the chain saw switched off and away from your body. When transporting or storing the chain saw, always fit the guide bar cover.** *Proper handling of the chain saw will reduce the likelihood of accidental contact with the moving saw chain.*

j) **Follow instructions for lubricating, chain tensioning and changing the bar and chain.** *Improperly tensioned or lubricated chain may either break or increase the chance for kickback.*

k) **Cut wood only. Do not use chain saw for purposes not intended. For example: do not use chain saw for cutting metal, plastic, masonry or non-wood building materials.** *Use of the chain saw for operations different than intended could result in a hazardous situation.*

l) **Do not attempt to fell a tree until you have an understanding of the risks and how to avoid them.** *Serious injury could occur to the operator or bystanders while felling a tree.*

NOTE The above warning is omitted for **chain saws** that are not suitable for tree felling as specified by the manufacturer. See 8.14.2 b) 104).

m) **This chain saw is not intended for tree felling.** *Use of the chain saw for operations different than intended could result in serious injury to the operator or bystanders.*

NOTE The above warning is omitted for **chain saws** that are suitable for tree felling.

2) **Causes and operator prevention of kickback:**

Kickback may occur when the nose or tip of the guide bar touches an object, or when the wood closes in and pinches the saw chain in the cut.

Tip contact in some cases may cause a sudden reverse reaction, kicking the guide bar up and back towards the operator.

Pinching the saw chain along the top of the guide bar may push the guide bar rapidly back towards the operator.

Either of these reactions may cause you to lose control of the saw which could result in serious personal injury. Do not rely exclusively upon the safety devices built into your saw. As a chain saw user, you should take several steps to keep your cutting jobs free from accident or injury.

Kickback is the result of chain saw misuse and/or incorrect operating procedures or conditions and can be avoided by taking proper precautions as given below:

a) **Maintain a firm grip, with thumbs and fingers encircling the chain saw handles, with both hands on the saw and position your body and arm to allow you to resist kickback forces.** *Kickback forces can be controlled by the operator, if proper precautions are taken. Do not let go of the chain saw.*

NOTE Figure 103 may be used as an illustration in the instruction manual for holding the machine properly.

b) **Do not overreach and do not cut above shoulder height.** *This helps prevent unintended tip contact and enables better control of the chain saw in unexpected situations.*

c) **Only use replacement guide bars and saw chains specified by the manufacturer.** *Incorrect replacement guide bars and saw chains may cause chain breakage and/or kickback.*

d) **Follow the manufacturer's sharpening and maintenance instructions for the saw chain.** *Decreasing the depth gauge height can lead to increased kickback.*

8.14.2 a) *Addition:*

101) Explanation of **chain saw** safety devices;

102) Instructions for properly installing and adjusting the **guide bar** and **saw chain**;

103) Instruction for selection and use of protective equipment for eyes, ears, head, hands, legs and feet, as applicable.

8.14.2 b) *Addition:*

101) Recommendation for the use of a **residual current device** with a tripping current of 30 mA or less;

102) Statement to position the cord so that it will not be caught on branches and the like, during cutting;

103) Recommendation that the first-time user should, as a minimum, practise cutting logs on a saw-horse or cradle;

104) Information that the **chain saw** is not suitable for tree felling, if applicable;

105) Instructions to explain the proper techniques for basic felling, limbing, and crosscutting. Examples for the required instructions are given in Clause BB.1 to BB.5. If the **chain saw** is not suitable for tree felling as specified by the manufacturer, then instructions for felling techniques may be omitted;

106) If applicable, instruction on the use of a manual lubrication control;

107) If applicable, instruction not to operate the **chain saw** without lubrication and to replenish it in due time before the container is empty;

108) Instruction to use only recommended lubricants;

109) Information on the **maximum speed** of the **saw chain**, or if the **maximum speed** of the **saw chain** is less than 20 m/s, this may be stated.

8.14.2 c) *Addition:*

101) Information on recommended **guide bar** and **saw chain** combination(s) that can be used and that maintains compliance with this standard;

102) Instructions on sharpening and maintenance of the **saw chain** and/or a recommendation to have sharpening and maintenance of the **saw chain** performed by authorised service centres.

8.14.3 *Replacement:*

If information about the mass or weight of the machine is provided, it shall be the mass of the machine without the **saw chain**, **guide bar**, **guide bar** cover, oil and optional **accessories**.

Compliance is checked by inspection.

9 Protection against access to live parts

This clause of Part 1 is applicable.

10 Starting

This clause of Part 1 is applicable.

11 Input and current

This clause of Part 1 is applicable.

12 Heating

This clause of Part 1 is applicable, except as follows:

12.2.1 *Replacement:*

The load conditions for the heating test of 12.2 are as follows:

The machine is operated with a torque load applied such that rated input or rated current is drawn. The machine is operated for 30 min. During this period, the torque load is adjusted as necessary to maintain rated input or rated current.

13 Resistance to heat and fire

This clause of Part 1 is applicable.

14 Moisture resistance

This clause of Part 1 is applicable, except as follows:

Addition:

NOTE 101 **Saw chain** lubrication tanks and lubrication systems intended for use with oil as specified in 8.14.2 are not considered to be **liquid systems**.

14.2.1 *Replacement:*

The machine is not connected to the supply.

The machine is placed in its normal rest position on a perforated turntable. The turntable is then turned continuously at approximately 1 rev/min during the test.

*Electrical components, covers and other **detachable parts** are removed and subjected, if necessary, to the relevant treatment with the main part. Movable covers that are non-**detachable parts** and are not self-restoring are placed in the most unfavourable position.*

NOTE Examples of self-restoring covers include those that are spring loaded or close by gravity.

14.3 This subclause of Part 1 is not applicable for **saw chain** lubrication tanks and lubrication systems intended for use with oil as specified in 8.14.2.

15 Resistance to rusting

This clause of Part 1 is applicable.

16 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

17 Endurance

This clause of Part 1 is applicable, except as follows:

17.2 *Modification:*

This subclause is applicable as for **hand-held tools**. The **saw chain** is removed for the endurance test.

18 Abnormal operation

This clause of Part 1 is applicable, except as follows:

18.3 *Replacement:*

Machines incorporating a series motor are operated without the ***saw chain*** *at a voltage equal to 1,3 times* ***rated voltage*** *for 1 min at no-load.*

During the test, parts shall not be ejected from the machine. After this test, the machine need not be capable of further use.

An additional device incorporated in the machine to limit the speed may operate during the test.

18.5 *Modification:*

The requirements for tools other than **lawn and garden machinery** are applicable.

18.8.1 *Replacement of Table 4 by the following:*

Table 4
Required performance levels

Type and purpose of SCF	Minimum performance level (PL)
Power switch – prevent unwanted switch-on	Shall be evaluated using the fault conditions of 18.6.1 without the loss of this **SCF**
Power switch – provide desired switch-off	Shall be evaluated using the fault conditions of 18.6.1 without the loss of this **SCF**
Provide desired direction of rotation for **cutting lengths** ≤ 300 mm.	a
Provide desired direction of rotation for **cutting lengths** > 300 mm.	b
Starting current limitation as in 10.2	Not an **SCF**
Prevent exceeding thermal limits as in Clause 18	a
Manually activated chain brake function if required in 19.107.1 for **chain saws**	b
Overspeed prevention for **chain saws** with no chain brake if such overspeed would cause non-compliance with 19.107.1	a
Overspeed prevention if such overspeed would cause non-compliance with 19.107.1.2	a
Prevent exceeding the maximum braking time in 19.107.1.2	a
Overspeed prevention for **chain saws** without a **non-manually activated chain brake** to prevent chain speed above 15 m/s as in 19.107.2	a
Non-manually activated chain brake function as in 19.107.2	b
Overspeed prevention if such overspeed would cause non-compliance with 19.107.4	a
Provide automatic lubrication of the **saw chain** as in 19.110	Not an **SCF**
Prevent exceeding the maximum run down time in 19.112	a
Operator presence sensor as in 21.18.102	a
Lock-off function as required by 21.18.102	b
Visual or audible indicator as referenced in 21.18.102	Not an **SCF**
Prevent self-resetting as required in 23.3	a

19 Mechanical hazards

This clause of Part 1 is applicable, except as follows:

19.1 *Modification:*

The requirements of this subclause do not apply to those moving parts and **guards** which are separately covered by 19.102, 19.103 and 19.104.

19.6 This subclause of Part 1 is not applicable.

19.7 This subclause of Part 1 is not applicable.

19.8 This subclause of Part 1 is not applicable.

19.9 *Replacement:*

If, in accordance with 8.14.2, the user is instructed to remove a **drive sprocket** cover, such as for maintenance, to change the **saw chain** or **guide bar**, then the fastenings shall remain attached to the **drive sprocket** cover or to the machinery, unless the **drive sprocket** cover fastenings are the only means for retaining the **guide bar**. If a fastening is not removed for removing the **drive sprocket** cover, it is considered as still attached.

Compliance is checked by inspection and by manual test.

19.101 Handles

Chain saws shall be fitted with at least two handles to provide safe control. The length of the grip area of the **front handle** shall be at least 100 mm. The handle surfaces shall be so designed and shaped that firm grip may be applied. Minimum clearances and sizes of the handles shall be in accordance with ISO 7914 for forest work **chain saws**, except for the determination of dimension *D*. Dimension *D* shall be the straight line distance from the rear side of the **power switch** to a point on the axis of the **front handle**, 50 mm to the left of X_0, where X_0 is determined in accordance with ISO 6533. For **chain saws** with a **maximum speed** of the **saw chain** not exceeding 8 m/s and a maximum **cutting length** not exceeding 300 mm, however, the dimension *D* in Table 1 of ISO 7914:2002 may be reduced to a minimum of 125 mm.

Compliance is checked by inspection and by measurement.

19.102 Front hand guard

A guard shall be fitted in the vicinity of the **front handle** to protect the operator's fingers from injury by contact with the **saw chain**. The dimensions and clearances of this **front hand guard** and the prevention of access from the **front handle** to the **saw chain** shall comply with ISO 6533.

Compliance is checked by inspection and by measurement.

19.103 Rear hand guard

A **rear hand guard** shall be provided along the length of the right side of the bottom of the **rear handle** to protect the operator's hand from contact in case the **saw chain** breaks or derails.

The **rear hand guard** shall extend from the right edge of the **rear handle** for at least 30 mm on the **guide bar** side (see Figure 104) and

– at least 100 mm lengthwise from the inner rear part of the **chain saw** body (see Figure 104); or

– at least three times the diameter of 25 mm behind the **power switch**, as defined by three cylinders pressed against the **rear handle** and the **power switch**;

whichever of these options is further back.

This requirement may also be fulfilled by parts of the machine.

Compliance is checked by inspection and by measurement.

19.104 Drive sprocket cover

The **drive sprocket** and **saw chain** shall be covered within the area of the body of the **chain saw**. This cover shall not be removable without the aid of a tool unless the **drive sprocket** cover fastenings are the only means for retaining the **guide bar**.

There may be openings at the front, the front upper section and the bottom section to allow the ejection of wood chips and to allow passage of the **guide bar** and **saw chain**.

Compliance is checked by inspection and by the following test:

*With the **drive sprocket** cover, **guide bar** and **saw chain** fitted, it shall not be possible to touch the **drive sprocket** and **saw chain** with the straight test probe (see Figure 105) introduced with a force not exceeding 5 N from the top, the rear and the sides of the **drive sprocket** cover within the area of the body of the **chain saw**.*

19.105 Chain catcher

The **chain saw** shall be fitted with a **chain catcher** device placed under the **saw chain** as far to the front as practicable. The **chain catcher** shall extend sideways at least 5 mm from the centre-plane of the **guide bar**.

Compliance is checked by inspection and by measurement.

19.106 Void

19.107 Protection against injury by kickback

Chain saws shall be designed to minimize the risk of injury due to the effect of **kickback**.

19.107.1 **Chain saws** shall be equipped with a **manually activated chain brake**, operated by the **front hand guard** in a direction away from the operator, that stops movement of the **saw chain**.

A **manually activated chain brake** is not required if the **chain saw** is fitted with a **non-manually activated chain brake** that meets the requirements of 19.107.2 or provided the following requirements are fulfilled:

– the **maximum speed** of the **saw chain** does not exceed 5 m/s; and

– the **cutting length** without **bar tip guard** does not exceed 300 mm.

*Compliance is checked by inspection and by measurement with the **chain saw** fitted with a **saw chain** and **guide bar** as specified in 8.14.2.*

NOTE In New Zealand, the following conditions apply:

All **chain saws** shall be fitted with a **manually activated chain brake**.

19.107.1.1 The **manually activated chain brake** shall be designed so that the static activation force required is not more than 60 N and not less than 20 N.

Compliance is checked by the following test.

*With the **power switch** in the "on" position and the **chain saw** disconnected from the power source, the force on the **front hand guard** needed to activate the brake shall be measured at the centre of the top (horizontal) part of the **front hand guard** and in the direction of 45° forward and downward in relation to the **guide bar** centreline, see Figure 106.*

The force shall be applied at a uniform rate.

19.107.1.2 The average braking time shall not exceed 0,12 s and the maximum braking time shall not exceed 0,15 s.

Compliance is checked by the following test.

*The **chain saw** and **saw chain** tension shall be adjusted as for **normal use**, as specified in 8.14.2. The **chain saw** shall be run in before starting the test by performing 10 on"/"off" cycles with the **power switch**. One cycle consists of 30 s running and 30 s rest. After the run-in, the **saw chain** tension shall be adjusted according to the manufacturer's recommendations. If no recommendations are provided, the **saw chain** tension shall generally be adjusted so that, when a 1 kg mass is hanging from the centre of the **cutting length** along the lower portion of the **saw chain**, the gap between the **saw chain** side link and the **guide bar** is a minimum of 0,017 mm per millimetre of **guide bar** length.*

*With the **saw chain** lubricated as in **normal use**, and operated at **rated voltage** and **maximum speed**, the **front hand guard** is set in motion by the impact of a pendulum. This pendulum shall have a mass of 0,70 kg, a hammer with a flat strike face of 50 mm diameter and an arm of 700 mm length. The pendulum drop height shall be 200 mm. Any special hardware and/or software used to achieve **maximum speed** in accordance with 5.101 shall not influence the braking performance provided by the chain brake. The time for the **saw chain** to stop shall be measured from the moment of impact with the **front hand guard** (see Figure 107).*

*The **chain brake** shall be operated a total of 25 times. The maximum stopping time and the average stopping time of the **saw chain** shall be determined at the first five and the last five braking operations.*

*The **saw chain** is considered to be stopped when the time taken for two successive drive links (see dimension a in Figure 108) to pass a fixed point exceeds 5 ms.*

*The tests shall be done in 2 min intervals, comprising a no-load running period of 1 min prior to each impact of the pendulum. Immediately after the operation of the **chain brake** and the **saw chain** has stopped, the **chain saw** shall be switched off for the remainder of the interval. The **chain brake** actuation mechanism shall be reset during this off period.*

19.107.2 **Chain saws** with a **maximum speed** of the **saw chain** above 15 m/s shall be equipped with a **non-manually activated chain brake** that is sufficiently sensitive to operate when **kickback** occurs.

*Compliance is checked by inspection and by the test of ISO 13772, with the **power switch** in the "on" position and the **chain saw** disconnected from the power source. For **cutting lengths** less than 500 mm, the threshold level of **chain saws** for forest service with ≤ 40 cm^3 engine displacement shall apply. For*

cutting lengths *of 500 mm or greater, the threshold level of* ***chain saws*** *for forest service with > 40 cm^3 engine displacement shall apply.*

19.107.2.1 If the actuation of the **non-manually activated chain brake** is independent of the **front hand guard**, the stopping time requirements shall apply as specified in 19.107.1.2.

Compliance is checked by the test described by 19.107.1.2. The pendulum, however, is replaced by any arrangement suitable to measure the time from the moment the simulated ***kickback*** *is detected by the* ***non-manually activated chain brake*** *until the* ***saw chain*** *has stopped.*

NOTE Examples of suitable test arrangements include the use of timing devices, sensors, high speed video, etc.

19.107.2.2 If the **non-manually activated chain brake** functions through the activation of the **front hand guard**, then the stopping time requirements in 19.107.1.2 shall apply.

Compliance is checked by test described by 19.107.1.2. If this test was already performed for a ***manually activated chain brake****, this test need not be repeated.*

19.107.3 After activation of a **chain brake**, if any, the motion of the **saw chain** shall stop and operation of the **chain saw** shall not resume without deliberate operator action of either:

– deactivation and reactivation of the **power switch**; or

– resetting of the **front hand guard**, if the operational state of the **chain brake** is recognizable by position or other means.

Compliance is checked by inspection and by manual test.

19.107.4 The computed kickback angle or the chain stop angle, whichever is lower, shall be determined for the most unfavourable **guide bar** and **saw chain** combination specified in 8.14.2. The angle shall not exceed 45°.

NOTE The most unfavourable combination can be determined by testing for the worst case **saw chain** on a single **guide bar** and independently testing for the worst case **guide bar** using the worst case **saw chain**.

If the **chain saw** is provided with a **guide bar** incorporating a **bar tip guard**, whether removable or permanently attached, this shall be removed prior to testing.

The medium-density fibreboard (MDF) samples shall be as specified in ISO 9518.

Compliance is checked by determination of the computed kickback angle or the chain stop angle in accordance with ISO 9518.

19.108 Guide bar cover

A protective cover shall be provided with the **chain saw** to cover the **guide bar** in order to prevent injuries during transportation.

The **guide bar** cover shall not be displaced by more than 50 mm when the **guide bar** is in a vertical downward position.

When the **guide bar** is adjusted to its maximum length and the **guide bar** cover is fully engaged on the **guide bar**, no more than 50 mm of the **saw chain** on the top or bottom of the **guide bar** shall remain exposed.

Compliance is checked by inspection and by measurement.

19.109 Saw chain tension

Chain saws shall be provided with means of tensioning the **saw chain**.

Compliance is checked by inspection.

19.110 Saw chain lubrication

Chain saws with a **maximum speed** of the **saw chain** of 5 m/s and above shall be equipped with a provision for lubricating the **saw chain**.

If the **chain saw** is fitted with a manual lubrication control, it shall be so located that it can be operated while holding the **chain saw** with both hands in a normal operating position.

Compliance is checked by inspection.

19.111 Balance

Chain saws shall be in longitudinal balance.

Compliance is checked by the following test.

*The **chain saw** shall be fitted with the most unfavourable **guide bar** and **saw chain** as specified in 8.14.2. The lubrication tank, if any, shall be half full. The **spiked bumper**, if any, shall be fitted. The **supply cord** is removed at its point of exit from the **chain saw** or, if supplied with a cord guard, at its point of exit from the cord guard. If the **chain saw** is fitted with an appliance inlet, then no connection shall be made at the appliance inlet. The **chain saw guide bar** cover shall not be fitted.*

*The **chain saw** shall be supported on the **front handle**, positioned so that the **guide bar** plane is vertical. This support shall produce the lowest possible friction to allow **chain saw** rotation. A segment of a suitable size of ball bearing may be used to achieve the low friction. See Figure 109.*

*The angle α between the centreline of the **guide bar** and the horizontal plane as shown in Figure 109 shall not exceed ± 30°.*

19.112 Run down time

The run down time of **chain saws** shall be limited.

Compliance is checked by the following test.

*The **chain saw** and **saw chain** tension shall be adjusted as for **normal use**, as specified in 8.14.2. The **chain saw** shall be run in before starting the test by performing 10 "on"/"off" cycles with the **power switch**. One cycle consists of 30 s running and 30 s rest. After the run-in, the **saw chain** tension shall be adjusted according to the manufacturer's recommendations. If no recommendations are provided, the saw chain tension shall generally be adjusted so that, when a 1 kg mass is hanging from the centre of the **cutting***

length *along the lower portion of the chain, the gap between the* ***saw chain*** *side link and the* ***guide bar*** *is a minimum of 0,017 mm per millimetre of* ***guide bar*** *length.*

The test is made under no-load. The test sequence shall consist of a total of 2 500 cycles.

The run down time of the ***saw chain*** *shall not exceed 2 s for the first 6 cycles of operation and shall not exceed 3 s for the final 6 cycles of the test sequence.*

The stop time is measured from the moment of release of the ***power switch*** *actuator until the* ***saw chain*** *is stopped. The* ***saw chain*** *is considered to be stopped when the time taken for two successive drive links (see dimension a in Figure 108) to pass a fixed point exceeds 5 ms.*

20 Mechanical strength

This clause of Part 1 is applicable, except as follows:

20.1 *Addition:*

Damage to the ***guide bar****,* ***saw chain*** *and* ***chain catcher*** *are ignored.*

Prior to performing the electric strength test, there shall be no leakage of lubrication through cracks in lubrication tanks and tank caps while the ***chain saw*** *is being held in each of the six orthogonal directions for 30 s. Seepage through ventilation systems is not considered a failure.*

20.3.1 *Replacement:*

The ***chain saw****, fully assembled in accordance with 8.14.2 and with the lubrication tank empty, is dropped three times in total on a concrete surface from a height of 1 m. For these three drops, the sample is tested in the three most unfavourable positions with the lowest point of the machine being 1 m above the concrete surface. Secondary impacts shall be avoided.*

NOTE A method for avoiding secondary impacts is tethering.

If ***attachments*** *are provided as specified and mounted in accordance with 8.14.2, the test is repeated with each* ***attachment*** *or combination of* ***attachments*** *mounted to a separate machine sample.*

After the test, the lubrication tank is filled to the maximum level in accordance with 8.14.2.

20.101 Handles

The handles shall be of durable construction and capable of withstanding stress sustained under normal working conditions.

Compliance is checked by the handle strength test of ISO 7915, the test forces for a machine with a displacement of "≤ 50 cm^3" shall apply.

20.102 Front and rear hand guard

The **front hand guard** and **rear hand guard** shall be of durable construction and capable of withstanding impacts sustained in normal working conditions.

Compliance is checked by applying the dynamic and durability tests of ISO 6534. In 5.2 of ISO 6534:2007, a temperature of (–10 ± 3) °C shall apply.

20.103 The **chain catcher** shall have sufficient mechanical strength.

Compliance is checked by inspection and by the strength test of Clauses 3 and 4 of ISO 10726:1992. In 4.1 of ISO 10726:1992, a temperature of (–10 ± 3) °C shall apply.

21 Construction

This clause of Part 1 is applicable, except as follows:

21.18 *Replacement:*

Additional requirements for power switches for chain saws are given in 21.18.101 and 21.18.102.

21.18.101 The **power switch** required by 21.17 shall be a **momentary power switch** without a lock-on device, which can be switched on and off by the user without the need to release any of the handle(s) or grasping surface(s) required by 19.101.

When the lock-off function as specified in 21.18.102 is in the unlocked state, the chain saw shall operate within 1 s after actuation of the **power switch**.

The **chain saw** shall only operate when the **chain brake**, if any, is deactivated.

Compliance is checked by inspection and by manual test.

21.18.102 The machine shall be provided with a **power switch** having a lock-off device such that at least two separate and dissimilar actions are required before drive to the **saw chain** is possible. It shall not be possible to achieve these actions with a single grasping motion or a straight line motion within any grasping surface identified in accordance with 8.14.2 b) 6).

The lock-off device and the **operator presence sensor** (if any) shall be actuated before the **power switch** can enable drive to the **saw chain**.

It shall not be necessary to sustain the actuation of the lock-off device until the **power switch** is activated, provided:

– the **power switch** or an **operator presence sensor** (if any) is activated within 5 s of the release of the lock-off device; and

– there is a visual or audible indication as soon as the lock-off actuator is released and continues at least until the **power switch** is activated;

or

– an **operator presence sensor** (if any) is activated prior to the release of the actuator of the lock-off device.

NOTE The visual or audible indication is intended to only indicate the state of the machine.

The machine shall return to the original locked state within 1 s when the **power switch** is released (i.e. at least two separate and dissimilar actions are required before drive to the **saw chain** is possible), unless:

– an **operator presence sensor** is provided; and

– the hand is not released from the **operator presence sensor**.

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

*Additionally, for a lock-off device located within any grasping surface identified in accordance with 8.14.2 b) 6), in order to determine if it is possible to actuate the **power switch** and the lock-off device with a single grasping motion or a straight line motion, compliance is checked by the following test:*

The lock-off device shall not be actuated by a 25 mm diameter x 75 mm long rod with a force not exceeding 20 N on the lock-off device in any direction. The rod shall be applied such that its cylindrical surface bridges the surface of the lock-off device and any surface adjacent to the lock-off device.

21.18.102DV D2 *Modification: Replace the second paragraph of Clause 21.18.102 of the Part 4 with the following:*

The lock-off device shall be actuated before the power switch can enable drive to the cutting device.

21.101 Determination of cutting length

The **cutting length** *L* shall be measured with the **guide bar** adjusted to its midway point. The measurement shall be made along the centreline of the **guide bar** in accordance with a) – d) below.

a) For **chain saws** without a **bar tip guard** and where no **spiked bumper** is provided or the **spiked bumper** is removable, the **cutting length** *L* is determined as $L = L_1 + L_3$ as shown in Figure 102 a), where

– L_1 is the distance from the **chain saw** body (*A*), to the tip end of the **guide bar** (not including the bar tip sprocket, if any); and

– L_3 is 6 mm, which is an approximation for the height of the **saw chain** cutter.

b) For **chain saws** without a **bar tip guard** and where the **spiked bumper** is permanently attached to the **chain saw**, the **cutting length** *L* is determined as $L = L_2 + L_3$ as shown in Figure 102 a), where

– L_2 is the distance from root of the spike nearest the centreline of the **guide bar** on the **spiked bumper** (*B*); and

– L_3 is 6 mm, which is an approximation for the height of the **saw chain** cutter.

c) For **chain saws** with a **bar tip guard** and where no **spiked bumper** is provided or the **spiked bumper** is removable, the cutting length *L* is determined as $L = L_1$ as shown in Figure 102 b), where L_1 is the distance from the **chain saw** body (*A*) and the inside part of the **bar tip guard**.

d) For **chain saws** with a **bar tip guard** and where the **spiked bumper** is permanently attached to the **chain saw**, the **cutting length** *L* is determined as $L = L_2$ as shown in Figure 102 b), where L_2 is the distance from the root of the spike nearest the centreline of the **guide bar** on the **spiked bumper** (*B*) and the inside part of the **bar tip guard**.

21.102 Operator presence sensor

The **operator presence sensor**, if any, shall be incorporated in the handle or grasping surface associated with the **power switch**.

It is not required that the **operator presence sensor** is capable of distinguishing between an operator's hand and other objects.

The function of the **operator presence sensor** may be achieved by one or any combination of mechanical, electrical or electronic means.

NOTE An example of an **operator presence sensor** is shown in Figure 101.

Compliance is checked by inspection.

21.103 Spiked bumper

Chain saws may

– be equipped with a **spiked bumper** (see Figure 101); or

– have provision for mounting one.

NOTE A **spiked bumper** provides operator convenience for certain types of cuts.

Compliance is checked by inspection.

21.104 Bar tip guard

Chain saws may be equipped with a **bar tip guard** (see Figure 102 b)).

NOTE A **bar tip guard**, if provided, influences the determination of **cutting length** in 21.101.

Compliance is checked by inspection.

22 Internal wiring

This clause of Part 1 is applicable.

23 Components

This clause of Part 1 is applicable, except as follows:

23.1.10.1 *Modification of the sixth paragraph:*

Switches shall further be classified as follows with respect to endurance:

power switches for **chain saws** – for 50 000 cycles.

Addition:

Auxiliary switches, if any, associated with the **chain brake** are considered to be switches other than **power switches** and shall be classified as follows with respect to endurance – for 10 000 cycles.

23.1.10.2 *Modification of the third paragraph:*

Power switches for **chain saws** are tested for 50 000 cycles.

23.3 *Addition:*

Protection devices (e. g. overload or over-temperature protection devices) or circuits that switch off the **chain saw** shall be of the non-self-resetting type.

24 Supply connection and external flexible cords

This clause of Part 1 is applicable, except as follows:

24.1 *Replacement:*

Machines shall be provided with one of the following means of connection to the supply:

– an appliance inlet having at least the same degree of protection against moisture as marked in accordance with 8.1 for the machine; or

– a **supply cord** with a length between 0,2 m and 0,5 m and fitted with a plug or other connector having at least the same degree of protection against moisture as marked in accordance with 8.1 for the machine.

Plugs, connectors and inlets shall be suitable for the ratings of the machine.

Compliance is checked by inspection and by measurement.

The cord is measured from where it exits the machine to where it enters the plug or connector. The length of a cord guard projecting from the body of the machine or from the body of the plug is included in the measurement when determining the length of the cord.

NOTE 101 In Canada and the United States of America, the following additional conditions apply:

The appliance inlet or the attachment plug on the **supply cord** shall be constructed so that, when inserted in the connector of an extension cord, the blades will not be energized until they are inaccessible to contact.

Compliance is checked by the following test:

The receptacle shall be connected to the extension cord of the test assembly illustrated in Figure 110 with the plug inserted in the receptacle as far as possible. The plug shall be withdrawn not more than the distance necessary to permit the test probe to be inserted between the plug body and the extension cord receptacle. The test probe shall be inserted with a force of 18 N (4,1 lb) or less, until the probe contacts one blade of the plug. While the probe is in contact with the blade, the electrical continuity shall be determined by an ohmmeter or similar instrument between the contacts of the extension cord receptacle and the test probe. The test probe shall not contact any current-carrying blade of the attachment plug while the plug is conductively connected to the connector of the extension cord. The test shall be repeated for the other blade of the attachment plug.

24.4 *Modification:*

Supply cords shall not be lighter than heavy polychloroprene sheathed flexible cable (code designation 60245 IEC 66) or equivalent.

Compliance is checked by inspection.

Replacement of NOTE 1 and NOTE 2:

NOTE 1 In the United States of America, the following conditions apply:

Supply cords shall be not lighter than type SJOW, SJTW, or the equivalent that is oil and weather resistant in accordance with the National Electrical Code, ANSI/NFPA 70.

Attachment plugs and cords shall be equal to or greater than the rating of the machine.

NOTE 2 In Canada, the following conditions apply:

Supply cords shall be not lighter than type SJOW, SJTW, or the equivalent that is oil and weather resistant in accordance with the Canadian Electrical Code, Part 1.

25 Terminals for external conductors

This clause of Part 1 is applicable.

26 Provision for earthing

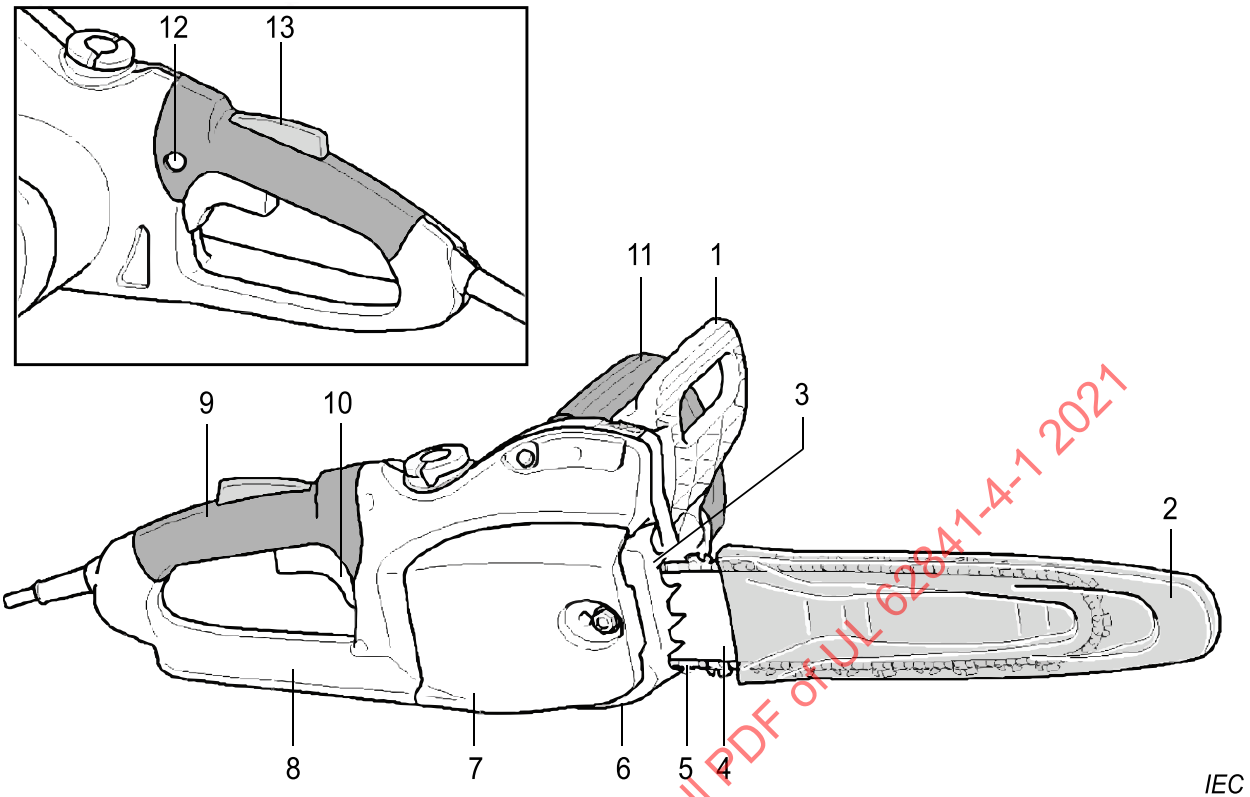
This clause of Part 1 is applicable.

27 Screws and connections

This clause of Part 1 is applicable.

28 Creepage distances, clearances and distances through insulation

This clause of Part 1 is applicable.



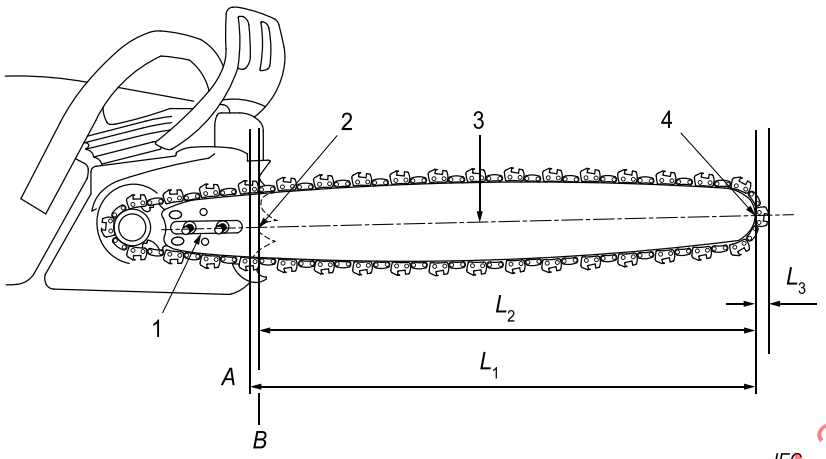
su3363

Key

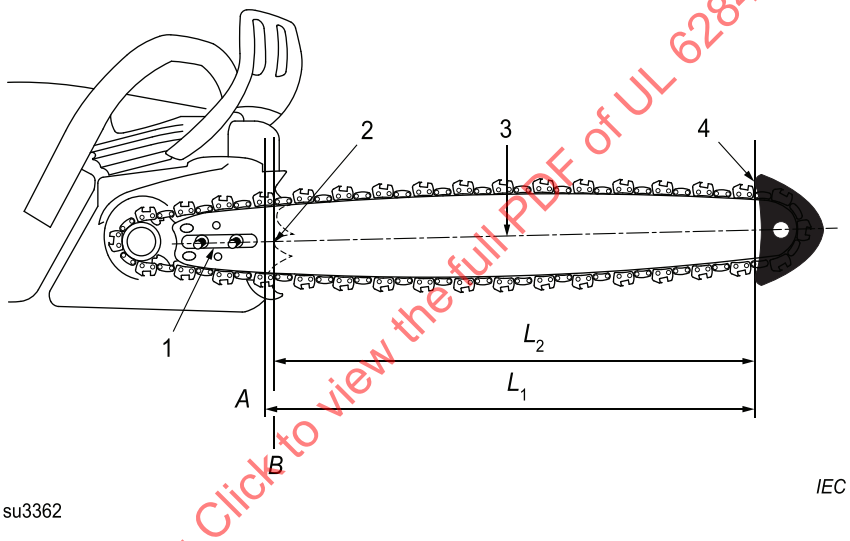
1 **front hand guard**
2 **guide bar** cover
3 **spiked bumper**
4 **guide bar**
5 **saw chain**
6 **chain catcher**
7 **drive sprocket** cover
8 **rear hand guard**
9 **rear handle**
10 **power switch**
11 **front handle**
12 lock-off device
13 **operator presence sensor**

Figure 101

Chain saw nomenclature



a) Chain saw without a bar tip guard



b) Chain saw with a bar tip guard

Key

1 **guide bar**

2 **spiked bumper**

3 centreline of **guide bar**

4 **bar tip guard**

A **chain saw** body

B root of the spike nearest the centreline of the **guide bar** on the **spiked bumper**

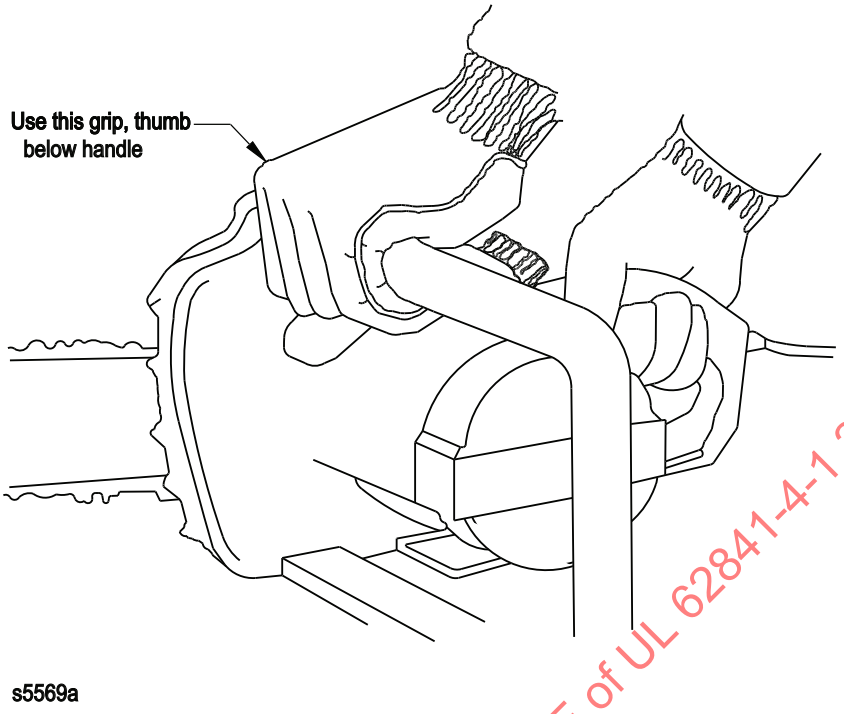
L_1 distance from *A* to the tip end of the **guide bar** (for **chain saws** with no **bar tip guard**) or the distance from *A* to the inside part of the **bar tip guard**

L_2 distance from *B* to the tip end of the **guide bar** (for **chain saws** with no **bar tip guard**) or the distance from *B* to the inside part of the **bar tip guard**

L_3 6 mm (approximation for the height of the **saw chain** cutter)

Figure 102

Cutting length



IEC

Figure 103

Holding the chain saw

Dimensions in millimetres

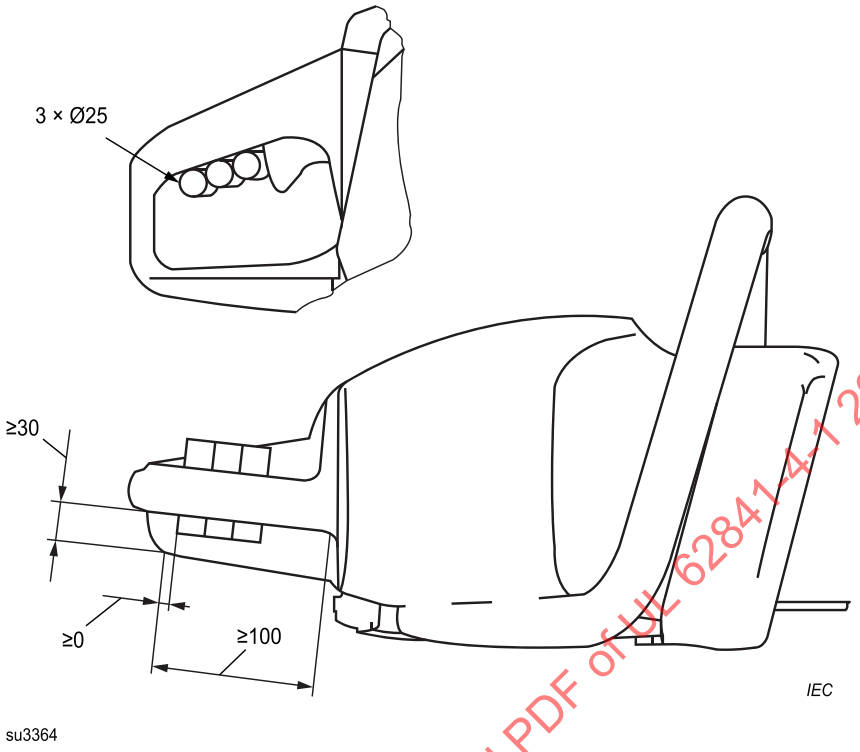
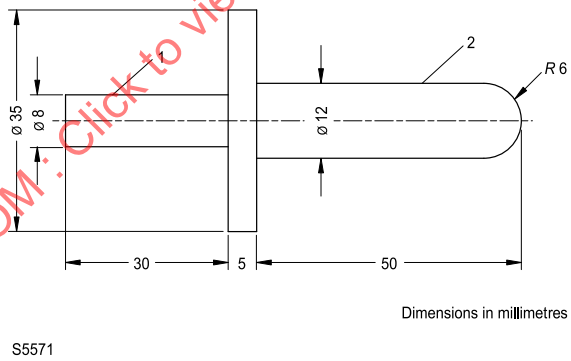


Figure 104

Minimum rear hand guard dimensions



IEC

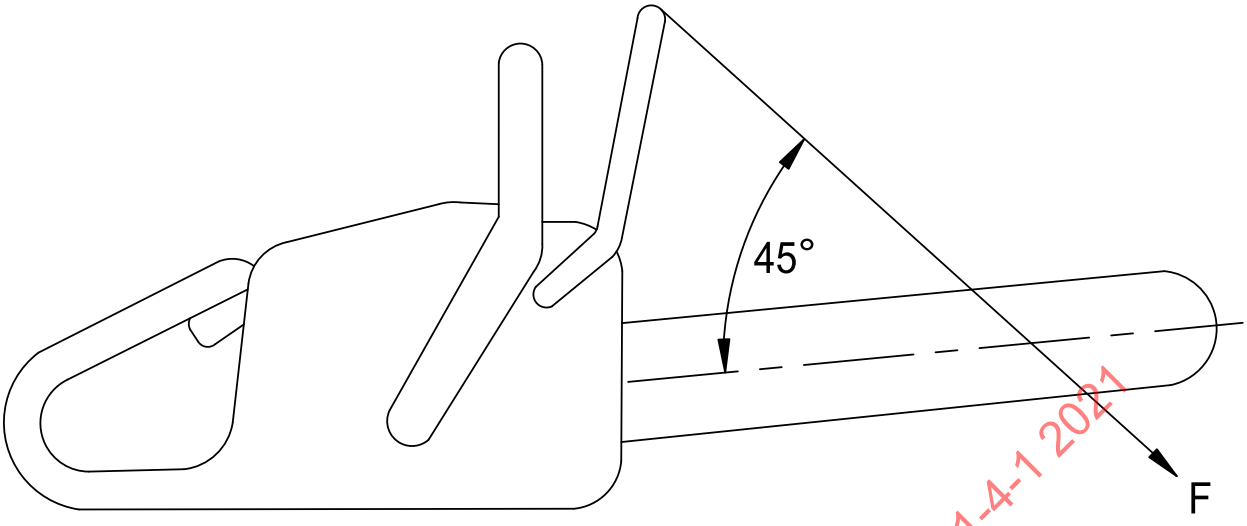
Key

1 handle section

2 test section

Figure 105

Straight test probe



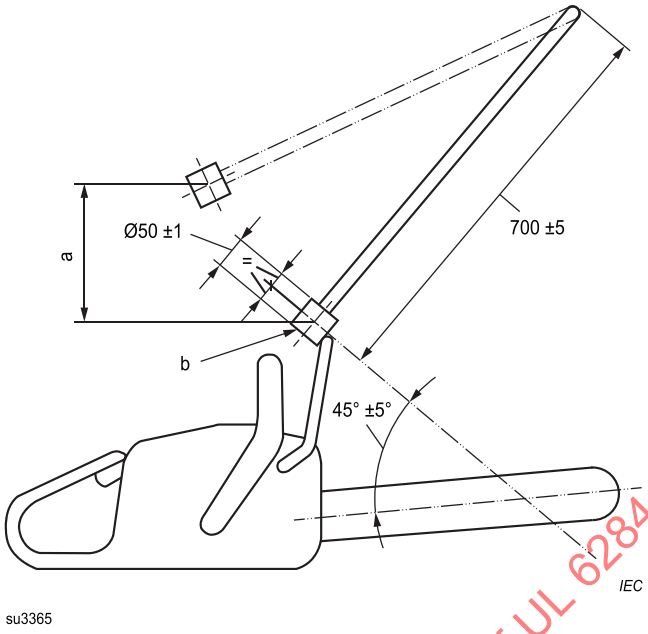
S5573

IEC

Figure 106

Measuring direction of static activation force *F*

Dimensions in millimetres



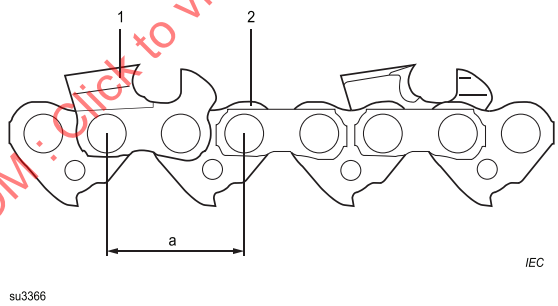
Key

a pendulum drop height

b sharp edges shall be chamfered

Figure 107

Impact direction and pendulum



Key

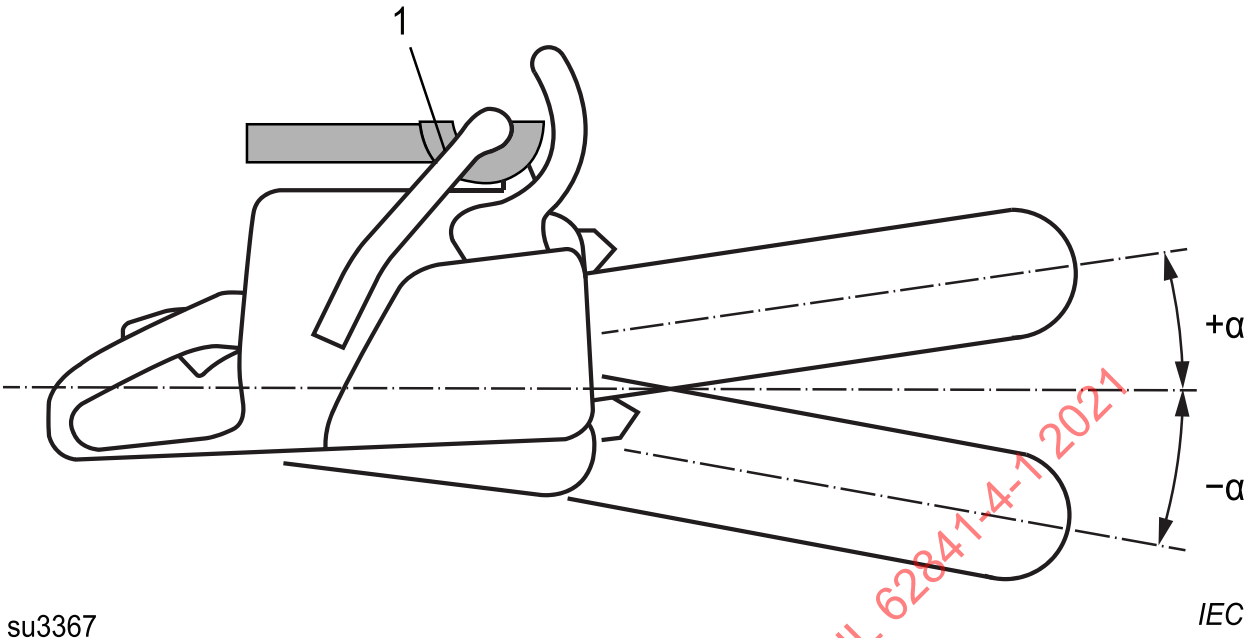
1 cutter

2 drive link

a distance between drive links

Figure 108

Saw chain drive link spacing



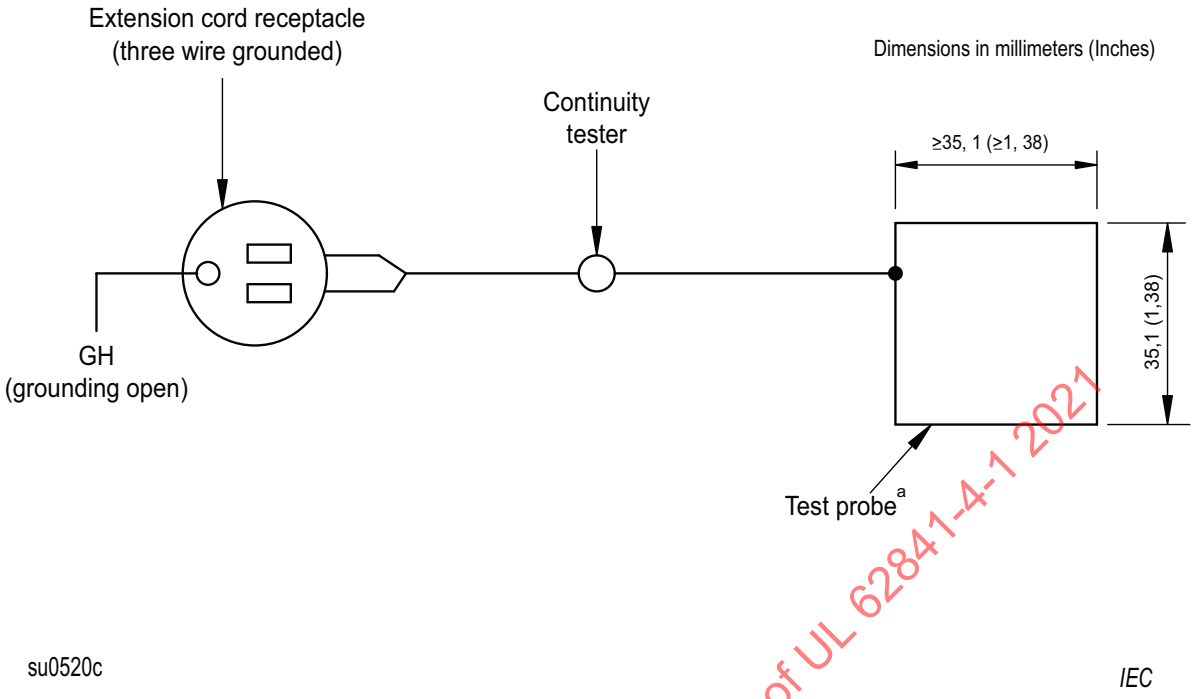
Key

1 segment of a ball bearing or equivalent

α angle between the centreline of the **guide bar** and the horizontal plane

Figure 109

Chain saw balance



[a] Test probe shall be made of 1,5 mm (0,006 inch) thick metal

Figure 110

Test assembly for accessibility of attachment plug blades

Annexes

The annexes of Part 1 are applicable except as follows:

Annex I
(informative)

Measurement of noise and vibration emissions

NOTE In Europe (EN 62841-4-1), Annex I is normative.

I.2 Noise test code (grade 2)

This clause of Part 1 is applicable, except as follows:

I.2.2.1 General

Replacement:

The sound power level shall be measured using a hemispherical measurement surface according to Figure I.101 and ISO 3744, where the acoustic environment, instrumentation, quantities to be measured, quantities to be determined, and the measurement procedure are specified.

The sound power level shall be given as A-weighted sound power level in dB reference 1 pW. The A-weighted sound pressure levels, from which the sound power is to be determined, shall be measured directly, and not calculated from frequency band data. Measurements shall be made outdoors or indoors in an essentially free field.

I.2.2.2 This subclause of Part 1 is not applicable.

I.2.2.3 This subclause of Part 1 is not applicable.

I.2.2.4 Lawn and garden machinery

Replacement:

The test environment outdoors shall be a flat open space (a slope, if any, not exceeding 5/100), visibly free of sound-reflecting objects (building, trees, poles, sign boards, etc.) within a circular area with a radius equal to approximately three times the radius of the hemispherical measurement surface used.

For the determination of sound power level, ISO 3744 shall be used subject to the following modifications:

– the microphone array shall be six microphone positions according to Figure I.101 and Table I.101;

– for outdoor and indoor measurements, the reflecting surface shall be replaced by an artificial surface according to I.2.2.101 or a natural ground surface according to I.2.2.102. Reproducibility of results using natural grass or other organic material is likely to be worse than that required for Grade 2 of accuracy. In case of dispute, measurements shall be carried out in the open air and on the artificial surface according to I.2.2.101;

– the measurement surface shall be a hemisphere with a radius, r, for which r = 4 m;

– for measurements outdoors, K_{2A} = 0;

– for measurements outdoors, the environmental conditions shall be within the limits specified by the manufacturers of the measuring equipment. The ambient air temperature shall be in the range from –10 °C to 30 °C and the wind speed shall be less than 8 m/s and preferably less than 5 m/s. A wind screen shall be used whenever the wind speed exceeds 1 m/s;

– for measurements indoors, the environment shall be according to ISO 3744 and the value of K_{2A}, determined without artificial surface and in accordance with Annex A of ISO 3744:2010, shall be ≤ 2 dB, in which case K_{2A} shall be disregarded;

– measurements shall be made using an integrating-averaging sound level meter as defined in IEC 61672-1; alternatively, instruments with the time-weighting characteristics “slow”, as defined in IEC 61672-1, may be used.

The A-weighted sound power level, L_{WA}, shall be calculated in accordance with 8.6 of ISO 3744:2010, as follows:

(I.101)

$$L_{WA} = \overline{L_{pfA}} + 10\lg\left(\frac{S}{S_0}\right) \text{ dB}$$

with $\overline{L_{pfA}}$ determined from

$$\overline{L_{pfA}} = 10\lg\left[\frac{1}{6}\sum_{i=1}^{6} 10^{0,1L_{p'A,i}}\right] - K_{1A} - K_{2A} \text{ dB}$$

where

$\overline{L_{pfA}}$ is the A-weighted surface sound pressure level according to ISO 3744;

$L_{p'A,i}$ is the A-weighted sound pressure level measured at the i[th] microphone position, in dB;

K_{1A} is the background noise correction, A-weighted;

K_{2A} is the environmental correction, A-weighted;

S is the area of the measurement surface, in m^2;

S_0 = 1 m^2.

For the hemispherical measurement surface, the area S of the measurement surface is calculated as follows:

$$S = 2\pi r^2, \text{ in } m^2.$$

where the radius of the hemisphere, r = 4 m

so, from equation (I.101)

$$L_{WA} = \overline{L_{pfA}} + 20 \text{ dB}$$

Table I.101
Co-ordinates of microphone positions

Position No.	*x*	*y*	*z*
1	+0,65 *r*	+0,65 *r*	0,38 *r*
2	–0,65 *r*	+0,65 *r*	0,38 *r*
3	–0,65 *r*	–0,65 *r*	0,38 *r*
4	+0,65 *r*	–0,65 *r*	0,38 *r*
5	–0,28 *r*	+0,65 *r*	0,71 *r*
6	+0,28 *r*	–0,65 *r*	0,71 *r*

I.2.2.101 Requirements for an artificial surface

The artificial surface shall have absorption coefficients as given in Table I.102, measured in accordance with ISO 354.

Table I.102
Absorption coefficients

Frequencies Hz	Absorption coefficients	Tolerance
125	0,1	± 0,1
250	0,3	± 0,1
500	0,5	± 0,1
1 000	0,7	± 0,1
2 000	0,8	± 0,1
4 000	0,9	± 0,1

The artificial surface shall be placed on a hard, reflecting surface and have a size of at least 3,6 m × 3,6 m placed at the centre of the test environment. The construction of the supporting structure shall be such that the requirements for the acoustic properties are also met with the absorptive material in place. The structure shall support the operator to avoid compression of the absorbing material.

NOTE See Annex CC for an example of a material and construction which can be expected to fulfil these requirements.

I.2.2.102 Requirements for a natural ground surface

The ground at the centre of the test site shall be flat and have good sound-absorbing properties. The surface shall be either forest ground or grass, with the grass or other organic material having a height of (50 ± 20) mm.

I.2.3 Emission sound pressure level determination

This subclause of Part 1 is applicable, except as follows:

I.2.3.2 This subclause of Part 1 is not applicable.

I.2.3.3 *Replacement:*

The emission sound pressure for the **chain saw** shall be determined in accordance with I.2.3.1.

NOTE A **chain saw** is used in a similar way to hand-held tools, without a uniquely defined work station. The sound pressure at a distance of 1 m from the machine is applicable.

I.2.4 Installation and mounting conditions of the power tools during noise tests

Replacement:

The installation and mounting conditions shall be the same for the determination of both sound power level and emission sound pressure level at the work station.

The machine under test shall be new and equipped with **attachments** which affect the acoustic properties, as specified in 8.14.2. Prior to commencing testing, the machine (including any required ancillary equipment) shall be set up in a stable condition as specified in 8.14.2.

The installation and mounting conditions for A-weighted sound power level measurement shall be in accordance with A.1 and A.2 of ISO 22868:2011, as far as applicable to electric **chain saws**.

The operator, if any, shall not be positioned directly between any microphone position and the machine.

NOTE It is likely that the results from conducting tests using an operator will not achieve Grade 2 accuracy.

I.2.5 Operating conditions

Replacement:

I.2.5.1 General

The operating conditions shall be identical for the determination of both sound power level and emission sound pressure level at the work station.

Measurements shall be carried out on a new machine.

Before starting the test, the machine shall be operated under the conditions of I.2.5.2 or I.2.5.3 for a period of at least 15 min.

Care shall be taken that the location of the test timber on its support does not adversely affect the result of the test.

I.2.5.2 Mains powered **chain saws** shall be tested at **rated voltage** using a **saw chain** and the longest **guide bar** as specified in 8.14.2 c) 101), under both of the following conditions:

– no-load speed, with the highest setting of the speed control, if any, without altering any hardware or software; and

– **rated input** or **rated current** using a water brake (or equivalent) as specified in A.2.1 of ISO 22868:2011.

Four consecutive sound power level tests at no-load speed and four at **rated input** or **rated current** shall be carried out. The resulting sound power level L_{WA} is calculated by:

$$L_{\mathrm{WA}} = 10\lg\frac{1}{2}\left[10^{0,1L_{W1}} + 10^{0,1L_{W2}}\right]\ \mathrm{dB}$$

where

L_{W1} is the arithmetic mean, rounded to the nearest decibel, of the four sound power level tests performed at no-load speed; and

L_{W2} is the arithmetic mean, rounded to the nearest decibel, of the four sound power level tests performed at **rated input** or **rated current**.

During measurements, the machine shall operate under stable conditions. Once the noise emission is steady, the measurement time interval shall be at least 15 s. If measurements are to be made in octave or one-third octave frequency bands, the minimum period of observation shall be 30 s for the frequency bands centred on or below 160 Hz, and 15 s for the frequency bands centred on or above 200 Hz.

I.2.5.3 Battery powered **chain saws** shall be tested with a fully charged battery using a **saw chain** and the longest **guide bar** combination(s) as specified in 8.14.2 c) 101), under both of the following conditions:

– no-load speed, with the highest setting of the speed control, if any, without altering any hardware or software; and

– **maximum speed** at no-load, in accordance with 5.101.

NOTE A water brake (or equivalent) as specified in A.2.1 of ISO 22868:2011 is not used for the test of I.2.5.3.

Four consecutive sound power level tests at no-load speed and four at **maximum speed** at no-load shall be carried out. The resulting sound power level L_{WA} is calculated by:

$$L_{WA} = 10 \lg \frac{1}{2}\left[10^{0,1L_{W1}} + 10^{0,1L_{W2}}\right] \text{ dB}$$

where

L_{W1} is the arithmetic mean, rounded to the nearest decibel, of the four sound power level tests performed at no-load speed; and

L_{W2} is the arithmetic mean, rounded to the nearest decibel, of the four sound power level tests performed at **maximum speed** at no-load.

During measurements, the machine shall operate under stable conditions. Once the noise emission is steady, the measurement time interval shall be at least 15 s. If measurements are to be made in octave or one-third octave frequency bands, the minimum period of observation shall be 30 s for the frequency bands centred on or below 160 Hz, and 15 s for the frequency bands centred on or above 200 Hz.

I.3 Vibration

This clause of Part 1 is applicable, except as follows:

I.3.3.2 Location of measurement

Addition:

Figure I.102 shows the positions of the transducers for **chain saws**.

I.3.5.3 Operating conditions

Addition:

Chain saws are tested under load observing the conditions shown in Table I.103.

Table I.103
Test conditions

Material	Sound timber taken from freshly felled hardwood log, not seasoned or frozen. Width of the log to be trimmed to 75 % of the usable **cutting length** of the **guide bar**.
Orientation of workpiece	Log to be rigidly clamped horizontally so that the centre line of the log is at (800 ± 100) mm from the ground
Orientation of the **attachment**	The **chain saw** shall be held with the **guide bar** centreline horizontal and the **guide bar** plane vertical
Cutting **attachment**	The most unfavourable combination of a **saw chain** and the longest **guide bar** as specified in 8.14.2 c) 101)
Feed force	For mains powered **chain saws**, sufficient force to achieve **rated input** ± 10 %. For battery powered **chain saws**, sufficient force to achieve the fastest cut possible without overloading the machine.
Test cycle	Perform the measurements during crosscutting in a part substantially free of knots. The vibration measurements shall be taken in the middle third through the log with the complete **guide bar** tip free outside the log. There shall be no contact between the test timber and the motor part of the machine or the **spiked bumper**, if any. Only the **guide bar** and the **saw chain** shall come into contact with the test timber.

I.3.6.1 *Addition:*

The vibration data for each test shall be obtained from at least four measurements with a duration of at least 2 s each, totalling to at least 20 s. After each measurement, the **chain saw** shall be switched off.

I.3.6.2 Declaration of the vibration total value

Addition:

The vibration total value a_h of the handle with the highest emission and the uncertainty K shall be declared.

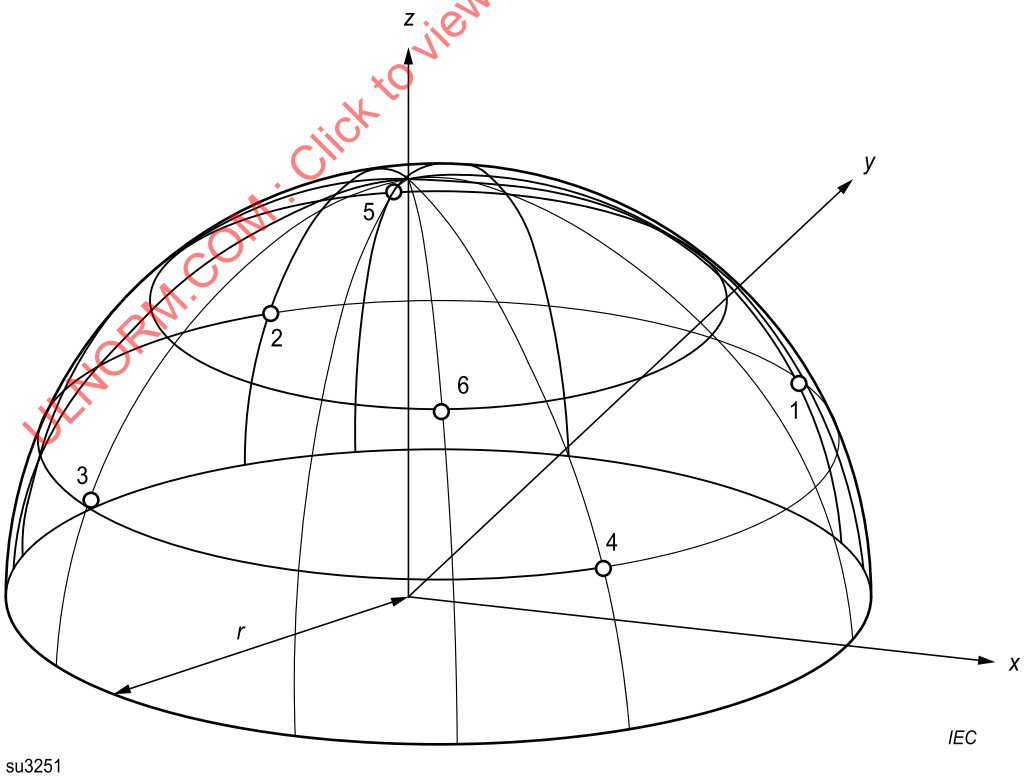


Figure I.101

Microphone positions on the hemisphere (see Table I.101)

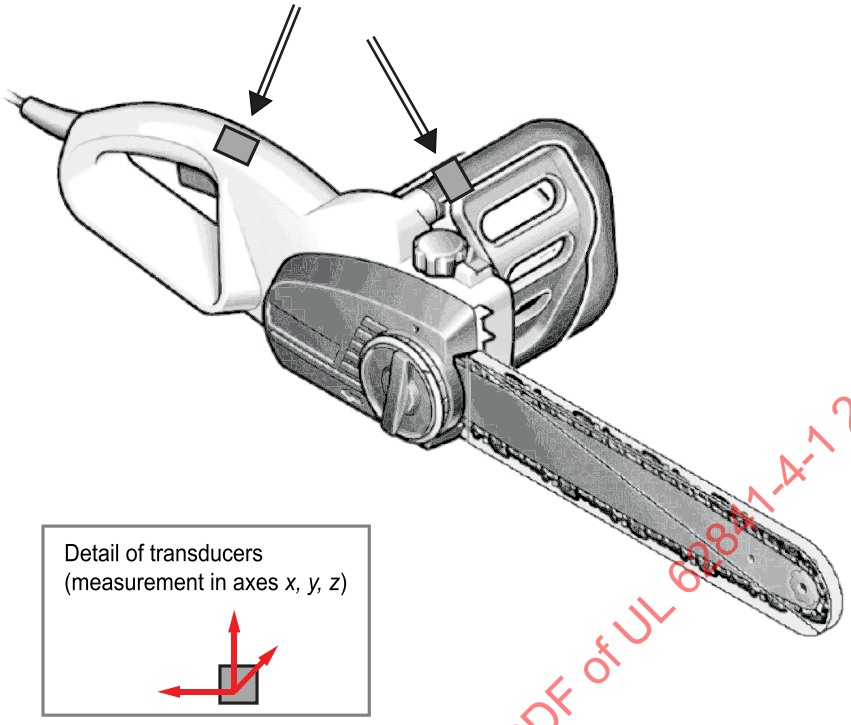


Figure I.102

Positions of transducers for chain saws

Annex K
(normative)

Battery tools and battery packs

All clauses of the main body of this Part 4-1 apply unless otherwise specified in this annex. If a clause is stated in this annex, its requirements replace the requirements of the main body of this Part 4-1 unless otherwise specified.

K.1 Scope

This clause of Part 1 is applicable, except as follows:

Addition:

This standard applies to **chain saws** for cutting wood and designed for use by one person. This standard does not cover **chain saws** designed for use in conjunction with a guide-plate and riving knife or in any other way such as with a support or as a stationary or transportable machine.

This standard does not apply to

– **chain saws** for tree service as defined in ISO 11681-2; or

– pole-mounted pruners.

NOTE 101 Pole-mounted pruners will be covered by a future part of IEC 62841.

NOTE 102 In Europe (EN 62841-4-1), this annex does not apply to **chain saws** equipped with integral batteries and with a **maximum speed** of the **saw chain** exceeding 5 m/s.

The **chain saws** covered by this standard are designed only to be operated with the right hand on the **rear handle** and the left hand on the **front handle**.

K.1DV DR *Modification: Delete the first dashed item in Clause K.1 of the Part 4 (U.S. Only):*

~~**– chain saws for tree service as defined in ISO 11681-2; or**~~

K.8.14.1.101 Safety instructions for chain saws

Replacement of item 1) c):

c) **Hold the chain saw by insulated gripping surfaces only, because the saw chain may contact hidden wiring.** *Saw chains contacting a "live" wire may make exposed metal parts of the chain saw "live" and could give the operator an electric shock.*

K.8.14.1.101DV.1 D2 *Modification: Replace Item e) of Clause 8.14.1.101 with the following:*

e) Do not operate a chain saw, on a ladder, from a rooftop, or any unstable support. Operation of a chain saw in this manner could result in serious personal injury.

K.8.14.1.101DV.2 D2 ***Modification: Add Item nDV) to Clause K.8.14.1.101:***

nDV) Do not operate a chain saw in a tree unless you have been specifically trained to do so. Operation of a chain saw in a tree without proper training could increase the risk of serious personal injury.

K.8.14.1.301 General chain saw safety warnings

a) **Follow all instructions when clearing jammed material, storing or servicing the chain saw. Make sure the switch is off and the battery pack is removed.** *Unexpected actuation of the chain saw while clearing jammed material or servicing may result in serious personal injury.*

NOTE 1 The above warning is used for machines with separable batteries or detachable batteries.

b) **Follow all instructions when clearing jammed material, storing or servicing the chain saw. Make sure the switch is off and the lock-off is in the locked position.** *Unexpected actuation of the chain saw while clearing jammed material or servicing may result in serious personal injury.*

NOTE 2 The above warning is used for machines with **integral batteries**.

K.8.14.2 b) Items 101) and 102) in Part 4-1 are not applicable.

Addition:

301) Instructions for the use and adjustment of any means of support for **separable battery packs** in accordance with K.21.301 and instructions for release or removal.

K.8.14.2 c) *Addition:*

301) For machines with **integral batteries**, instructions on how to disable the machine during maintenance or servicing.

K.8.14.3 If information about the mass or weight of the machine is provided, it shall be the mass of the machine without the **saw chain**, **guide bar**, guide bar cover, oil, **battery** (except for **integral batteries**) and optional accessories.

If information about the mass or weight of the **battery(ies)** is provided, it shall cover the range of specified **batteries**.

K.12.2.1 This subclause of Part 4-2 is not applicable.

K.14 Moisture resistance

This clause of Part 4-1 is not applicable, except as follows:

K.14.301 Battery-powered chain saw moisture resistance

K.14.301.1 The enclosure of the machine shall provide the degree of protection against moisture in accordance with the classification of the machine. This does not apply to **saw chain** lubrication tanks and lubrication systems intended for use with oil as specified in 8.14.2.

Compliance is checked by the appropriate treatment specified in K.14.301.3, with the machine conditions as in K.14.301.2.

K.14.301.2 *The machine is tested with **detachable battery pack(s)** or **separable battery pack(s)** fitted. The machine is switched off during the test.*

The machine is placed in its normal rest position on a perforated turntable. The turntable is then turned continuously at approximately 1 rev/min during the test.

*Electrical components, covers and other **detachable parts** are removed and subjected, if necessary, to the relevant treatment with the main part. Movable covers that are non-**detachable parts** and are not self-restoring are placed in the most unfavourable position.*

NOTE Examples of self-restoring covers include those that are spring loaded or close by gravity.

***Batteries** with a classification greater than IPX0 are tested separately according to their rating.*

K.14.301.3 *Machines other than IPX0 are subjected to tests of IEC 60529 as follows:*

– IPX1 machines are subjected to the test described in 14.2.1;

– IPX2 machines are subjected to the test described in 14.2.2;

– IPX3 machines are subjected to the test described in 14.2.3;

– IPX4 machines are subjected to the test described in 14.2.4;

– IPX5 machines are subjected to the test described in 14.2.5;

– IPX6 machines are subjected to the test described in 14.2.6;

– IPX7 machines are subjected to the test described in 14.2.7. For this test, the machine is immersed in water containing approximately 1,0 % NaCl.

*Immediately after the appropriate treatment, the machine shall show that there is no trace of water on insulation which could result in a reduction of **creepage distances** and **clearances** which impairs compliance with K.28.1.*

K.17.2 This subclause of Part 4-1 is not applicable.

K.18.3 This subclause of Part 4-1 is not applicable.

K.18.5 This subclause of Part 4-1 is not applicable.

K.19.107.4 *Addition:*

The weight of different optional **batteries** shall be taken into consideration when conducting the test in order to identify the worst case.

K.19.111 *Replacement:*

Chain saws shall be in longitudinal balance.

Compliance is checked by the following test.

*The **chain saw** shall be fitted with the most unfavourable combination of **guide bar**, **saw chain** and **detachable battery pack** as specified in 8.14.2 and K.8.14.2. If the **chain saw** is supplied by means of a **separable battery pack**, the cord shall be removed at its point of exit from the **chain saw** or, if supplied*

*with a cord guard or adapter, at its point of exit from the cord guard or adapter. The lubrication tank shall be half full. The **spiked bumper**, if any, shall be fitted. The **guide bar** cover shall not be fitted.*

*The **chain saw** shall be supported on the **front handle**, positioned so that the **guide bar** plane is vertical. This support shall produce the lowest possible friction to allow **chain saw** rotation. A segment of a suitable size of ball bearing may be used to achieve the low friction. See Figure 109.*

*The angle α between the centreline of the **guide bar** and the horizontal plane as shown in Figure 109 shall not exceed ± 30°.*

K.20.1 This subclause of Part 1 is applicable, except as follows:

Addition:

*Damage to the **guide bar**, **saw chain** and **chain catcher** are ignored.*

*There shall be no leakage of lubrication through cracks in lubrication tanks and tank caps while the **chain saw** is being held in each of the six orthogonal directions for 30 s. Seepage through ventilation systems is not considered a failure.*

K.20.3.1 The **chain saw**, fully assembled in accordance with 8.14.2 and with the lubrication tank empty, *with any **detachable battery pack** attached is dropped three times in total on a concrete surface from a height of 1 m. For these three drops, the sample is tested in the three most unfavourable positions the lowest point of the tool being 1 m above the concrete surface. Secondary impacts shall be avoided. For the test, separable **accessories** are not mounted.*

NOTE A method for avoiding secondary impacts is tethering.

*For battery machines with **detachable battery packs**, the test is repeated three more times without the **battery** pack attached to the machine. New samples may be used for each series of three drops. For the test, separable **accessories** are not mounted.*

*In addition for **detachable battery packs** or **separable battery packs**, the test is repeated three more times on the **battery** packs separately.*

*If **attachments** are provided as specified and mounted in accordance with 8.14.2, the test is repeated with each **attachment** or combination of **attachments** mounted to a separate machine sample with a **detachable battery pack** or **separable battery pack** installed.*

After the test, the lubrication tank is filled to the maximum level in accordance with 8.14.2.

K.21.18 *Addition:*

NOTE In Europe (EN 62841-4-1), the following additional subclause applies:

K.21.18.Z101 Isolation and disabling device

Machines with an **integral battery** shall either be equipped

– with an isolation device to prevent the risk of injury from mechanical hazards during servicing or **user maintenance**; or

– with a disabling device that prevents unintentional starting of the machine.

An isolation device shall

– provide disconnection of all poles of the **battery** from the serviceable region of the machine;

– be equipped with an unambiguous indication of the state of the disconnection device which corresponds to each position of its manual control (actuator);

– be provided with protection against accidental reconnection.

NOTE 1 Examples of methods to achieve this disconnection include removable jumpers, **integral batteries** that can be disconnected for servicing or **user maintenance**, or an electromechanical **power switch** with a direct mechanical link between the actuator and the contact.

NOTE 2 The risk of accidental reconnection for a **power switch** is addressed by the requirement of 21.18.102. The other examples in NOTE 1 achieve this by the necessary actions for reconnection.

A disabling device may be achieved by any of the following:

– a self-restoring or non-self-restoring lock-off device where two separate and dissimilar actions are necessary before the motor is switched on (e.g. a **power switch** which has to be pushed in before it can be moved laterally to close the contacts to start the motor). It shall not be possible to achieve these two actions with a single grasping motion or a straight line motion;

– a removable disabling device provided with the machine where it shall not be possible for the machine to be operated when either applied or removed.

Compliance is checked by inspection and by manual test.

K.21.301 **Separable battery packs** that are intended to be supported on the body of an operator in accordance with K.8.14.2 b) 301) shall be provided with a means of support or attachment.

This requirement may be fulfilled by providing a shoulder harness, belt harness or other means of support or attachment.

Any shoulder or belt harness shall be adjustable to the size of the operator and its operation shall be in accordance with K.8.14.2 b) 301).

Shoulder or belt harnesses shall be:

– designed in a way for easy removal; or

– equipped with a quick release mechanism

that ensures that the **separable battery pack(s)** can be removed or released quickly from the operator.

The quick release mechanism shall be positioned either at the connection between the **separable battery pack(s)** and harness or between the harness and operator. The quick release mechanism shall only allow separation by deliberate action of the operator. The quick release mechanism shall be designed to open while under the weight of the **separable battery pack(s)**. It shall require the use of only one hand and have no more than two release points.

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

A double shoulder harness is considered to be designed in a way for easy removal, if the left and right shoulder straps are not connected to each other in front of the operator's body. If straps to connect between the left and right shoulder straps are provided, it is also considered to be designed in a way for easy removal when the straps connecting between the left and right shoulder straps can be released under the load of the **separable battery pack(s)** by using one hand and have no more than two release points.

The release mechanism shall only allow separation by deliberate action of the operator.

*Compliance is checked by inspection and by functional test using the heaviest **separable battery pack(s)** identified in K.8.14.2 e).*

K.23.1.10.1 This subclause of Part 4-1 is not applicable.

K.23.1.10.2 This subclause of Part 4-1 is not applicable.

K.23.301 Auxiliary switches, if any, associated with the **chain brake** are considered to be switches other than **power switches**. They shall, however, meet the requirements of K.23.1.10 and K.23.1.201.

Compliance is checked by the relevant tests.

K.24 Supply connection and external flexible cords

This clause of Part 4-1 is not applicable, except as follows:

K.24.301 For **battery** machines with **separable battery packs**, the external flexible cable or cord shall have anchorages such that the conductors are relieved from strain, including twisting, where they are connected within the machine, and protected from abrasion.

Compliance is checked by inspection.

K.24.302 If a machine is supplied with a **separable battery pack**, it shall be possible for the operator to disconnect the **separable battery pack** from the machine without the use of a tool during **normal use**.

Compliance is checked by inspection.

Annex L
(normative)

Battery tools and battery packs provided with mains connection or non-isolated sources

All clauses of the main body of this Part 4-1 apply unless otherwise specified in this annex. If a clause is stated in this annex, its requirements replace the requirements of the main body of this Part 4-1 unless otherwise specified.

L.1 Scope

This clause of Part 1 is applicable, except as follows:

Addition:

This standard applies to **chain saws** for cutting wood and designed for use by one person. This standard does not cover **chain saws** designed for use in conjunction with a guide-plate and riving knife or in any other way such as with a support or as a stationary or transportable machine.

This standard does not apply to

– **chain saws** for tree service as defined in ISO 11681-2; or

– pole-mounted pruners.

NOTE 101 Pole-mounted pruners will be covered by a future part of IEC 62841.

NOTE 102 In Europe (EN 62841-4-1), this annex does not apply to **chain saws** equipped with **integral batteries** and with a **maximum speed** of the **saw chain** exceeding 5 m/s.

The **chain saws** covered by this standard are designed only to be operated with the right hand on the **rear handle** and the left hand on the **front handle**.

L.8.14.1.101 Safety instructions for chain saws

Replacement of item 1) c):

c) **Hold the chain saw by insulated gripping surfaces only, because the saw chain may contact hidden wiring.** *Saw chains contacting a "live" wire may make exposed metal parts of the chain saw "live" and could give the operator an electric shock.*

L.8.14.1.301 General chain saw safety warnings

a) **Follow all instructions when clearing jammed material, storing or servicing the chain saw. Make sure the switch is off and the battery pack is removed.** *Unexpected actuation of the chain saw while clearing jammed material or servicing may result in serious personal injury.*

NOTE 1 The above warning is used for machines with separable batteries or detachable batteries.

b) **Follow all instructions when clearing jammed material, storing or servicing the chain saw. Make sure the switch is off and the lock-off is in the locked position.** *Unexpected actuation of the chain saw while clearing jammed material or servicing may result in serious personal injury.*

NOTE 2 The above warning is used for machines with integral batteries.

L.8.14.2 b) *Addition:*

301) Instructions for the use and adjustment of any means of support for **separable battery packs** in accordance with L.21.301 and instructions for release or removal.

L.8.14.3 If information about the mass or weight of the machine is provided, it shall be the mass of the machine without the **saw chain**, **guide bar**, guide bar cover, oil, **battery** (except for **integral batteries**) and optional accessories.

L.19.107.4 The weight of different optional **batteries**, if applicable, shall be taken into consideration when conducting the test in order to identify the worst case.

L.19.111 *Replacement:*

Chain saws shall be in longitudinal balance.

Compliance is checked by the following test.

*The **chain saw** shall be fitted with the most unfavourable combination of **guide bar**, **saw chain** and **detachable battery pack** as specified in 8.14.2 and L.8.14.2. If the **chain saw** is supplied by means of a **separable battery pack**, the cord shall be removed at its point of exit from the **chain saw** or, if supplied with a cord guard or adapter, at its point of exit from the cord guard or adapter The lubrication tank shall be half full. The **spiked bumper**, if any, shall be fitted. The **guide bar** cover shall not be fitted.*

*The **chain saw** shall be supported on the **front handle**, positioned so that the **guide bar** plane is vertical. This support shall produce the lowest possible friction to allow **chain saw** rotation. A segment of a suitable size of ball bearing may be used to achieve the low friction. See Figure 109.*

*The angle α between the centreline of the **guide bar** and the horizontal plane as shown in Figure 109 shall not exceed ± 30°.*

L.20.1 This subclause of Part 1 is applicable, except as follows:

Addition:

*Damage to the **guide bar**, **saw chain** and **chain catcher** are ignored.*

*There shall be no leakage of lubrication through cracks in lubrication tanks and tank caps while the **chain saw** is being held in each of the six orthogonal directions for 30 s. Seepage through ventilation systems is not considered a failure.*

L.20.201 *Addition:*

*Following the test, there shall be no leakage of lubrication through cracks in lubrication tanks and tank caps while the **chain saw** is being held in each of the six orthogonal directions for 30 s. Seepage through ventilation systems is not considered a failure.*

L.20.202 *For **chain saws**, L.20.301 applies.*

L.20.301 The **chain saw**, while not directly connected to the mains or to a **non-isolated source**, fully assembled in accordance with 8.14.2 and with the lubrication tank empty, *with any* **detachable battery pack** *attached is dropped three times in total on a concrete surface from a height of 1 m. For these three drops, the sample is tested in the three most unfavourable positions the lowest point of the tool being 1 m above the concrete surface. Secondary impacts shall be avoided. For the test, separable **accessories** are not mounted.*

NOTE A method for avoiding secondary impacts is tethering.

*For battery machines with **detachable battery packs**, the test is repeated three more times without the **battery** pack attached to the machine. New samples may be used for each series of three drops. For the test, separable **accessories** are not mounted.*

*In addition for **detachable battery packs** or **separable battery packs**, the test is repeated three more times on the **battery** packs separately.*

*If **attachments** are provided as specified and mounted in accordance with 8.14.2, the test is repeated with each **attachment** or combination of **attachments** mounted to a separate machine sample with a **detachable battery pack** or **separable battery pack** installed.*

After the test, the lubrication tank is filled to the maximum level in accordance with 8.14.2.

L.21.18 *Addition:*

NOTE In Europe (EN 62841-4-1), the following additional subclause applies:

L.21.18.Z101 Isolation and disabling device

Machines with an **integral battery** shall either be equipped

– with an isolation device to prevent the risk of injury from mechanical hazards during servicing or user **maintenance**; or

– with a disabling device that prevents unintentional starting of the machine.

An isolation device shall

– provide disconnection of all poles of the **battery** from the serviceable region of the machine;

– be equipped with an unambiguous indication of the state of the disconnection device which corresponds to each position of its manual control (actuator);

– be provided with protection against accidental reconnection.

NOTE 1 Examples of methods to achieve this disconnection include removable jumpers, **integral batteries** that can be disconnected for servicing or **user maintenance**, or an electromechanical **power switch** with a direct mechanical link between the actuator and the contact.

NOTE 2 The risk of accidental reconnection for a **power switch** is addressed by the requirement of 21.18.102. The other examples in NOTE 1 achieve this by the necessary actions for reconnection.

A disabling device may be achieved by any of the following:

– a self-restoring or non-self-restoring lock-off device where two separate and dissimilar actions are necessary before the motor is switched on (e.g. a **power switch** which has to be pushed in before it can be moved laterally to close the contacts to start the motor). It shall not be possible to achieve these two actions with a single grasping motion or a straight line motion;

– a removable disabling device provided with the machine where it shall not be possible for the machine to be operated when either applied or removed.

Compliance is checked by inspection and by manual test.

L.21.301 **Separable battery packs** that are intended to be supported on the body of an operator in accordance with L.8.14.2 b) 301) shall be provided with a means of support or attachment.

This requirement may be fulfilled by providing a shoulder harness, belt harness or other means of support or attachment.

Any shoulder or belt harness shall be adjustable to the size of the operator and its operation shall be in accordance with L.8.14.2 b) 301).

Shoulder or belt harnesses shall be:

– designed in a way for easy removal; or

– equipped with a quick release mechanism

that ensures that the **separable battery pack(s)** can be removed or released quickly from the operator.

The quick release mechanism shall be positioned either at the connection between the **separable battery pack(s)** and harness or between the harness and operator. The quick release mechanism shall only allow separation by deliberate action of the operator. The quick release mechanism shall be designed to open while under the weight of the **separable battery pack(s)**. It shall require the use of only one hand and have no more than two release points.

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

A double shoulder harness is considered to be designed in a way for easy removal, if the left and right shoulder straps are not connected to each other in front of the operator's body. If straps to connect between the left and right shoulder straps are provided, it is also considered to be designed in a way for easy removal when the straps connecting between the left and right shoulder straps can be released under the load of the **separable battery pack(s)** by using one hand and have no more than two release points.

The release mechanism shall only allow separation by deliberate action of the operator.

*Compliance is checked by inspection and by functional test using the heaviest **separable battery pack(s)** identified in L.8.14.2 e).*

L.24.1 *Modification:*

This subclause also applies to a flexible cord between a **non-isolated source** and the machine.

L.24.4 *Modification:*

This subclause applies, except a flexible cord provided between a **non-isolated source** and the tool shall not be provided with a plug that can be connected directly to the mains.

L.24.301 If a machine is supplied with a **separable battery pack**, it shall be possible for the operator to disconnect the **separable battery pack** from the machine without the use of a tool during **normal use**.

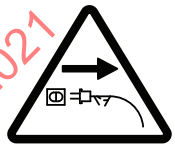
Compliance is checked by inspection.

Annex AA
(normative)

Safety signs

1) Do not expose to rain. (Source: IEC 60745-2-13:2009, Annex AA)

2) Remove plug from the mains immediately if the cable is damaged or cut. (Source: IEC 60745-2-13:2009, Annex AA)



3) Wear eye protection. (Source: IEC 60745-2-13:2009, Annex AA)

4) Alternative for wear eye protection:

5) Wear ear protection. (Source: IEC 60745-2-13:2009, Annex AA)

6) Optional symbol for “wear eye protection and wear ear protection”.

7) Optional symbol for “wear eye and head protection”.

8) Optional symbol for “wear eye, ear and head protection”.

Annex BB
(informative)

Examples of instructions concerning the proper techniques for basic felling, limbing, and cross-cutting

BB.1 Felling a tree

When cross-cutting/bucking and felling operations are being performed by two or more persons at the same time, the felling operations should be separated from the crosscutting/ bucking operation by a distance of at least twice the height of the tree being felled. Trees should not be felled in a manner that would endanger any person, strike any utility line or cause any property damage. If the tree does make contact with any utility line, the company should be notified immediately.

The **chain saw** operator should keep on the uphill side of the terrain as the tree is likely to roll or slide downhill after it is felled.

An escape path should be planned and cleared as necessary before cuts are started. The escape path should extend back and diagonally to the rear of the expected line of fall as illustrated in Figure BB.101.

Before felling is started, consider the natural lean of the tree, the location of larger branches and the wind direction to judge which way the tree will fall.

Remove dirt, stones, loose bark, nails, staples and wire from the tree.

BB.2 Notching undercut

Make the notch 1/3 the diameter of the tree, perpendicular to the direction of falls as illustrated in Figure BB.102. Make the lower horizontal notching cut first. This will help to avoid pinching either the saw chain or the guide bar when the second notch is being made.

BB.3 Felling back cut

Make the felling back cut at least 50 mm higher than the horizontal notching cut as illustrated in Figure BB.102. Keep the felling back cut parallel to the horizontal notching cut. Make the felling back cut so enough wood is left to act as a hinge. The hinge wood keeps the tree from twisting and falling in the wrong direction. Do not cut through the hinge.

As the felling gets close to the hinge, the tree should begin to fall. If there is any chance that the tree may not fall in desired direction or it may rock back and bind the **saw chain**, stop cutting before the felling back cut is complete and use wedges of wood, plastic or aluminium to open the cut and drop the tree along the desired line of fall.

When the tree begins to fall, remove the **chain saw** from the cut, stop the motor, put the **chain saw** down, then use the retreat path planned. Be alert for overhead limbs falling and watch your footing.

BB.4 Limbing a tree

Limbing is removing the branches from a fallen tree. When limbing leave larger lower limbs to support the log off the ground. Remove the small limbs in one cut as illustrated in Figure BB.103. Branches under tension should be cut from the bottom up to avoid binding the chain saw.

BB.5 Cross-cutting/bucking a log

Cross-cutting/bucking is cutting a log into lengths. It is important to make sure your footing is firm and your weight is evenly distributed on both feet. When possible, the log should be raised and supported by the use of limbs, logs or chocks. Follow the simple directions for easy cutting.

When the log is supported along its entire length as illustrated in Figure BB.104, it is cut from the top (overbuck).

When the log is supported on one end, as illustrated in Figure BB.105, cut 1/3 the diameter from the underside (underbuck). Then make the finished cut by overbucking to meet the first cut.

When the log is supported on both ends, as illustrated in Figure BB.106, cut 1/3 the diameter from the top (overbuck). Then make the finished cut by underbucking the lower 2/3 to meet the first cut.

When cross-cutting/bucking on a slope always stand on the uphill side of the log, as illustrated in Figure BB.107. When “cutting through”, to maintain complete control, release the cutting pressure near the end of the cut without relaxing your grip on the **chain saw** handles. Don’t let the chain contact the ground. After completing the cut, wait for the **saw chain** to stop before you move the chain saw. Always stop the motor before moving from tree to tree.

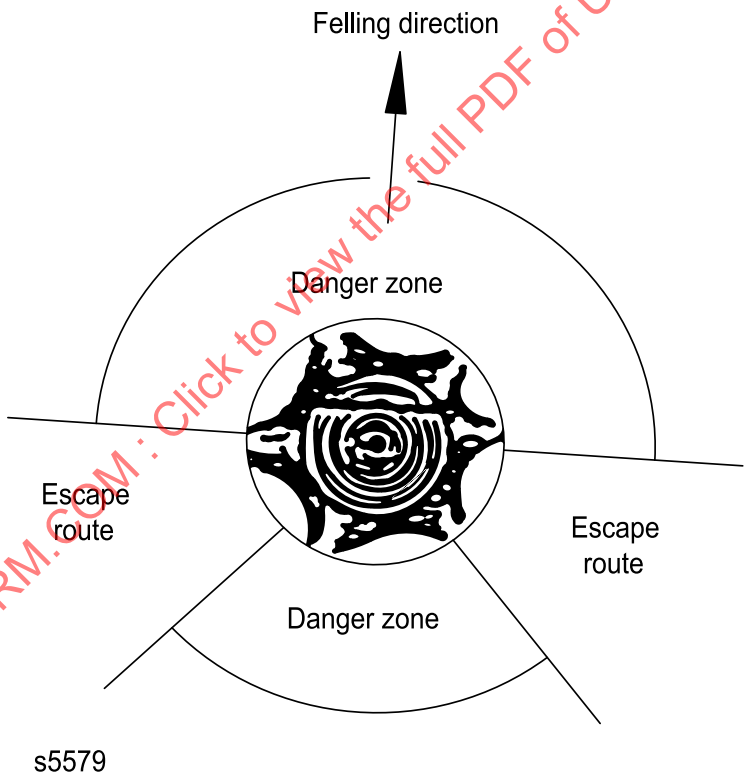


Figure BB.101

Description of felling: escape routes